



مدينتي  
ذكية  
My Smart City

وزارة الشؤون  
البلدية والقروية

Ministry of Municipal & Rural Affairs



# Smart Cities Blueprint Master Document

V 0.98

31-12-2017



وحدة التحول الرقمي  
National Digitization Unit



رؤية  
2030  
المملكة العربية السعودية  
KINGDOM OF SAUDI ARABIA

**INTRODUCTION**

**APPROACH**

**VISION & FUTURE ASPIRATIONS**

**CHALLENGES**

**STRATEGIC GOALS & OBJECTIVES**

**PRIORITY INITIATIVE**

**ROADMAP**

**APPENDICES**





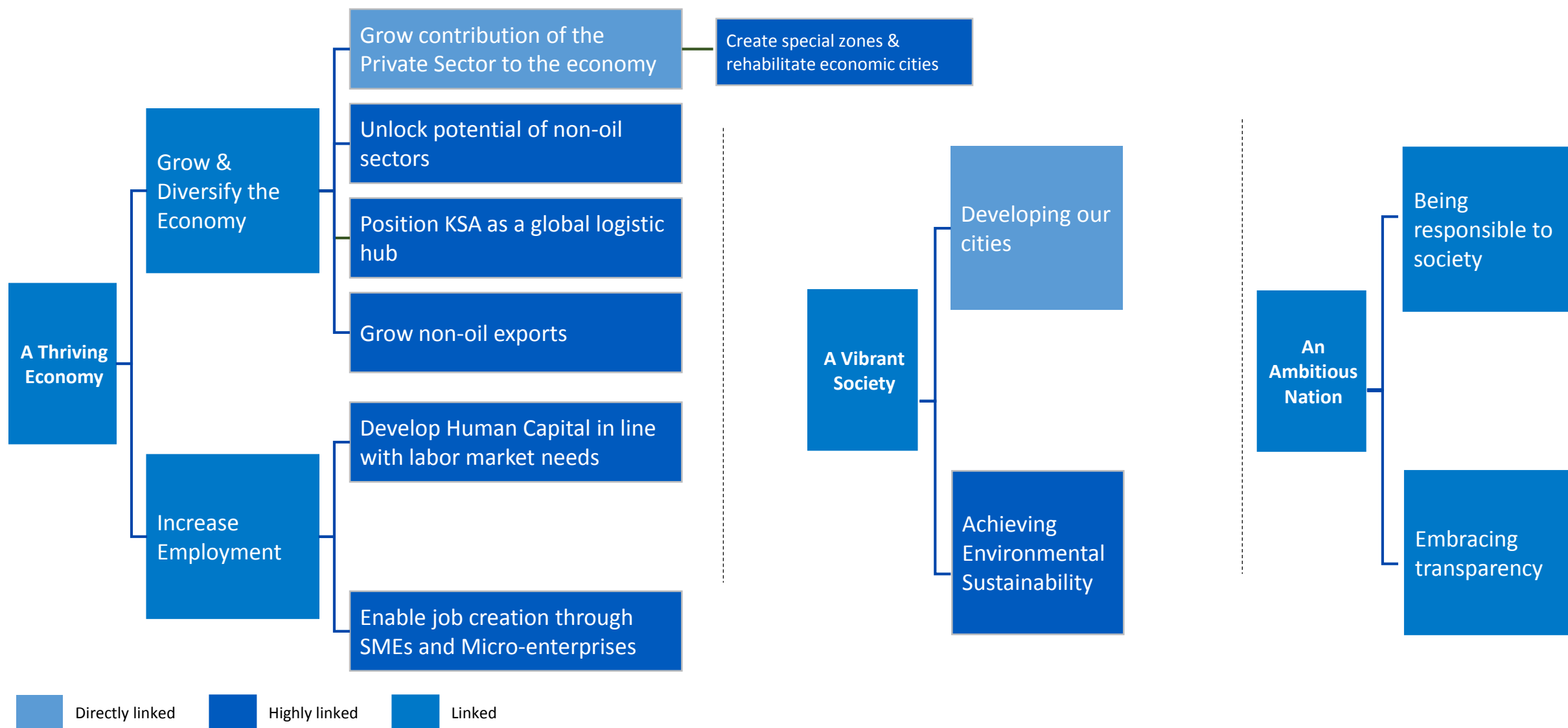
# What Defines a Smart City?

A city can be defined as **'SMART'**  
when **investments in modern (ICT)**  
**infrastructure and services** fuel sustainable  
economic development and a high quality of life, with a  
wise management of city resources.



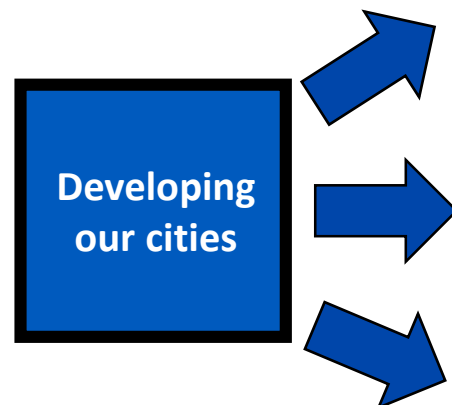


# Elements of Vision 2030 Linked to Smart Cities





# MOMRA's NTP Objectives Linked to Smart Cities



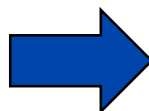
MOMRA – Objective 1: “Continuously enhance quality of life by providing cities with public facilities and infrastructure of high quality and efficiency”

MOMRA – Objective 2: “Sustainable and balanced urban development and improvement of the level of quality of life in cities and regions of the Kingdom”

MOMRA – Objective 7: “Provide a healthy local urban environment”



**Developing  
our cities**



OTHER MINISTRIES ARE TASKED WITH KEY STRATEGIC TARGETS ALIGNED WITH SMART CITIES AND WILL BE ENGAGED DURING EXECUTION, for example:

- MOH have Traffic Safety ( with MOI, MOT contribution)
- MEIM (M of Energy, Industry & Mineral Resources) has IOT, Street Lighting
- MEWA (M of Environment, Water and Agri) has environmental monitoring



# Aim of the Program

## 5 Smart Cities by 2020

Aid & support the transformation of Riyadh, Jeddah, Al-Madina Al Monawara, Makkah, and Dammam into Smart Cities by 2020.



## 16 Smart Cities by 2030

Aid & support the transformation of an additional eleven cities into Smart Cities by 2030



## 3 Cities in Top 100 by 2030

Aid & support three Saudi cities be recognized in the top-ranked 100 cities in the world by 2030.

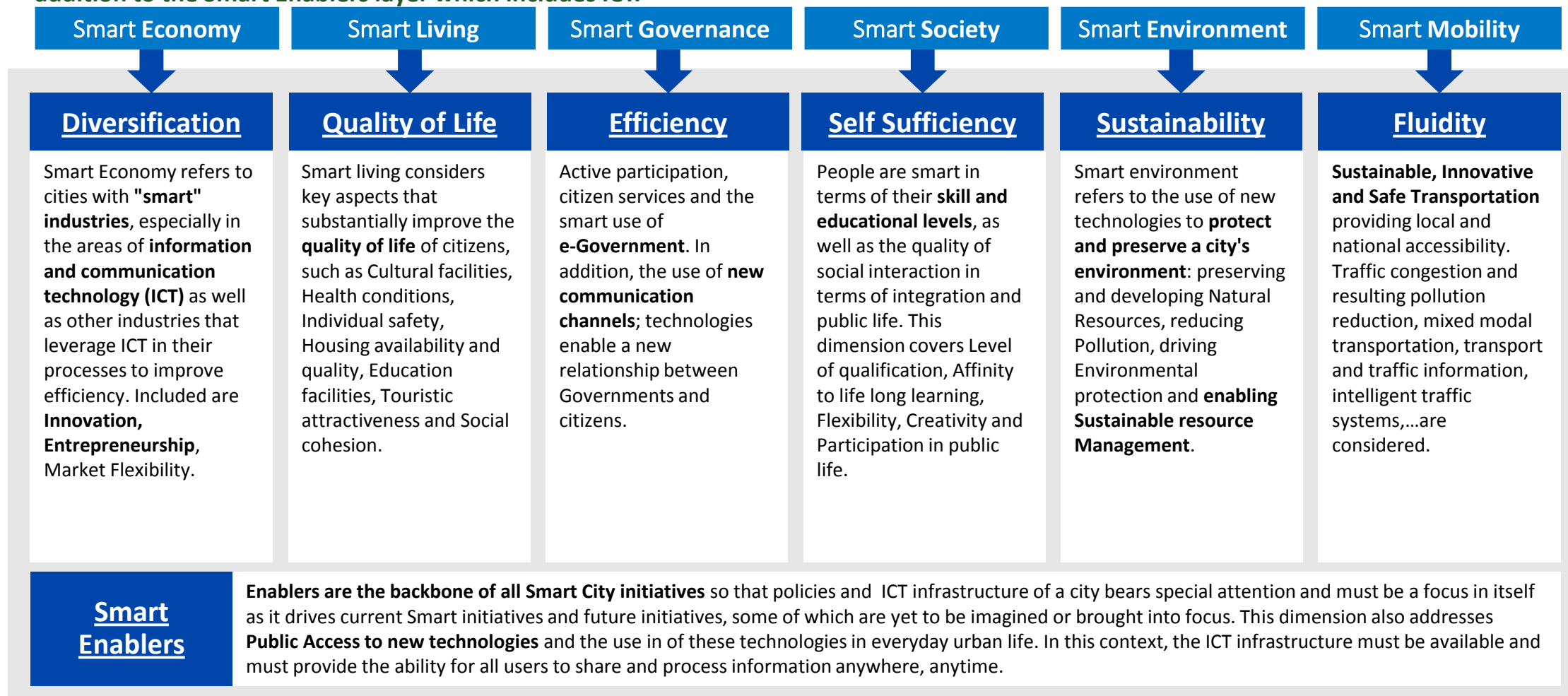


Source: NTP 2020, Strategic Objectives, MOMRA, NXN analysis



# Smart City Framework

Seven Dimensions have been defined to outline a smart city based on: (1) Regional and global competitiveness; (2) Quality of life; (3) Participation of citizens in the governance of cities; (4) Human and social capital; (5) Natural resources; (6) Transport and mobility; in addition to the Smart Enablers layer which includes ICT.





# Potential Smart Cities Impact

From Benchmarks, we can observe the impacts on the Top 5 Cites (which represent 70% of the KSA population) can achieve by 2025 and the OPPORTUNITY COST of inaction

## SAVINGS

# SAR 11 Bn <sup>1</sup>

Average Savings per year, top 5 cities

Assuming a conservative (25%) of a calculated benchmark:  
**\$4.95 Billion Annual Savings for cities of 10 M population, apportioned to top 5 KSA cities.**

**Drivers: Smart City Operations, Energy ,Water, Waste, Building Management**

Conservative estimate as "The Yokohama Smart City Project will deliver 32% reduction of energy. "  
**Smart Cities Council**

"Today cities are the hub of world economic growth, generating an estimated 80 percent of global GDP"<sup>2</sup>  
**World Bank.**

## JOBS CREATED

# 23,000 Jobs <sup>3</sup>

Increase in jobs public and private sector for top 5 cities  
(Context: Saudi Job Seekers Q2 2017 1.07 M)

Through:  
Skills Enhancement  
New Industries  
ICT Investment, FDI  
Impact of Smart networks, grids

Barcelona created 1,800 jobs in one year from Smart City programs (0.1% of population)  
**Barcelona City Council**

(1) Source: ABI Research (Dec 2017) \$4.95B savings per year for cities over 10M population (<http://www.information-age.com/smart-cities-lead-cost-savings-5-trillion-123469863/>); NXN analysis

(2) Source: <http://www.worldbank.org/en/topic/urbandevelopment>

(3) Source: Extrapolation of Barcelona direct job creation from Smart city projects for one year, averaged over the KSA population of top 5 cities(jobs created = 0.1% of population), per year; Conservative estimate as Smart Cities Council indicated smart grids alone may reduce unemployment by 1%; NXN analysis

Population from General Authority for Statistics; <https://www.socinfo.es/contenido/seminarios/0508smartcities7/JuliaLopez.pdf>

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# Smart Cities Blueprint - Process



Source: NXN analysis



# 5-Day Innovation Lab

The key feedback loop has been the five day innovation lab with key city and national stakeholders





# The Innovation Lab Discussed Some of the Important Themes

“R&D is an accelerator”

“Change behavior & habits”

“Government as an orchestrator of public, private, social sectors”

“Returns for the Private Sector”

“Utility co-ordination reduces city costs”

“City data is a gold mine”

“Costs for the private sector”

“Planning for horizon technologies”

“Capacity building”

“Quality of private sector services”

“Support for smaller cities”

“Funding comes from multiple sources”

“Enforcement”



# Blueprint Purpose



Expand the vision



Challenges, future state, measure success



Initiatives, roadmap  
Information the leadership require for decisions



Guide the country's digitization program

## PRINCIPLE OBJECTIVES

Accelerate the  
adoption and  
implementation of  
Smart Cities in KSA

-----

Enhance the  
maturity level of  
the 5 chosen cities  
to excel against  
global standards by  
2020

**33m people**

**17 cities**

**1 future nation**



# The Blueprint Elements



## Future Aspirations

The future aspirations describe how Smart Cities will look like in KSA by the end of the roadmap (2022).

It sets the scene for the to-be state for each of the dimensions of Smart Cities.



## Challenges & Opportunities

Challenges in any and all dimensions of Smart Cities that are hindering the adoption of Smart Cities in KSA.

Identify opportunities informed by best practices and stakeholder input.



## Strategic Goals & Objectives

The strategic goals & objectives for Smart Cities in KSA.

These describe what is to be achieved by supporting the growth and development of Smart City initiatives.



## Initiatives & KPIs

Existing & new initiatives required to remedy the challenges, achieve the future state, and attain the strategic goals & objectives.

KPIs are for the initiatives and the strategic goals & objectives.



## Roadmap

- The roadmap combines the identified priority initiatives with high level prioritization among initiatives
- 2018, 2019, 2020, 2021-2022

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# Our National Digital Ambition is Rooted in our Vision 2030



## Pillars



*Our status as the heart of the Arab and Islamic worlds*



*Our determination to become a global investment powerhouse*



*Our unique strategic location into a global hub connecting 3 continents*

### A Vibrant Society

*With strong roots  
With fulfilling lives  
With strong foundations*



### A Thriving Economy

*Rewarding opportunities  
Investing for the long-term  
Open for business  
Leveraging its unique position*



### An Ambitious Nation

*Effectively governed  
Responsibly enabled*



### Digital Society

Building **digital platforms and enablers** to grow and enhance services for citizens, visitors and businesses

Reinforcing the capacity and security of the **infrastructure** enabling the expansion of digital platforms

### Digital Economy

**Leader of the digital economy**, increasing ICT contribution to GDP and creating new jobs opportunities

Focusing on **technology innovation** and **entrepreneurship** to transform the citizen **experience**

### Digital Nation

**Global leader in e-government**, offering high quality and efficient services, and fostering a digital by default culture

Interactive **online engagement** with citizens and businesses to promote collaboration and participation



# Our Goals to Become a Digital Leader by 2025 are...

#

Current value



Exceeding NTP target



World Economic Forum



Global Innovation Index

## Leading digital economy and ICT sector

### ICT sector contribution



1%

5

### ICT services Exports



0.1%

5

  
Diversified economy  
Disruptive incubator

## 2025 DIGITAL GOALS

## A leading global startup incubator with Arab world focus

### Tech. companies from incubators



110

600

### Expenditure on R&D



0.1%

5

## The region's largest pool of digital talent

### Quality of math and science



4.1

6

Index value

### #Saudi cadres in ICT



0

50K

  
Digital talent  
Digital Government

## A pioneer in digital government

### Government online services



18

Country ranking

7

### e-government maturity level



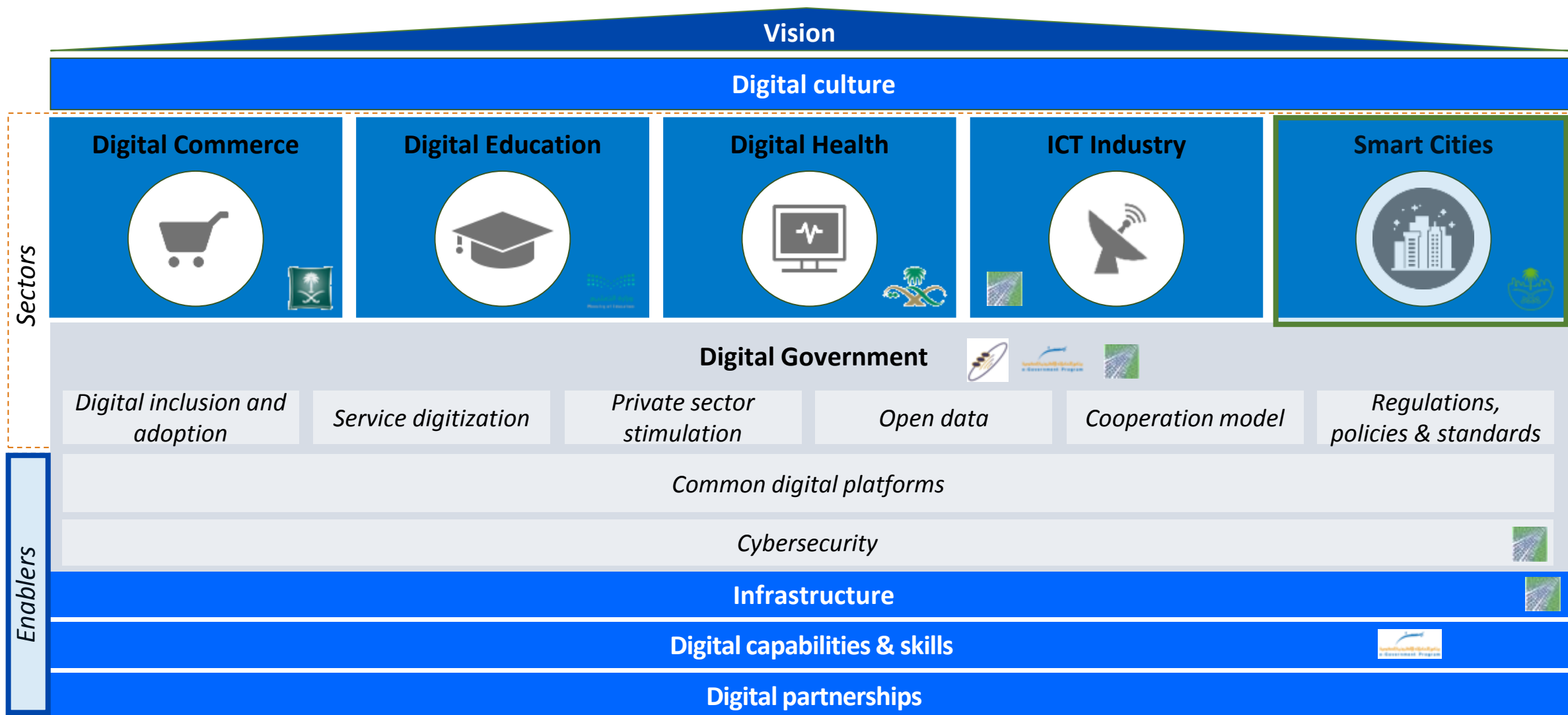
44%

95



# The National Digitization Strategy

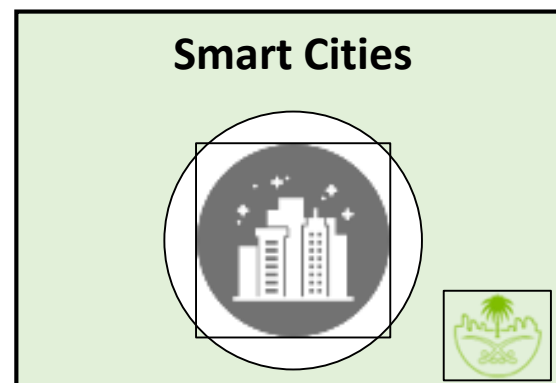
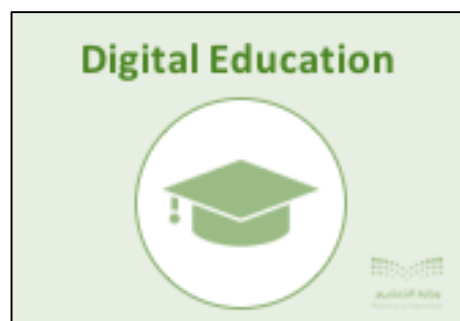
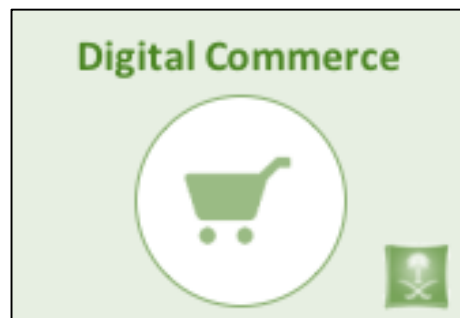
The National Digitization Smart City vision sits within a strategic framework for the digitization of the Kingdom



Source: NDU - The Kingdom's Strategic Digital Vision



# E-Commerce, Education, Health: Aligned with the Smart City Program



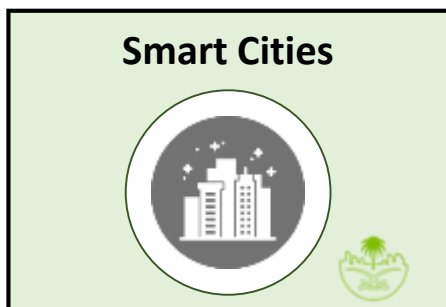
All tracks are powered  
by common enablers



# Digital Sectors: Aligned with the MOMRA Dimensions

The national sectorial digital blueprints for e-Commerce, Digital Education and Digital Health will be interoperable with MOMRA's smart city dimensions

National Digitization Sectorial  
Blueprint Focus



Connected energy efficient environments  
Autonomous, intelligent transport  
Personalized digital communities  
Next generation pilgrimage journey

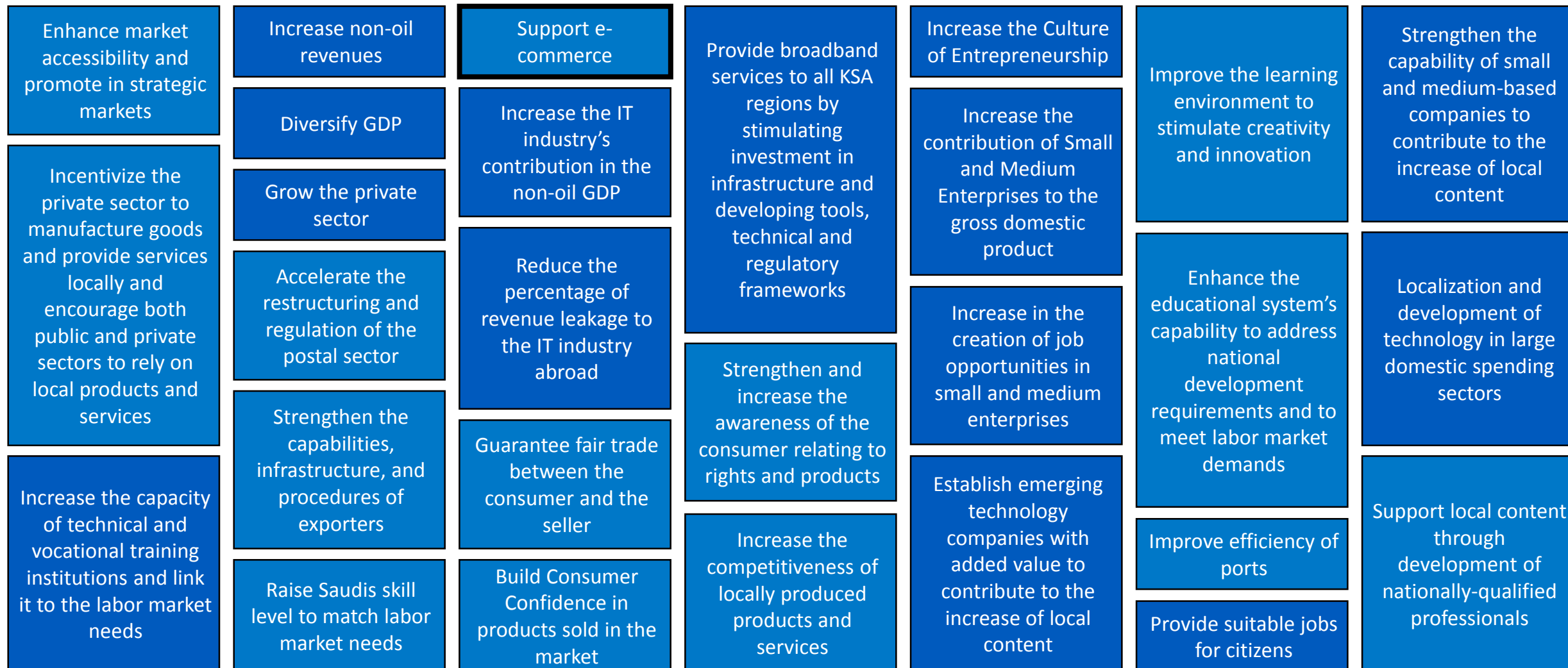
MOMRA Strategy



Focus dimensions contain initiatives aligned with the scope of cities and the national frameworks



# Elements of NTP 2020 Linked to Smart City



 Directly linked    Highly linked    Linked



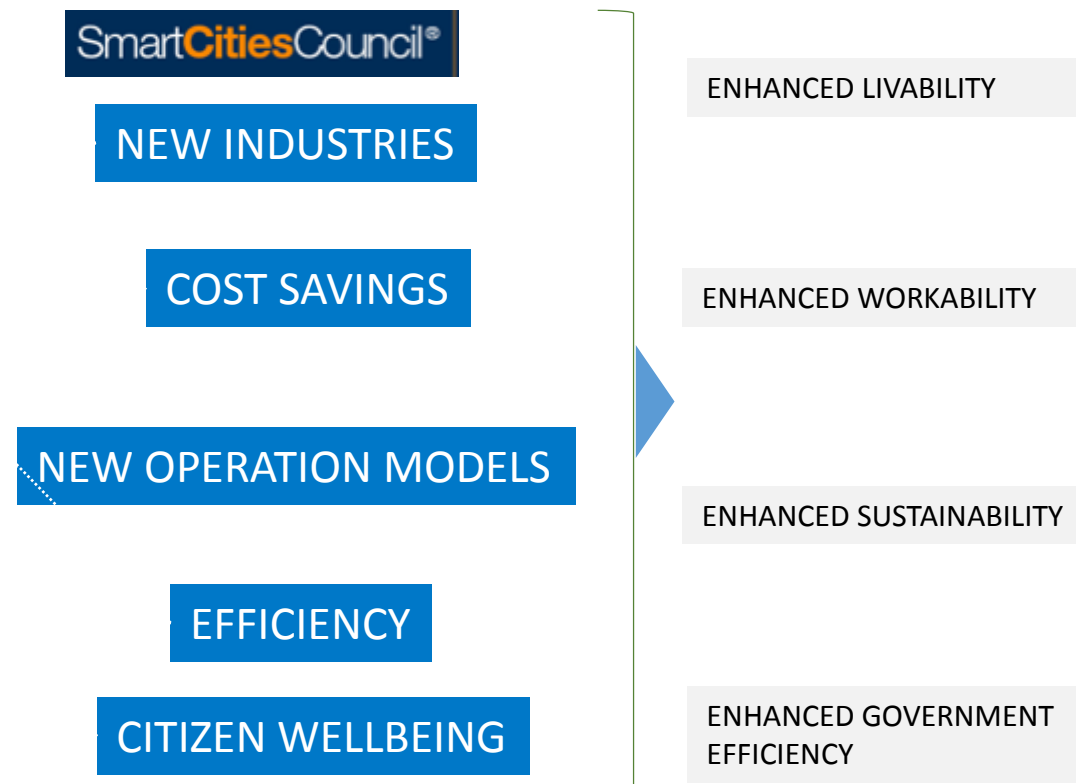
# Benefits of Smart Cities and Vision 2030 Indicators

Benefits of Smart Cities, as defined by the Smart Cities Council, can impact most of the Vision 2030 Indicators

## Vision 2030 Objectives



## Best Practice Benefits of Smart Cities\*

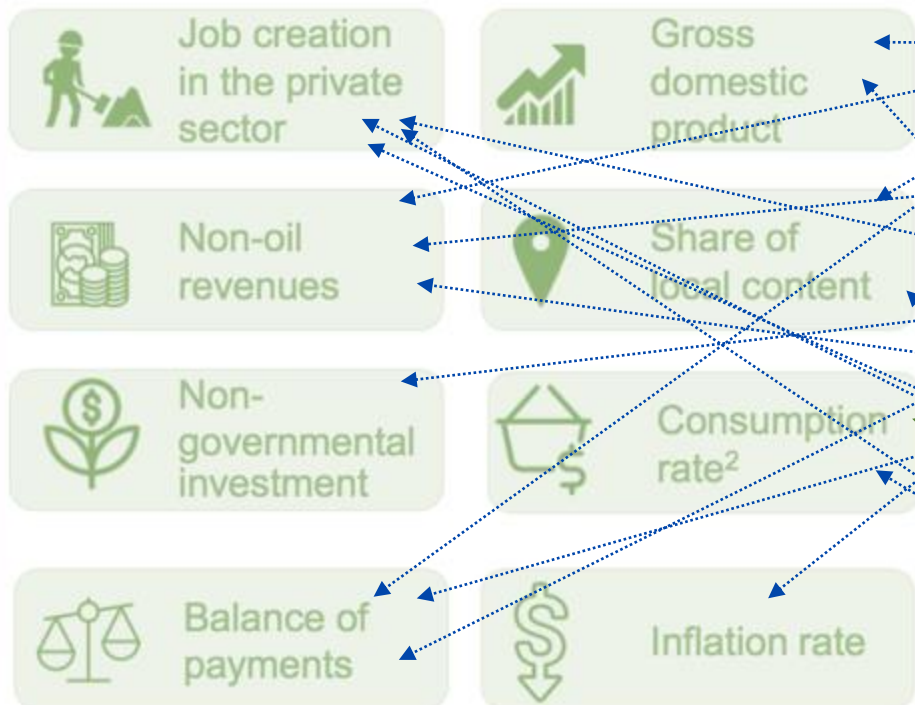




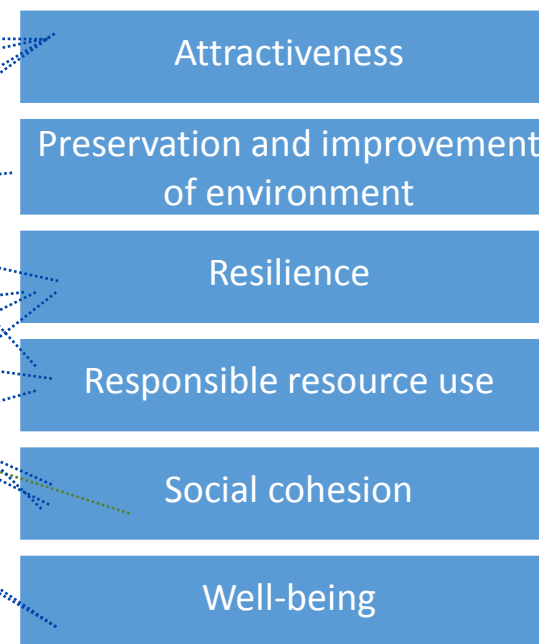
# Likewise for Benefits Defined by ISO and BSI

## Vision 2030 Objectives

Indicators to maximize



## Best Practice Goals of Smart Cities\*



ENHANCED LIVABILITY

ENHANCED WORKABILITY

ENHANCED SUSTAINABILITY

ENHANCED GOVERNMENT EFFICIENCY

ISO 37106: best practices for smart city impact measurement

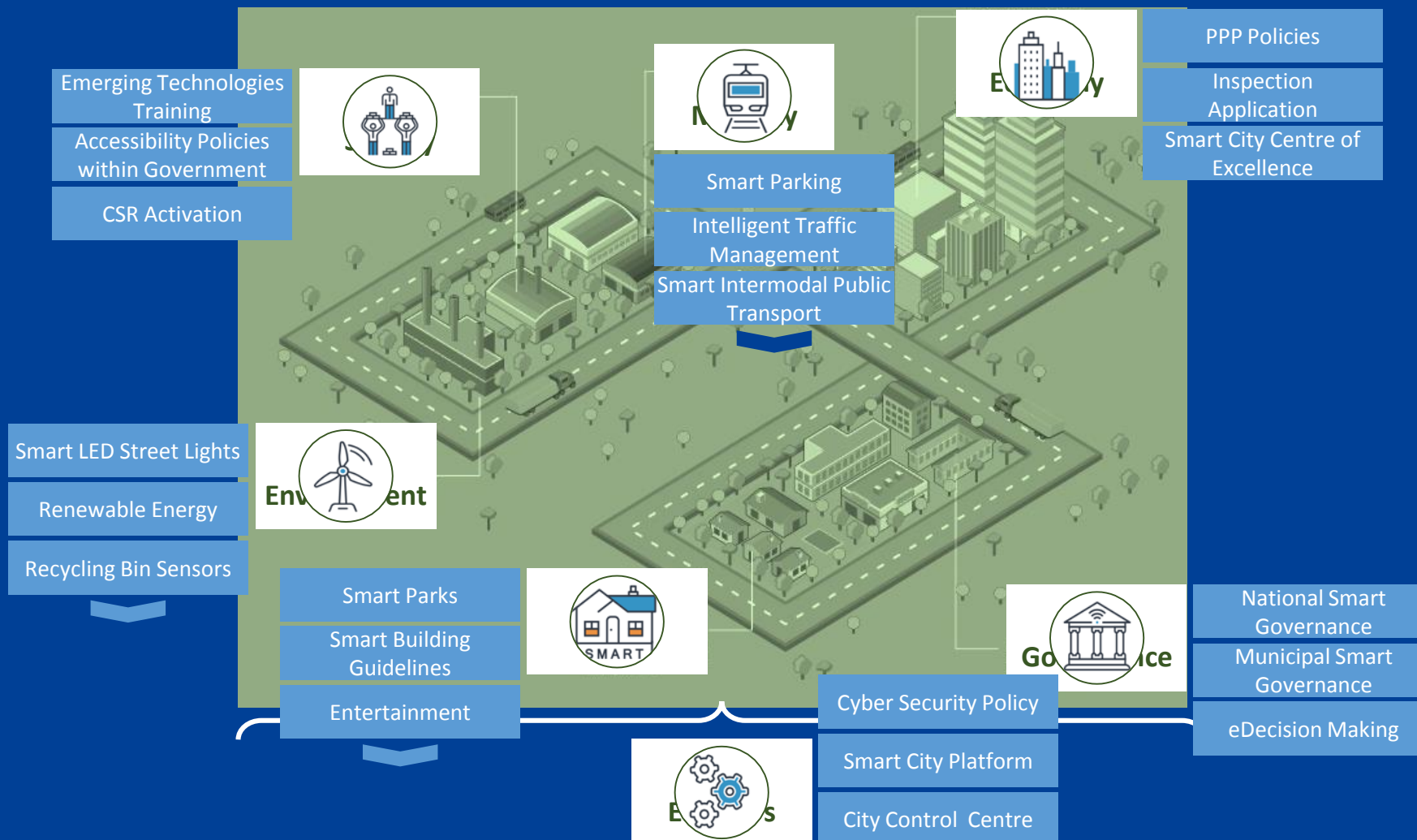


# Smart City Framework & Dimensions

KSA will define Smart City using Dimensions & Initiatives from international benchmarks such as the European Parliament

This framework **aligns Smart City initiatives** with NTP, MOMRA and National Digitization Goals and **addresses key challenges** in Saudi Arabia, including:

- Budget/PPP
- Governance
- Enablers
- Infrastructure
- Skills

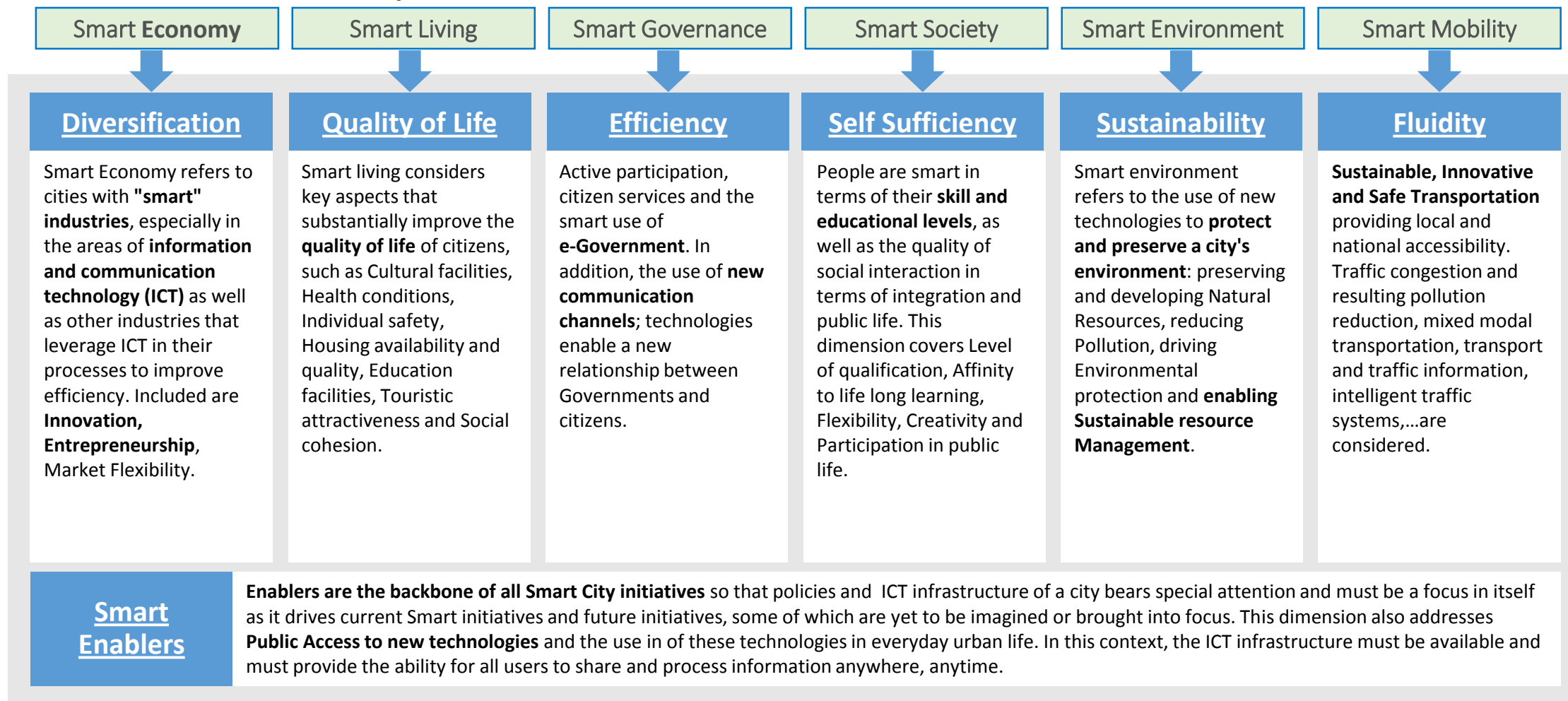


**100+ initiatives & KPIs are categorized and prioritized using this framework**



# Further Defining the Smart City Framework

Seven Dimensions have been defined to outline a smart city based on: (1) Regional and global competitiveness; (2) Quality of life; (3) Participation of citizens in the governance of cities; (4) Human and social capital; (5) Natural resources; (6) Transport and mobility; in addition to the Smart Enablers layer which includes ICT.





# Illustrative User Journey in a Future KSA Smart City

## CITY ENTITY EXECUTIVE



Nawaf

### City Entity Executive

- Age: 37
- Wants his department to offer the most seamless service in the city

### Needs

- His department to offer the most seamless service to citizens

### Challenges

- Allocating resources and investing in services
- He has a set of department KPI's set by Government
- Decreasing budgets and increasing expectations



## Faster and Cheaper services for city governments

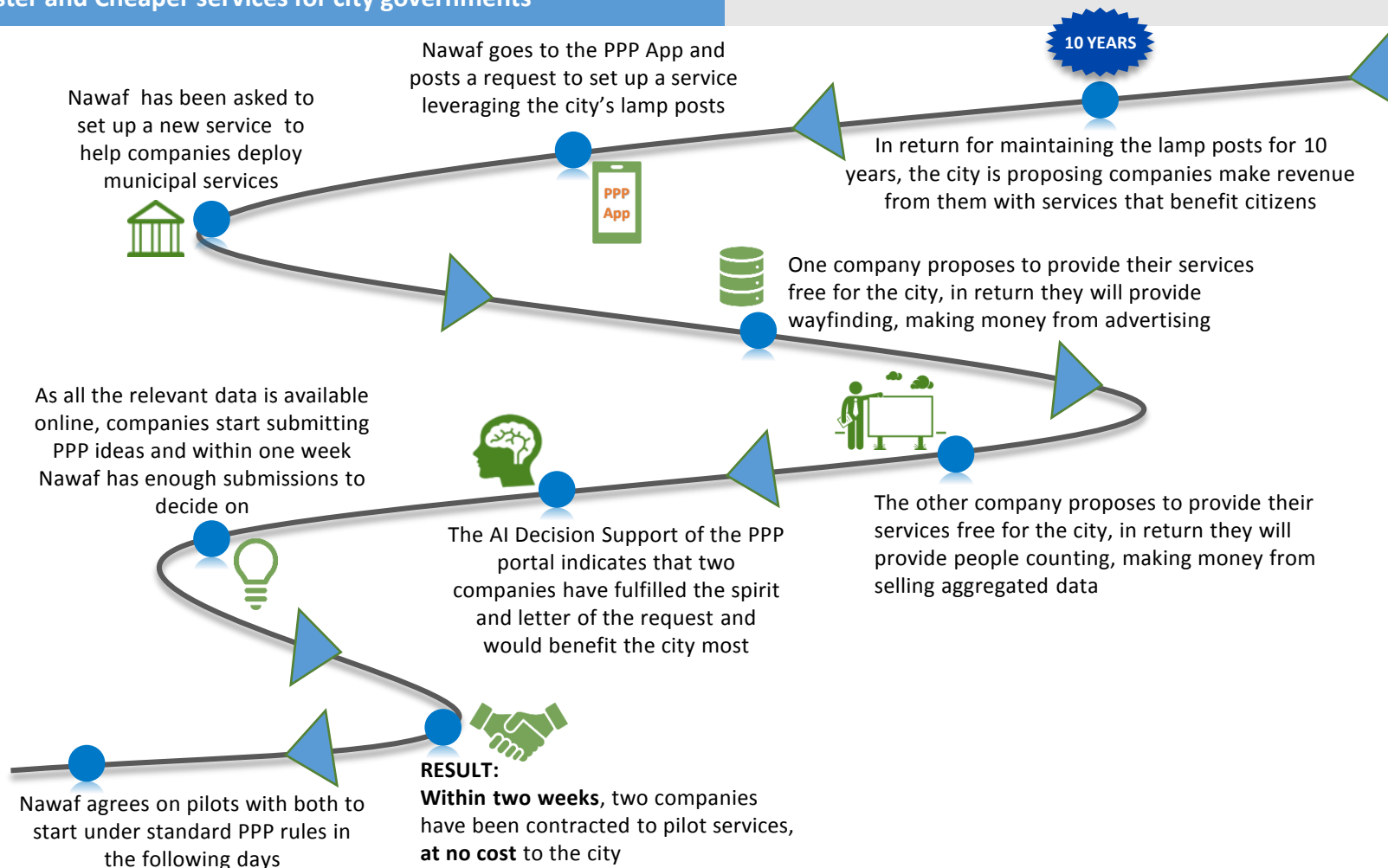
IDEATION



PPP NEGOTIATION

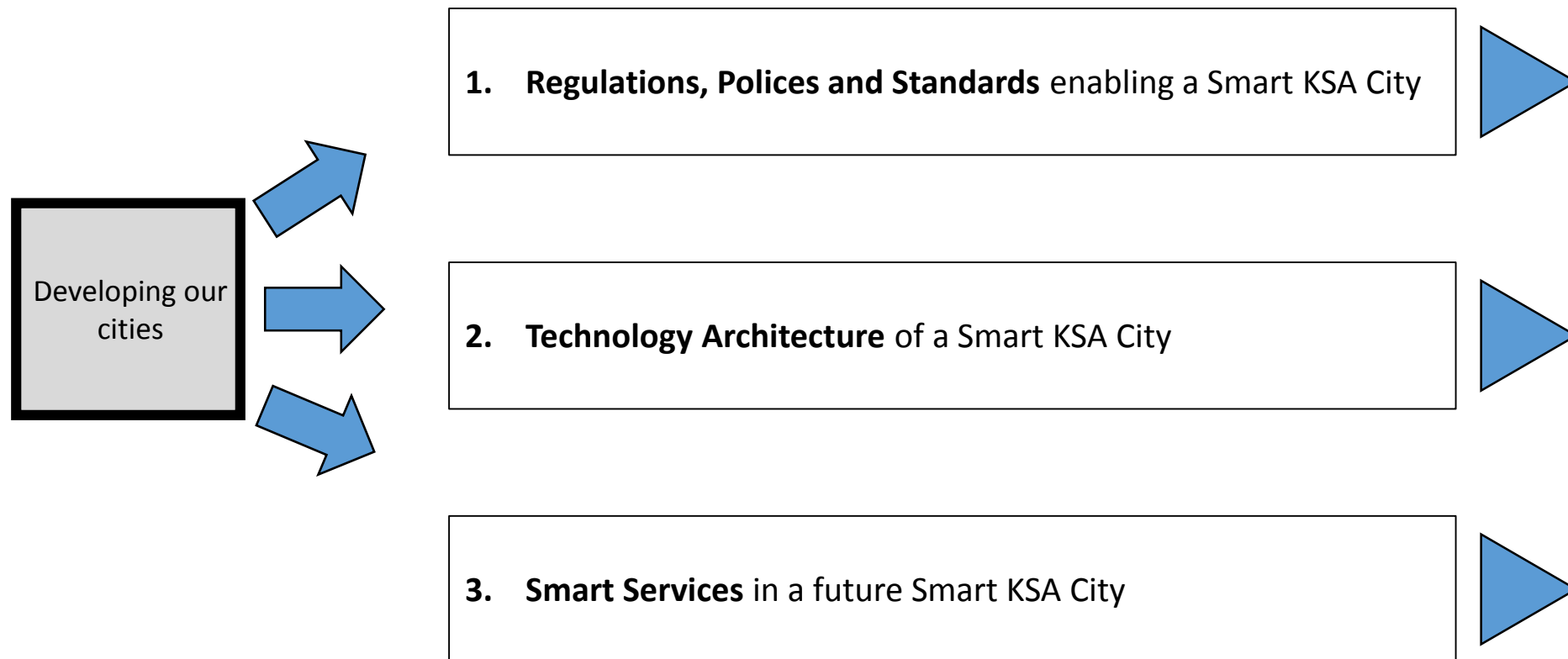


IMPLEMENTATION





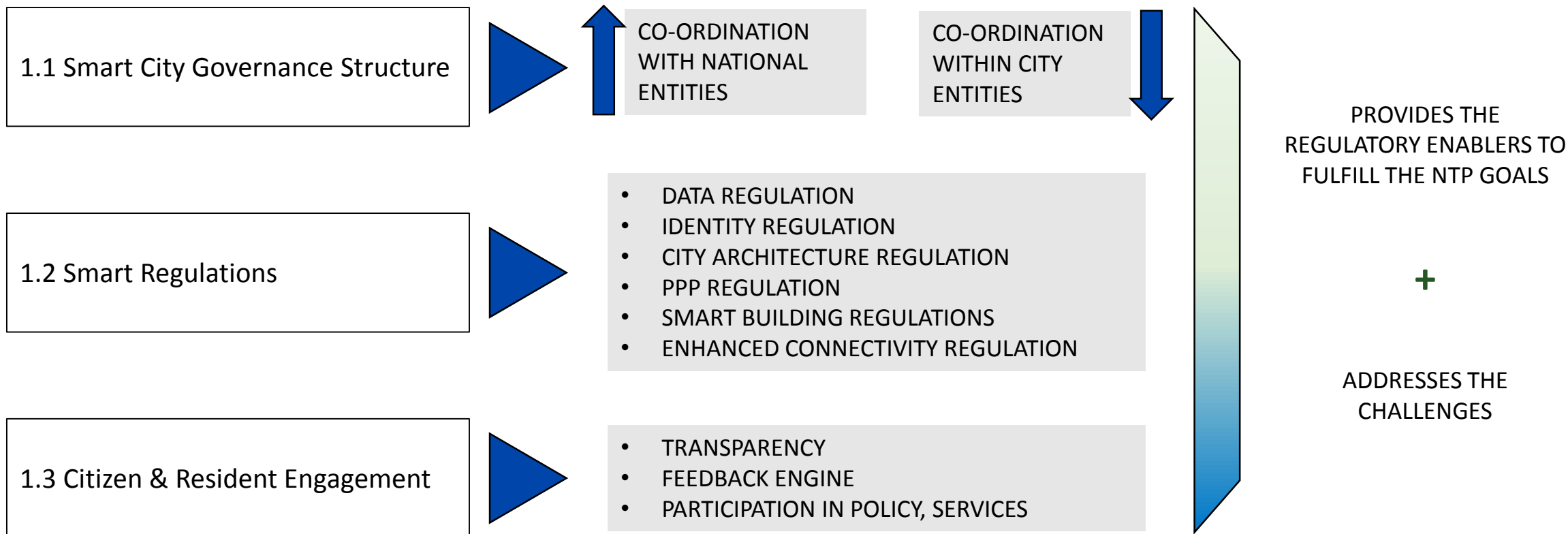
# Vision & Future Aspirations of KSA Smart Cities: Three Axes





# Regulations, Policies and Standards

Areas of governance that a Smart City will need

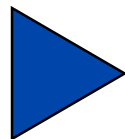




# Benchmarks for Regulations, Policies and Standards

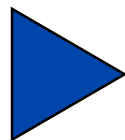
We can glean inspiration from cutting edge initiatives in this space

1. Smart City Governance Structure



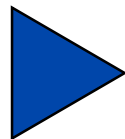
- TOKYO SMART GOVERNANCE

2. Smart Regulations



- DUBAI DATA ESTABLISHMENT

3. Citizen & Resident Engagement



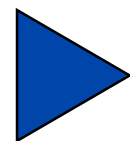
- ESTONIA



# Benchmarks for Regulations, Policies and Standards

The Governance structure will deliver clear responsibilities between Municipalities and Ministries

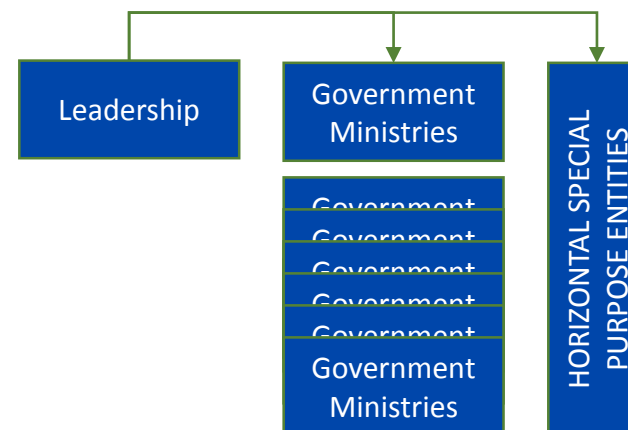
## 1. Smart City Governance Structure



### • TOKYO SMART GOVERNANCE

**Tokyo have integrated an Information governance framework between various primary stakeholders to more effectively manage resilience.**

**Clear roles and responsibilities have been predefined among the public stakeholders: private institutions: residents in order to manage natural disaster.**



### FUTURE KSA IMPLEMENTATION

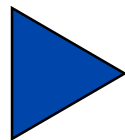
- KSA WILL ALIGN THE WORK OF ITS MINISTRIES WITH CROSS FUNCTIONAL ENTITIES
- KSA WILL TRANSFORM ITS ENTITIES AND MANPOWER TO SUPPORT NEW SMART SERVICES



# Benchmarks for Regulations, Policies and Standards

Smart Regulations enable the use of the latest technologies to their full potential

## 2. Smart Regulations



- DUBAI DATA ESTABLISHMENT

The Dubai Data initiative, led by the Dubai Data Establishment and decreed by the Dubai Data Law of 2015, is the single most comprehensive city-wide data initiative guiding the opening and sharing of city data across the public and private sector.



## FUTURE KSA IMPLEMENTATION

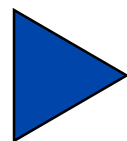
- KSA WILL HAVE A NATIONAL POLICY OF DATA MANAGEMENT
- THE POLICY WILL BE IMPLEMENTED AT ALL MINISTRIES AND MUNICIPALITIES
- DATA WILL NO LONGER HAVE TO BE REQUESTED ON AN AD HOC BASIS BUT WILL BE AVAILABLE FOR AUTHORISED ENTITIES TO PULL DOWN AS NEEDED



# Benchmarks for Regulations, Policies and Standards

Areas of governance that a Smart City will need

## 3. Citizen & Resident Engagement



- ESTONIA

- NASDAQ in Estonia has implemented a POC of a voting system for its Annual General Meetings
- The voting system is analogous to a City requesting feedback on specific policies
- The system uses the government issued digital identity for authentication
- Users can vote from anywhere, securely

### FUTURE KSA IMPLEMENTATION

- KSA WILL HAVE A GRANULAR, SECURE CITIZEN VOTING CAPABILITY THAT WILL ENABLE POLLING FOR ANY TOPIC OR SUB TOPIC
- ENGAGEMENT IN POLICY WILL CREATE A GREATER SENSE OF WELLBEING AND CONTENTMENT IN CITIZENS

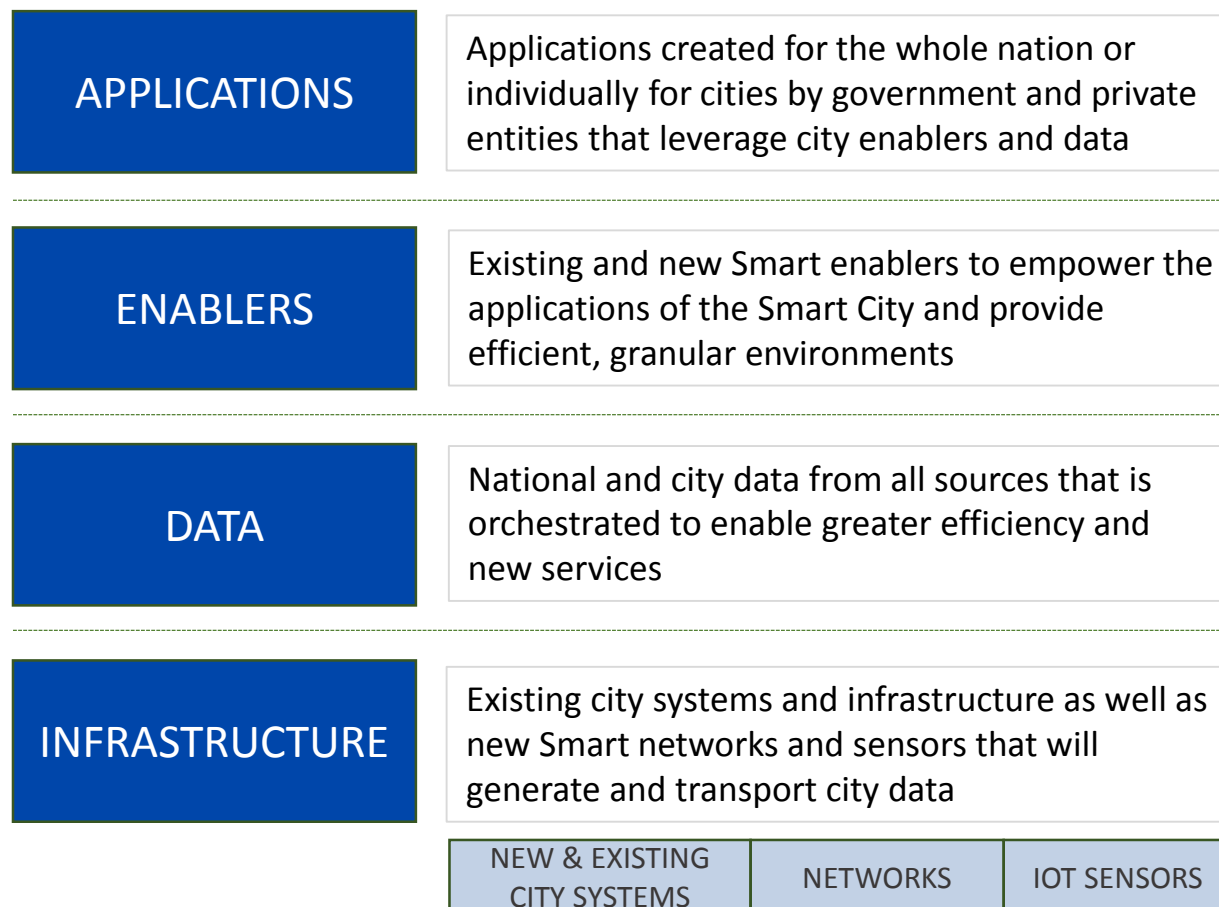
A Key enabler for success of citizen engagement is SECURE DIGITAL IDENTITY



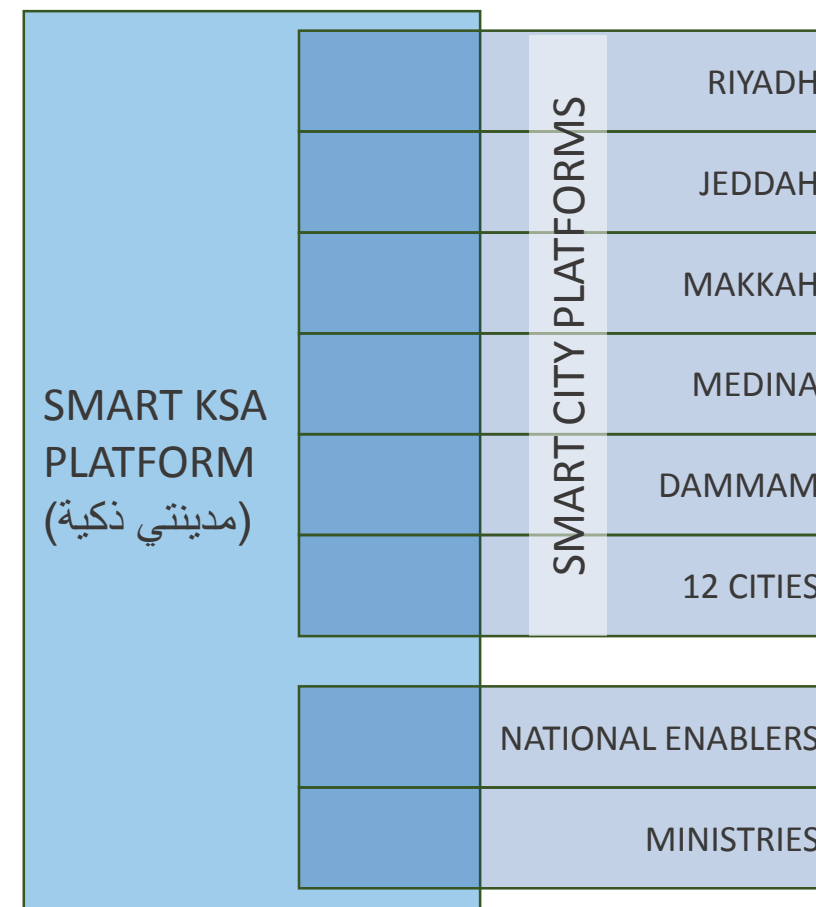
# Technology Architecture of a Smart KSA City



Technical enablers for future Smart cities can be represented as belonging to the following layers:



The nation and each city will have Smart platforms that will interact



Source: NXN analysis, ITU, SDO Smart District Guidelines



# Smart Services in a Future Smart KSA City

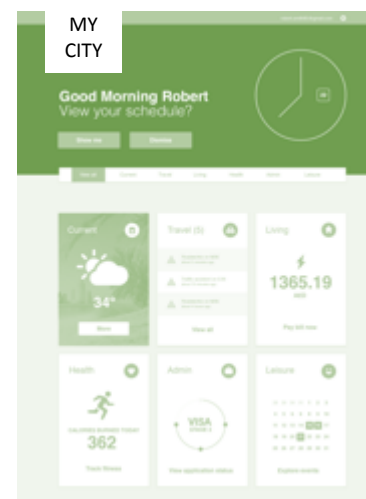
**City Dashboards** The creation of advanced visualizations based on cross-departmental data is facilitated by the analytics tools of the platform.

**3D Model** is one component of a City Dashboard. It provides a visual fly-through experience to consume City Data and gives up-to-date information “painted” onto a 3D model of the city. Users can further click into buildings and other objects to obtain additional data.



**Personal Dashboards** allow residents to monitor their specific government and city data, as well as initiate transactions and set automated actions such as immediate bills payments and license renewals.

The development of personal dashboards is greatly simplified by the availability of cross-departmental data, identity services, and payment services, accessible via the standard APIs provided by the platform.





# Smart Services in a Future Smart KSA City

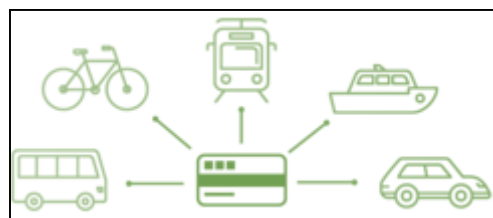
The future cities of KSA will be among the world's most livable cities and communities

## Connected energy efficient environments



- Utilize resources efficiently through **smart metering** and monitoring
- **Reduce waste and consumption**, embracing latest smart technologies

## Autonomous intelligent transportation



- Increase safety of roads by introducing **autonomous driverless cars**
- Reduce road and traffic congestion with **intelligent traffic management** solutions

## Personalized digital communities



- Personalized living spaces **that adapt and respond** to individual preferences
- **Improve sustainability of homes** with future home that is ecologically sustainable



# Shared, Open and Connected Infrastructure

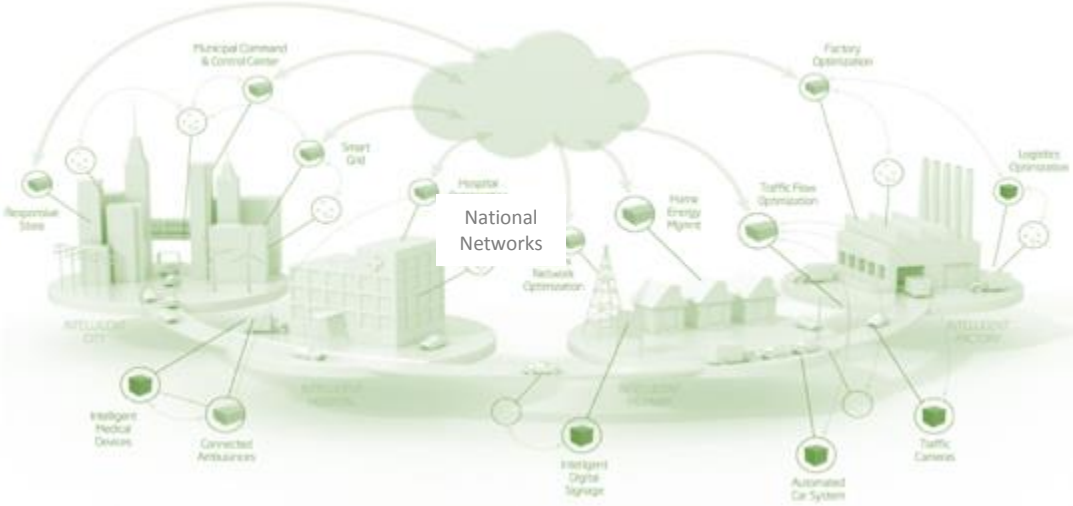
Creating the world's most livable cities requires shared, open and connected infrastructure is required

INTEROPERABILITY

**Interoperability** is key to manage national systems and to open markets to competitive solutions, and is guaranteed through the adoption of international standards ensuring that components from different suppliers and technologies can interact seamlessly.

INFRASTRUCTURE SHARING

**Infrastructure sharing** principles and development of common standards are adopted across all the stakeholders of the nation to ensure that data can flow freely between systems while protecting confidentiality and individual privacy.



| NATIONAL IoT INFRASTRUCTURE     |  | NATIONAL SYSTEMS INFRASTRUCTURE     |  |
|---------------------------------|--|-------------------------------------|--|
| Small sensors, actuators, tags  |  | CCTV, databases, control centers    |  |
| NATIONAL NETWORK INFRASTRUCTURE |  |                                     |  |
| Metro fiber, GSN                |  | Telco networks (3G/4G, xDSL, fiber) |  |

EXAMPLES OF NATIONAL INFRASTRUCTURE



# Illustrative Smart Services in a Future Smart KSA City

## EXPAT MANAGER

## Frictionless Moving

Najib

**Jordanian Ex-pat father Manager  
IT**

- Age: 35

### Needs

- Seamless business processes
- Fast transportation
- Easy life for his family

### Challenges

- Traffic jams and accidents cause many unexpected delays
- Activities for his wife & for the kids to play
- Costs of transportation
- Easier official paperwork



*Najib plans to move to KSA with his family*



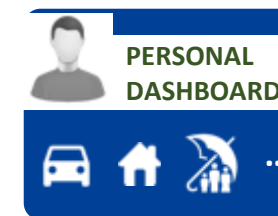
*His company needs him to work in Jeddah*



*He receives his Personal Dashboard with his e-visa and selects to explore Jeddah*



*Najib's digital identity (linked to Saudi visa and Jordanian passport)*



The dashboard displays information about **cars, cost of living and insurance options**. It suggests housing choices based on lifestyle and family (work, schooling, healthcare).

The dashboard displays **apartments** close to golf club and swimming pools because of Najib's **hobbies**.

Najib can view apartments in augmented reality.



# Illustrative Smart Services in a Future Smart KSA City, CONT.

## STARTUP BUSINESS OWNER

### Noora

#### Local Graduate- Setting up online business

- Age: 23
- Lives with her parents and other siblings. She just graduated, is very social, and knows what's missing from fashion
- She was supposed to join her father's company, but has an idea for an online fashion business.

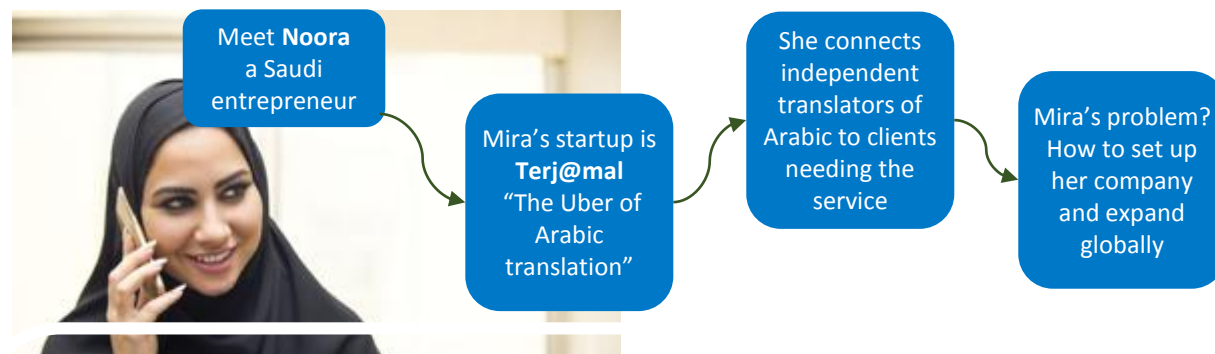
#### Needs

- Being creative and enjoying her interests
- Needs to find colleagues to work with her and create a distinct design at a good price
- Taking part in business related conferences and events

#### Challenges

- Productivity is low during some periods
- Deciding between her career and family – she will get married in a few years in an arranged marriage
- Finding the best place for her business
- Belonging to a community in a design district, but also wanting a recognizable address in a prestigious district

## Frictionless, faster trading for SMEs



Mira hears about “KSA TURBO SME” from a friend and goes along to the APP where she quickly receives...

ONLINE COMPANY SETUP – employee visas online too

PAYMENT VIA DIGITAL OR TRADITIONAL CURRENCY

ARTIFICIAL INTELLIGENCE POWERED MARKET RESEARCH

FUNDING

STAFFING

PRESENCE

MENTORS

RESULTS?

COMPANY SET UP SAME DAY WITH ALL LICENSES AND BANK ACCOUNT – TRADING STARTS THE NEXT DAY

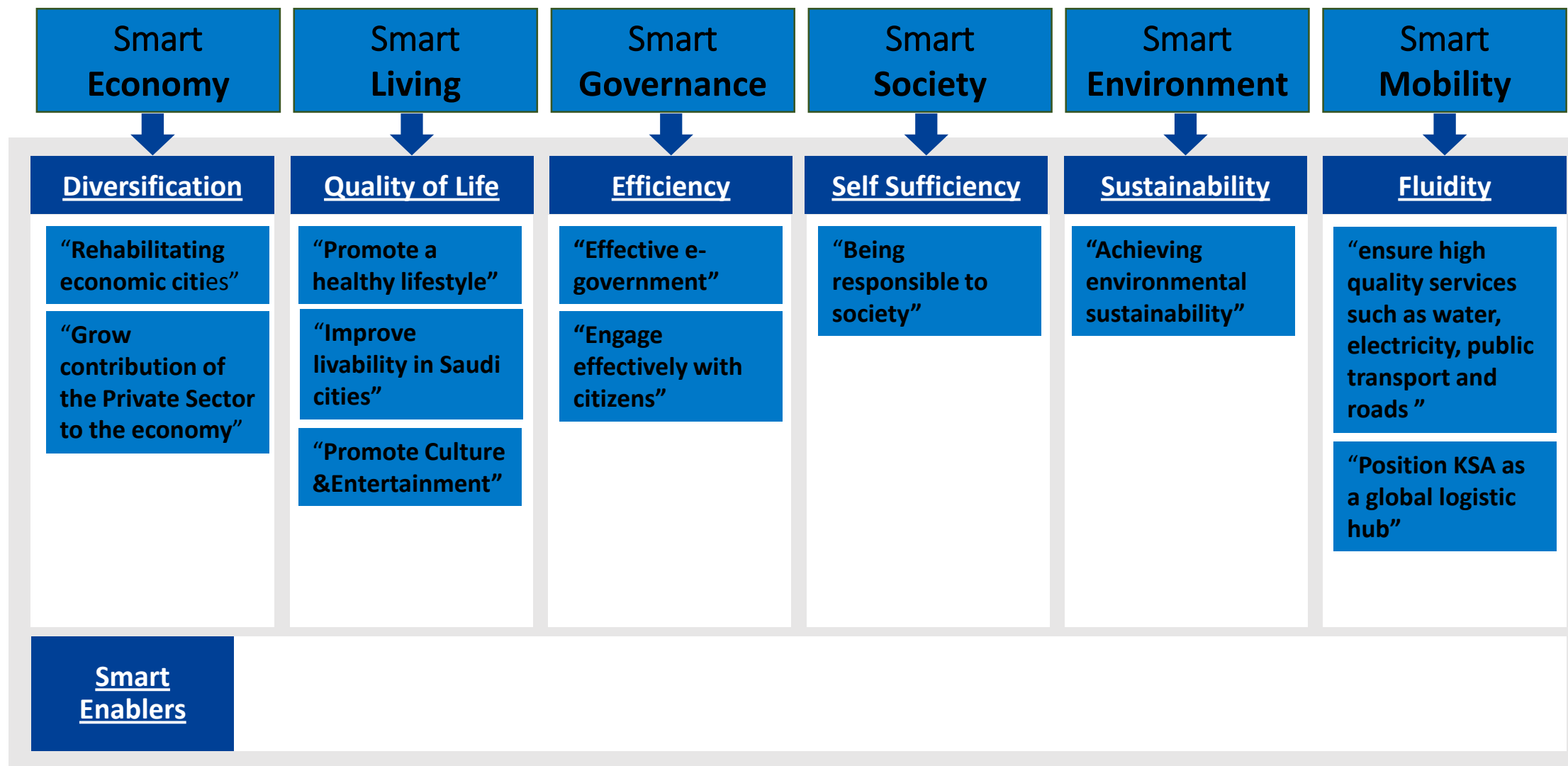


# Sample Smart City Benchmarks

| Smart Economy                                                                                                                                             | Smart Living                                                                                                                                                  | Smart Governance                                                                                                                                  | Smart Society                                                                                                                                             | Smart Environment                                                                                                                                                                                    | Smart Mobility                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The SME Development Survey of 2014 in Singapore found that <b><u>42% of SMEs</u></b> could directly attribute increased revenues to leveraging technology | Building system lifetimes can be <b><u>improved by up to 80%</u></b> , reducing imports, as well as significant reductions in maintenance and operation costs | In 2014, Barcelona measured <b><u>€85M of GDP impact from 22 Smart City programs</u></b> and expects to achieve €832M of economic benefit by 2025 | Government departments in Ireland have <b><u>re-skilled 30,000 people in three years</u></b> , giving them ICT skills and filling vacant ICT jobs         | The Yokohama Smart City Project will deliver <b><u>32% reduction of energy</u></b> .<br>-----<br>Fujishawa Smart Sustainable City can generate up to <b><u>30% of its own power</u></b> requirements | Smart Parking has helped a district of Nice to <b><u>reduce traffic by up to 30%</u></b><br>-----<br>Barcelona's Born District has <b><u>increased parking revenues by \$50 M</u></b> per year |
| Smart Enablers                                                                                                                                            | Barcelona Smart Infrastructure will save 600,000 liters of water per year                                                                                     |                                                                                                                                                   | Dubai's Data Law and Framework has catalogued all city data and categorized it to enable data orchestration and unlock \$2+Bn of economic benefit by 2021 |                                                                                                                                                                                                      |                                                                                                                                                                                                |

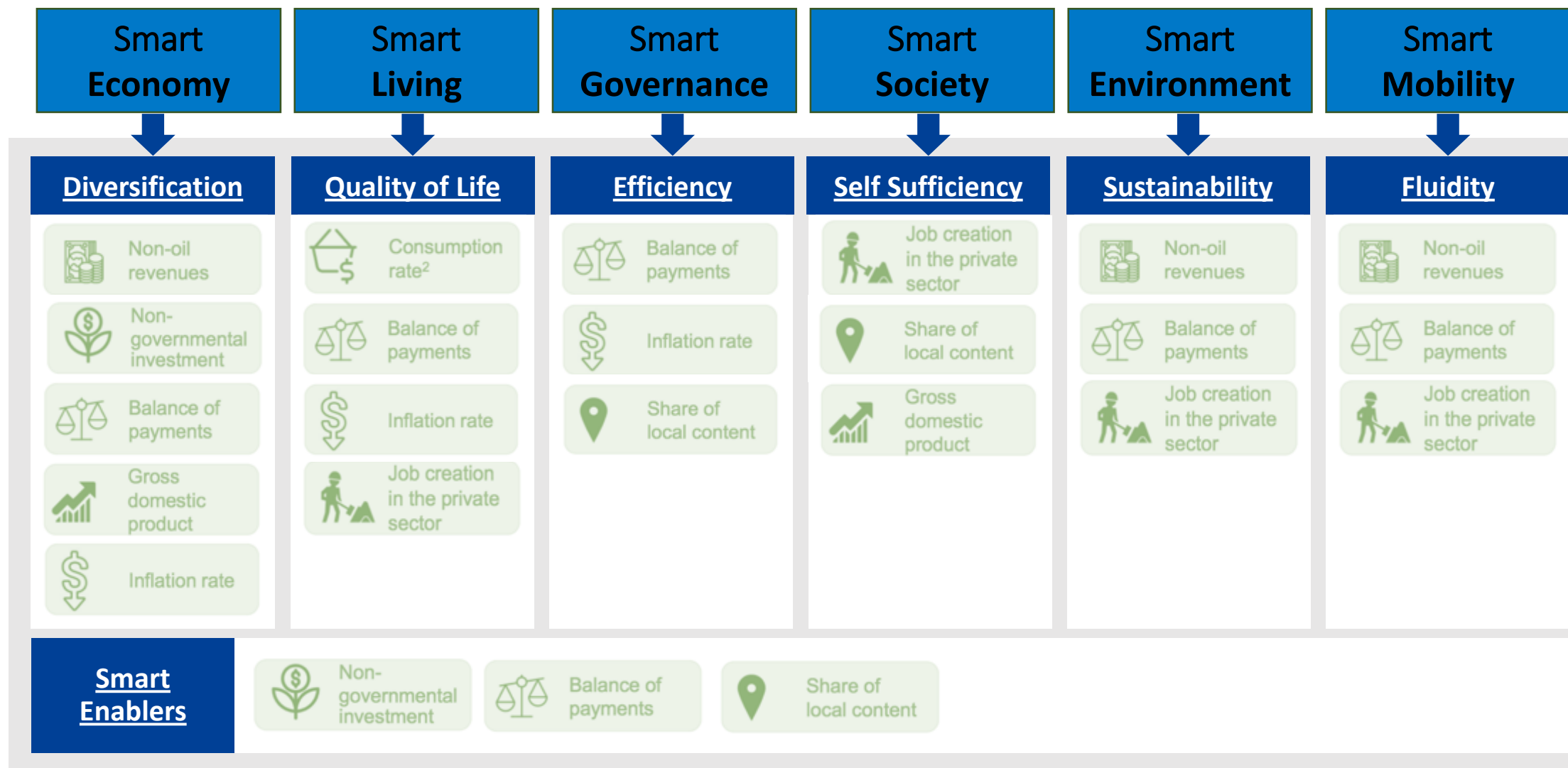


# Vision 2030 Aspirations Alignment to the Smart Cities Dimensions



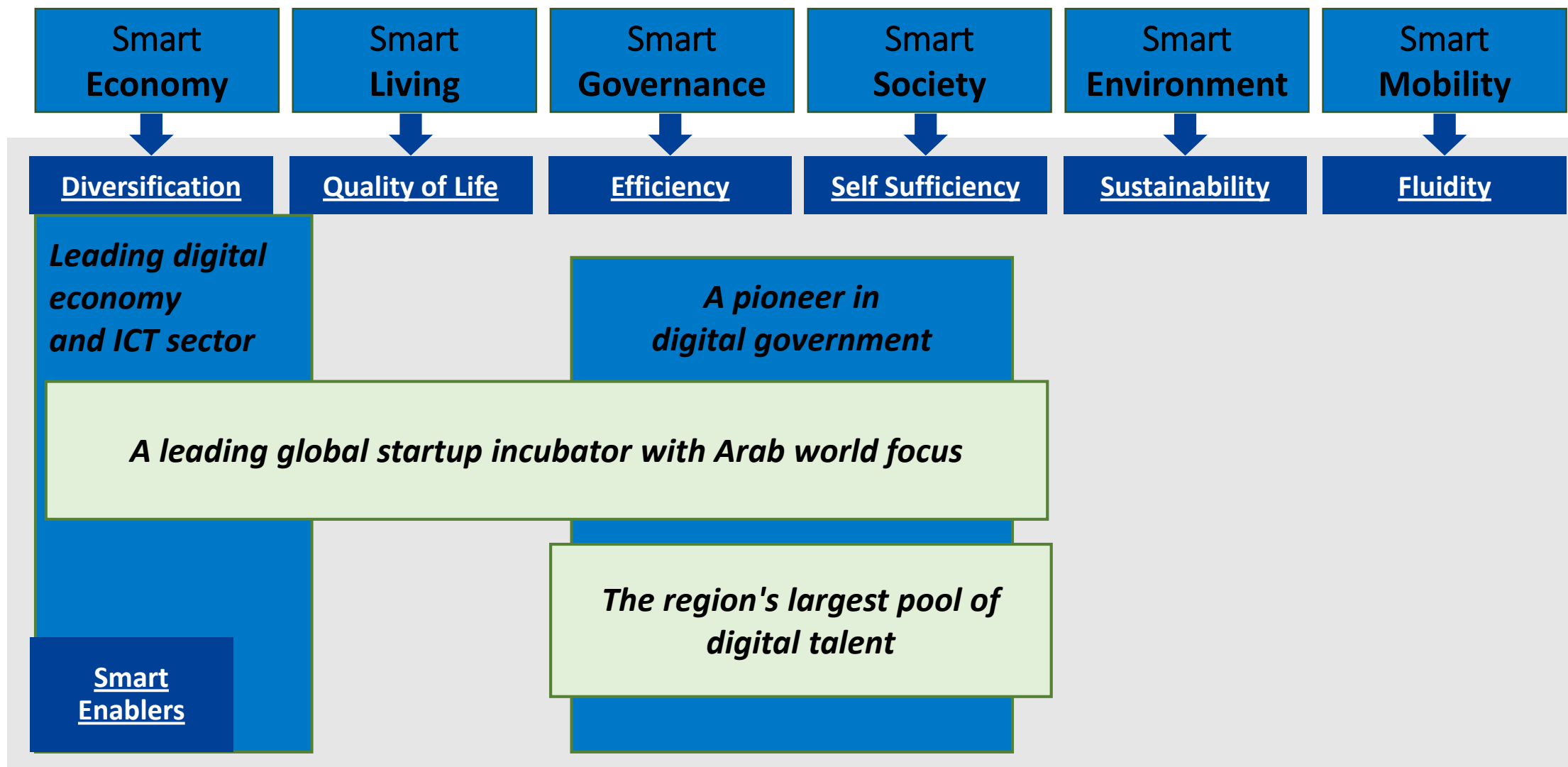


# Vision2030 Indicators Alignment with Smart City Dimensions



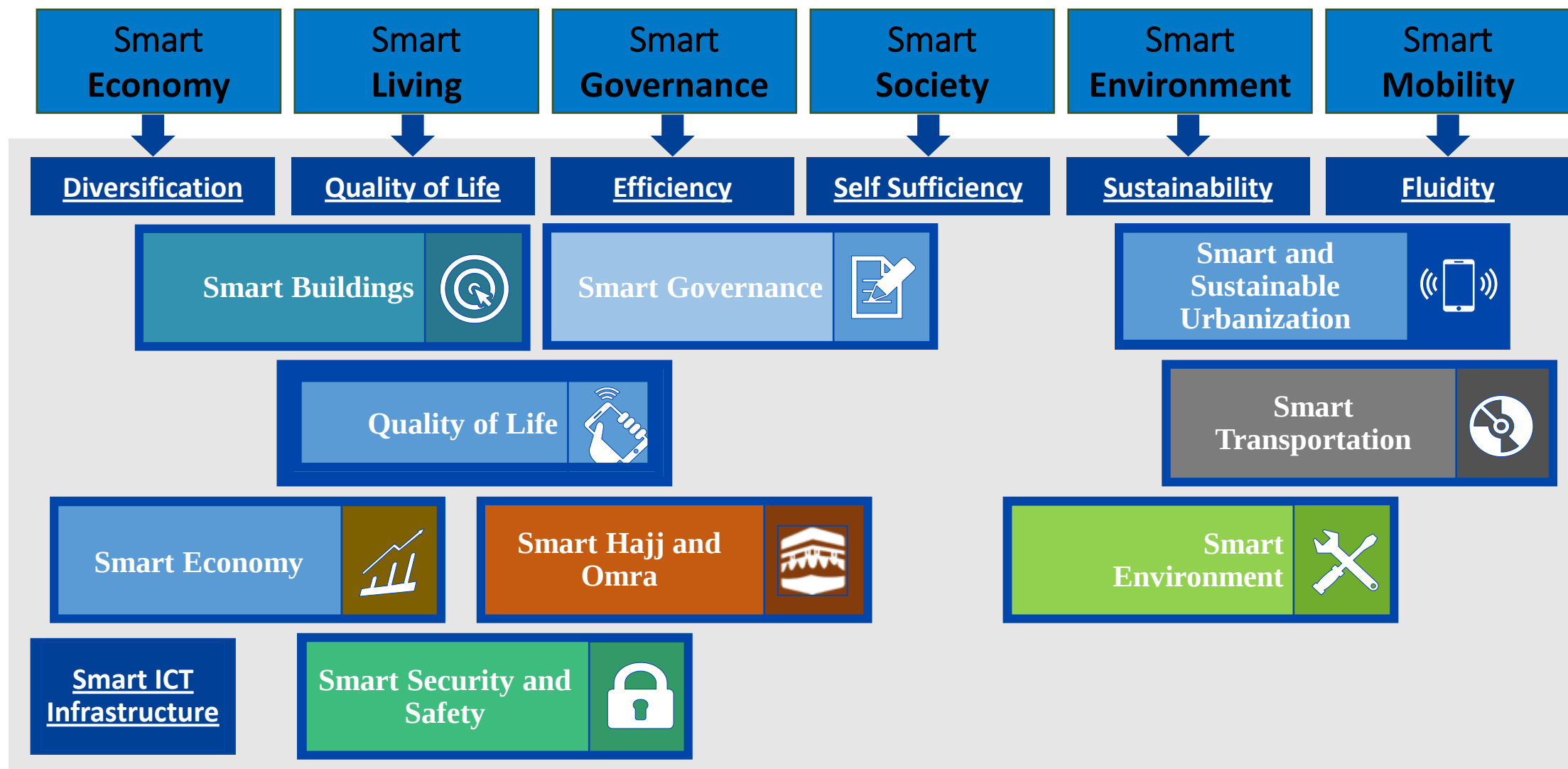


## Likewise Dimensions Align with National Digitization Goals





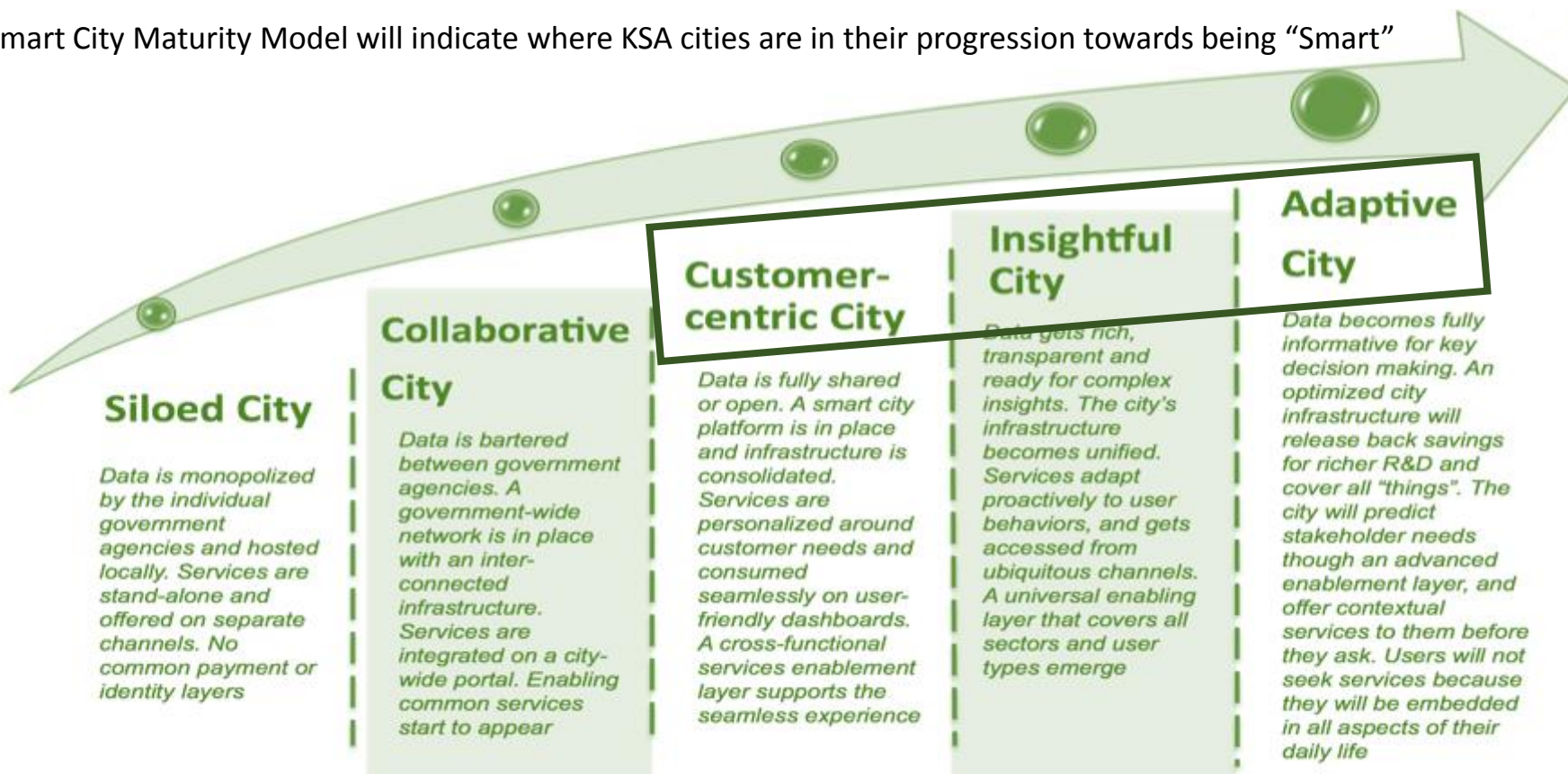
## And with MOMRA Dimensions





# The NXN Smart City Maturity Model

The NXN Smart City Maturity Model will indicate where KSA cities are in their progression towards being “Smart”



IDC/MOMRA



ISO Draft

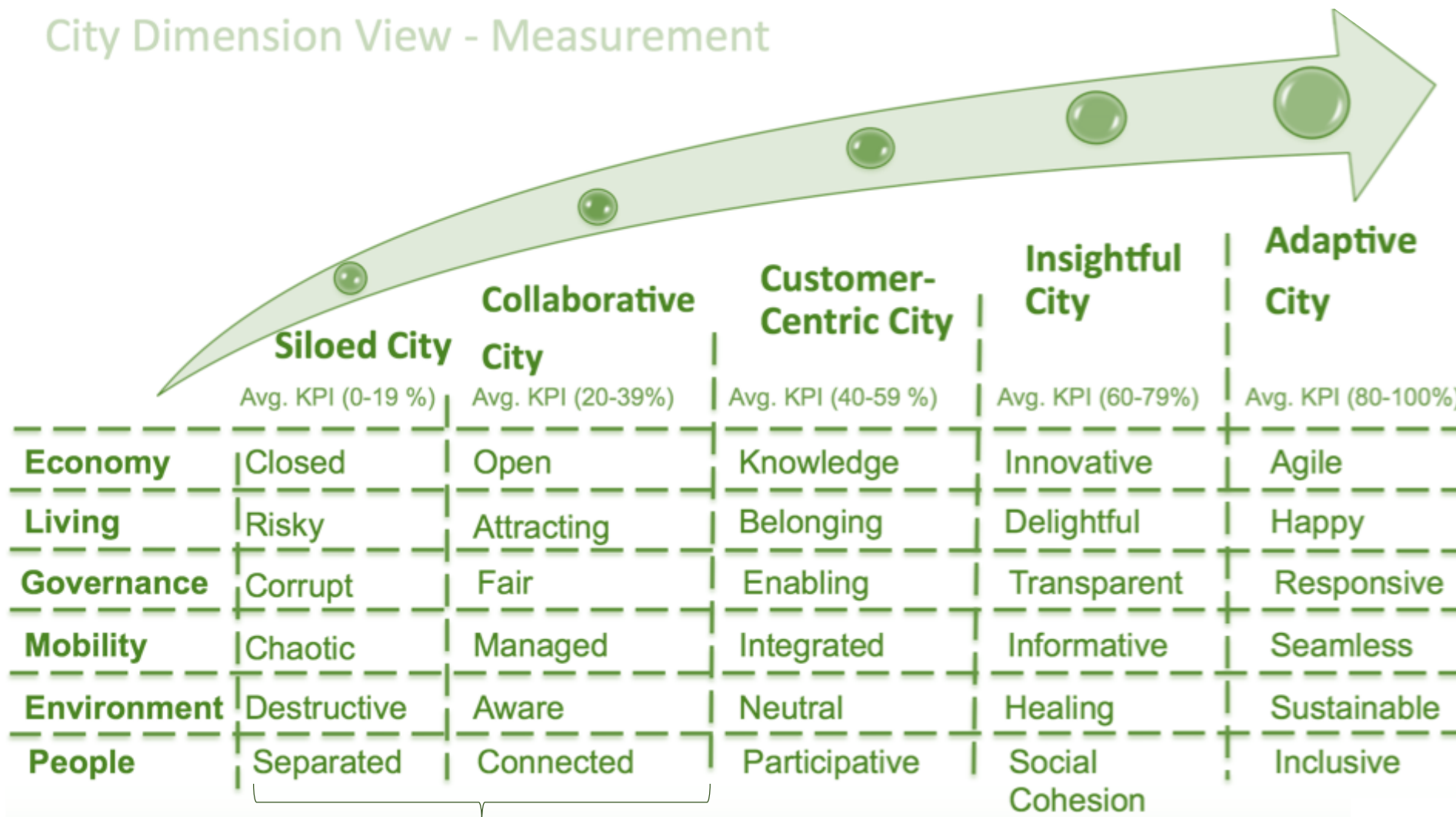


Source: NXN analysis



# Measuring Smart Cities Maturity Through Measurement of ITU KPIs

## City Dimension View - Measurement



This KSA model will assist us in measuring the success of KSA' Smart Cities along the maturity model through KPI achievement

CURRENT SAUDI CITIES ESTIMATED MEASUREMENT

Source: NXN analysis

**INTRODUCTION**

**APPROACH**

**VISION & FUTURE ASPIRATIONS**

**CHALLENGES**

**STRATEGIC GOALS & OBJECTIVES**

**PRIORITY INITIATIVE**

**ROADMAP**

**APPENDICES**





# Global Observation: Risks & Challenges to Smart City Programs

According to ISO, cities share many common challenges with their Smart City programs

**Table – Key areas of risk for smart city programmes**

|                                                                                                                                                                                                                 |                                                                                                                                                                                                        |                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategic clarity</b> <ul style="list-style-type: none"><li>• Clear vision</li><li>• Strong business case</li><li>• Focus on results</li></ul>                                                               | <b>Leadership</b> <ul style="list-style-type: none"><li>• Sustained support</li><li>• Leadership skills</li><li>• Collaborative governance</li></ul>                                                   | <b>User focus</b> <ul style="list-style-type: none"><li>• A holistic view of the city's citizen and business customers</li><li>• Citizen-centric delivery</li><li>• Stakeholder empowerment</li></ul> |
| <b>Collaborative engagement</b> <ul style="list-style-type: none"><li>• Awareness and participation of interested parties</li><li>• Cross-sectoral partnership</li><li>• Engagement with other cities</li></ul> | <b>Skills</b> <ul style="list-style-type: none"><li>• Skills mapping</li><li>• Skills integration</li></ul>                                                                                            | <b>Supplier partnership</b> <ul style="list-style-type: none"><li>• Smart supplier selection</li><li>• Supplier integration</li></ul>                                                                 |
| <b>Achievable delivery</b> <ul style="list-style-type: none"><li>• Phased delivery</li><li>• Continuous improvement</li><li>• Risk management</li></ul>                                                         | <b>Future-proofing</b> <ul style="list-style-type: none"><li>• Interoperability</li><li>• Web-centric delivery</li><li>• Agility</li><li>• Shared services</li><li>• Support and maintenance</li></ul> | <b>Benefit realization</b> <ul style="list-style-type: none"><li>• Benefit mapping</li><li>• Benefit tracking</li><li>• Benefit delivery</li></ul>                                                    |





# KSA Smart Cities Challenges & Solutions

Mecca

Medina

Riyadh

Jeddah

Dammam

## CHALLENGES - source

1. **BUDGET** – Lack of budget or clarity of source while Government Procurement Rules are not clear on PPP
2. **GOVERNANCE** – Lack of clarity of the Responsibility Matrix between cities and national ministries
3. **OWNERSHIP** - Private Sector And Citizen Ownership can hamper the deployment of certain initiatives
4. **TRANSFORMATION** – New skills and resources are required for new technologies
5. **ENABLERS** – Implementation of key enablers for Smart Cities is needed for efficacy
6. **AWARENESS** – Lack of popular awareness hampers adoption of new services
7. **ICT INFRASTRUCTURE** - issues with quality and expansion of key elements such as networks and sensors

## SOLUTIONS

Procurement Policies

PPP Policies

National Smart  
Governance

Municipal Smart  
Governance

Municipal Smart  
Governance

PPP Pilots

Municipal Smart  
Governance

Smart City Training &  
Transformation

National Infrastructure  
Initiatives

MOMRA National  
Initiatives

SC Awareness  
Campaign / Education

Smart City Centre of  
Excellence

City Fiber, WIFI, IOT  
Networks

Smart City Platform

Source: MOMRA stakeholders, NXN analysis



# KSA Smart Cities Challenges and Potential Solutions

As per the Innovation Lab

- **BUDGET**

- PPP
  - need a plan to expose opportunities to the private sector
  - Need to educate Gov on advantages of PPP
  - Maturity of private sector in PPP needs addressing
- Look to leverage CSR
- Develop legislation to protect investors
- Build expertise for managing PPP

- **GOVERNANCE**

- Complexity of the Saudi environment where some cities have Development Authorities and some do not
- Absence of a Smart City Act and proper enforcement
- Government as an orchestrator of public / private / social sectors
- Challenges need to be categorized from the perspective of persona (gov, citizens, companies)
- Alignment of the strategies will ease current challenges
- eGovernment needs to be added as a stakeholder

- **OWNERSHIP**

- Ownership of data is also a significant issue, cities are sitting on gold mines in their data

These are some of the factors by which initiatives should be evaluated

Source: NDU, MOMRA, NXN analysis



# KSA Smart Cities Challenges and Potential Solutions

As per the Innovation Lab

- **TRANSFORMATION**
  - Interest the private sector in Smart City service provision, suggest attractive business models
  - R&D / CoE centers are required to kick start innovation
  - Understand the impact of asset replacement
  - Tackle challenges as a priority
  - Manage organisation change
- **ENABLERS**
  - R&D / CoE centers are required to kick start innovation
  - Enablers for future challenges will be needed, such as, robotics, autonomous transportation
  - Building regulations are required to move forward and not keep repeating previous issues
- **AWARENESS**
  - Education on Smart City initiatives will require significant focus
  - Two way communication is crucial
  - Alternates to communication such as through schools and gamification need to be tested
- **ICT**
  - Provision of network infrastructure a significant hurdle
  - Need government cloud standards
  - Cybersecurity is a major challenge that requires national and city attention
  - Power is a challenge for sensor implementation

**These are some of the factors by which initiatives should be evaluated**



# Leading Practices from Riyadh and Al-Madina Al Monawara

Key implementation challenges on the ground are:

- Power
- Permits
- Skills

Some tested services and results are;

- Parking – increased revenue
- Waste Management – reduced costs
- LED Lights – reduced cost
- Dimming Sensors – will further reduce cost
- Environment sensors and cameras increase efficiency, safety, security



# Budget Availability

MOMRA and Municipalities have a challenge to raise and justify funding for Smart City initiatives

BUDGET

CHALLENGE

- Municipalities are in a Catch 22 situation, they don't have budget nor PPP rules to go out to market with
  - RFP rules do not give the flexibility to select innovative partners with innovative models
  - Budgets for Smart City initiatives are being challenged
  - Rules have not been issued for how municipalities can engage in PPP arrangements
- The perception is that there is no level playing field for funding of city initiatives



# Potential Solutions to Budget Availability

Solutions could include creating new models that take into account a bigger picture and twinning revenue with non revenue programs

## BUDGET

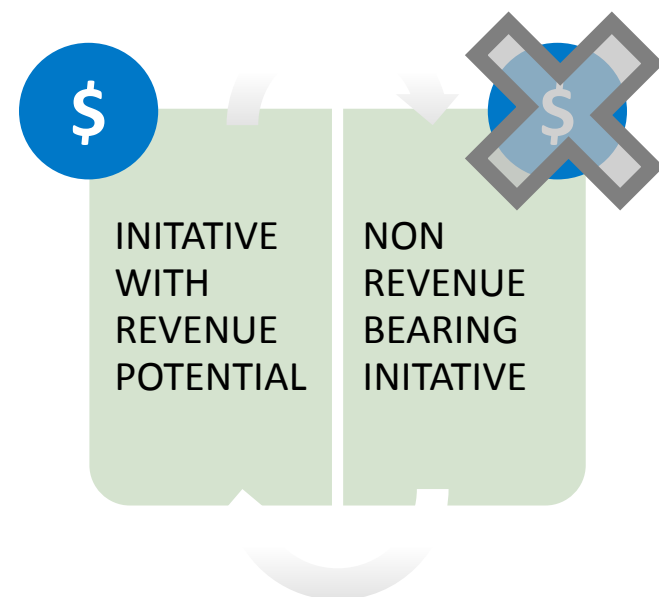
## SOLUTIONS

### HIGHER LEVEL SCOPE BUDGETING



- Consideration needs to be taken of the cost / benefit at the national level when considering individual initiatives
- Benefits may accrue to the nation that are not necessarily accruing to the entity or initiative

### TWINNING BUSINESS MODELS



- In order to get maximum value from PPPs, Government entities should twin initiatives that bear revenue with ones that do not
- This ensures the private sector is incentivized to participate in areas that would traditionally continue to fall under government budgets



# A New Procurement Paradigm (1/2)

BUDGET

SOLUTIONS

**Table 3 – Towards smarter city procurement**

| Traditional city procurement                                                                                          | Smart city procurement                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Silo-based procurement, with requirements set by individual business units within the city...                         | ▶ An integrated strategic approach to the commissioning of services, across the city council and in partnership with other city service delivery organizations                                                                                        |
| ... and with little ability to fund solutions that benefit multiple organizations                                     | ▶ Budget alignment mechanisms enable effective provision of common good platforms and services                                                                                                                                                        |
| The city defines the technology and other inputs it wants to buy, and the immediate outputs it wants these to deliver | ▶ The city defines the outcomes and service levels it wants to achieve                                                                                                                                                                                |
| Requirements are developed internally by the city                                                                     | ▶ Requirements are developed iteratively, in partnership between customer, commissioner and supplier                                                                                                                                                  |
| The city brings its requirements to the market in a piecemeal manner                                                  | ▶ Published pipelines of future requirements help to stimulate the market and enable suppliers to propose new cross-cutting solutions to deliver multiple requirements (both within and across cities)                                                |
| Cities define their requirements in isolation from each other                                                         | ▶ Joint procurement initiatives, facilitated by shared pipelines, enable shared services across more than one city and also stimulate the market for standardized and replicable city solutions                                                       |
| Procurement and contracting is based around purchaser-provider, client-agent relationships                            | ▶ A range of more innovative delivery models are deployed, including city companies, joint ventures, and partnerships between cities, industry and academia that promote collaborative solutions while safeguarding the intellectual property of each |



Source: ISO/DIS 36106:2016(E)

Source: ISO TC268 WG4 SSC, NXN analysis



# A New Procurement Paradigm (2/2)

## BUDGET

## SOLUTIONS

|                                                                                                  |                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Procurement decisions focus primarily on price                                                   | ► Procurement decisions focus primarily on long-term value for money, including: <ul style="list-style-type: none"> <li>• total cost of ownership (including costs of exit);</li> <li>• the suppliers' ability to innovate;</li> <li>• confidence in delivering the expected business benefits.</li> </ul> |
| IT as a capital investment                                                                       | ► IT as a service                                                                                                                                                                                                                                                                                          |
| Long-term, inflexible contracts                                                                  | ► Short-term, on-demand purchasing                                                                                                                                                                                                                                                                         |
| Bespoke, vertically-integrated solutions for each line of business                               | ► Sharing and reusing standardized components, drawing on best-of-breed building blocks and commercial-off-the-shelf products                                                                                                                                                                              |
| City systems are unable to interoperate, due to over-reliance on proprietary systems             | ► Interoperability based on open standards is designed into all procurements from the outset                                                                                                                                                                                                               |
| Important city data-sets cannot be opened up because they are owned by suppliers                 | ► Standard contractual arrangements ensure that all city suppliers make city data available via open standards and either for free or, where appropriate, on fair, reasonable and non-discriminatory terms                                                                                                 |
| No incentives on suppliers to share, collaborate and innovate with other city interested parties | ► Contractual arrangements encourage collaboration with others to create new value, and the sharing of common city assets, with benefits being shared between the city and its suppliers                                                                                                                   |
| The city buys from a limited pool of large suppliers                                             | ► The city buys from a large pool of small suppliers, plus strategic relations with one or a few platform suppliers who themselves integrate with many SMEs                                                                                                                                                |
| City leaders focus on managing relationships with a few large vendors                            | ► City leaders focus on nurturing and managing an innovation ecosystem                                                                                                                                                                                                                                     |



Source: ISO/DIS 36106:2016(E)

Source: ISO TC268 WG4 SSC, NXN analysis



# PPP Framework

A strong recommendation has evolved that a flexible regulatory framework for PPP relationships should be issued

BUDGET

SOLUTIONS

- **Regulation** should define how and when government agencies can engage in partnership rather than go through the RFP process
- **Government and private** sector ROI parameters should be clear, allow a wide range of activities and enable the grouping of services in to single agreements
- **Timelines** for the licensing of government assets to the private sector should be clarified
- **Agreement parameters** should be standardized
- **Potential business models** should be identified and standard groupings of models mandated
- **A flexible method for evaluating value** to the government should be mandated that allows for shorter time cycles while ensuring due diligence

**SOLUTION BENCHMARK: UAE:** The PPP Law has enabled government entities to enter into partnerships with the private sector for the provision of services and enablers. For instance, the Smart City Platform commissioned by the Smart KSA Office has been delivered in partnership with the telecom operator DU, reducing the government's up front investment remarkably and enabling DU to generate revenues from the platform and data.



## PPP Models (1/2)

PPP Models should focus on value for the city and long term win for both public and private sector partners

BUDGET

SOLUTIONS

- Special Purpose Vehicles
- BOT, BOO Leases
- Defrayed Capital Procurement
- Revenue Share Outsource
- Collaborative Purchasing



## PPP Models (2/2)

PPP Models can move responsibility for CAPEX to private sector partners in return for time based licenses & revenue opportunities

BUDGET

SOLUTIONS

|                                                                    |                                    | MUNICIPALITY                   | PRIVATE SECTOR PARTNER           |
|--------------------------------------------------------------------|------------------------------------|--------------------------------|----------------------------------|
| [BOT]<br>BUILD – OPERATE –<br>TRANSFER                             | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |
| [BOO]<br>BUILD – OWN – OPERATE /<br>SMART PLATFORM<br>AS A SERVICE | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |
|                                                                    | SERVICE OPERATION                  |                                | PARTNER OPERATIONS               |
| [JV]<br>JOINT VENTURE                                              | PLATFORM BUILD-UP & MAINTENANCE    | (JOINT INVESTMENT & OPERATION) |                                  |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE |                                |                                  |
|                                                                    | PLATFORM OPERATION                 |                                |                                  |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |

Source: NXN analysis

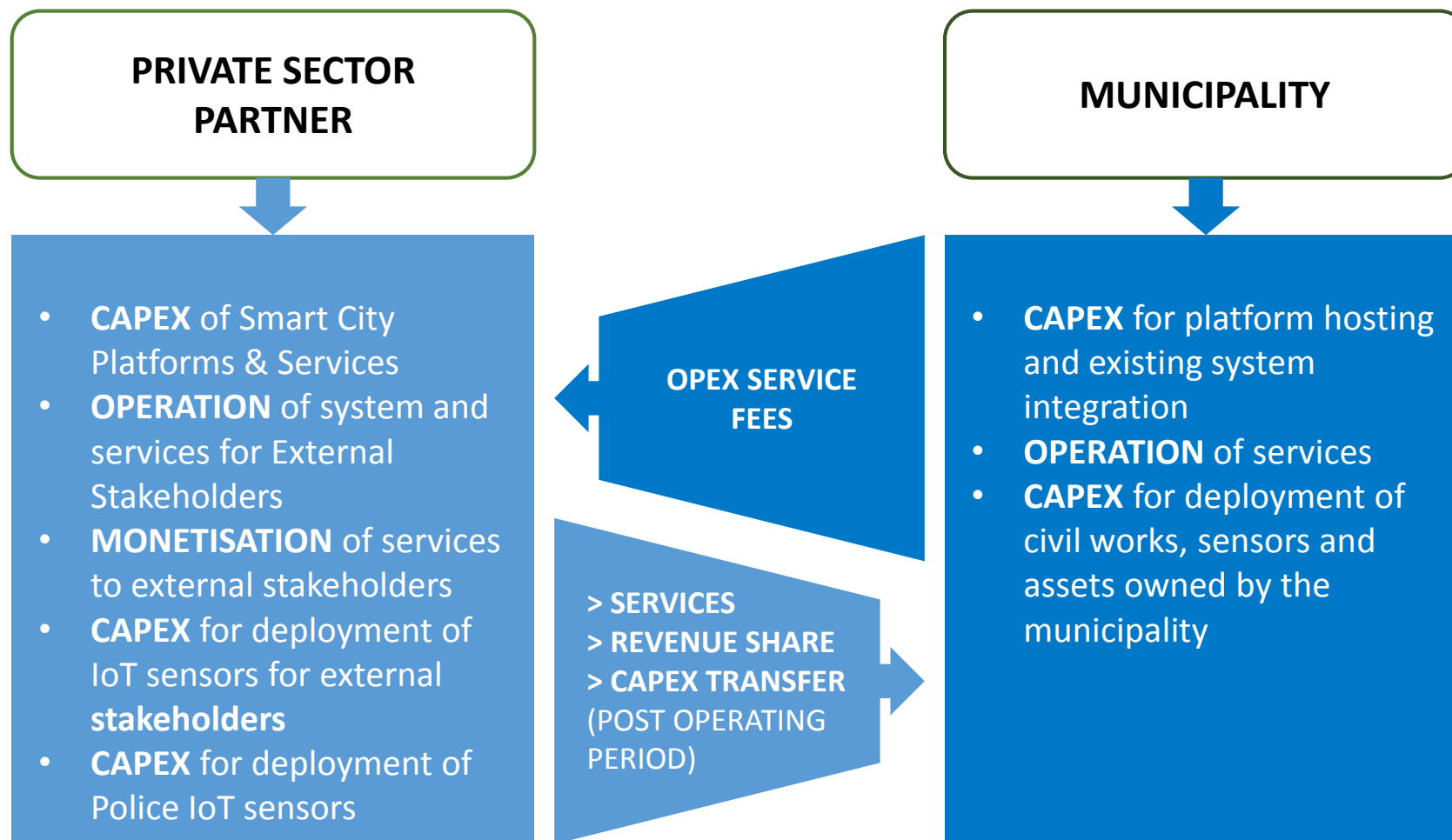


# From Capex to Opex

Even in models where funds are required from the municipality, these can be in the form of monthly fees rather than capex, at least for a period

BUDGET

SOLUTIONS

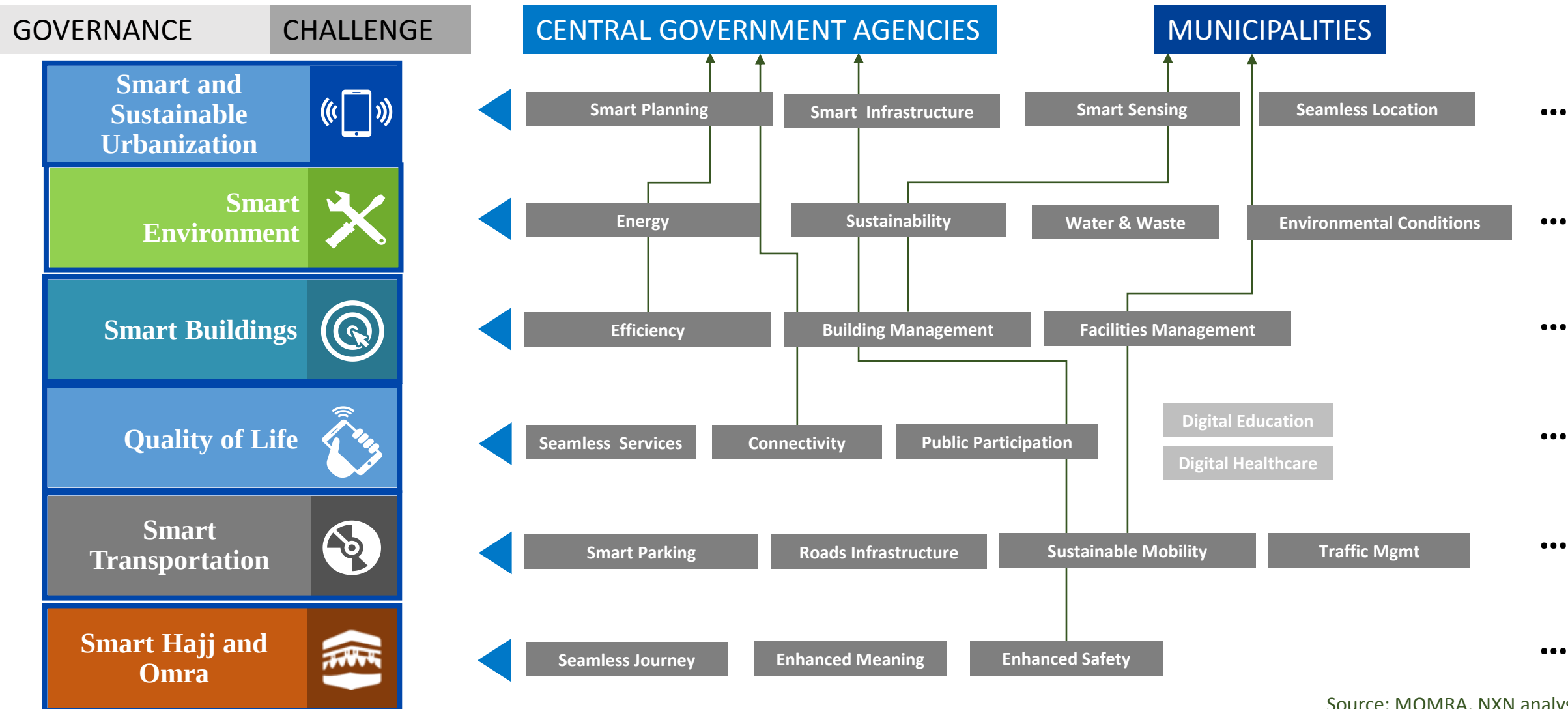


Source: NXN analysis



# Governance

Duplication of effort and unequal access to funds, enablers may arise from a lack of clarity on certain responsibilities



Source: MOMRA, NXN analysis



# Governance

**Governance** of initiatives should be clear between the layers of government to ensure maximum efficiency

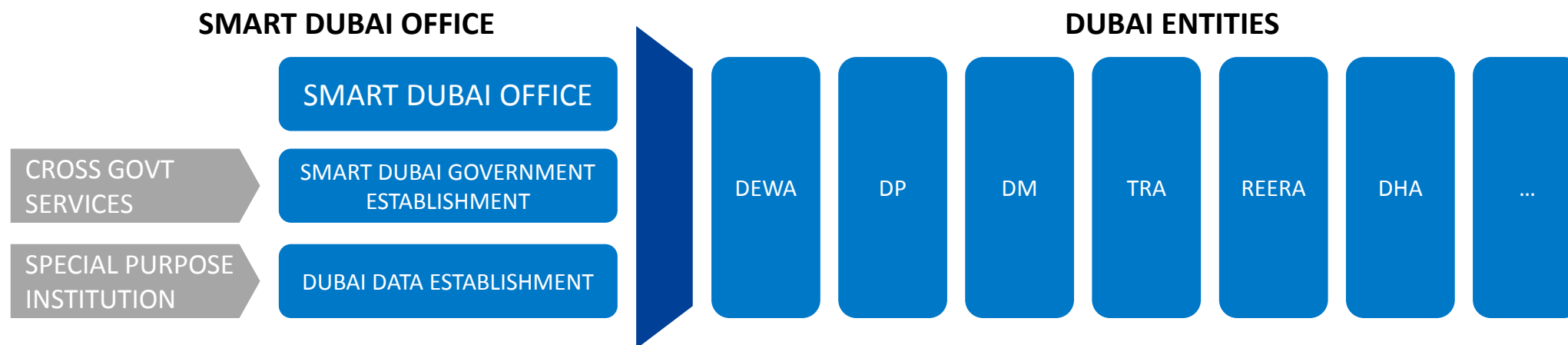
GOVERNANCE

SOLUTIONS

## SOLUTION BENCHMARK: Smart Dubai

### CREATE TRANSVERSAL INSTITUTIONS

DUBAI: Smart Dubai was created to drive Dubai towards a Smart City future and it has spawned transversal institutions as well as special purpose institutions. It has also delivered laws and implemented existing ones, including PPP.



**LESSONS FOR KSA:** Transversal and special focus institutions can drive innovation in ministries, while sharing responsibility



# Governance

**Governance** of initiatives should be clear between the layers of government to ensure maximum efficiency

GOVERNANCE

SOLUTIONS

## SOLUTION BENCHMARK:

### INVOLVE THE PRIVATE SECTOR

**AMSTERDAM:** Carried out a study of multiple projects and determined that Smart city projects show a broad diversity in partnerships, varying from fairly simple to highly complex, encompassing both small and large organizations. A partner ecosystem should not be fixed or inward-looking, but rather be open for new partners to enter when the project asks for new/different competencies. The city administration can play different roles in smart city projects, from initiator to facilitator, from financier to customer. The private sector can lead projects - Sustainable Neighborhood, Fair Meter, WASTED, Locally Grown Paint, Cargohopper and MokumMariteam projects all had a private partner in the lead that invested in the project.



**LESSONS FOR KSA:** The private sector can help lead projects under conditions where all parties have benefits

### LEAD WITH A LIGHTHOUSE PROJECT

**TORONTO:** Driving Toronto's smart city solution is the revitalization of [Waterfront Toronto](#), North America's largest urban renewal project. The effort will reinvigorate 800 hectares of brownfield shoreline with the development of 40,000 residential units, parks and 1 million square meters of commercial space. The project will offer 1 Gbps fiber-optic broadband, offered at no cost to residents. As a public-private collaboration, with public green spaces, digital availability and the promise of economic development (the project is expected to generate some 40,000 new jobs), Waterfront Toronto pulls together many of the hallmarks of an emerging smart city.

**LESSONS FOR KSA:** Cities should identify one or more lighthouse projects to drive Smart City services



# Governance

Governance of initiatives should be clear between the layers of government to ensure maximum efficiency

GOVERNANCE

SOLUTIONS

MULTIPLAYER ORGANISATION

ADAPTED PROCESSES

LEVERAGE OF TECHNOLOGY

## SMART GOVERNANCE

**Smart city leaders should establish leadership and governance arrangements that ensure:**

- An agreed, transparent roadmap
- National standards municipal implementation
- Rights of central agencies to operate within municipalities need to be clarified
- Alignment on roadmap may help reduce duplication of effort and inefficiency broad-based leadership team across the city;
- City leaders are brought together on a cross-sectoral basis into effective governance arrangements, at both the strategic and delivery levels;
- The right skills mix in the leadership team;
- An ability to manage organizational evolution among city partner organizations;
- Openness and transparency in the governance process, including through digitally-enabled models of public participation.





# The Ownership Profile

The **Ownership profile** of land and buildings can create significant hurdles to the implementation of Smart City initiatives in brown field sites

OWNERSHIP

CHALLENGE

- Initiatives such as Smart Parking and Smart Buildings are **heavily dependent on the ownership of property**
- KPIs may not be achieved for given areas or whole municipalities if implementation is stopped by owner disagreement

## ISSUE BENCHMARK:

**RIYADH KINGDOM TOWER AREA PILOT:** The pilot between Riyadh Municipality and CISCO has run into resistance and delays due to ownership and management of buildings involved.



# Initiatives Need a Complete Business Model

Initiatives need to have a complete business model, including taking notice of the ownership of required assets

OWNERSHIP

SOLUTIONS

- The benefits and impacts to all stakeholders need to be taken into account, including those of owners of property, being government agencies, private companies, citizens or charities
- Initiatives need to come with central regulations for implementation (e.g. access rights, remuneration) or come with a framework for agreeing required accesses
- The private sector should be involved deeply and incentivized through rights or licenses they need from the municipality

## SOLUTION BENCHMARK:

**Public Sector:** Australian municipalities are giving incentives for usage of new services, including reduced fees

**Private Sector:** Yalla Parking, Dubai, are negotiating to manage private sector parking and supply it to an app



# Transformation in Processes and Skills

Buy in to implementation and complete business models need to incorporate the impact on government employees

TRANSFORMATION

CHALLENGE

- The new technologies of Smart Cities will require **existing processes to change**
- Changes will impact the **skill and capabilities of existing staff**
- **New roles will be required** e.g. data scientist
- The return on investment of long term business models and government employment targets may be impacted due to the **lack of internal skilled resource**, especially Saudi national skills sets



# Change Management

Change management needs to be taken into account in all plans, especially the sourcing of skills sets to KSA and those of Saudi nationals

TRANSFORMATION

SOLUTIONS

- Process changes need to be one benefit of the majority of initiatives and be planned into the implementation
- Upgrade of skills of existing managers and staff impacted by the new initiative needs to be a clear milestone in the program
- Identification of new capabilities and their fulfillment over time by Saudi national should be a mandated step of each smart city initiative – an overall strategy will manage duplication of roles creation
- PPP agreements need to include skills upgrading and new capabilities creation
- PPP agreement should contain incentives to the private sector to train Saudis and residents to take on roles

## SOLUTION BENCHMARK:

Smart Cities Council India offers National Professional Training Certificate Course On Smart Cities Development to orient the policy makers on smart city concepts, theory, technologies, best practice



# Smart City National Enablers

Smart City enablers can be excessively expensive for cities to implement and may cause incompatibility with national services

## ENABLERS

## CHALLENGE

- Infrastructure (Fiber, WiFi, IOT networks, cloud computing and services, etc.)
- Smart City Platform
- Enablers
  - Mobile Digital Identity
  - SDI/GIS Standardization
  - Data Governance
  - Cyber Security
  - Blockchain

## SOLUTION BENCHMARK:

**UK:** Commissioning the Ordnance Survey to standardize GIS data for the whole country, all entities can now refer to items as small as a sensor by the same location reference



# National Enablers for all Cities

A transparent plan of national enablers needs to be agreed with national agencies and published to municipalities

ENABLERS

SOLUTIONS

- **A clear program** will give visibility on design, policy and implementation
- **Municipalities need not invest** in enablers if they have clear planning on national programs
- **Flexible** solutions that take into account the differing sizes of the cities will help to encourage adoption within the cities

## SOLUTION BENCHMARK:

**Estonia:** Clear regulation over the use of electronic enablers has resulted in a unified electronic identity, a pivotal enabler for digital government services and smart city



# Lack of Citizen Awareness is Stifling Adoption

AWARENESS

CHALLENGE

- For many Smart City initiatives, the **benefits come from large scale adoption**
- New services often **incur a learning curve for consumers**
- Government communication has to compete with the “noise” of day to day marketing of the private sector
- Messages are often complex or of niche interest

## SOLUTION BENCHMARK:

**Dubai:** The Digital Identity program MyID, only managed to onboard 50,000 of Dubai's 2.8M residents due to lack of awareness, complex onboarding process and limited locations for joining.



# Awareness Campaigns to Spur Adoption

Adoption marketing has to go hand in hand with incentives that are attractive to consumers and achieve cities' long term goals

AWARENESS

SOLUTIONS

- Citizen engagement beyond marketing
- Electronic media engagement
- Blockchain based suggestion / voting on advice for potential policies or services
- Incentivization can come in many forms, including free services, discount services

## SOLUTION BENCHMARK:

Colombia has piloted a blockchain based voting service for expatriates to vote on a government proposal. This concept can be expanded to gain buy in from citizens in new services.



# Common ICT Challenges

Inefficiency in ICT execution and siloed approach is hampering services delivery

ICT

CHALLENGE

## **CHALLENGES SLOWING INFRASTRUCTURE & ICT SYSTEMS DEPLOYMENT**

- High speed and low power network reach
- Data networks regulatory framework may not be fit for purpose for smart services
- Standards for trenches across utilities
- Processes, licensing for trenches
- Tower location and sharing
- Lack of alignment between deployment of differing infrastructure e.g. telco, power, water
- Lack of alignment of ICT systems



# KSA Smart City Platform

A Smart City Platform Cloud, local developer incubation and distributed computing can help increase delivery bandwidth

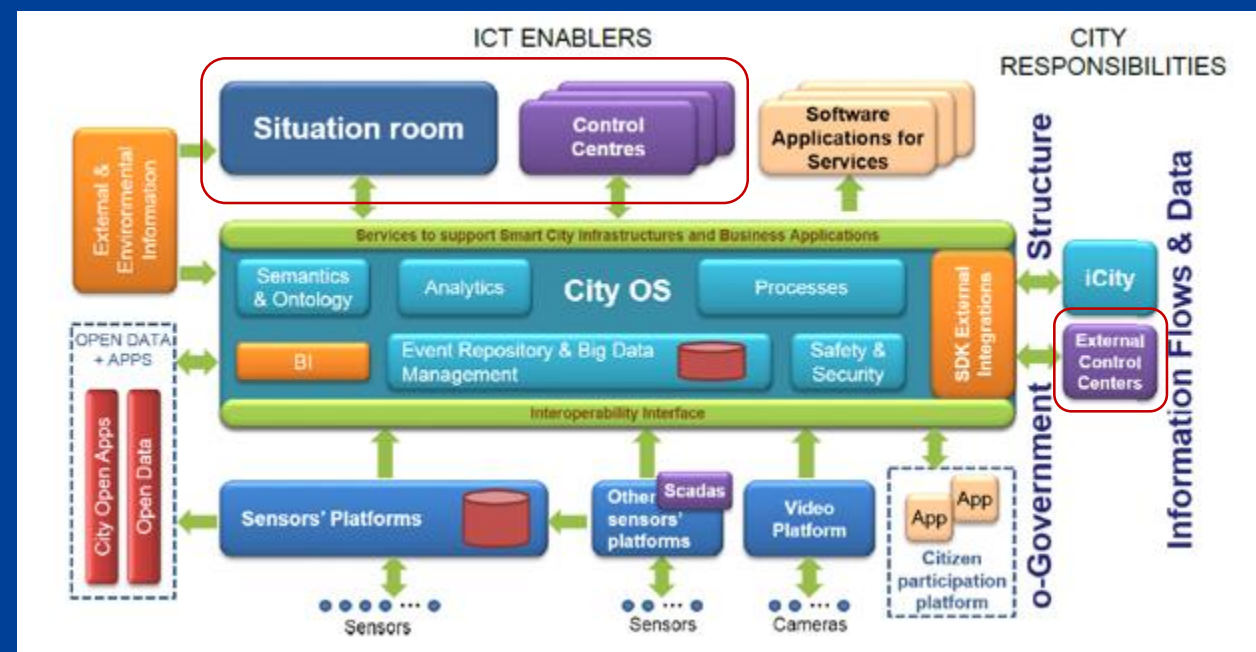
ICT

SOLUTIONS

- Appropriate updates to regulation allowing for combined infrastructure deployments
  - Licensing Framework
  - Building regulation
- Coverage of Networks
  - Civil works standards
  - Stimulate low power networks

## SOLUTION BENCHMARK:

**Barcelona:** The design of the CityOS targets synchronizing city assets to make delivery of services more efficient and enable new Smart City services



Source: NDU, MOMRA, NXN analysis

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# Sector Strategic Objectives & Metrics



## Sector Strategic Objectives

### 1. ENHANCED LIVABILITY

### 2. ENHANCED WORKABILITY

### 3. ENHANCED SUSTAINABILITY

### 4. ENHANCED GOVERNMENT EFFICIENCY

## Vision 2030 & NTP Objectives



- Improve livability of Saudi Cities
- Improve the urban landscape in Saudi Cities
- Enhance Traffic Safety
- “Continuously enhance quality of life by providing cities with public facilities and infrastructure of high quality and efficiency”



- Develop Our Cities / Rehabilitating economic cities
- Increase the capacity of technical and vocational training
- Increase the contribution of Small and Medium Enterprises
- Localization and development of technology



- Achieving environmental sustainability
- “Sustainable and balanced urban development and improvement of the level of quality of life in cities and regions of the Kingdom”
- “Provide a healthy local urban environment”



- Improve the quality of services provided in Saudi Cities
- Privatizing our government services
- Grow the private sector



## Sample Metrics

- Satisfaction with housing conditions
- Satisfaction with crime prevention and security control
- Adoption of ICT for disaster management
- Road traffic efficiency

- Employment rate in knowledge-intensive sectors
- Penetration of teleworking systems
- Percentage of R&D expenditure in GDP
- Improvement of traditional industry with ICT

- Electricity generation from renewable sources & system management with ICT measures
- Satisfaction with public transport
- Noise, solid waste disposal & flood control monitoring with ICT measures

- Provision of digital services
- Percentage of public buildings with integrated management technologies
- Percentage of open government information / data
- Digital planning systems



# Dimension Strategic Goals & Metrics

|                   |  <b>Dimension Strategic Goals</b>                                                                                                                                                                      |  <b>Key Metrics</b>                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ECONOMY</b>    | <ol style="list-style-type: none"> <li>1. Smart platforms powering a seamless economy and enhancing productivity</li> <li>2. Public Private Partnerships giving rise to hubs of new technology businesses</li> <li>3. Fostering of entrepreneurship in new technology fields</li> </ol> | <ul style="list-style-type: none"> <li>• Penetration of teleworking systems</li> <li>• Satisfaction with online commercial and financial services.</li> <li>• Improvement of traditional industry with ICT</li> <li>• Employees belonging to ICT sector</li> <li>• Proportion of GDP contributed by high-tech enterprises</li> <li>• Ratio of knowledge-intensive enterprises</li> <li>• Effectiveness of smart tech spin-offs from knowledge centers</li> </ul> |
| <b>LIVING</b>     | <ol style="list-style-type: none"> <li>4. Safe and secure cities through implementation of ICT</li> <li>5. Efficient buildings providing seamless services and with proactive maintenance</li> <li>6. Public spaces providing education and entertainment</li> </ol>                    | <ul style="list-style-type: none"> <li>• Adoption of ICT for disaster management</li> <li>• Satisfaction with food / drug safety monitoring</li> <li>• Satisfaction with housing conditions</li> <li>• Percentage of public buildings with integrated management technologies</li> <li>• Proportion of smart home automation adoption</li> <li>• Per capita open space and public places</li> </ul>                                                              |
| <b>GOVERNANCE</b> | <ol style="list-style-type: none"> <li>7. A government organized to collaborate</li> <li>8. Efficient and proactive government services</li> <li>9. Planning powered by real time information</li> <li>10. Bi-directional communication with citizens</li> </ol>                        | <ul style="list-style-type: none"> <li>• Convenience of government services</li> <li>• Percentage of open government information / data</li> <li>• Provision of online systems for administering public services and facilities</li> <li>• Proportion of urban planning and operation information documented in digital form</li> <li>• Satisfaction Index (for individuals and businesses) with municipal services</li> </ul>                                   |

Source: Vision 2030, NTP 2020, NXN analysis



## Dimension Strategic Goals & Metrics, Cont.

|                    |  Dimension Strategic Goals                                                                                                                                                                                                                                |  Key Metrics                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SOCIETY</b>     | <ul style="list-style-type: none"><li>11. Citizens highly skilled in new technologies</li><li>12. Citizens participating in decision making concerning city initiatives</li><li>13. Cities that are accessible to citizens with physical or mental handicaps &amp; the elderly</li><li>14. Widespread use of voluntary resources</li></ul> | <ul style="list-style-type: none"><li>• Existence of strategies, rules and regulations to enable ICT literacy among inhabitants</li><li>• Availability of online city information and feedback mechanisms</li><li>• Application of services to support persons with specific needs</li><li>• Online civic engagement</li></ul>                                                                                                                        |
| <b>ENVIRONMENT</b> | <ul style="list-style-type: none"><li>15. Environmentally and socially sustainable cities</li><li>16. Efficient use of energy, water and waste</li><li>17. An effective recycling program</li><li>18. Proactive management of environmental conditions</li></ul>                                                                           | <ul style="list-style-type: none"><li>• Green areas surface</li><li>• Energy saving in households</li><li>• Availability of smart electricity meters</li><li>• Level of industrial electricity usage</li><li>• Electricity use for street lighting</li><li>• Recycling of waste</li><li>• Application of ICT based environmental monitoring system</li></ul>                                                                                          |
| <b>MOBILITY</b>    | <ul style="list-style-type: none"><li>19. Efficient and seamless travel</li><li>20. Proactive management of transportation systems</li><li>21. Proactive maintenance of transport infrastructure</li><li>22. Seamless mobility</li></ul>                                                                                                   | <ul style="list-style-type: none"><li>• Satisfaction with quality of public transport</li><li>• Convenience of smart traffic information administration and service</li><li>• Road traffic efficiency</li><li>• Availability of online bicycle/car sharing system</li><li>• Availability of traffic monitoring using ICT</li><li>• Availability of real-time traffic information</li><li>• Deficiency rate relative to the lengths of roads</li></ul> |

Source: Vision 2030, NTP 2020, NXN analysis



## Dimension Strategic Goals & Metrics, Cont.

| ENABLERS |  Dimension Strategic Goals                                                                                                                                                               |  Key Metrics                                                                                                                                                                                                                                                                                             |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          | <ul style="list-style-type: none"><li>23. Policy enablers for a holistic smart city</li><li>24. ICT Infrastructure to empower unified smart city services</li><li>25. Centralized monitoring and management</li><li>26. Widespread use of emerging technologies</li></ul> | <ul style="list-style-type: none"><li>• Adherence to ITU / ISO Maturity Model</li><li>• Information security of public services and systems</li><li>• Availability of Internet access in households</li><li>• Availability of Wi-Fi in public areas</li><li>• Availability of unified control centers</li><li>• Usage of emerging technologies (e.g. AI, Robotics, Blockchain...)</li></ul> |

These enablers are elements that are key to reaching our goals for a smart city and fulfilling the sector goals of the six dimensions...





# Smart Cities Objectives & Dimension Goals

| 26 Dimension Goals |                                                        | 4 Smart Cities Objectives | 1. ENHANCED LIVABILITY | 2. ENHANCED WORKABILITY | 3. ENHANCED SUSTAINABILITY | 4. ENHANCED GOVERNMENT EFFICIENCY |
|--------------------|--------------------------------------------------------|---------------------------|------------------------|-------------------------|----------------------------|-----------------------------------|
| ECONOMY            | 1. Smart Platforms                                     |                           | ✓                      | ✓                       | ✓                          | ✓                                 |
|                    | 2. Public Private Partnerships                         |                           |                        | ✓                       |                            | ✓                                 |
|                    | 3. Fostering of entrepreneurship                       |                           | ✓                      | ✓                       | ✓                          | ✓                                 |
| LIVING             | 4. Safe and secure cities                              |                           | ✓                      | ✓                       |                            |                                   |
|                    | 5. Efficient Buildings                                 |                           | ✓                      | ✓                       | ✓                          | ✓                                 |
|                    | 6. Public Spaces providing education and entertainment |                           | ✓                      |                         |                            |                                   |
| GOVERNANCE         | 7. A government organized to collaborate               |                           |                        |                         |                            | ✓                                 |
|                    | 8. Efficient and proactive government services         |                           | ✓                      | ✓                       |                            | ✓                                 |
|                    | 9. Planning powered by real time information           |                           |                        |                         |                            | ✓                                 |
|                    | 10. Bilateral communication with citizens              |                           | ✓                      |                         |                            | ✓                                 |

Source: Vision 2030, NTP 2020, NXN analysis



# Smart Cities Objectives & Dimension Goals, Cont.

| Dimension Goals |                                                        | 4 Smart Cities Objectives | 1. ENHANCED LIVABILITY | 2. ENHANCED WORKABILITY | 3. ENHANCED SUSTAINABILITY | 4. ENHANCED GOVERNMENT EFFICIENCY |
|-----------------|--------------------------------------------------------|---------------------------|------------------------|-------------------------|----------------------------|-----------------------------------|
| SOCIETY         | 11. Citizens highly skilled in new technologies        |                           |                        | ✓                       |                            | ✓                                 |
|                 | 12. Citizens participating in decision making          |                           | ✓                      |                         |                            | ✓                                 |
|                 | 13. Cities that are accessible to handicapped citizens |                           | ✓                      |                         |                            |                                   |
|                 | 14. Widespread use of voluntary resources              |                           | ✓                      |                         |                            | ✓                                 |
| ENVIRONMENT     | 15. Environmentally and socially sustainable cities    |                           | ✓                      |                         | ✓                          |                                   |
|                 | 16. Efficient use of energy water and waste            |                           | ✓                      |                         | ✓                          | ✓                                 |
|                 | 17. An effective recycling program                     |                           |                        |                         | ✓                          | ✓                                 |
|                 | 18. Proactive management of environmental conditions   |                           | ✓                      |                         | ✓                          | ✓                                 |
| MOBILITY        | 19. Efficient and seamless travel                      |                           | ✓                      | ✓                       | ✓                          |                                   |
|                 | 20. Proactive management of transportation systems     |                           | ✓                      | ✓                       |                            | ✓                                 |
|                 | 21. Proactive maintenance of transport infrastructure  |                           | ✓                      | ✓                       |                            | ✓                                 |
|                 | 22. Seamless mobility                                  |                           | ✓                      | ✓                       | ✓                          | ✓                                 |

Source: Vision 2030, NTP 2020, NXN analysis



## Smart Cities Objectives & Dimension Goals, Cont.

| Dimension Goals<br>ꣳ |                                               | 4 ꣳ<br>Smart Cities<br>Objectives<br>ꣳ | 1. ENHANCED<br>LIVABILITY | 2. ENHANCED<br>WORKABILITY | 3. ENHANCED<br>SUSTAINABILITY | 4. ENHANCED<br>GOVERNMENT<br>EFFICIENCY |
|----------------------|-----------------------------------------------|----------------------------------------|---------------------------|----------------------------|-------------------------------|-----------------------------------------|
| ENABLERS             | 23. Policy enablers for a holistic smart city |                                        | ✓                         | ✓                          | ✓                             | ✓                                       |
|                      | 24. ICT Infrastructure                        |                                        | ✓                         | ✓                          | ✓                             | ✓                                       |
|                      | 25. Centralized monitoring and management     |                                        | ✓                         | ✓                          | ✓                             | ✓                                       |
|                      | 26. Widespread use of emerging technologies   |                                        | ✓                         | ✓                          | ✓                             | ✓                                       |



# Goals & KPIs

Measuring Goals requires KPIs, which in turn leads us to identify the initiatives to achieve goals

VISION

KPIs

INITIATIVES

ROADMAP

KPIs allow the measurement of achievement of the strategy and lead to the initiatives that need to be undertaken

KSA DIGITALIZATION GOALS FOR SMART CITY

MOMRA SMART CITY RESEARCH

ITU SMART SUSTAINABLE CITIES KPIS

KSA SMART CITY STRATEGY KPIS

| Goal ID | Goal                                                                                                           | Indicator                                                                                                      | Unit | Target | Value |
|---------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------|--------|-------|
| 1.1.1   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.2   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.3   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.4   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.5   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.6   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.7   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.8   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.9   | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |
| 1.1.10  | Proportion of employees working in service industries in the city compared with the total employment workforce | Proportion of employees working in service industries in the city compared with the total employment workforce | %    | 750    | 750   |

KSA SMART CITY INDEX

Source: ITU, NXN analysis



# Indicators to Measure the Vision 2030 Achievement





# Why Use ITU (and ISO) as a Basis for Measuring Smart City?

- **Commercially Independent**
- **Robust and adaptable KPIs**
- **Significant Adoption**
  - **44 cities have adopted ITU SSC**
- **Support by UN Agencies**
- **Based on observation and city input**
- **Input to evolving ISO maturity index**

## KPIS PRINCIPLES

- **Comprehensiveness:** The set of indicators should cover all the aspects of SSC. The indicators of evaluation should be aligned to the measured subject, i.e., ICT and its impact on the sustainability of cities.
- **Comparability:** The KPIs should be defined in a way that data can be compared scientifically between different cities according to different phases of urban development, which means the KPIs must be comparable over time and space.
- **Availability:** The KPIs should be quantitative and the historic and current data should be either available or easy to collect.
- **Independence:** The KPIs in the same dimension should be independent or almost-orthogonal i.e., overlap of the KPIs should be avoided as much as possible.
- **Simplicity:** The concept of each indicator should be simple and easy to understand for the urban stakeholders. The calculation of the associated data should also be kept intuitive and simple.
- **Timeliness:** This refers to the ability to produce KPIs with respect to emerging issues in SSC construction.



# Smart City KPIs & the Sustainable Development Goals

The Smart City KPIs will also include relevant and significant elements of the Sustainable Development Goals



Relevance being judged by the ability of a city and its main partner institutions to take actions to enhance the goal

Source: UNDP



# Sample KPIs to Measure the Vision Achievement

| Smart Living                                                          | Smart Mobility                                                                       | Smart                                                                      | Smart ICT                                                                  |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Integrated management in public buildings                             | Availability of parking guidance systems                                             | Automatic energy management in buildings                                   | Compliance with WHO endorsed EMF exposure guidelines for ICT installations |
| Availability of Internet access in households                         | Availability of traffic monitoring using ICT                                         | Availability of visualised real-time information regarding electricity use | Availability of EMF information                                            |
| Adoption of ICT for disaster management                               | Availability of real-time traffic information                                        | Water supply system management using ICT                                   | Availability of WiFi in public areas                                       |
| Availability of ICT based safety systems                              | Availability of online bike/car sharing system                                       | Sewage system management using ICT                                         | Availability of electronic and mobile payment platforms                    |
| Disaster and emergencies alert accuracy                               | Proportion of travellers utilizing public transportation and Road traffic efficiency | Drainage system management using ICT                                       |                                                                            |
| Provision of online systems for administering services and facilities | Street lighting with ICT                                                             |                                                                            |                                                                            |

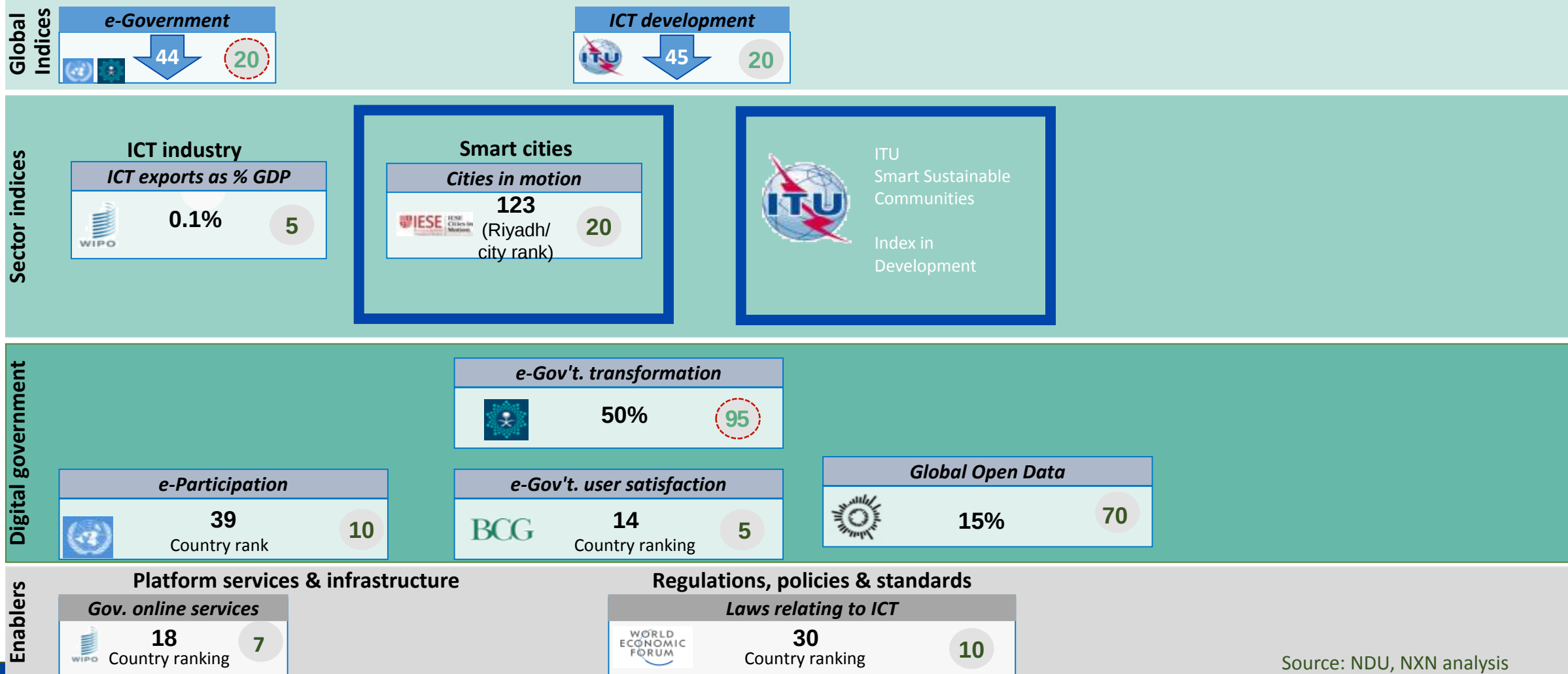
...

KPIs are ITU and NTP KPIs as listed below and in attached spreadsheet

Source: ITU, NXN analysis



# Other Indices to Monitor as per the National Digital Cockpit



Source: NDU, NXN analysis

Legend: # Current value # KPT





# The CIMI Dimensions Map to ITU

- CIMI diagnosis considers the following key dimensions:
  - Human capital → Smart Society
  - Social cohesion → Smart Society
  - Economy → Smart Economy
  - Public management → Smart Governance
  - Governance → Smart Governance
  - Mobility & transportation → Smart Mobility
  - Environment → Smart Environment
  - Urban planning → Smart Living
  - International outreach → Smart Economy
  - Technology → Smart City ICT



# Saudi Cities can use their KPIs to Track Progression Against per the IESE Cities In Motion Index

## Economy KPIs:

Labor productivity calculated as GDP/working population (in thousands)

Time necessary to start a business

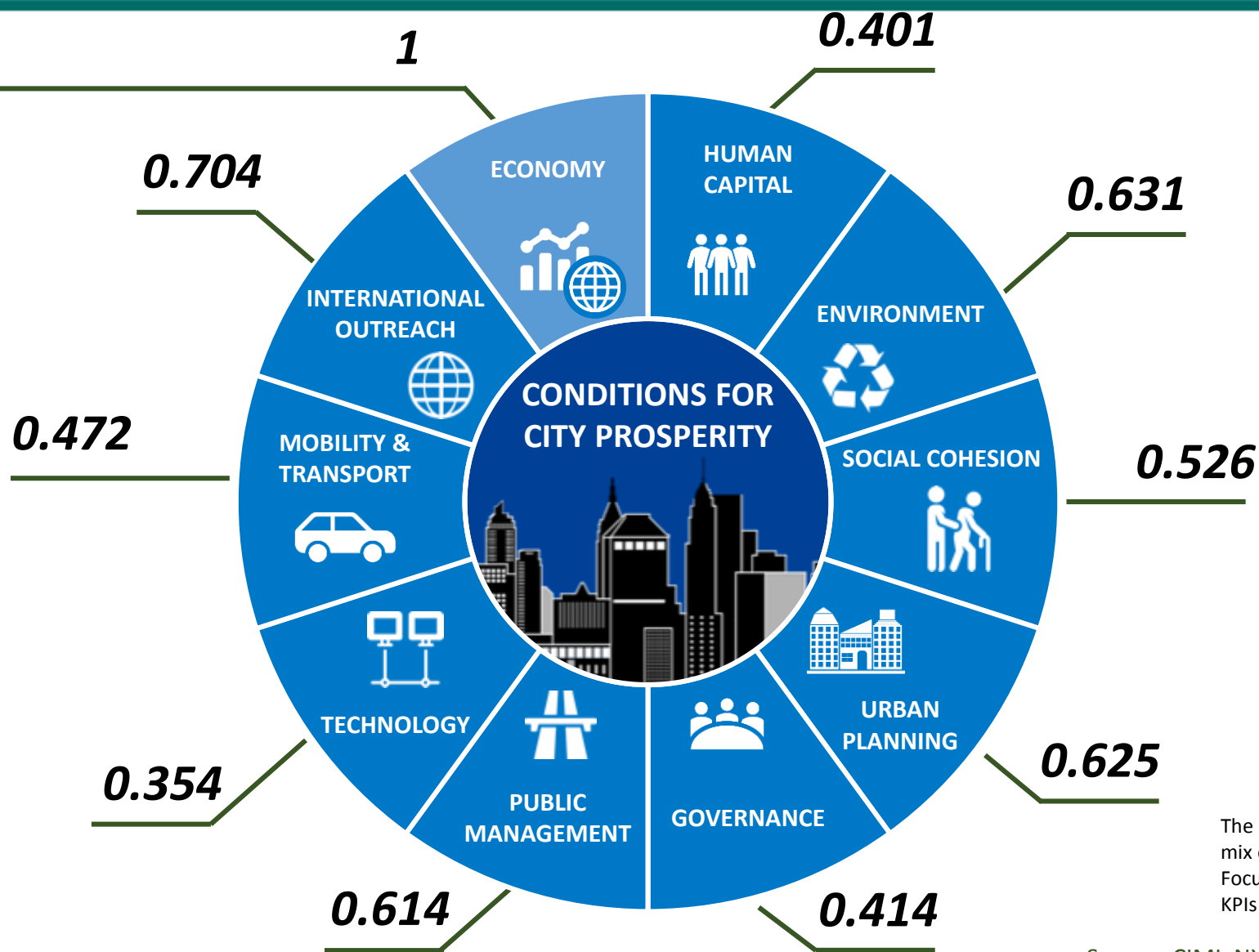
Ranking in the "Ease of Starting a Business" Index

Number of publicly traded company headquarters

Percentage of 18 to 64-year-old population who are new entrepreneurs or owners/managers of a new business (no more than 42 months)

Entrepreneurs - Companies in an initial phase that represent a city's economic bases.

GDP in millions of U.S. dollars at 2014 prices



The IESE factors are a mix of Dimensions and Focus areas but the ITU KPIs cover many of them

Source: CIMI, NXN analysis

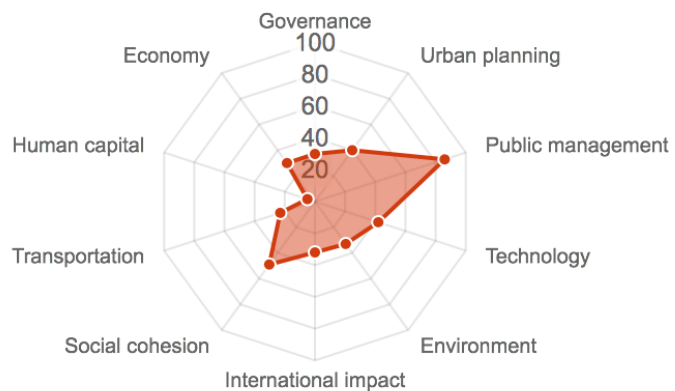


# IESE Cities In Motion Index: Riyadh & Jeddah as of 2017

RANKING

**138**

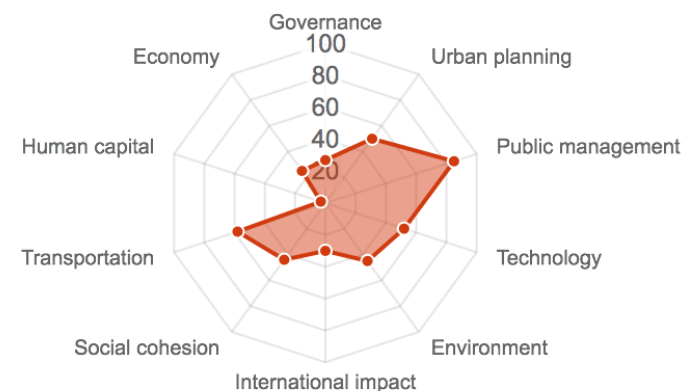
● Riyadh (Saudi Arabia)



RANKING

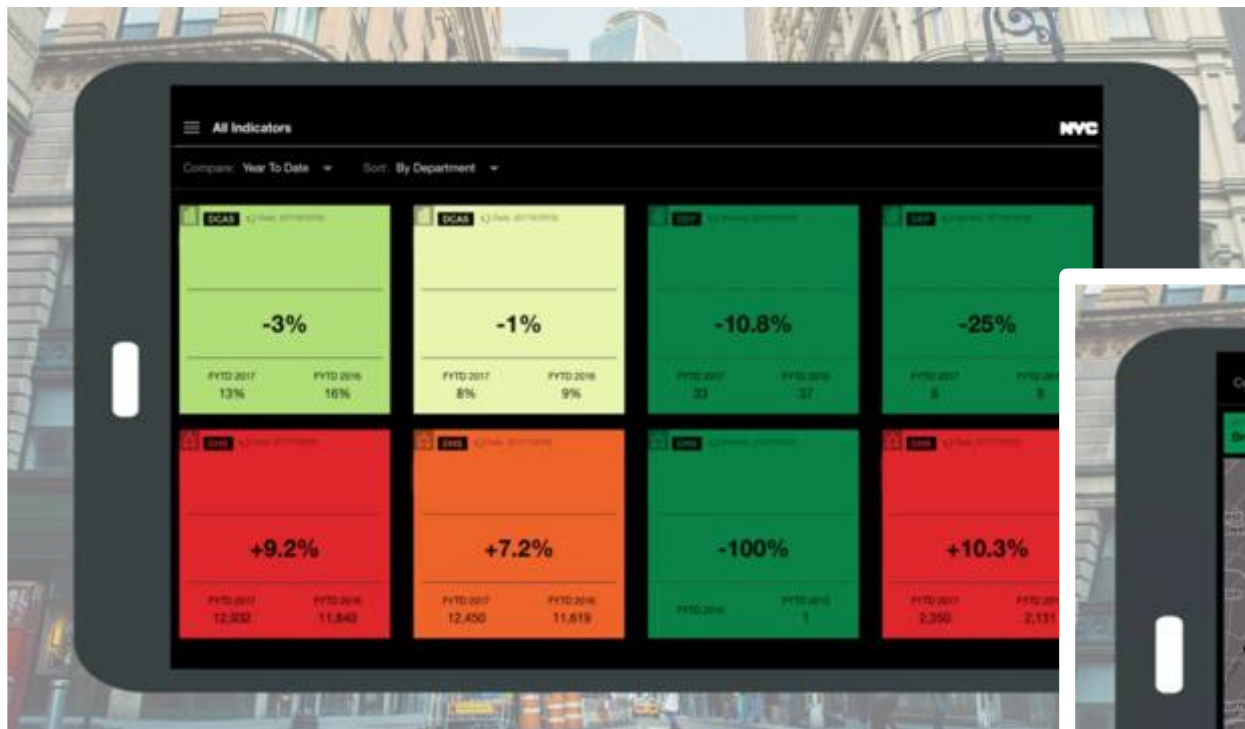
**120**

● Jeddah (Saudi Arabia)





# KPI Measurement – Smart City Real Time Dashboard



New York has created a dashboard for the Mayor and the senior management of the city to monitor progress at any time they need to.

KPIs and City Data can be monitored on a daily basis in real time and dashboards made accessible to all city stakeholder, including leadership officials.





# Critically, IESE CIMI Makes a Key Recommendation Identified in the Innovation Lab

## Recommendations

### **1. *Cities need to define their identity and establish a strategic plan.***

Define the identity of the city that will help set out the path of transformation that it must travel to achieve that identity. Strategic plans must be unique and individual for each city. escape the one-size-fits-all approach. The CIMI makes clear that there is no single model of success. The cities that top the ranking are not identical but prioritize various dimensions.

### **2. *The first step is a good diagnosis.***

One of the first activities in any strategic definition is to assess the current status of the city. Cities must identify their strengths and to find out places where there is room for improvement.

### **3. *The benchmark as the beginning of change***

it must be borne in mind that, while the challenges facing cities are global, their effects are local. Therefore, the benchmark should serve as a source of inspiration rather than as a road map for action.

### **4. *Need for an overview***

The CIMI makes clear that it is not enough to be good in only one dimension. A city should be capable of reaching acceptable minimums in the dimensions as a whole and understand that the technology is not the main (or only) ingredient of a smart city. There are other critical dimensions that define the urban situation.

### **5. *Collaboration as the cornerstone of success.***

Cities must fully understand the challenges facing cities are too big to be tackled individually. Collaboration is needed between different social partners, whether these be public, private, educational institutions, or nonprofit organizations.



*To accurately measure the success towards Smart City Goals there will be a KSA Index based on the ITU which can integrate to international indices*

1

The key is to have a flexible set of KPIs that will fit multiple indices as the ranking and maturity models evolve

2

Cities take all the KPIs from the KSA Index and apply the relevant ones required for the ranking list

2030 - 3 Cities should be top 10

2020 targets need to transform 5 cities into Smart Cities

## KSA Index

KPIs

Indices

100+ ITU Smart City KPIs  
+ IESE KPIs  
+ IDC KPIs



Past (Proprietary)



Today Open but Incomplete



Tomorrow Global Certified Standard

A subset of the 130+ KPIs can be measured on a more regular basis as a pulse for all Saudi cities

**INTRODUCTION**

**APPROACH**

**VISION & FUTURE ASPIRATIONS**

**CHALLENGES**

**STRATEGIC GOALS & OBJECTIVES**

**PRIORITY INITIATIVE**

**ROADMAP**

**APPENDICES**





# In Every Dimension, the Innovation Lab Identified Specific Activities

## Smart Economy

Suggest adding the following KPIs

- “Efficiency measurement” KPI
- “Private sector contribution” KPI
- “New Startups” KPI
- “Share of GDP” KPI
- Suggestion to map the SDGs (Sustainable Development Goals) to the Smart City Dimensions

## Smart Living

- Identified “Improving the quality of life (in the city)” as a key goal e.g. public spaces
- Adding “Smart Community” is closely tied to the Vision 2030 intention of strengthening volunteering and CSR.
- Develop a program to have community leaders/influencers encourage volunteering within the community. SAP have a benchmark in Vienna, Barcelona also

## Smart Governance

There is a need for 2 coordination bodies that sit across current entities:

- National Smart City Coordinating Body  
Develops national enablers
- Municipal Smart City Coordinating Bodies  
Implements initiatives
- Recommend passing a Smart City Act to set governance, frameworks and enforcement

## Smart People

- Link Education to Strategy
- Stress the need to invest in people
- Continue the implementation of MIT’s FabLabs in KSA but ensure they don’t become “geeky”

## Smart Environment

- Need smart regulation regarding buildings e.g.
  - all-glass facades
  - green space
  - plastic bags

## Smart Mobility

- Technology and regulation to control vehicle movement e.g. trucks at rush hour
- Regulation on autonomous vehicles
- Consider the social movement of people

## Enablers incl. Smart ICT

- Need clear national-level cyber-security regulations
- Need a program to promote/utilize the new developments in ICT
- Need a KPI to measure new technology implementation e.g. AI, Robotics, Blockchain



# High Potential Best Practices



## SMART ECONOMY

- Smartcity Campus 22
- Shared **Innovation Centers**
- i-City
- **Citilab** Innovation Hub
- Tech **Start-up Hub**
- Science Park
- Cyberport
- Future Cities Catapult
- **Geohub**
- **Digital.nyc**
- NYU CUSP
- Issy-les-Moulineaux SC
- THD Platform – Paris
- Global Culture City
- Seongsu IT Center
- **Smart Work Center**
- Incheon Free Economic Zone
- Eun-pyeong u-City
- Jurong Lake District
- Kista **Science City** Waterfront Toronto
- Aspern Urban Lake Side
- KOIL



## SMART LIVING

- **Telecare**
- Charite University Hospital
- **Visiting Nurse Service** of New York
- **Online learning** iZone
- City 24/7
- Welcome City Lab
- **U-Health Care**
- **Enhance Citizens' Safety through Smart Devices**
- iN2015 Healthcare and Biomedical Sciences Plan
- A Living Lab
- **Fujisawa Security**
- Senior Pad
- **Town Health Stations**
- E-Health



## SMART GOVERNANCE

- **Open Data Law**
- **Smart ID Card**
- **Fix my Street**
- Open Data
- **New York Open Data**
- Smart City
- Equitable City
- e-Services in Stockholm
- My Parra App
- Wellbeing Toronto



## SMART PEOPLE

- The Culture Diary
- BiblioBoard
- **Neighborhoods.nyc**
- Be Learner
- e-Institute
- **Learning Project of Tomorrow**



## SMART ENVIRONMENT

- **Smart Streetlights**
- **Smart Metering**
- Hammarby Sjostad
- NICE
- **Smart Grid Technologies**
- Copenhagen Connecting



## SMART MOBILITY

- Smartquesina
- An Open innovation platform
- **City Mapper**
- Midtown in Motion
- GTL
- **u-Shelter Bus Stops**
- **Intelligent Transport System**
- PLANET
- SMILE
- Mobypark
- **Smart Traffic Management**
- **Real-Time Parking**
- Intelligent Transport Systems
- **Driverless Buses**

- **City OS**
- **Safe City Test Bed**

## SMART ICT/ENABLERS



## INFRASTRUCTURE

- iN2015
- **Stokab Open Access Fiber**
- i-Scope



# High Potential Smart City Initiatives by Dimension

Initiatives of focus for MOMRA / MDC / NDU

Initiatives covered in other digitization blueprints

Initiatives of focus for other government entities

Initiatives NOT included in this blueprint

| Smart Economy                                                                                                                                                                                       | Smart Living                                                                                                                                                                                                                                                       | Smart Governance                                                                                                                                                                                                                                                                         | Smart Society                                                                                                                                                                                                                                                   | Smart Environment                                                                                                                                                                                                               | Smart Mobility                                                                                                                                                                                                                                                                                                        |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| <div>PPP Framework</div> <div>Procurement Policies</div> <div>Smart City Centre of Excellence</div> <div>Smart City Incubation Zone</div> <div>SME Access to Government</div> <div>E-Commerce</div> | <div>Public Safety Unified Video Cams.</div> <div>Social Media Sentiment Analysis</div> <div>Smart Districts</div> <div>Smart Parks</div> <div>Smart Building Guidelines</div> <div>Entertainment</div> <div>Digital Healthcare</div> <div>Digital Education</div> | <div>National Smart Governance</div> <div>Regional &amp; City Smart Governance</div> <div>Inspection + 940 Application</div> <div>SC Awareness Campaign / Education</div> <div>eDecision Making</div> <div>Paperless Services (Blockchain)</div> <div>Emerging Technology Policies</div> | <div>Smart City Training &amp; Transformation</div> <div>Emerging Technologies Training</div> <div>Electronic Issue Voting</div> <div>Accessibility Policies within Government</div> <div>Private Sector Accessibility Policies</div> <div>CSR Activation</div> | <div>Smart Municipal Buildings</div> <div>Smart LED Street Lights</div> <div>Renewable Energy</div> <div>Smart Water</div> <div>Smart Waste Mgmt</div> <div>Recycling Policy</div> <div>Publication of Environmental Data</div> | <div>Smart Parking</div> <div>Intelligent Traffic Management</div> <div>Traffic Sensing &amp; Prediction</div> <div>Smart Vehicle Pooling</div> <div>Electric Vehicles</div> <div>Smart Intermodal Public Transport</div> <div>Smart Infrastructure Control</div> <div>Autonomous Vehicle Municipal Initiatives</div> |                            |
| Smart Enablers                                                                                                                                                                                      | Cyber Security Policy & Systems                                                                                                                                                                                                                                    | City Networks: WIFI & IOT                                                                                                                                                                                                                                                                | Smart KSA Platform                                                                                                                                                                                                                                              | National Digital ID & Signature                                                                                                                                                                                                 | Unified City Apps                                                                                                                                                                                                                                                                                                     | Smart Parks Guidelines     |
|                                                                                                                                                                                                     | National Data Policy & City Data Framework                                                                                                                                                                                                                         | City Sensors                                                                                                                                                                                                                                                                             | Smart City Platform                                                                                                                                                                                                                                             | SDI                                                                                                                                                                                                                             | Smart City Control Centre                                                                                                                                                                                                                                                                                             | Smart Districts Guidelines |

Source: European Parliament, Smart Cities Council, City Protocol Society, "Smart Cities Readiness Guide", NXN analysis



# SMART ECONOMY



# PPP Framework (1/2): A Key Enabler to Project Funding

| PPP Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                              | GOVERNANCE             | NATIONAL INITIATIVE | CITY INITIATIVE                                                                               |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------|------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Objective     | Development of PPP Framework                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                              |                        |                     |                                                                                               |
| Description   | <p>The recommendation is to set up a PPP body to create and optimise:</p> <ul style="list-style-type: none"><li>• PPP Business Models</li><li>• Monitor and Control Mechanism</li><li>• Assessment Framework of Services</li><li>• Smart City Platform PPP Framework</li><li>• SPV / MSI Operating Model</li><li>• PPP Business Case Parameters</li><li>• PPP Contractual Templates</li><li>• Leverage Corporate Social Responsibility</li></ul> |      |                                                              |                        |                     | CHALLENGES                                                                                    |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                              |                        |                     | <div>GOVERNANCE</div> <div>BUDGET/PPP</div> <div>ENABLERS</div> <div>ICT INFRASTRUCTURE</div> |
| Dimension     | Smart Economy                                                                                                                                                                                                                                                                                                                                                                                                                                    | Goal | Public Private Partnerships<br>Fostering of entrepreneurship | Related KPI            |                     |                                                                                               |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                              | ITU Smart Economy KPIs |                     |                                                                                               |
| OWNER         | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                              | IMPACT                 | SAVINGS             | GDP + JOBS                                                                                    |
| MODEL         | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                              |                        |                     |                                                                                               |

Source: NXN analysis, Barcelona, Singapore. Adapted from OECD 2008; University of Melbourne 2008 <https://ppp-certification.com/ppp-certification-guide/52-efficiency-and-effectiveness-ppp-potential-source-higher-efficiency>



## PPP Framework (2/2):

Operations Models can Move Responsibility for Capital Investment to Private Sector Partners in Return for Time Based Licenses & Revenue Opportunities

| BUDGET                                                             | SOLUTIONS                          | MUNICIPALITY                   | PRIVATE SECTOR PARTNER           |
|--------------------------------------------------------------------|------------------------------------|--------------------------------|----------------------------------|
| [BOT]<br>BUILD – OPERATE –<br>TRANSFER                             | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |
| [BOO]<br>BUILD – OWN – OPERATE /<br>SMART PLATFORM<br>AS A SERVICE | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |
|                                                                    | SERVICE OPERATION                  |                                | PARTNER OPERATIONS               |
| [JV]<br>JOINT VENTURE                                              | PLATFORM BUILD-UP & MAINTENANCE    | (JOINT INVESTMENT & OPERATION) |                                  |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE |                                |                                  |
|                                                                    | PLATFORM OPERATION                 |                                |                                  |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |



# Public Sector Procurement Policies (Optimization) (1/2): Make Capital Investments More Efficient

| Procurement Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                                          | GOVERNANCE             | NATIONAL INITIATIVE | CITY INITIATIVE                                                                               |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------|------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Objective             | Development of Procurement Framework                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          |                        |                     |                                                                                               |
| Description           | <p>Recommend a set of concepts that can help cities efficiently find budget for implementing their strategies.</p> <ul style="list-style-type: none"><li>• Initiative twinning</li><li>• Integrated strategic procurement</li><li>• Initiative alignment across cities to produce economies of scale</li><li>• Sharing &amp; reusing standardized components for selected initiatives (e.g. sensors for smart parking initiatives)</li></ul> |      |                                                                                          |                        |                     | CHALLENGES                                                                                    |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                                          |                        |                     | <div>GOVERNANCE</div> <div>BUDGET/PPP</div> <div>ENABLERS</div> <div>ICT INFRASTRUCTURE</div> |
| Dimension             | Smart Economy                                                                                                                                                                                                                                                                                                                                                                                                                                | Goal | Policy enablers for a holistic smart city<br>Efficient and proactive government services | Related KPI            |                     |                                                                                               |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                                          | ITU Smart Economy KPIs |                     |                                                                                               |
| OWNER                 | MOMRA / NDU / MDC                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          | IMPACT                 | SAVINGS             | GDP + JOBS                                                                                    |
| MODEL                 | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                          |                        |                     |                                                                                               |



## Procurement Policies (2/2):

Solutions Could Include Creating New Models that take into Account a Bigger Picture and Twinning Revenue with Non Revenue Programs

BUDGET

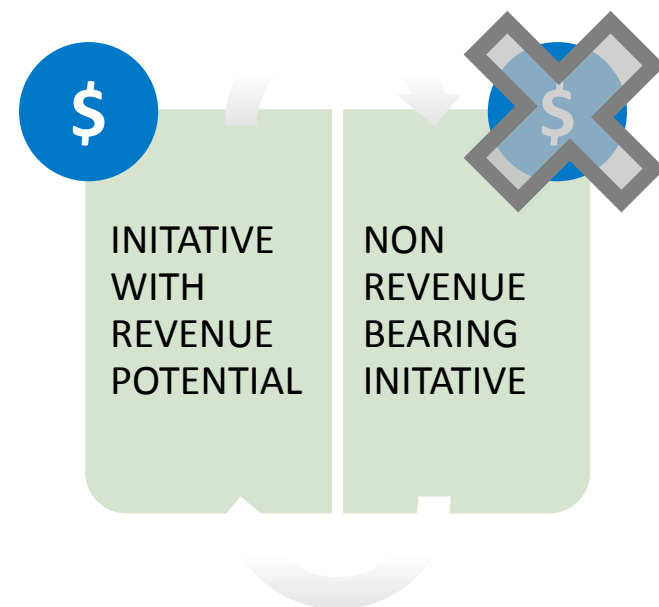
SOLUTIONS

### HIGHER LEVEL SCOPE BUDGETING



- Consideration needs to be taken of the cost / benefit at the national level when considering individual initiatives
- Benefits may accrue to the nation that are not necessarily accruing to the entity or initiative

### TWINNING BUSINESS MODELS



- In order to get maximum value from PPPs, Government entities should twin initiatives that bear revenue with ones that do not
- This ensures the private sector is incentivized to participate in areas that would traditionally continue to fall under government budgets



# Smart City Centre of Excellence: Helping Cities Leverage Each Others' Successes

| Smart City CoE |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        | GOVERNANCE                                          | NATIONAL INITIATIVE | CITY INITIATIVE    |      |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------|--------------------|------|
| Objective      | Cross pollination of initiatives between cities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        |                                                     |                     |                    |      |
| Description    | <p>The Smart City Centre of Excellence will gather initiatives executed by cities and distribute relevant information about them to other cities:</p> <ul style="list-style-type: none"><li>- including the initiative description, goals and achievements</li><li>- the operating model</li><li>- qualified vendors and partners</li></ul> <p>A competition and campaigns of bilateral awareness will be run to enhance excellence.</p> <p>The CoE will also showcase international best practice and incubate/co-ordinate pilots within cities.</p> <p>The CoE may work with partners and vendors to demonstrate new technologies.</p> <p>The CoE will be driven by the MDC, therefore MOMRA and NDU will ensure its operation</p> |      |                                                                                        |                                                     |                     | CHALLENGES         |      |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        |                                                     |                     | GOVERNANCE         |      |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        |                                                     |                     | BUDGET/PPP         |      |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        |                                                     |                     | ENABLERS           |      |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        |                                                     |                     | ICT INFRASTRUCTURE |      |
| Dimension      | Smart Economy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal | Citizens highly skilled in new technologies<br>Widespread use of emerging technologies | Related KPI                                         |                     |                    |      |
|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                        | ITU Smart Governance KPIs<br>ITU Smart Economy KPIs |                     |                    |      |
| OWNER          | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                        | IMPACT                                              | SAVINGS             | GDP +              | JOBS |
| MODEL          | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                                        |                                                     |                     |                    |      |



# Smart City Incubation Zone:

## Smart City Focused Start-up Innovation Ecosystem

| Smart City Incubation Zone |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       | GOVERNANCE             | NATIONAL INITIATIVE | CITY INITIATIVE    |      |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------------|------------------------|---------------------|--------------------|------|
| Objective                  | One-stop-shop innovation hub(s) focused on Smart-City related start-ups                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                       |                        |                     |                    |      |
| Description                | <p>Without the proper ecosystem, they cannot thrive. This initiative serves as a network, connecting start-ups with investors, resources, and funding. Start-ups can bring innovation and fresh ideas to KSA, and successful “unicorns” can catapult the Kingdom toward achieving its Vision 2030 objectives.</p> <p>The Incubation Zone will connect start-ups to Smart City opportunities within the Smart City program as well as to investors, mentors, supporting business services, support in entering the secondary market, and networking opportunities.</p> |      |                                                                       |                        |                     | CHALLENGES         |      |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       |                        |                     | GOVERNANCE         |      |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       |                        |                     | BUDGET/PPP         |      |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       |                        |                     | ENABLERS           |      |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       |                        |                     | ICT INFRASTRUCTURE |      |
| Dimension                  | Smart Economy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Goal | Give rise to home-grown solutions to serve KSA and the export market. | Related KPI            |                     |                    |      |
|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                       | ITU Smart Economy KPIs |                     |                    |      |
| OWNER                      | MOMRA (MDC), Cities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                                       | IMPACT                 | SAVINGS             | GDP +              | JOBS |
| MODEL                      | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                       |                        |                     |                    |      |



# SME Access to Government

| SME ACCESS TO GOVERNMENT |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                      | GOVERNANCE | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------|------------|---------------------|------------------------------------------------------------|
| Objective                | Link SMEs to government opportunities through a rich database of opportunities                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                      |            |                     |                                                            |
| Description              | <p>Link SMEs to government opportunities through a rich database of opportunities with contextualized city data, that gives access to potential government needs and opportunities, city data and global &amp; regional economy factors, allowing users to create future forecasts and scenarios.</p> <p>This will help stimulate the KSA SME market and the development of future generations of new digitally enabled business people and future growth in all areas across the economy.</p> |      |                                                                      |            |                     | CHALLENGES                                                 |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                      |            |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension                | Smart Economy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Goal | Grow the SME market through linking them to government opportunities |            |                     |                                                            |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      | Related KPI                                                          |            |                     |                                                            |
| OWNER                    | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                      | IMPACT     | SAVINGS             | GDP +                                                      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                      |            |                     | JOBS                                                       |
| MODEL                    | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                      |            |                     |                                                            |



# SMART LIVING



# Public Safety, Unified Video Cameras

| Public Safety, Unified Video Cameras |                                                                                                                                                                                                                                                                                                                                                                                                  |      |                        | GOVERNANCE                                                            | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------|-----------------------------------------------------------------------|---------------------|----------------------|------|--|
| Objective                            | Unified monitoring in public spaces enhances public safety and security while improving emergency care response times.                                                                                                                                                                                                                                                                           |      |                        |                                                                       |                     |                      |      |  |
| Description                          | The public surveillance smart services use a combination of multiple systems like CCTV, facial recognition, tracking service in order to provide multiple services from unified systems. For example public “tele-help” provide assistance to people with complex needs while located in public spaces by providing special and instant support by either paramedics or medical equipped drones. |      |                        |                                                                       |                     | CHALLENGES           |      |  |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                  |      |                        |                                                                       |                     | GOVERNANCE           |      |  |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                  |      |                        |                                                                       |                     | BUDGET/PPP           |      |  |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                  |      |                        |                                                                       |                     | ENABLERS             |      |  |
| Dimension                            | Smart Living                                                                                                                                                                                                                                                                                                                                                                                     | Goal | Safe and secure cities | Related KPIs                                                          |                     |                      |      |  |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                  |      |                        | Availability of ICT based systems that increase the perceived safety. |                     |                      |      |  |
| OWNER                                | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                        |      |                        | IMPACT                                                                | SAVINGS             | GDP +                | JOBS |  |
| MODEL                                | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                        |      |                        |                                                                       |                     |                      |      |  |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources



# Social Media Sentiment Analysis

| Social Media Sentiment Analysis |                                                                                                                                                                                                                                                                                                                                    |      |                                                                      | GOVERNANCE                    | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------|-------------------------------|---------------------|----------------------|------|--|
| Objective                       | Gauge sentiment analysis using public social media information to ascertain public sentiment and improve services.                                                                                                                                                                                                                 |      |                                                                      |                               |                     |                      |      |  |
| Description                     | Implement, and put into use, social media analysis tools that scan the public social media information. The idea is to discover patterns and make sense of the data and ultimately to deduce useful information that allows cities to help cities monitor citizen needs and preferences, enhance services and manage expectations. |      |                                                                      |                               |                     | CHALLENGES           |      |  |
|                                 |                                                                                                                                                                                                                                                                                                                                    |      |                                                                      |                               |                     | GOVERNANCE           |      |  |
|                                 |                                                                                                                                                                                                                                                                                                                                    |      |                                                                      |                               |                     | BUDGET/PPP           |      |  |
|                                 |                                                                                                                                                                                                                                                                                                                                    |      |                                                                      |                               |                     | ENABLERS             |      |  |
| Dimension                       | Smart Living                                                                                                                                                                                                                                                                                                                       | Goal | Better understanding of public sentiment and improvement of services | Related KPIs                  |                     |                      |      |  |
|                                 |                                                                                                                                                                                                                                                                                                                                    |      |                                                                      | Population satisfaction index |                     |                      |      |  |
| OWNER                           | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                        |      |                                                                      | IMPACT                        | SAVINGS             | GDP +                | JOBS |  |
| MODEL                           | CAPEX                                                                                                                                                                                                                                                                                                                              |      |                                                                      |                               |                     |                      |      |  |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources



# Smart Parks

| Smart Parks |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                     | GOVERNANCE                    | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------|-------------------------------|---------------------|----------------------|
| Objective   | Open Spaces with technology, safety and entertainment services                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                     |                               |                     |                      |
| Description | <p>Urban redevelopment is an economic engine and a reform mechanism for city-initiated development projects. They contribute to the city’s social and economic fabric through sustainable development, efficient public services, and advanced ICT infrastructure.</p> <p>Part of the initiative development would include an examination of the current implementations and the lessons learnt, and then designing the services and associated technologies that a Smart Park should support along with a set of guidelines for implementing Smart Parks allowing the different cities an easier and more assured path towards implementing Smart Parks.</p> |      |                                                     |                               |                     | CHALLENGES           |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                     |                               |                     | GOVERNANCE           |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                     |                               |                     | BUDGET/PPP           |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                     |                               |                     | ENABLERS             |
| Dimension   | Smart Living (the Parks)<br>Enablers (the Guidelines)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Goal | Public Spaces providing education and entertainment | Related KPIs                  |                     |                      |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                     | Population satisfaction index |                     |                      |
| OWNER       | NDU / MDC / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                     | IMPACT                        | SAVINGS             | GDP + JOBS           |
| MODEL       | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                     |                               |                     |                      |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources



# Smart Districts

| Smart Districts |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               | GOVERNANCE                    | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------|-------------------------------|---------------------|----------------------|
| Objective       | Designated city districts supported with technology, safety and entertainment services                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                               |                               |                     |                      |
| Description     | <p>Support the cities’ urban development efforts through advocating for and supporting the implementation of Smart Districts as a building block towards city-wide Smart City initiative development.</p> <p>The initiative seeks to build on the Smart District pilots and develop a template for Smart District design including the services and associated technologies along with a set of guidelines that provide a coherent and common architecture and disseminate the pilots’ achievements and best practices towards other cities.</p> |      |                                               |                               |                     | CHALLENGES           |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               |                               |                     | GOVERNANCE           |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               |                               |                     | BUDGET/PPP           |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               |                               |                     | ENABLERS             |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               |                               |                     | ICT INFRASTRUCTURE   |
| Dimension       | Smart Living (the Districts)<br>Enablers (the Guidelines)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal | Smart city districts<br>guidelines and pilots | Related KPIs                  |                     |                      |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                               | Population satisfaction index |                     |                      |
| OWNER           | NDU / MDC / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                               | IMPACT                        | SAVINGS             | GDP + JOBS           |
| MODEL           | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                               |                               |                     |                      |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources



# Smart Building Guidelines

| Building Guidelines |                                                                                                                                                                                                                                                                                                                                                                    |      |                     | GOVERNANCE                                                                                                                              | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|------|
| Objective           | Enhance Building regulations with Smart services                                                                                                                                                                                                                                                                                                                   |      |                     |                                                                                                                                         |                     |                      |      |
| Description         | <p>Guidelines that are integrated into building regulations to enhance buildings.</p> <ul style="list-style-type: none"><li>• ICT systems to manage building functions</li><li>• Energy management &amp; generation</li><li>• Central system management for all systems</li><li>• Central system management for multiple buildings</li><li>• IOT sensors</li></ul> |      |                     |                                                                                                                                         |                     | CHALLENGES           |      |
|                     |                                                                                                                                                                                                                                                                                                                                                                    |      |                     |                                                                                                                                         |                     | GOVERNANCE           |      |
|                     |                                                                                                                                                                                                                                                                                                                                                                    |      |                     |                                                                                                                                         |                     | BUDGET/PPP           |      |
|                     |                                                                                                                                                                                                                                                                                                                                                                    |      |                     |                                                                                                                                         |                     | ENABLERS             |      |
|                     | ICT INFRASTRUCTURE                                                                                                                                                                                                                                                                                                                                                 |      |                     |                                                                                                                                         |                     |                      |      |
| Dimension           | Smart Living                                                                                                                                                                                                                                                                                                                                                       | Goal | Efficient Buildings | Related KPIs                                                                                                                            |                     |                      |      |
|                     |                                                                                                                                                                                                                                                                                                                                                                    |      |                     | Application level of energy saving technologies in public buildings.<br><br>Percentage of public buildings with integrated technologies |                     |                      |      |
| OWNER               | NDU / MDC / EACH CITY                                                                                                                                                                                                                                                                                                                                              |      |                     | IMPACT                                                                                                                                  | SAVINGS             | GDP +                | JOBS |
| MODEL               | CAPEX                                                                                                                                                                                                                                                                                                                                                              |      |                     |                                                                                                                                         |                     |                      |      |



# Entertainment

| Incubation and provision of entertainment |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 | GOVERNANCE            | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------|-----------------------|---------------------|----------------------|------|
| Objective                                 | Using technology to provide entertainment in the city                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                 |                       |                     |                      |      |
| Description                               | <p>Various initiatives to enhance entertainment of citizens and residents in the city through applying technology to physical and digital entertainment. Examples may include:</p> <ul style="list-style-type: none"><li>• Smart street furniture e.g. games on street lights, musical swings</li><li>• Incubating and encouraging Saudi SMEs to provide entertainment, gamification of government services</li><li>• A Cultural Portal is for any cultural organization, from small independent organizations to major national institutions. It is a tool for cultural organizations to add and share cultural events planned across the city and around the world to provide better strategic planning and clash avoidances for public and private events.</li><li>• Gameification has proven to enhance satisfaction with government services</li></ul> |      |                                                 |                       |                     | CHALLENGES           |      |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 |                       |                     | GOVERNANCE           |      |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 |                       |                     | BUDGET/PPP           |      |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 |                       |                     | ENABLERS             |      |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 |                       |                     | ICT INFRASTRUCTURE   |      |
| Dimension                                 | Smart Living                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Goal | Environmentally and socially sustainable cities | Related KPIs          |                     |                      |      |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                 | NTP Entertainment KPI |                     |                      |      |
| OWNER                                     | NDU / MDC / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                 | IMPACT                | SAVINGS             | GDP +                | JOBS |
| MODEL                                     | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                 |                       |                     |                      |      |



# SMART GOVERNANCE



# National Governance Framework (1/5):

## Enabling a Clear Assignment of Responsibility and Co-ordination

| National Governance Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                       | GOVERNANCE | NATIONAL INITIATIVE | CITY INITIATIVE    |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------|------------|---------------------|--------------------|
| Objective                     | Policies, standards and national enablers for Smart Cities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                       |            |                     |                    |
| Description                   | <b>The recommendation is to set up a Governance Committee to create:</b> <ul style="list-style-type: none"> <li>• A National Smart City Act</li> <li>• National Smart City Policies, Regulations and Guidelines including: Infrastructure and utilities, Telecommunications, Cyber Security, Data Governance Implementation (in alignment with the Data Governance Committee), Blockchain / SDI / Identity / Electronic payment</li> <li>• National enablers, which include Smart KSA Platform, Digital ID, SDI, into municipal systems and services</li> <li>• Ensure ownership and execution</li> <li>• Capture existing regulation in each space as a starting point</li> </ul> |      |                                       |            |                     | CHALLENGES         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                       |            |                     | GOVERNANCE         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                       |            |                     | BUDGET/PPP         |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                       |            |                     | ENABLERS           |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                       |            |                     | ICT INFRASTRUCTURE |
| Dimension                     | Smart Governance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Goal | A government organized to collaborate |            |                     |                    |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      | Related KPI                           |            |                     |                    |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      | ITU Smart Governance KPIs             |            |                     |                    |
| OWNER                         | MOMRA (MDC*)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                       | IMPACT     | SAVINGS             | GDP + JOBS         |
| MODEL                         | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                       |            |                     |                    |

\* Municipal Digitization Committee

Source: NXN analysis, ABI Research, TMForum, World Bank



## National Governance Framework (2/5):

The Governance Committee will Establish a Number of Sub Committees to Co-ordinate Specific Tracks

### Smart City Act

Establish the legal framework for cross entity co-ordination of Smart Cities and their measurement.

#### Data Governance

Establish a comprehensive Data Governance policy which is enacted through a Data Law. This policy is further enabled with data security & privacy laws.

#### ICT Budgets

Standardize policies on ICT procurement across the public sector. Policies are implemented to guide Public spending on ICT & on operations optimization using ICT. Align with PPP framework.

#### Innovation & Knowledge Development

Foster innovation through policies and government sponsorship. Focus on the educational development of the knowledge sector through public policy. Involve policymakers in public participation.

#### Public Participation

Implement flexible legal framework for public entities procurement of public participation outcomes. Establish policies for encouraging end user involvement for economic and innovation promotion.

#### Urbanization Guidelines

Provide guidelines for: district development (such as TODs), Smart Services MARCOMMS, user experience and for public participation initiatives.

#### Community Cohesion

Provide guidelines to develop communities and build national partnerships that cities can leverage to encourage community action.



## National Governance Framework (3/5):

The Governance Committee will Establish a Number of Sub Committees to Co-ordinate Specific Tracks

### Digital Identity

Create a national digital identity and the framework for its use across government systems and the private sector. Establish the program to implement the KSA digital identity and drive its adoption.

### Smart KSA Platform

Create a national smart data and application platform architecture for its use across ministries, cities and the private sector. Establish the program to implement the KSA platform and drive its adoption.

### Cyber Security

Set guidelines and standards for government systems to ensure cyber security. Define a program of adherence and necessary regulation to enforce it.

### Paperless Government

Create policies, standards and a program to implement fluid, efficient and paperless government workflows and services leveraging distributed ledger systems.

### Unified Geo Spatial Data

Create a national GEO data and application platform architecture for its use across ministries, cities and the private sector. Establish the program to implement the national standards and drive its adoption.

### Electronic Payment (eCom.)

Foster eCommerce and enhance government revenues through a program of policies, standards and platforms to deliver electronic payment for all government services.

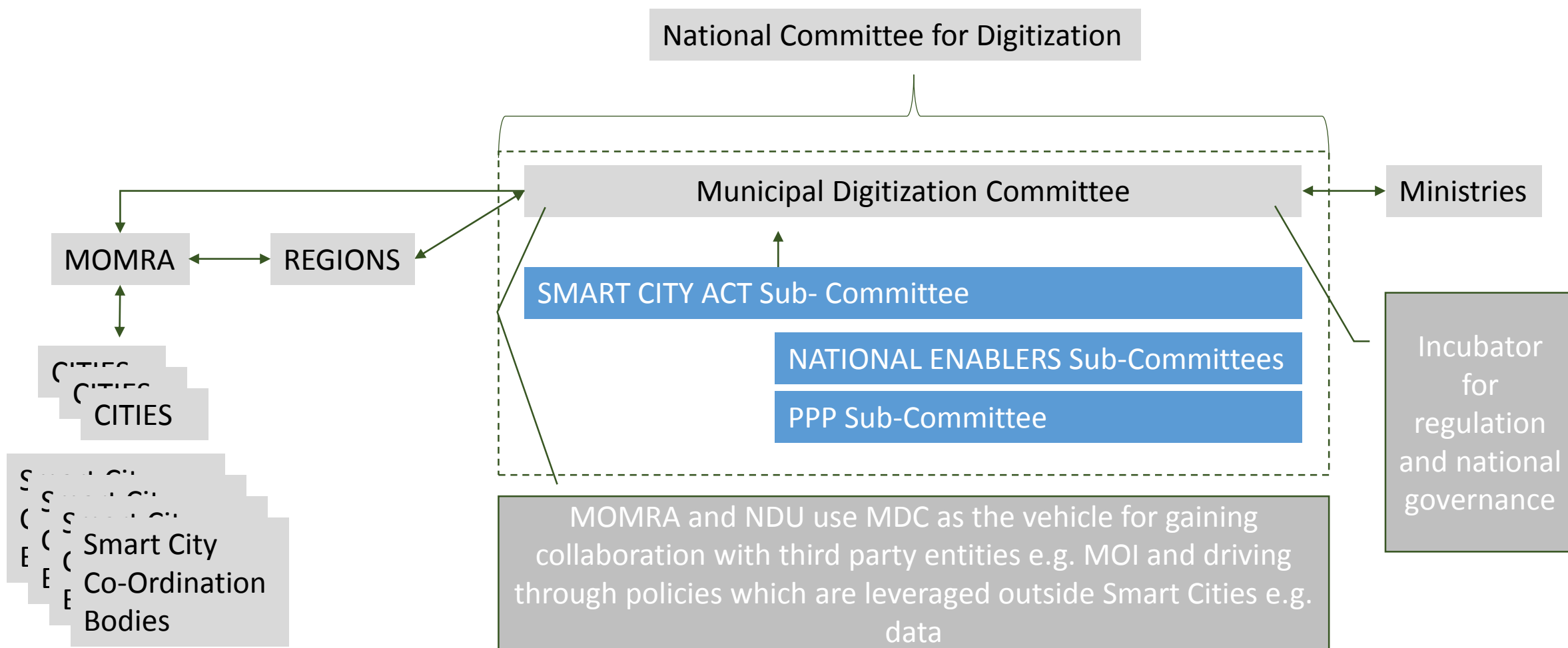
### Emerging Technologies

Standards and incubation of emerging technologies for Smart Cities



# National Governance Framework (4/5): Enabling a Clear Assignment of Responsibility and Co-ordination

ILLUSTRATIVE





# National Governance Framework (5/5):

Governance of Initiatives Between the Layers of Government to Ensure Maximum Efficiency

GOVERNANCE

SOLUTIONS

MULTIPLAYER ORGANIZATION

ADAPTED PROCESSES

LEVERAGE OF TECHNOLOGY

## SMART GOVERNANCE

**Smart city leaders should establish leadership and governance arrangements that ensure:**

- An agreed, transparent roadmap
- National standards municipal implementation
- Rights of central agencies to operate within municipalities need to be clarified
- Alignment on roadmap may help reduce duplication of effort and inefficiency broad-based leadership team across the city;
- City leaders are brought together on a cross-sectoral basis into effective governance arrangements, at both the strategic and delivery levels;
- The right skills mix in the leadership team;
- An ability to manage organizational evolution among city partner organizations;
- Openness and transparency in the governance process, including through digitally-enabled models of public participation.





# Regional Smart Governance:

## Enabling a Clear Assignment of Responsibility and Co-ordination

| Smart Governance |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    | GOVERNANCE                | NATIONAL INITIATIVE | CITY INITIATIVE    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------|---------------------------|---------------------|--------------------|
| Objective        | Policies, standards and REGIONAL enablers for Smart Cities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                    |                           |                     |                    |
| Description      | <p>The recommendation is to set up a Governance Committee to create:</p> <ul style="list-style-type: none"><li>• REGIONAL Smart City Policies, Regulations and Guidelines including: Infrastructure and utilities, Telecommunications, Cyber Security, Data Governance Implementation (in alignment with the Data Governance Committee), Blockchain / SDI / Identity / Electronic payment</li><li>• REGIONAL enablers, which include Smart KSA Platform, Digital ID, SDI, into municipal systems and services</li><li>• Ensure ownership and execution</li></ul> |      |                                                                                    |                           |                     | CHALLENGES         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    |                           |                     | GOVERNANCE         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    |                           |                     | BUDGET/PPP         |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    |                           |                     | ENABLERS           |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    |                           |                     | ICT INFRASTRUCTURE |
| Dimension        | Smart Governance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Goal | A government organized to collaborate<br>Policy enablers for a holistic smart city | Related KPI               |                     |                    |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    | ITU Smart Governance KPIs |                     |                    |
| OWNER            | EACH REGION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                    | IMPACT                    | SAVINGS             | GDP + JOBS         |
| MODEL            | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    |                           |                     |                    |



# City Smart Governance: Enabling a Clear Assignment of Responsibility and Co-ordination

| Smart Governance |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                 | GOVERNANCE                | NATIONAL INITIATIVE | CITY INITIATIVE                                                                               |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------|---------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Objective        | A transversal organization within the municipality to co-ordinate Smart City implementation and oversee cross entity systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                                                 |                           |                     |                                                                                               |
| Description      | <p>The recommendation is to set up a Smart City Co-ordinating Body to oversee:</p> <ul style="list-style-type: none"><li>• Enactment of National Smart City Policies, Regulations and Guidelines including: Infrastructure and utilities, Telecommunications, Physical Security, Cyber Security, Data Governance Implementation (in alignment with the Data Governance Committee), Blockchain / SDI / Identity</li><li>• Integration of National enablers, which include Smart KSA Platform, Digital ID, SDI, into municipal systems and services</li><li>• Creation of Smart city capabilities that are across city entities, such as a Smart City Platform</li></ul> |      |                                                                                 |                           |                     | CHALLENGES                                                                                    |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                 |                           |                     | <div>GOVERNANCE</div> <div>BUDGET/PPP</div> <div>ENABLERS</div> <div>ICT INFRASTRUCTURE</div> |
| Dimension        | Smart Governance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Goal | A government organized to collaborate Policy enablers for a holistic smart city | Related KPI               |                     |                                                                                               |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                 | ITU Smart Governance KPIs |                     |                                                                                               |
| OWNER            | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      | IMPACT                                                                          | SAVINGS                   | GDP +               | JOBS                                                                                          |
| MODEL            | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                 |                           |                     |                                                                                               |



# Smart Inspection Platform

| Smart Inspector Platform |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        | GOVERNANCE                                                                   | NATIONAL INITIATIVE | CITY INITIATIVE    |      |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------|------------------------------------------------------------------------------|---------------------|--------------------|------|
| Objective                | An application that combines 940 systems and inspector systems to make inspection more efficient and involve citizens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                        |                                                                              |                     |                    |      |
| Description              | <ul style="list-style-type: none"><li>Riyadh Municipality has provided a <b>Plus940</b> service to residents of Riyadh city, where the Emergency center has developed an application to provide the latest methods of notifications delivery to Riyadh Municipality.</li><li>This service will thus build on this service offering to make inspection paperless and leverage current information from 940 systems provided by citizens. The system will allow for inspectors to submit reports and access all necessary data from their mobile device.</li><li>Citizens will be informed of resolutions to reported incidents and notifications of positive, negative inspections. A workflow will track and report on inspection advancement, prioritization of inspections, routing, resolutions and ensure KPI / SLA adherence.</li><li>The application will also be a platform for private sector inspection through PPP. Inspection partnerships will incorporate transformation fro public inspectors.</li><li>The inspection platform will enhance inspection with IOT, Drones, Blockchain, AI and other technologies.</li></ul> |      |                        |                                                                              |                     | CHALLENGES         |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        |                                                                              |                     | GOVERNANCE         |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        |                                                                              |                     | BUDGET/PPP         |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        |                                                                              |                     | ENABLERS           |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        |                                                                              |                     | ICT INFRASTRUCTURE |      |
| Dimension                | Smart Governance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal | Safe and secure cities | Related KPIs                                                                 |                     |                    |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                        | Provision of online systems for administering public services and facilities |                     |                    |      |
| OWNER                    | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                        | IMPACT                                                                       | SAVINGS             | GDP +              | JOBS |
| MODEL                    | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                        |                                                                              |                     |                    |      |

Source: NXN analysis, Barcelona, Singapore. Adapted from OECD 2008; University of Melbourne 2008 <https://ppp-certification.com/ppp-certification-guide/52-efficiency-and-effectiveness-ppp-potential-source-higher-efficiency>



# Smart City Awareness / Education

| Smart City Awareness |                                                                                                                                                                                                                                      |      |                                       | GOVERNANCE                                                                                                            | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------|
| Objective            | Make citizens and companies aware of Smart City initiatives, how they can benefit from them and how they can help                                                                                                                    |      |                                       |                                                                                                                       |                     |                                                            |
| Description          | Marketing campaigns and interactive digital activities.<br>Communication on Smart City as a whole and individual initiatives.<br>Engagement with citizens on service design.<br>Proactive analytics of citizen requests, activities. |      |                                       |                                                                                                                       |                     | CHALLENGES                                                 |
|                      |                                                                                                                                                                                                                                      |      |                                       |                                                                                                                       |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension            | Smart Governance                                                                                                                                                                                                                     | Goal | Bilateral communication with citizens | Related KPIs                                                                                                          |                     |                                                            |
|                      |                                                                                                                                                                                                                                      |      |                                       | Appliance of smart community services.<br>Satisfaction Index (for individuals and businesses) with municipal services |                     |                                                            |
| OWNER                | MOMRA (MDC) / EACH CITY                                                                                                                                                                                                              |      |                                       | IMPACT                                                                                                                | SAVINGS             | GDP + JOBS                                                 |
| MODEL                | CAPEX/PPP                                                                                                                                                                                                                            |      |                                       |                                                                                                                       |                     |                                                            |

Source: NXN analysis, World Bank, European Union “Report on Innovative Citizen Engagement Strategies”



# Paperless Services (Blockchain)

| Paperless Government Services |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          | GOVERNANCE   | NATIONAL INITIATIVE | CITY INITIATIVE |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------|--------------|---------------------|-----------------|
| Objective                     | Create seamless paperless services for citizens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          |              |                     |                 |
| Description                   | <p>Enhance government services with true paperless service flows and permanent, trusted digital records. Optimisation of processes to leverage completely digital records and integration of enablers such as ID. Create a platform for blockchain services and deploy high impact use cases through it, including:</p> <ul style="list-style-type: none"><li>• Multi departments Committee &amp; citizen request decision processes e.g. building permits</li><li>• License or permit request processes &amp; their attendant documentation e.g. shop licenses</li><li>• Certificates e.g. birth and death certificates</li><li>• Access to sensitive systems, in conjunction with digital identity e.g. security systems</li><li>• Integration of digital identity and payment seamlessly into process flows e.g. fee payments</li></ul> |      |                                                                                          |              | CHALLENGES          |                 |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          |              | GOVERNANCE          |                 |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          |              | BUDGET/PPP          |                 |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          |              | ENABLERS            |                 |
|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                          |              | ICT INFRASTRUCTURE  |                 |
| Dimension                     | Smart Governance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Goal | Efficient and proactive government services<br>Citizens participating in decision making | Related KPIs |                     |                 |
|                               | Appliance of smart community services.<br>Satisfaction Index (for individuals and businesses) with municipal services                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                          |              |                     |                 |
| OWNER                         | MOMRA (MDC) / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                                          | IMPACT       | SAVINGS             | GDP + JOBS      |
| MODEL                         | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                          |              |                     |                 |



# Emerging Technology Policies

| Smart Government |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  | GOVERNANCE                                                     | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------|----------------------------------------------------------------|---------------------|----------------------|
| Objective        | Incentivize and structure the adoption of emerging technologies.                                                                                                                                                                                                                                                                                                                   |              |                                                  |                                                                |                     |                      |
| Description      | <p>Set national policies to enhance the adoption of emerging technologies by setting legal, procurement and private sector policies.</p> <p>Establish appropriate incentives to develop the technology.</p> <p>Establish physical hubs where the technology can evolve.</p> <p>Technologies can include AI, 3D Printing, Augmented Reality, Robotics and others as they emerge</p> |              |                                                  |                                                                |                     | CHALLENGES           |
|                  |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  |                                                                |                     | GOVERNANCE           |
|                  |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  |                                                                |                     | BUDGET/PPP           |
|                  |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  |                                                                |                     | ENABLERS             |
|                  |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  |                                                                |                     | ICT INFRASTRUCTURE   |
| Dimension        | Smart Governance                                                                                                                                                                                                                                                                                                                                                                   | Goal         | Widespread use of emerging technologies          | Related KPIs                                                   |                     |                      |
|                  |                                                                                                                                                                                                                                                                                                                                                                                    |              |                                                  | Use of emerging technologies (AI, Robotics, 3D Printing, etc.) |                     |                      |
| OWNER            | MOMRA (MDC)/NDU/EACH CITY                                                                                                                                                                                                                                                                                                                                                          |              |                                                  | IMPACT                                                         | SAVINGS             | GDP +                |
| MODEL            | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                          | IMPACT SCALE | Create jobs equivalent to 0.1% of the population |                                                                |                     |                      |



# SMART SOCIETY



# Smart City Training & Transformation

| Smart City Training & Transformation |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                             | GOVERNANCE                                                                          | NATIONAL INITIATIVE | CITY INITIATIVE                                                                               |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------|-------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Objective                            | Ensure training and opportunities for Saudis within Smart City initiatives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                             |                                                                                     |                     |                                                                                               |
| Description                          | <p>Ensuring that the Smart City transformation surfaces opportunities for Saudis and manages the changes in roles / skills sets that will be required. There are two key tracks:</p> <ul style="list-style-type: none"><li>• Training and new skills opportunities for existing employees of entities impacted by transformation, ensuring that roles are found for Saudis impacted by changes</li><li>• Skills training and opportunities for new roles that will be created by Smart City transformation, ensuring Saudis can fill new roles that are created</li><li>• Human Resource Management</li></ul> |      |                                             |                                                                                     |                     | CHALLENGES                                                                                    |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                             |                                                                                     |                     | <div>GOVERNANCE</div> <div>BUDGET/PPP</div> <div>ENABLERS</div> <div>ICT INFRASTRUCTURE</div> |
| Dimension                            | Smart Society                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Goal | Citizens highly skilled in new technologies | Related KPIs                                                                        |                     |                                                                                               |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                             | Employees belonging to ICT sector<br>Employment rate in knowledge-intensive sectors |                     |                                                                                               |
| OWNER                                | MOMRA (MDC) / NDU / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                             | IMPACT                                                                              | SAVINGS             | GDP + JOBS                                                                                    |
| MODEL                                | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                             |                                                                                     |                     |                                                                                               |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources, FIT Ireland, Smart Cities Council



# Electronic Issue Voting

| Electronic Issue Voting |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             | GOVERNANCE                    | NATIONAL INITIATIVE | CITY INITIATIVE    |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------|-------------------------------|---------------------|--------------------|
| Objective               | Engage the public and give them a voice in decision making.                                                                                                                                                                                                                                                                                                                                                                                           |      |                                             |                               |                     |                    |
| Description             | <p>Engage the public in suitable city decisions and create a more engaging culture. In its simplest form, you can engage the public at large with specific questions and provide results in real-time, both to the public and to city officials.</p> <p>Through tying this to the National Digital ID, you will be able to address the population at large or target a certain sub-group giving you insight into specific groups or demographics.</p> |      |                                             |                               |                     | CHALLENGES         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             |                               |                     | GOVERNANCE         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             |                               |                     | BUDGET/PPP         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             |                               |                     | ENABLERS           |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             |                               |                     | ICT INFRASTRUCTURE |
| Dimension               | Smart Society                                                                                                                                                                                                                                                                                                                                                                                                                                         | Goal | Citizens highly skilled in new technologies | Related KPIs                  |                     |                    |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                             | Population satisfaction index |                     |                    |
| OWNER                   | MOMRA (MDC) / NDU / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                             | IMPACT                        | SAVINGS             | GDP + JOBS         |
| MODEL                   | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                             |                               |                     |                    |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources, FIT Ireland, Smart Cities Council



# Accessibility Policies Within Government

| Accessibility Policies Within Government |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                 | GOVERNANCE                          | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------|-------------------------------------|---------------------|----------------------|------|--|
| Objective                                | Enhance accessibility to government facilities and digital services.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                                 |                                     |                     |                      |      |  |
| Description                              | <p>The objective is to define a standard for a high level of accessibility for all government facilities and services with special attention directed towards government web pages and apps. The standard would define the accessibility standards for the main types of disabilities visual, hearing, motor or cognitive.</p> <p>The government would also publish a set of best practices and implementation guidelines to facilitate individual site and app developers/purveyors compliance with the standard.</p> |      |                                                                 |                                     |                     | CHALLENGES           |      |  |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                 |                                     |                     | GOVERNANCE           |      |  |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                 |                                     |                     | BUDGET/PPP           |      |  |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                 |                                     |                     | ENABLERS             |      |  |
| Dimension                                | Smart Society                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Goal | Government services that are accessible to handicapped citizens | Related KPIs                        |                     |                      |      |  |
|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                 | Number of accessibility initiatives |                     |                      |      |  |
| OWNER                                    | MOMRA (MDC)/NDU/EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                 | IMPACT                              | SAVINGS             | GDP +                | JOBS |  |
| MODEL                                    | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                 |                                     |                     |                      |      |  |



# Private Sector Accessibility Policies

| Private Sector Accessibility Policies |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    | GOVERNANCE                          | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------|-------------------------------------|---------------------|----------------------|
| Objective                             | Enhance accessibility to physical and digital services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                                    |                                     |                     |                      |
| Description                           | Guiding principles for the planning and development of accessible Smart Cities programs<br>Model policies for Smart Cities programs to adopt for ensuring a commitment to accessibility<br>Inventory of relevant accessibility technical standards<br>Database of accessible Smart Cities solutions and a platform to share best practices and transfer knowledge<br>Catalog of Smart Cities accessibility indicators and metrics<br>Capacity building programs for CIOs, and technology leaders<br>Other specific tools to ensure that accessible technology is an explicit and central component of Smart Cities programs |      |                                                    |                                     |                     | CHALLENGES           |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    |                                     |                     | GOVERNANCE           |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    |                                     |                     | BUDGET/PPP           |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    |                                     |                     | ENABLERS             |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    |                                     |                     | ICT INFRASTRUCTURE   |
| Dimension                             | Smart Society                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Goal | Cities that are accessible to handicapped citizens | Related KPIs                        |                     |                      |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                    | Number of accessibility initiatives |                     |                      |
| OWNER                                 | MOMRA (MDC)/NDU/EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | IMPACT                                             | SAVINGS                             | GDP +               | JOBS                 |
| MODEL                                 | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                    |                                     |                     |                      |



# CSR Activation

| CSR Activation |                                                                                                                                                                                                                                                                                                                                              |      |                                       | GOVERNANCE                | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------|---------------------------|---------------------|----------------------|
| Objective      | Activation of CSR initiatives to provide Smart City services                                                                                                                                                                                                                                                                                 |      |                                       |                           |                     |                      |
| Description    | <p>Policies on CSR activation and incentivizing.<br/>Catalogue of CSR initiatives benefiting Smart City goals.<br/>Example 1: Education – Remote education<br/>Example 2: Healthcare – Tele-health<br/>Example 3: Energy –smart offices<br/>Example 4: Citizenship –Citizen Day<br/>Example 5: Research – Research grants and endowments</p> |      |                                       |                           |                     | CHALLENGES           |
|                |                                                                                                                                                                                                                                                                                                                                              |      |                                       |                           |                     | GOVERNANCE           |
|                |                                                                                                                                                                                                                                                                                                                                              |      |                                       |                           |                     | BUDGET/PPP           |
|                |                                                                                                                                                                                                                                                                                                                                              |      |                                       |                           |                     | ENABLERS             |
|                |                                                                                                                                                                                                                                                                                                                                              |      |                                       |                           |                     | ICT INFRASTRUCTURE   |
| Dimension      | Smart Society                                                                                                                                                                                                                                                                                                                                | Goal | Widespread use of voluntary resources | Related KPIs              |                     |                      |
|                |                                                                                                                                                                                                                                                                                                                                              |      |                                       | Number of CSR initiatives |                     |                      |
| OWNER          | MOMRA (MDC)/NDU/EACH CITY                                                                                                                                                                                                                                                                                                                    |      |                                       | IMPACT                    | SAVINGS             | GDP + JOBS           |
| MODEL          | PPP                                                                                                                                                                                                                                                                                                                                          |      |                                       |                           |                     |                      |

Source: NXN analysis, The impact of CSR on Smart Cities [https://www.researchgate.net/publication/283638526\\_The\\_impact\\_of\\_CSR\\_on\\_Smart\\_Cities](https://www.researchgate.net/publication/283638526_The_impact_of_CSR_on_Smart_Cities)



# SMART ENVIRONMENT



# Smart Municipal Buildings

| Smart Municipal Buildings:<br>Building Guidelines & Implementation |                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                        | GOVERNANCE                                                                                                                          | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|------|--|
| Objective                                                          | Enhance Municipal Building regulations with smart services                                                                                                                                                                                                                                                                                                                              |      |                                                                        |                                                                                                                                     |                     |                      |      |  |
| Description                                                        | <i>A “Smart Building” policy that highlights the elements needed to integrate major municipal buildings onto a common city-level network and sharing information and functionality between systems in order to improve building operations to achieve benefits in three categories: Improved energy efficiency, enhanced operational effectiveness and increased user satisfaction.</i> |      |                                                                        |                                                                                                                                     |                     | CHALLENGES           |      |  |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                        |                                                                                                                                     |                     | GOVERNANCE           |      |  |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                        |                                                                                                                                     |                     | BUDGET/PPP           |      |  |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                        |                                                                                                                                     |                     | ENABLERS             |      |  |
| Dimension                                                          | Smart Environment                                                                                                                                                                                                                                                                                                                                                                       | Goal | Efficient Buildings<br>Environmentally and socially sustainable cities | Related KPIs                                                                                                                        |                     |                      |      |  |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                        | Application level of energy saving technologies in public buildings.<br>Percentage of public buildings with integrated technologies |                     |                      |      |  |
| OWNER                                                              | EACH CITY                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                        | IMPACT                                                                                                                              | SAVINGS             | GDP +                | JOBS |  |
| MODEL                                                              | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                        |                                                                                                                                     |                     |                      |      |  |



# Smart LED Street Lights

| Smart LED Street Lights |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |                                       | GOVERNANCE | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE                                       |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|---------------------------------------|------------|---------------------|------------------------------------------------------------|
| Objective               | Improve sustainability of city services and increase energy efficiency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                |                                       |            |                     |                                                            |
| Description             | <p><i>Smart LED street lighting is an important and a very accessible service that city managers can employ to improve safety, sustainability, and citizens' lives. LED-based smart lighting solutions consume less energy than conventional lighting fixtures, and when coupled with presence detection, can achieve even higher savings. With Smart-LED lights that can maintenance and failure information to the operations center, maintenance truck rolls can be scheduled optimizing roots and fixing lights before they fail.</i></p> <p><i>Frequently, this initiative is combined with the installation of additional sensors on the light poles including air-quality and noise monitors to provide even greater benefit to the city.</i></p> |                                                |                                       |            |                     | CHALLENGES                                                 |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |                                       |            |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension               | Smart Environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal                                           | Related KPIs                          |            |                     |                                                            |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Enhanced sustainability and energy efficiency. | Percentage of Smart-LED street lights |            |                     |                                                            |
| OWNER                   | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                |                                       | IMPACT     | SAVINGS             | GDP + JOBS                                                 |
| MODEL                   | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                                       |            |                     |                                                            |



# Renewable Energy

| Renewable Energy |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                | GOVERNANCE                                                                                                            | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |            |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|----------------------|------------|
| Objective        | Improve sustainability of cities through the use of renewable energy sources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                |                                                                                                                       |                     |                      |            |
| Description      | <p><i>The aim of this initiative is to improve sustainable energy access by accelerating the deployment of renewable energy (solar being the obvious first choice). The initiative would entail two flavors of renewable energy generation:</i></p> <ol style="list-style-type: none"><li><i>1. Utility-based generation using photovoltaics (PV) and concentrated solar power (CSP) by the utility providers and is then fed into the grid.</i></li><li><i>2. End-user based generation using photovoltaics, typically installed on rooftops for powering the user’s home/office/building with excess capacity fed back into the grid for a credit to the user.</i></li></ol> |      |                                                |                                                                                                                       |                     | CHALLENGES           |            |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                |                                                                                                                       |                     | GOVERNANCE           | BUDGET/PPP |
| Dimension        | Smart Environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Goal | Enhanced sustainability and energy efficiency. | Related KPIs                                                                                                          |                     |                      |            |
|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                | Percentage of power generated from renewable sources.<br>Percentage of users generating power from renewable sources. |                     |                      |            |
| OWNER            | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                | IMPACT                                                                                                                | SAVINGS             | GDP +                | JOBS       |
| MODEL            | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                |                                                                                                                       |                     |                      |            |



# Smart Water

| Smart Water Management |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                         | GOVERNANCE                                            | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------|-------------------------------------------------------|---------------------|----------------------|------|--|
| Objective              | Smart Water will lead to operational and environmental efficiencies while reducing waste.                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                         |                                                       |                     |                      |      |  |
| Description            | <p>A smart water monitoring system using multi-functional water sensors feed data about pressure irregularities and other key factors into analytics software. The information is then sent to a central command center that will enable alerts to be sent to field devices, even in remote areas. The data updates will be used to adjust water flow and pressure in the water network, find irregularities, respond to alerts - all of which cut water losses due to leaks and clogged pipes.</p> |      |                                         |                                                       |                     | CHALLENGES           |      |  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | GOVERNANCE           |      |  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | BUDGET/PPP           |      |  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | ENABLERS             |      |  |
| Dimension              | Smart Environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Goal | Efficient use of energy water and waste | Related KPIs                                          |                     |                      |      |  |
|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |                                         | ITU: Application of city water monitoring through ICT |                     |                      |      |  |
| OWNER                  | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                         | IMPACT                                                | SAVINGS             | GDP +                | JOBS |  |
| MODEL                  | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                         |                                                       |                     |                      |      |  |



# Smart Waste Management

| Smart Waste Management |                                                                                                                                                                                                                                                                                                     |      |                                         | GOVERNANCE                                            | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------|-------------------------------------------------------|---------------------|----------------------|------|
| Objective              | Smart Waste will lead to operational and environmental efficiencies while reducing waste.                                                                                                                                                                                                           |      |                                         |                                                       |                     |                      |      |
| Description            | <p>A smart waste monitoring system using multi-functional sensors that feed data about pressure irregularities, water leakage and other key factors into an analytics application.</p> <p>Remote management of waste fleet - scheduling pick up based on optimal routing and waste fill levels.</p> |      |                                         |                                                       |                     | CHALLENGES           |      |
|                        |                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | GOVERNANCE           |      |
|                        |                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | BUDGET/PPP           |      |
|                        |                                                                                                                                                                                                                                                                                                     |      |                                         |                                                       |                     | ENABLERS             |      |
| Dimension              | Smart Environment                                                                                                                                                                                                                                                                                   | Goal | Efficient use of energy water and waste | Related KPIs                                          |                     |                      |      |
|                        |                                                                                                                                                                                                                                                                                                     |      |                                         | ITU: Application of city waste monitoring through ICT |                     |                      |      |
| OWNER                  | EACH CITY                                                                                                                                                                                                                                                                                           |      |                                         | IMPACT                                                | SAVINGS             | GDP +                | JOBS |
| MODEL                  | CAPEX/PPP                                                                                                                                                                                                                                                                                           |      |                                         |                                                       |                     |                      |      |



# Recycling Policy

| Smart Recycling |                                                                                                                                                                                                                                                                                                               |      |                                | GOVERNANCE                                                           | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------|----------------------------------------------------------------------|---------------------|----------------------|
| Objective       | Create a recycling policy and initiatives to implement recycling.                                                                                                                                                                                                                                             |      |                                |                                                                      |                     |                      |
| Description     | <p>Recycling policy at national and municipal levels including:</p> <ul style="list-style-type: none"><li>• Types of material to be recycled</li><li>• PPP initiatives to collect and recycle waste</li><li>• Incentives for waste producers to recycle</li><li>• Domestic and industrial recycling</li></ul> |      |                                |                                                                      |                     | CHALLENGES           |
|                 |                                                                                                                                                                                                                                                                                                               |      |                                |                                                                      |                     | GOVERNANCE           |
|                 |                                                                                                                                                                                                                                                                                                               |      |                                |                                                                      |                     | BUDGET/PPP           |
|                 |                                                                                                                                                                                                                                                                                                               |      |                                |                                                                      |                     | ENABLERS             |
|                 |                                                                                                                                                                                                                                                                                                               |      |                                |                                                                      |                     | ICT INFRASTRUCTURE   |
| Dimension       | Smart Environment                                                                                                                                                                                                                                                                                             | Goal | An effective recycling program | Related KPIs                                                         |                     |                      |
|                 |                                                                                                                                                                                                                                                                                                               |      |                                | ITU: Proportion of waste recycled compared to total collected waste. |                     |                      |
| OWNER           | MDC/EACH CITY                                                                                                                                                                                                                                                                                                 |      |                                | IMPACT                                                               | SAVINGS             | GDP + JOBS           |
| MODEL           | CAPEX/PPP                                                                                                                                                                                                                                                                                                     |      |                                |                                                                      |                     |                      |



# Publication of Environmental Data

| Open Data   |                                                                                                                                                                                                                           |      |                                                  | GOVERNANCE                                   | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------|----------------------------------------------|---------------------|----------------------|
| Objective   | Publish environmental data and goal achievement                                                                                                                                                                           |      |                                                  |                                              |                     |                      |
| Description | <p>Policy on environmental data publication in line with data policy.</p> <p>Enhance knowledge of energy consumption and other environmental factors.</p> <p>Framework for capturing environmental data with sensors.</p> |      |                                                  |                                              |                     | CHALLENGES           |
|             |                                                                                                                                                                                                                           |      |                                                  |                                              |                     | GOVERNANCE           |
|             |                                                                                                                                                                                                                           |      |                                                  |                                              |                     | BUDGET/PPP           |
|             |                                                                                                                                                                                                                           |      |                                                  |                                              |                     | ENABLERS             |
| Dimension   |                                                                                                                                                                                                                           |      |                                                  | Related KPIs                                 |                     |                      |
|             | Smart Environment                                                                                                                                                                                                         | Goal | Proactive management of environmental conditions | Data sets published on environmental factors |                     |                      |
| OWNER       | MDC/EACH CITY                                                                                                                                                                                                             |      |                                                  | IMPACT                                       | SAVINGS             | GDP + JOBS           |
| MODEL       | CAPEX/PPP                                                                                                                                                                                                                 |      |                                                  |                                              |                     |                      |



# SMART MOBILITY



# Smart Parking

| Smart Parking |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            | GOVERNANCE                                 | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------|--------------------------------------------|---------------------|----------------------|
| Objective     | Reduce congestion and improve efficiency of parking spaces                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                            |                                            |                     |                      |
| Description   | <p>Modern, busy cities teeming with offices, restaurants, and residential neighborhoods struggle with parking. This is true for KSA cities just like most cities around the world.</p> <p>The initiative would entail the installation of smart parking technology (including sensors and/or cameras with suitable analytics) that allows drivers to check a mobile app for real-time availability of parking spots. This is typically supported by installing electronic signs guiding drivers where to find available parking.</p> |      |                                            |                                            |                     | CHALLENGES           |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            |                                            |                     | GOVERNANCE           |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            |                                            |                     | BUDGET/PPP           |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            |                                            |                     | ENABLERS             |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            |                                            |                     | ICT INFRASTRUCTURE   |
| Dimension     | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Goal | Generate revenue while reducing congestion | Related KPIs                               |                     |                      |
|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                            | Number of parking spots included pre city. |                     |                      |
| OWNER         | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                            | IMPACT                                     | SAVINGS             | GDP + JOBS           |
| MODEL         | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                            |                                            |                     |                      |



# Intelligent Traffic Management System

| Intelligent Traffic Management System |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                      | GOVERNANCE                                        | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |      |  |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|---------------------|----------------------|------|--|
| Objective                             | Reduce accidents and enhance traffic flow through central monitoring and smart ICT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                                                                                      |                                                   |                     |                      |      |  |
| Description                           | <i>Citywide traffic monitoring and management achieved through inputs from sensors and CCTVs of various city stakeholders. It utilizes advanced analytics to map out historical, real-time and predictive traffic analysis which is used to direct and manage citywide traffic systems (intersections/Visual guidance systems). ITS provides contextualized incident and traffic reporting for situational awareness while maintaining traffic dashboards and KPI's for reporting. It displays real-time traffic maps on a 3D city map and is used by a variety stakeholders for planning, scenario tests and emergency response. It aims to ease congestion, improve traffic flow, and reduce air pollution by allowing operators to respond to traffic conditions in real time.</i> |      |                                                                                                                                      |                                                   |                     | CHALLENGES           |      |  |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                      |                                                   |                     | GOVERNANCE           |      |  |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                      |                                                   |                     | BUDGET/PPP           |      |  |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                      |                                                   |                     | ENABLERS             |      |  |
| Dimension                             | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal | Efficient and seamless travel<br>Proactive management of transportation systems<br>Proactive maintenance of transport infrastructure | Related KPIs                                      |                     |                      |      |  |
|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                                                                                      | ITU: Availability of traffic monitoring using ICT |                     |                      |      |  |
| OWNER                                 | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                                                                                                      | IMPACT                                            | SAVINGS             | GDP +                | JOBS |  |
| MODEL                                 | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                                                                                                      |                                                   |                     |                      |      |  |



# Traffic Sensing and Prediction

| Traffic Sensing and Prediction |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              | GOVERNANCE                                        | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------|---------------------------------------------------|---------------------|----------------------|
| Objective                      | Develop models to predict traffic patterns in cities to aid the city planners                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |                                                                              |                                                   |                     |                      |
| Description                    | <p><i>Collate and correlate traffic data from a variety of sensors including induction loops, Floating Car Data (FCD) – cars, typically taxis and deliver trucks, equipped with special on-board units), license plate recognition cameras and others.</i></p> <p><i>The data is fed into a central city-level system that is able to extract and consolidate the key information representing the traffic situation of a city, including average speed and volume of traffic on street segments as well as recognizing the pattern of origins and destinations in a city.</i></p> <p><i>The system can employ a predictive analytics engine to predict the traffic situation in the city into the future and over changing conditions.</i></p> |      |                                                                              |                                                   |                     | CHALLENGES           |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              |                                                   |                     | GOVERNANCE           |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              |                                                   |                     | BUDGET/PPP           |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              |                                                   |                     | ENABLERS             |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              |                                                   |                     | ICT INFRASTRUCTURE   |
| Dimension                      | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Goal | Efficient and seamless travel.<br>Additional insights to help city planners. | Related KPIs                                      |                     |                      |
|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                              | ITU: Availability of traffic monitoring using ICT |                     |                      |
| OWNER                          | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                              | IMPACT                                            | SAVINGS             | GDP + JOBS           |
| MODEL                          | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                                              |                                                   |                     |                      |



# Smart Vehicle Pooling

| Smart Vehicle Pooling |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   | GOVERNANCE                                                                                                  | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |     |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|-------------------------------------------------------------------------------------------------------------|---------------------|----------------------|-----|
| Objective             | Peer car pooling to ease congestion and increase mobility options                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                   |                                                                                                             |                     |                      |     |
| Description           | <p>When public transport is not an option, the use of personal cars leads to increased traffic and congestion, increased carbon footprint and parking challenges. To combat these, Smart Vehicle Pooling (aka Smart Peer Car Pooling) can be an effective solution.</p> <p>Smart Vehicle Pooling will provide a special mobile app that allows users to schedule rides day-by-day or in advance. GPS technology allows riders to direct drivers to exact locations, and typically a chat feature allows riders and drivers communicate in real time.</p> |      |                   |                                                                                                             |                     | CHALLENGES           |     |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                             |                     | GOVERNANCE           |     |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                             |                     | BUDGET/PPP           |     |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                             |                     | ENABLERS             |     |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                             |                     | ICT INFRASTRUCTURE   |     |
| Dimension             | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Goal | Seamless mobility | Related KPIs                                                                                                |                     |                      |     |
|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   | ITU: Satisfaction with quality of public transport<br>Use of Smart Vehicle Pooling, Air pollution intensity |                     |                      |     |
| OWNER                 | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                   | IMPACT                                                                                                      | SAVINGS             | GDP +                | JOB |
| MODEL                 | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   |                                                                                                             |                     |                      |     |



# Smart Intermodal Public Transport

| Smart Intermodal Public Transport |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   | GOVERNANCE                                                                                             | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------------------------------------------------------------------------------------------|---------------------|----------------------|
| Objective                         | A real time journey planning application which incorporates multi-modal path-finding and voice navigation.                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                   |                                                                                                        |                     |                      |
| Description                       | <p>The Journey Planner provides metro maps and various search functions like: door-to-door routes, alternative routes, transit search (including public bus), station list, offline free Wi-Fi hot spot locations, recent routes, Points of Interest and GPS assisted maps. It provides routes across the city using all public transit modes, private transport and pedestrian routes. It incorporates real time service updates and traffic updates, together with pricing information, travel time and estimated calorie use.</p> |      |                   |                                                                                                        |                     | CHALLENGES           |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   |                                                                                                        |                     | GOVERNANCE           |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   |                                                                                                        |                     | BUDGET/PPP           |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   |                                                                                                        |                     | ENABLERS             |
| Dimension                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   | Related KPIs                                                                                           |                     |                      |
|                                   | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Goal | Seamless mobility | ITU: Satisfaction with quality of public transport<br>Use of public transport, Air pollution intensity |                     |                      |
| OWNER                             | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                   | IMPACT                                                                                                 | SAVINGS             | GDP + JOBS           |
| MODEL                             | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                   |                                                                                                        |                     |                      |



# Smart Infrastructure Control

| Smart Infrastructure Control |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   | GOVERNANCE                                                                                             | NATIONAL INITIATIVE | MUNICIPAL INITIATIVE |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|--------------------------------------------------------------------------------------------------------|---------------------|----------------------|
| Objective                    | Proactive and centralized control of transportation infrastructure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                   |                                                                                                        |                     |                      |
| Description                  | <p>The use of sensors, wireless network, centralized control systems and operator apps to enhance the control of infrastructure related to transportation to the point of proactive intervention. The aims are to cut costs of maintenance, ensure more seamless operation and prevent maintenance issues from occurring. Control is orchestrated with a city control center.</p> <p>Infrastructure under control includes:</p> <ul style="list-style-type: none"><li>• Bridges, tunnels, roadways</li><li>• Roadwork management</li><li>• Flood prevention channels</li><li>• Public transport infrastructure</li></ul> |      |                   |                                                                                                        |                     | CHALLENGES           |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                        |                     | GOVERNANCE           |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                        |                     | BUDGET/PPP           |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                        |                     | ENABLERS             |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |                                                                                                        |                     | ICT INFRASTRUCTURE   |
| Dimension                    | Smart Mobility                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Goal | Seamless mobility | Related KPIs                                                                                           |                     |                      |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   | ITU: Satisfaction with quality of public transport<br>Use of public transport, Air pollution intensity |                     |                      |
| OWNER                        | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                   | IMPACT                                                                                                 | SAVINGS             | GDP + JOBS           |
| MODEL                        | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                   |                                                                                                        |                     |                      |



# SMART ENABLERS



# Cybersecurity Policy and Systems

| Cybersecurity Policy & Systems |                                                                                                                                                                                                                                                                                                         |                    |                        | GOVERNANCE                                                                                                           | NATIONAL INITIATIVE | CITY INITIATIVE |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|
| Objective                      | Policies and systems to ensure security of Smart City systems                                                                                                                                                                                                                                           |                    |                        |                                                                                                                      |                     |                 |
| Description                    | <div><div>Infrastructure Layer - Security</div><div>Application Layer - Security</div><div>Data Orchestration Layer - Security</div><div>Compliance (Assurance)</div><div>Service Enablement Layer - Security</div><div>Security Operations</div><div>Cyber Security Compliance (Assurance)</div></div> |                    |                        |                                                                                                                      | CHALLENGES          |                 |
|                                |                                                                                                                                                                                                                                                                                                         |                    |                        |                                                                                                                      | GOVERNANCE          |                 |
|                                |                                                                                                                                                                                                                                                                                                         |                    |                        |                                                                                                                      | BUDGET/PPP          |                 |
|                                |                                                                                                                                                                                                                                                                                                         |                    |                        |                                                                                                                      | ENABLERS            |                 |
|                                |                                                                                                                                                                                                                                                                                                         | ICT INFRASTRUCTURE |                        |                                                                                                                      |                     |                 |
| Dimension                      | Smart Enablers                                                                                                                                                                                                                                                                                          | Goal               | Safe and secure cities | Related KPIs                                                                                                         |                     |                 |
|                                |                                                                                                                                                                                                                                                                                                         |                    |                        | Existence of systems, rules and regulations to ensure information security and privacy protection in public service. |                     |                 |
| OWNER                          | NDU / MDC/ EACH CITY                                                                                                                                                                                                                                                                                    |                    |                        | IMPACT                                                                                                               | SAVINGS             | GDP +           |
| MODEL                          | PPP                                                                                                                                                                                                                                                                                                     |                    |                        |                                                                                                                      |                     | JOBS            |



# National Data Framework: Implementation of Data Governance

| National Data Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                           | GOVERNANCE                | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------|---------------------------|---------------------|------------------------------------------------------------|
| Objective               | Issue national data laws and guidelines to enable Smart City services.                                                                                                                                                                                                                                                                                                                                                                   |      |                                           |                           |                     |                                                            |
| Description             | <i>Following international standards and national laws, a LAW, roadmap, policy and set of guidelines and standards for the use of data governance to drive seamless services across public and private sectors.</i> <ul style="list-style-type: none"><li>• <i>Categorisation of data</i></li><li>• <i>Usage rights</i></li><li>• <i>Open and Intra Government Shared Data</i></li><li>• <i>Public and Private Sector Data</i></li></ul> |      |                                           |                           |                     | CHALLENGES                                                 |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                           |                           |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension               | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                           | Goal | Policy enablers for a holistic smart city | Related KPIs              |                     |                                                            |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                           | ITU Smart Governance KPIs |                     |                                                            |
| OWNER                   | NDU                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                           | IMPACT                    | SAVINGS             | GDP + JOBS                                                 |
| MODEL                   | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                           |                           |                     |                                                            |



# City Data Framework: Implementation of Data Governance within Municipal Services

| Municipal Data Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                 | GOVERNANCE                                                                                                           | NATIONAL INITIATIVE | CITY INITIATIVE                                                                               |      |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|------|
| Objective                | Prepare for and implement national data laws and guidelines to enhance municipal services                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                 |                                                                                                                      |                     |                                                                                               |      |
| Description              | <p><i>Following international standards and national Data laws and standards, a roadmap, policy and set of guidelines and standards for the use of data governance to drive seamless services across public and private sectors within the city.</i></p> <p><i>Prepare municipal systems to follow national data laws by cataloguing data sets, creating preliminary categorisation, aligning systems for open data and starting to have vendors / partners open data.</i></p> |      |                                                                 |                                                                                                                      |                     | CHALLENGES                                                                                    |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                 |                                                                                                                      |                     | <div>GOVERNANCE</div> <div>BUDGET/PPP</div> <div>ENABLERS</div> <div>ICT INFRASTRUCTURE</div> |      |
| Dimension                | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Goal | Policy enablers for a holistic smart city<br>ICT Infrastructure | Related KPIs                                                                                                         |                     |                                                                                               |      |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                 | Convenience of government services &<br>Provision of online systems for administering public services and facilities |                     |                                                                                               |      |
| OWNER                    | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                 | IMPACT                                                                                                               | SAVINGS             | GDP +                                                                                         | JOBS |
| MODEL                    | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                 |                                                                                                                      |                     |                                                                                               |      |



# Smart City Networks – IOT

## Low-Power IOT Networks

| Smart City Networks - IOT |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                 | GOVERNANCE                                                                                                          | NATIONAL INITIATIVE | CITY INITIATIVE |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|
| Objective                 | Low-power networks to support the use of Internet of Things (IOT) within smart city programs.                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                 |                                                                                                                     |                     |                 |
| Description               | <i>Design and launch a low-power network to support the use of Internet of Things (IOT) within smart city programs.</i><br><br><i>The initiative seeks to develop the reference designs including the services and associated technologies along with a set of guidelines that provide a coherent and common architecture for building IOT access and backhaul networks in the cities.</i><br><br><i>The technologies to be examined include WiFi Mesh, 3G/4G/5G networks, 6LoWPAN, NB-IOT and EC-GSM-IoT</i> |  |                                                 |                                                                                                                     |                     | CHALLENGES      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                 |                                                                                                                     |                     | GOVERNANCE      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                 |                                                                                                                     |                     | BUDGET/PPP      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                 |                                                                                                                     |                     | ENABLERS        |
| Dimension                 | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Goal                                            | Related KPIs                                                                                                        |                     |                 |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Technology and policy enablers for IOT networks | Development of the policy, standards and guidelines.<br>Implementation of the guidelines in Smart City initiatives. |                     |                 |
| OWNER                     | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                                                 | IMPACT                                                                                                              | SAVINGS             | GDP + JOBS      |
| MODEL                     | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                                 |                                                                                                                     |                     |                 |



# Smart City Networks – City WiFi

| Smart City Networks – City WiFi |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                            | GOVERNANCE                                                                                                          | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------|
| Objective                       | Low-power networks to support the use of Internet of Things (IOT) within smart city programs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                            |                                                                                                                     |                     |                                                            |
| Description                     | <p><i>WiFi is the ubiquitous access technology, and is the technology of choice for citizens, residents and visitors the world over. To facilitate access to services, cities are increasingly investing in city-wide WiFi networks that give users the low-cost and high-speed access needed.</i></p> <p><i>The purpose of this initiative is to explore the very large scale WiFi designs that will be needed and document the best practices and design guidelines to help cities in their quest for city-wide WiFi coverage.</i></p> <p><i>Just as importantly, the initiative should examine the related business models for providing this access and the impact of the different options on uptake and service availability.</i></p> |      |                                                            |                                                                                                                     |                     | CHALLENGES                                                 |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                            |                                                                                                                     |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension                       | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Goal | Technology and policy enablers for city-wide WiFi networks | Related KPIs                                                                                                        |                     |                                                            |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                            | Development of the policy, standards and guidelines.<br>Implementation of the guidelines in Smart City initiatives. |                     |                                                            |
| OWNER                           | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                            | IMPACT                                                                                                              | SAVINGS             | GDP + JOBS                                                 |
| MODEL                           | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                            |                                                                                                                     |                     |                                                            |



# City Sensors

| City Sensors |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                 | GOVERNANCE                                                                                                          | NATIONAL INITIATIVE | CITY INITIATIVE |      |  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|------|--|
| Objective    | IOT Sensors Standards Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |                                                 |                                                                                                                     |                     |                 |      |  |
| Description  | <p><i>Cities are investing and will continue to invest in smart sensors that provide insight into various aspects of city conditions, from environmental sensors, to crowd and vehicle counting, to CCTV cameras.</i></p> <p><i>With the proliferation of sensors, it is important to have a national policy towards the selection and deployment of such sensors. The policies should govern the range of issues from backhaul, suitability to task, environmental suitability, cybersecurity, maintenance, management and data ownership.</i></p> <p><i>Once the standards are agreed, the potential is there to standardize sensors across the cities resulting in improved economies of scale.</i></p> |      |                                                 |                                                                                                                     |                     | CHALLENGES      |      |  |
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                 |                                                                                                                     |                     | GOVERNANCE      |      |  |
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                 |                                                                                                                     |                     | BUDGET/PPP      |      |  |
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                 |                                                                                                                     |                     | ENABLERS        |      |  |
| Dimension    | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Goal | Technology and policy enablers for city sensors | Related KPIs                                                                                                        |                     |                 |      |  |
|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                 | Development of the policy, standards and guidelines.<br>Implementation of the guidelines in Smart City initiatives. |                     |                 |      |  |
| OWNER        | MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                 | IMPACT                                                                                                              | SAVINGS             | GDP +           | JOBS |  |
| MODEL        | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                 |                                                                                                                     |                     |                 |      |  |



# Smart KSA Platform (1/2)

| Smart KSA Platform |                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    | GOVERNANCE                                                                   | NATIONAL INITIATIVE | CITY INITIATIVE |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------|-----------------|
| Objective          | Provides an architecture and platform elements to enable Smart City initiatives.                                                                                                                                                                                                                                                                                                           |      |                                                                                    |                                                                              |                     |                 |
| Description        | Includes ICT Infrastructure, City Data, the Smart KSA Platform and the portfolio of smart services<br><br>The program will: <ul style="list-style-type: none"><li>• Set out the policies and guidelines for Smart City Architecture and Platforms in KSA</li><li>• Set the interface points for platforms</li><li>• Create a PPP model to involve the private sector in delivery</li></ul> |      |                                                                                    |                                                                              |                     | CHALLENGES      |
|                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    |                                                                              |                     | GOVERNANCE      |
|                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    |                                                                              |                     | BUDGET/PPP      |
|                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    |                                                                              |                     | ENABLERS        |
|                    | ICT INFRASTRUCTURE                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                    |                                                                              |                     |                 |
| Dimension          | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                             | Goal | Smart Platforms<br>ICT Infrastructure<br>Planning powered by real time information | Related KPIs                                                                 |                     |                 |
|                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                    | Provision of online systems for administering public services and facilities |                     |                 |
| OWNER              | NDU Lead with MOMRA (MDC)                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                    | IMPACT                                                                       | SAVINGS             | GDP + JOBS      |
| MODEL              | PPP                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                    |                                                                              |                     |                 |

Source: NXN analysis, top down Smart City Program benefits based on benchmark of Smart Dubai Platform, estimate 200% of Dubai benefits

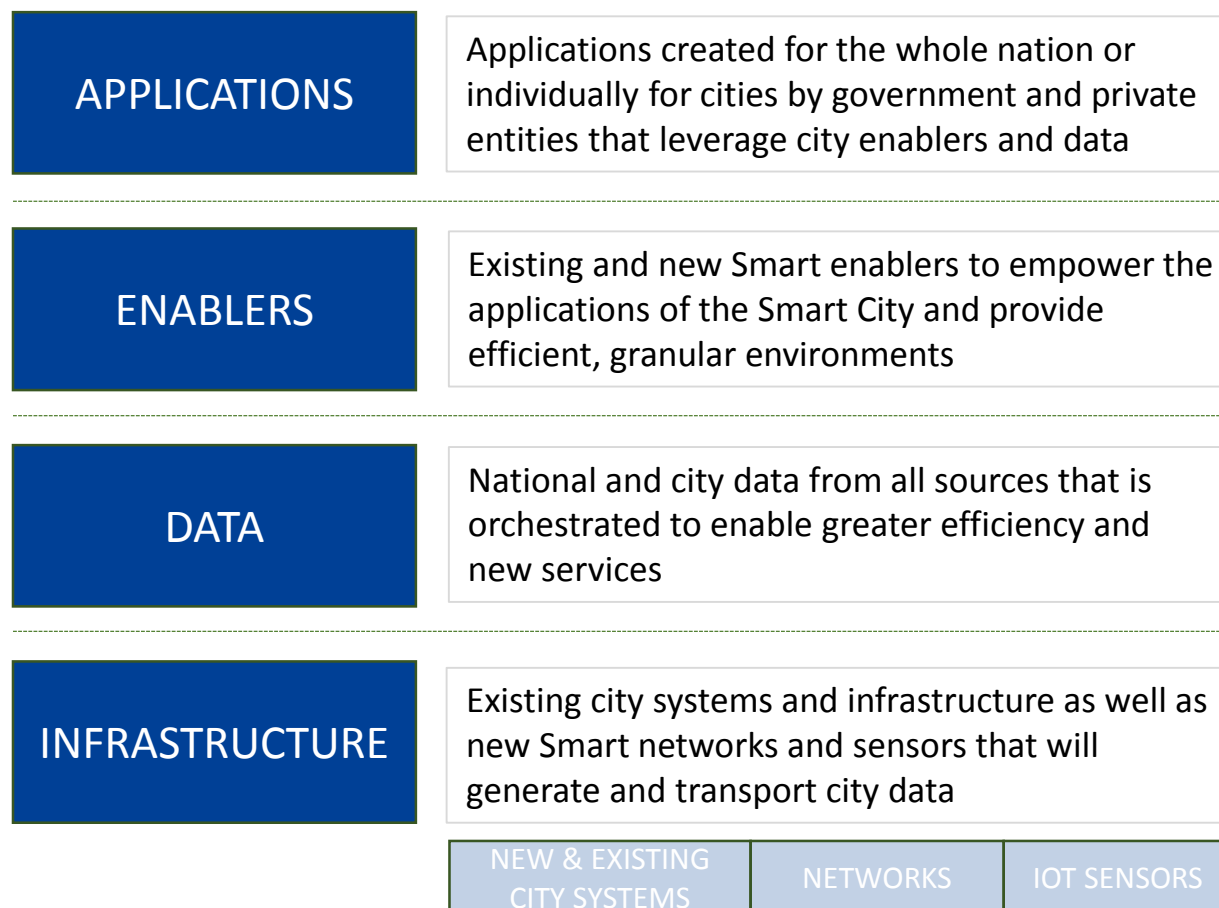


# Smart KSA Platform (2/2)

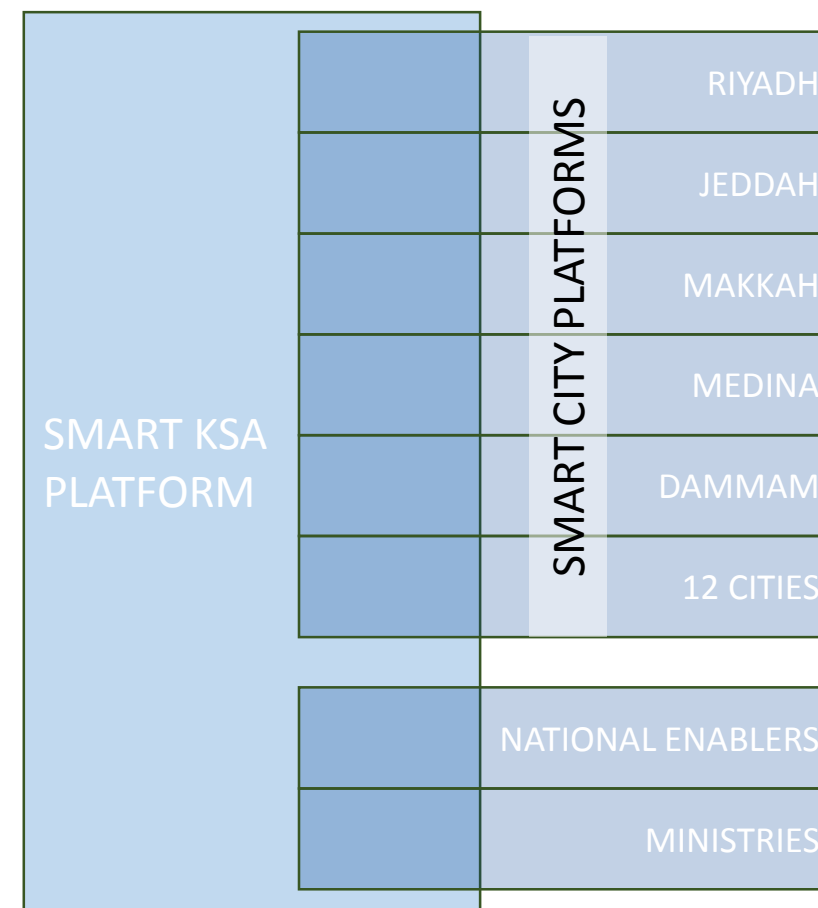
## Technology Architecture of a Smart KSA City



Technical enablers for future Smart cities can be represented as belonging to the following layers:



The nation and each city will have Smart platforms that will interact



Source: NXN analysis, ITU, SDO Smart District Guidelines



# Smart City Platforms

| Smart City Architecture |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                | GOVERNANCE                                                                   | NATIONAL INITIATIVE | CITY INITIATIVE    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------|--------------------|
| Objective               | Provides an architecture and platform elements to enable Smart City initiatives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                |                                                                              |                     |                    |
| Description             | <p>Includes ICT Infrastructure, City Data, the Smart KSA Platform and the portfolio of smart services</p> <p>The program will:</p> <ul style="list-style-type: none"><li>• Leverage the national policies and guidelines for Smart City Architecture and Platforms</li><li>• Leverage National platforms</li><li>• Set the interface points for platforms in alignment with National policies</li><li>• Create a PPP model to involve the private sector in delivery in alignment with National policies</li><li>• Build a Smart City Platform</li></ul> |      |                                                                                |                                                                              |                     | CHALLENGES         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                |                                                                              |                     | GOVERNANCE         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                |                                                                              |                     | BUDGET/PPP         |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                |                                                                              |                     | ENABLERS           |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                |                                                                              |                     | ICT INFRASTRUCTURE |
| Dimension               | Smart ICT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Goal | Smart Platforms<br>ICT Infrastructure<br>Centralized monitoring and management | Related KPIs                                                                 |                     |                    |
|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                | Provision of online systems for administering public services and facilities |                     |                    |
| OWNER                   | EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                                | IMPACT                                                                       | SAVINGS             | GDP + JOBS         |
| MODEL                   | PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |                                                                                |                                                                              |                     |                    |

Source: NXN analysis, top down Smart City Program benefits based on benchmark of Smart Dubai Platform, estimate similar to Dubai benefits



# National Digital ID & Signature: Implementation of Digital Identity within Government Services

| National Digital Identity & Signature Framework |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                 | GOVERNANCE                                                                                                           | NATIONAL INITIATIVE | CITY INITIATIVE |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|
| Objective                                       | Implement national digital identity & signature to enhance government services                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                                                 |                                                                                                                      |                     |                 |
| Description                                     | <i>Following international standards and national laws, a roadmap, system, policy and set of guidelines and standards for the use of digital identity and signatures to drive seamless services across public and private sectors.</i> <ul style="list-style-type: none"><li>• <i>Usages of digital identity</i></li><li>• <i>Technologies of authentication</i></li><li>• <i>Security and privacy standards in alignment with Data and Cybersecurity tracks</i></li><li>• <i>Signature formats</i></li></ul> |  |                                                                 |                                                                                                                      |                     | CHALLENGES      |
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                 |                                                                                                                      |                     | GOVERNANCE      |
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                 |                                                                                                                      |                     | BUDGET/PPP      |
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |                                                                 |                                                                                                                      |                     | ENABLERS        |
| Dimension                                       | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | Goal                                                            | Related KPIs                                                                                                         |                     |                 |
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Policy enablers for a holistic smart city<br>ICT Infrastructure | Convenience of government services &<br>Provision of online systems for administering public services and facilities |                     |                 |
| OWNER                                           | NDU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                 | IMPACT                                                                                                               | SAVINGS             | GDP +<br>JOBS   |
| MODEL                                           | CAPEX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                                                 |                                                                                                                      |                     |                 |



# City Digital ID Framework: Implementation of Digital Identity within Municipal Services

| City Digital Identity Framework |                                                                                                                                                                                                                                                                |      |                                                                 | GOVERNANCE                                                                                                           | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------|------------------------------------------------------------|
| Objective                       | Prepare for and implement national digital identity to enhance municipal services                                                                                                                                                                              |      |                                                                 |                                                                                                                      |                     |                                                            |
| Description                     | <i>Following international standards and national Digital Identity laws and standards, a roadmap, policy and set of guidelines and standards for the use of digital identity to drive seamless services across public and private sectors within the city.</i> |      |                                                                 |                                                                                                                      |                     | CHALLENGES                                                 |
|                                 |                                                                                                                                                                                                                                                                |      |                                                                 |                                                                                                                      |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension                       | Smart Enablers                                                                                                                                                                                                                                                 | Goal | Policy enablers for a holistic smart city<br>ICT Infrastructure | Related KPIs                                                                                                         |                     |                                                            |
|                                 |                                                                                                                                                                                                                                                                |      |                                                                 | Convenience of government services &<br>Provision of online systems for administering public services and facilities |                     |                                                            |
| OWNER                           | EACH CITY                                                                                                                                                                                                                                                      |      |                                                                 | IMPACT                                                                                                               | SAVINGS             | GDP + JOBS                                                 |
| MODEL                           | CAPEX                                                                                                                                                                                                                                                          |      |                                                                 |                                                                                                                      |                     |                                                            |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, ABI Research, TMForum, World Bank, estimate 50% of national benefits



# Spatial Data Infrastructure (SDI)

| Spatial Data Infrastructure (SDI) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                      | GOVERNANCE | NATIONAL INITIATIVE | CITY INITIATIVE                                            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------|------------|---------------------|------------------------------------------------------------|
| Objective                         | A national SDI to facilitate the sharing of spatial information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                      |            |                     |                                                            |
| Description                       | <p>The added dependence on, and utility of, Geographic Information Systems can give rise to GIS systems at different agencies not being 100% aligned. This results in inefficiencies and suspect data that plagues planners and execution teams alike.</p> <p>A national SDI is “a framework of technologies, policies, and institutional arrangements that together facilitate the creation, exchange, and use of geospatial data and related information resources across an information-sharing community”, such as the different concerned government agencies and related private sector organizations.</p> <p>The aim of this initiative is to define the national SDI framework and implement it facilitating the secure and accurate sharing of spatial information.</p> |      |                                                                                      |            |                     | CHALLENGES                                                 |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                                                                      |            |                     | GOVERNANCE<br>BUDGET/PPP<br>ENABLERS<br>ICT INFRASTRUCTURE |
| Dimension                         | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Goal | Efficient and effective SDI facilitating the sharing of spatial information          |            |                     |                                                            |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | Related KPIs                                                                         |            |                     |                                                            |
|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      | Define and implement the SDI.<br>The number of government agencies adopting the SDI. |            |                     |                                                            |
| OWNER                             | MOMRA (MDC) / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                                                                      | IMPACT     | SAVINGS             | GDP + JOBS                                                 |
| MODEL                             | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                                                                                      |            |                     |                                                            |



# Unified City Apps

| Unified City Apps |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          | GOVERNANCE                                                                                                            | NATIONAL INITIATIVE | CITY INITIATIVE    |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|--------------------|
| Objective         | A unified App with all city services                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                                                                          |                                                                                                                       |                     |                    |
| Description       | <p>Collects all city services into one app that can be used on mobile devices and PCs</p> <p>Allows payment of all fees due in a unified interface</p> <p>Connects to all relevant city and national entity apps to provide the widest service possible</p> <p>Benchmark is Jeddah City App, UK Fix My Street and Dubai Now</p> <p>Services can include: Payment of city fees e.g. permit renewal, payment of bills e.g. utilities, payment of fines e.g. parking, notification to the city of faults e.g. Fix My Street, applications for services</p> |      |                                                                                          |                                                                                                                       |                     | CHALLENGES         |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          |                                                                                                                       |                     | GOVERNANCE         |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          |                                                                                                                       |                     | BUDGET/PPP         |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          |                                                                                                                       |                     | ENABLERS           |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          |                                                                                                                       |                     | ICT INFRASTRUCTURE |
| Dimension         | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Goal | Efficient and proactive government services<br>Citizens participating in decision making | Related KPIs                                                                                                          |                     |                    |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                                                                                          | Appliance of smart community services.<br>Satisfaction Index (for individuals and businesses) with municipal services |                     |                    |
| OWNER             | MOMRA (MDC) / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                                                                          | IMPACT                                                                                                                | SAVINGS             | GDP + JOBS         |
| MODEL             | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                                          |                                                                                                                       |                     |                    |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources, Dubai Now



# Smart City Control Center

| Smart City Control Center |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          | GOVERNANCE                                                                                                                         | NATIONAL INITIATIVE | CITY INITIATIVE |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|
| Objective                 | An integrated city control center to ease management of the Smart City                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |                                                                          |                                                                                                                                    |                     |                 |
| Description               | <p>With the proliferation of Smart City implementation and the added dependence on related technologies, cities will need an effective and efficient integrated control center to manage all aspects of the Smart City program. This includes the management and operations of all aspects of Smart City including CCTV, Smart Parking, first responders, traffic and congestion management, waste management, Smart Water, Smart street lights and others.</p> <p>The aim of this initiative is to check international best practices in this regard and develop a set of guidelines to help cities implement and maintain efficient smart city control centers.</p> |      |                                                                          |                                                                                                                                    |                     | CHALLENGES      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          |                                                                                                                                    |                     | GOVERNANCE      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          |                                                                                                                                    |                     | BUDGET/PPP      |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          |                                                                                                                                    |                     | ENABLERS        |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          | ICT INFRASTRUCTURE                                                                                                                 |                     |                 |
| Dimension                 | Smart Enablers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Goal | Technology, policy and guideline enablers for smart city control centers | Related KPIs                                                                                                                       |                     |                 |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |                                                                          | Development of the policy, standards and guidelines.<br>Implementation of the guidelines in Smart City control center initiatives. |                     |                 |
| OWNER                     | MOMRA (MDC) / EACH CITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |                                                                          | IMPACT                                                                                                                             | SAVINGS             | GDP + JOBS      |
| MODEL                     | CAPEX/PPP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                                                          |                                                                                                                                    |                     |                 |

Source: NXN analysis, top down Smart City Program benefits based on benchmarks, see impact slide above for sources, Dubai Now

**INTRODUCTION**

**APPROACH**

**VISION & FUTURE ASPIRATIONS**

**CHALLENGES**

**STRATEGIC GOALS & OBJECTIVES**

**PRIORITY INITIATIVE**

**ROADMAP**

**APPENDICES**





# Workshop Based Priorities

## The 5 initiatives that move the needle vision the most

Table 1

- 1.City Control - Management
- 2.Polices (data, cyber, recycling, PPP ...etc)
- 3.ITM
- 4.City Fiber
- 5.Smart infra. Control
- 6.Unified GIS - (SDI)

Table 2

- 1.Implement NSDI
- 2.Unified service tunnel
- 3.City Portal
- 4.PPP regulations
- 5.Facilitate investors processes
- 6.Smart Metering (water, electricity, parking..)

Table 3

- 1.Digital Identification and profile
- 2.National Acts
- 3.SMEs Incentives
- 4.City Portal
- 5.PPP Regulations
- 6.Integration between government entities
- 7.Command Center

- City Control - Management
- Polices (data, cyber, recycling, PPP, SC Act...)
- ITM
- Smart infra. Control
- Unified GIS - (SDI)
- Unified City App
- SMEs Incentives

## The 5 initiatives that are easiest to implement

Table 1

- 1.Visitors info. System & apps (signage)
- 2.Municipality SG & Training
- 3.City WiFi
- 4.Safety (reduce accidents)
- 5.CSR, Promotions and inclusions
- 6.Social Media sentiment - awareness
- 7.Hackathon

Table 2

- 1.Activate citizens engagement/participations/awareness (malls awareness, neighborhood committees, Leverage the communities to report violations, collect customer feedback)
- 2.Activate social responsibility of key companies
- 3.Activate exchange programs between organizations

Table 3

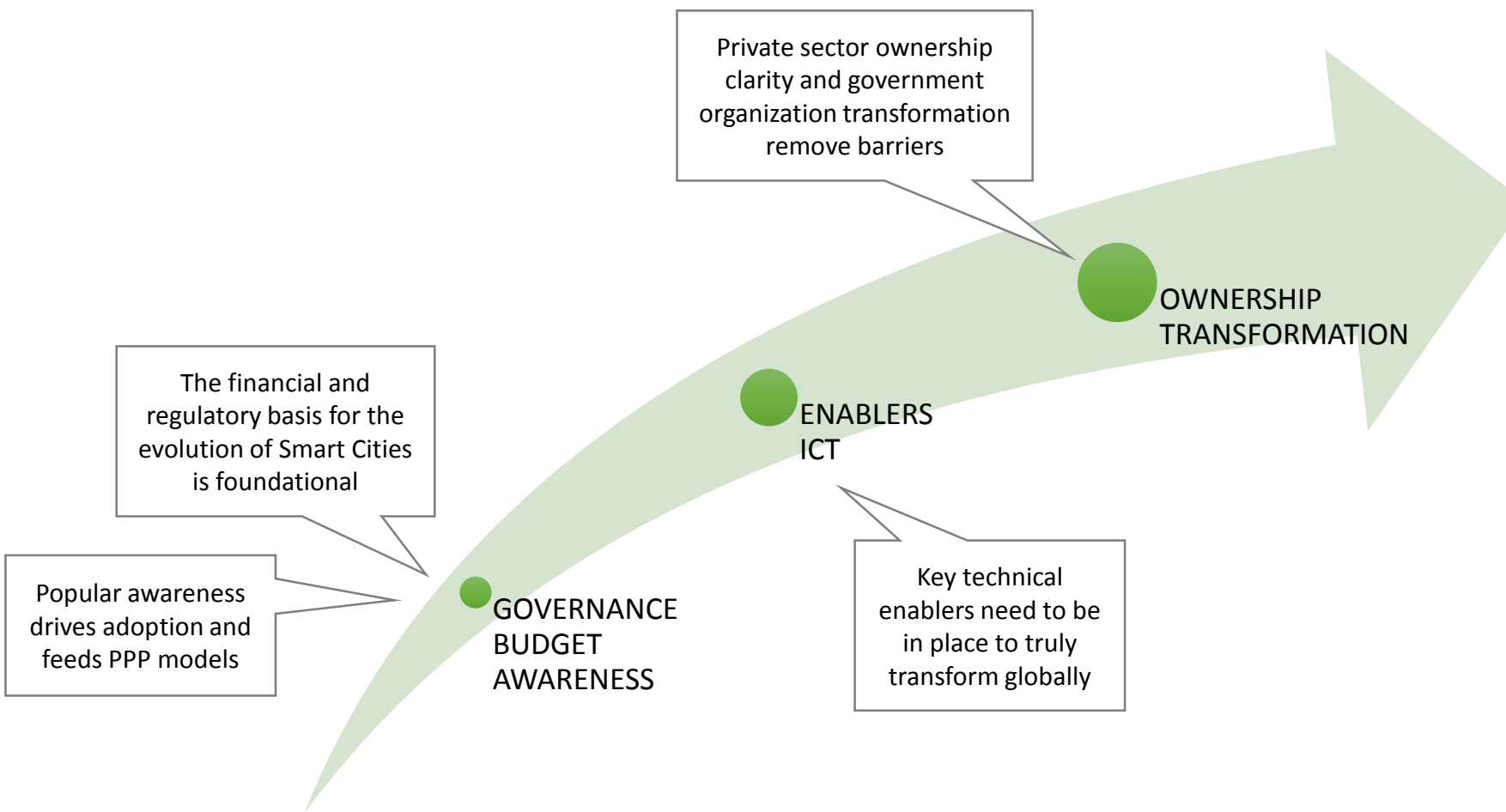
- 1.Customer Engagement
- 2.Smart Home
- 3.Smart Lighting
- 4.Smart Parking
- 5.Traffic Management
- 6.Smart Permits
- 7.Sensors
- 8.Fleet Management

- Municipality SG & Training
- CSR
- Promotions and inclusions
- Social Media sentiment analysis & awareness
- Activate citizens engagement



# Recommendations Summary:

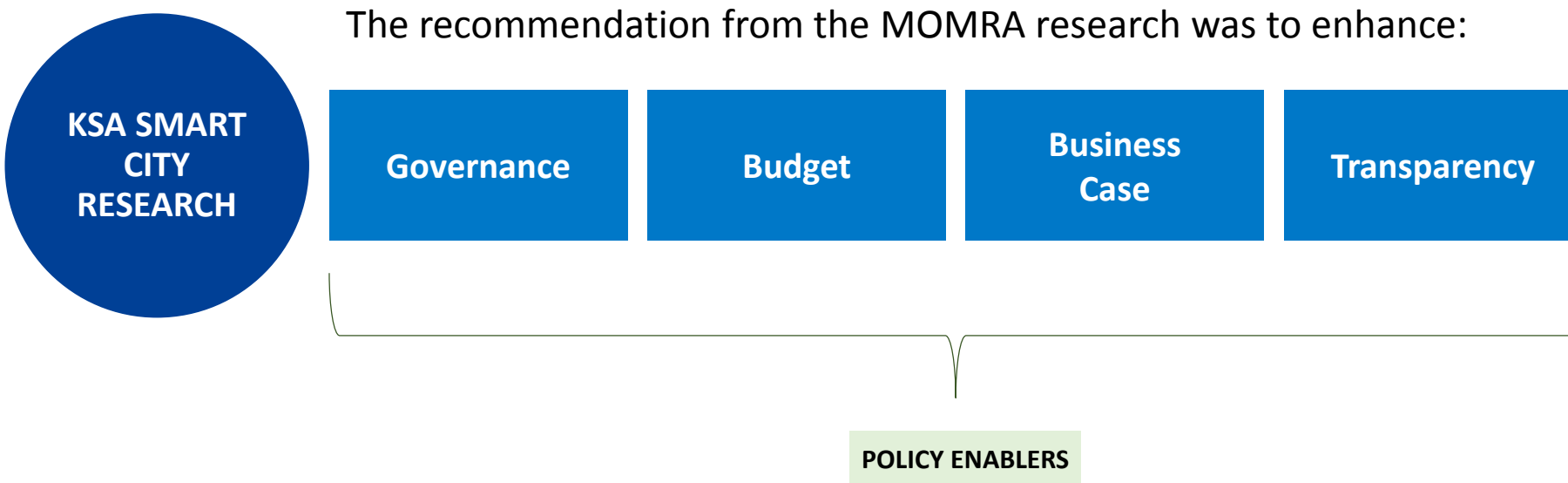
## Challenge Mitigation Needs to be Prioritized



Right now, Budget and Governance issues are a premium challenge, later transformation may become the most important



# Guidance to the Priorities for KSA Cities





## Additional Stakeholders

Further stakeholders that need to be engaged in Smart City Governance:

- MOI
- ADA
- NIC
- General Authority for Statistics
- Yesser



# Initiatives Timeframes

## PROJECTS

1

### STRATEGIC ENABLERS

Policy, Platform, Infrastructure  
*Must be done to power Smart Cities going forward*

2

### CLOSE

E.G. Pilots, Quick Wins  
*Those are projects that can be implemented now*

3

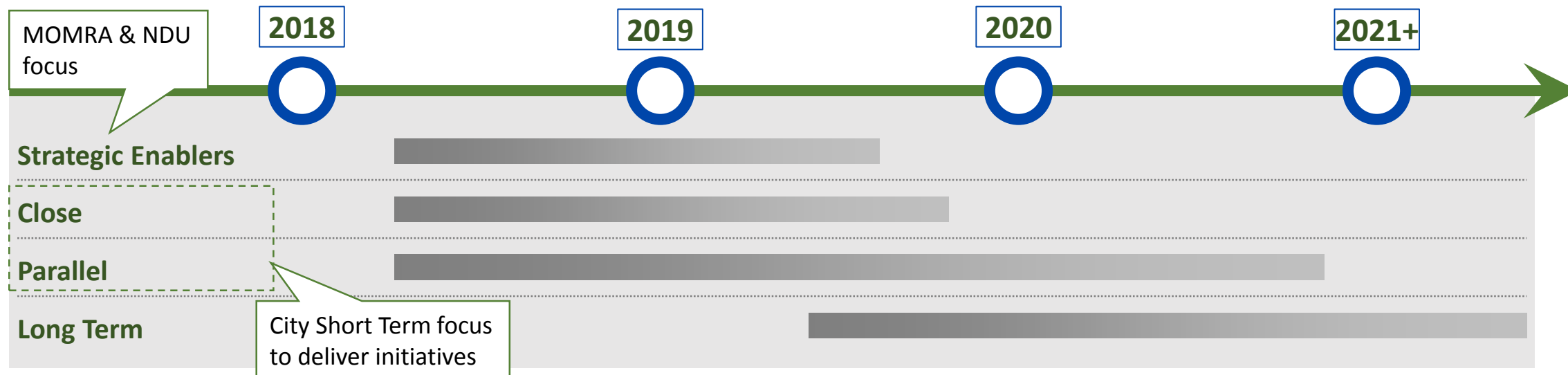
### PARALLEL

E.G. Apps  
*These are projects that can be started now, with large scale roll out once key strategic enablers are available*

4

### LONG TERM

Emerging tech., analytics  
*Programs that really need the enablers to be ready or close to ready before being developed*





# Roadmap – Committed Initiatives

## MOMRA

Finalize the national strategy for smart cities

STRATEGIC: SMART CITY NATIONAL GOVERNANCE



2018Q1



2018Q2



2018Q3



2018Q4

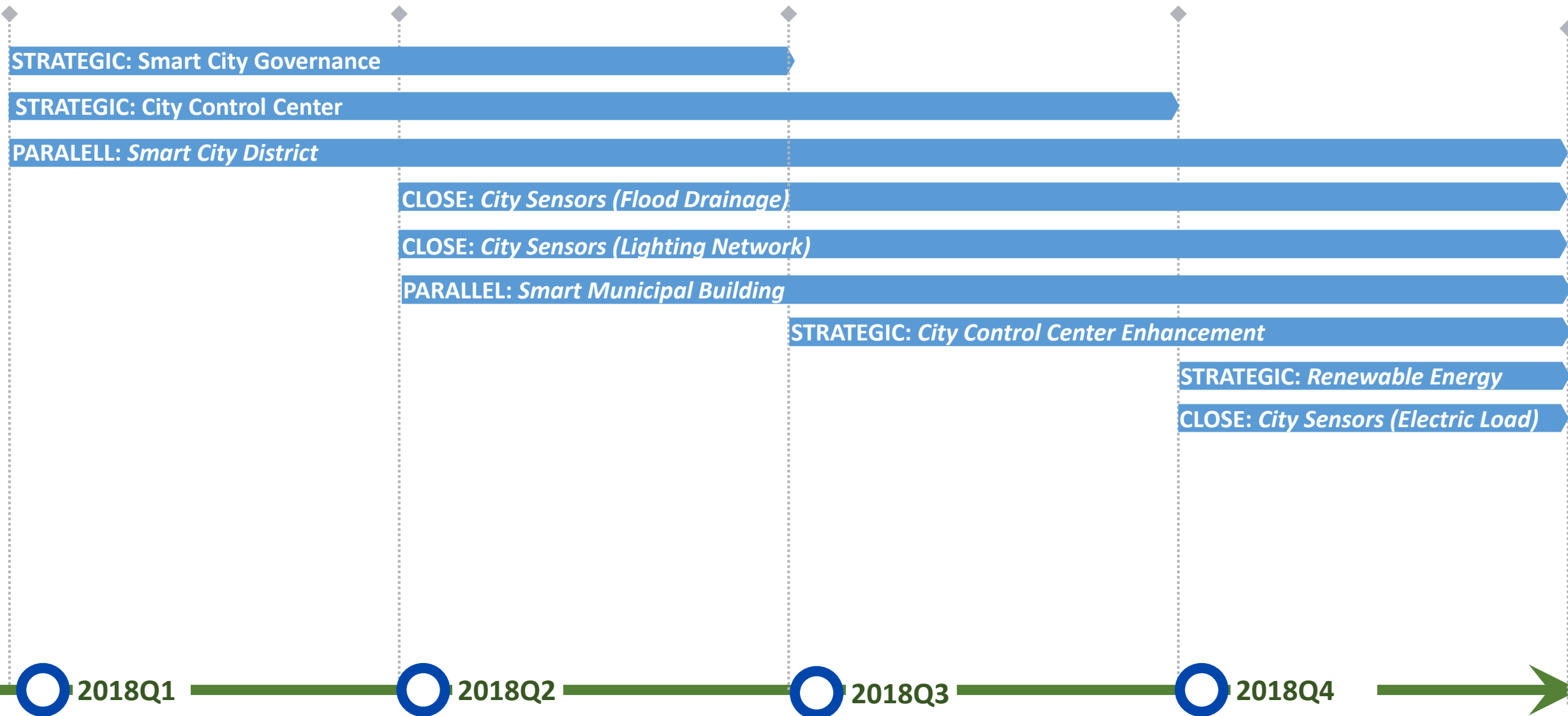


Source: MOMRA



# Roadmap – Committed Initiatives

## Riyadh

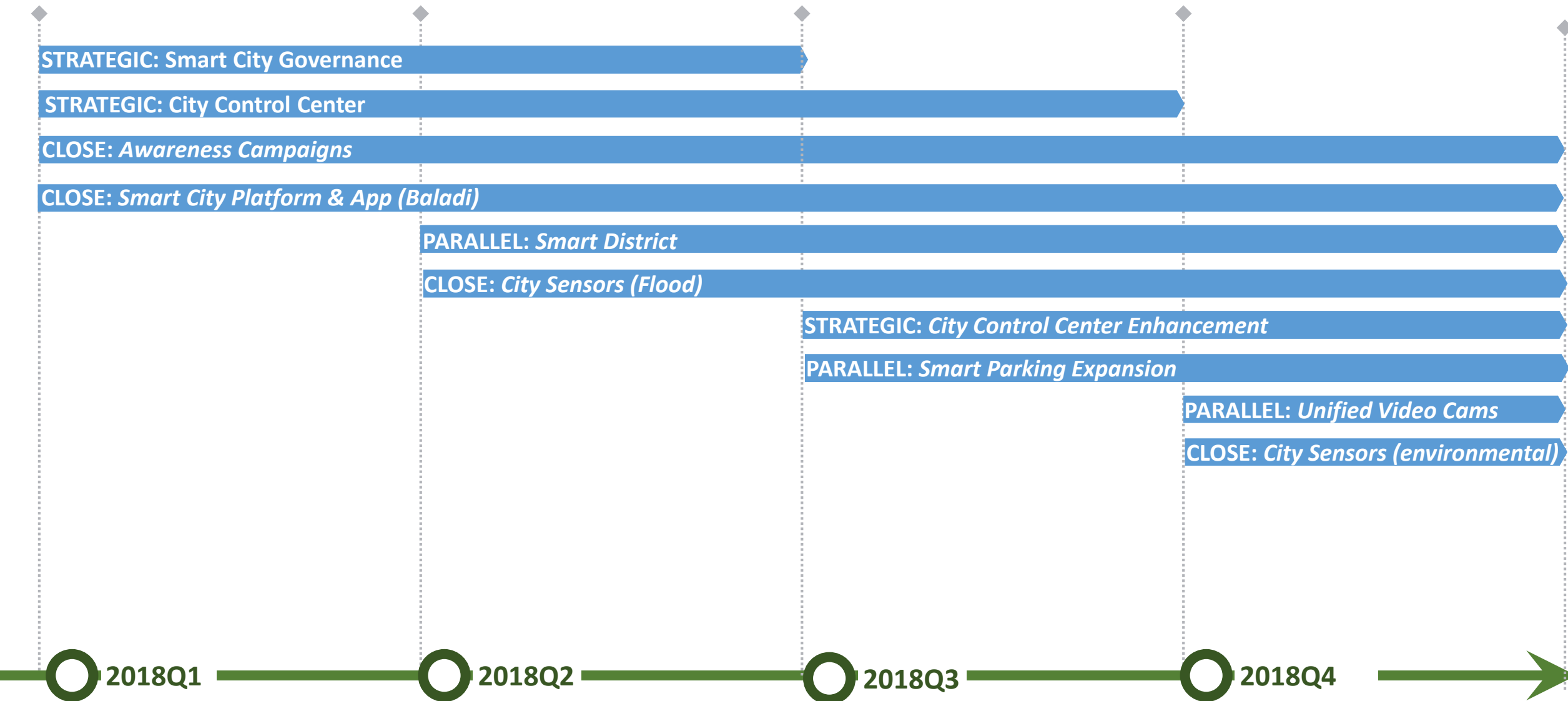


Source: MOMRA



# Roadmap – Committed Initiatives

## Jeddah

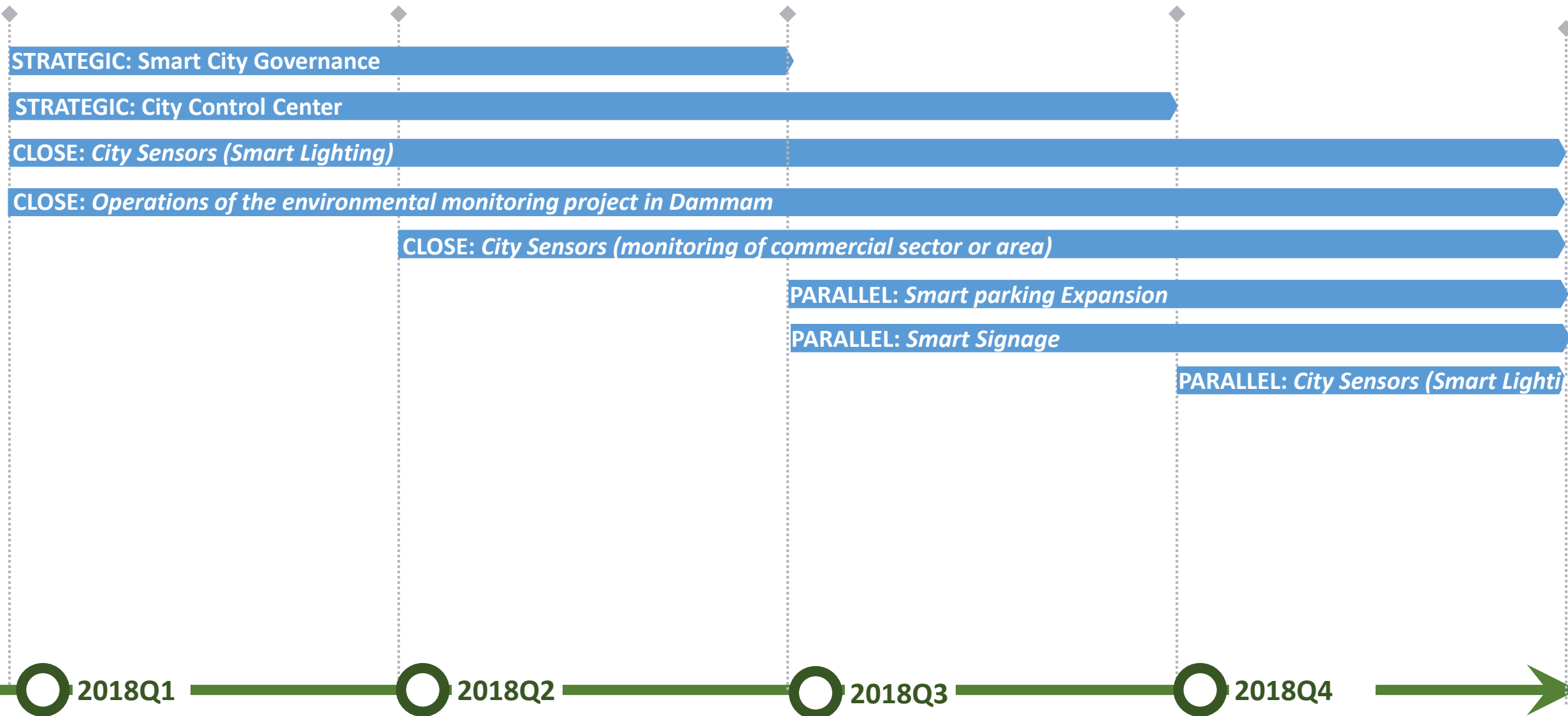


Source: MOMRA



# Roadmap – Committed Initiatives

## Eastern Region

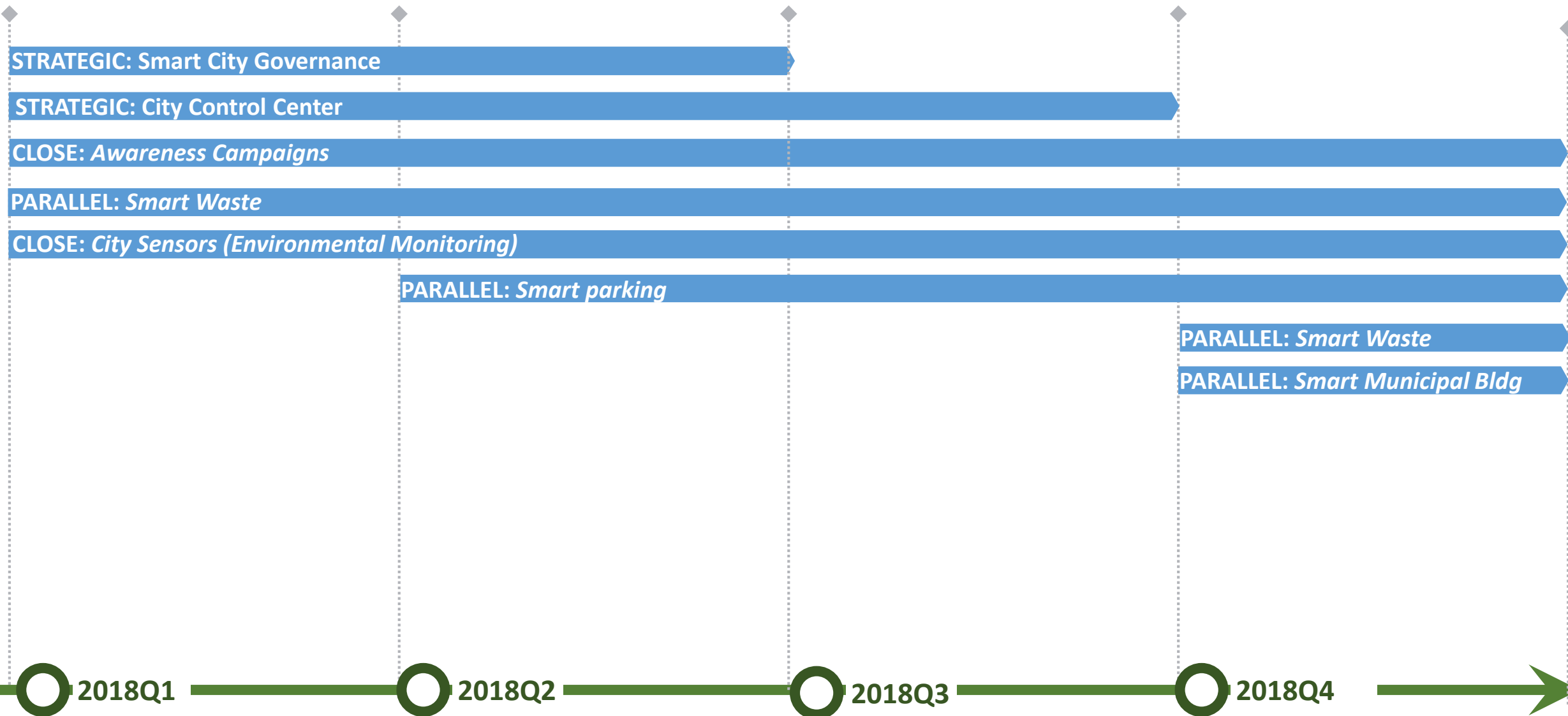


Source: MOMRA



# Roadmap – Committed Initiatives

## Al-Madina Al Monawara

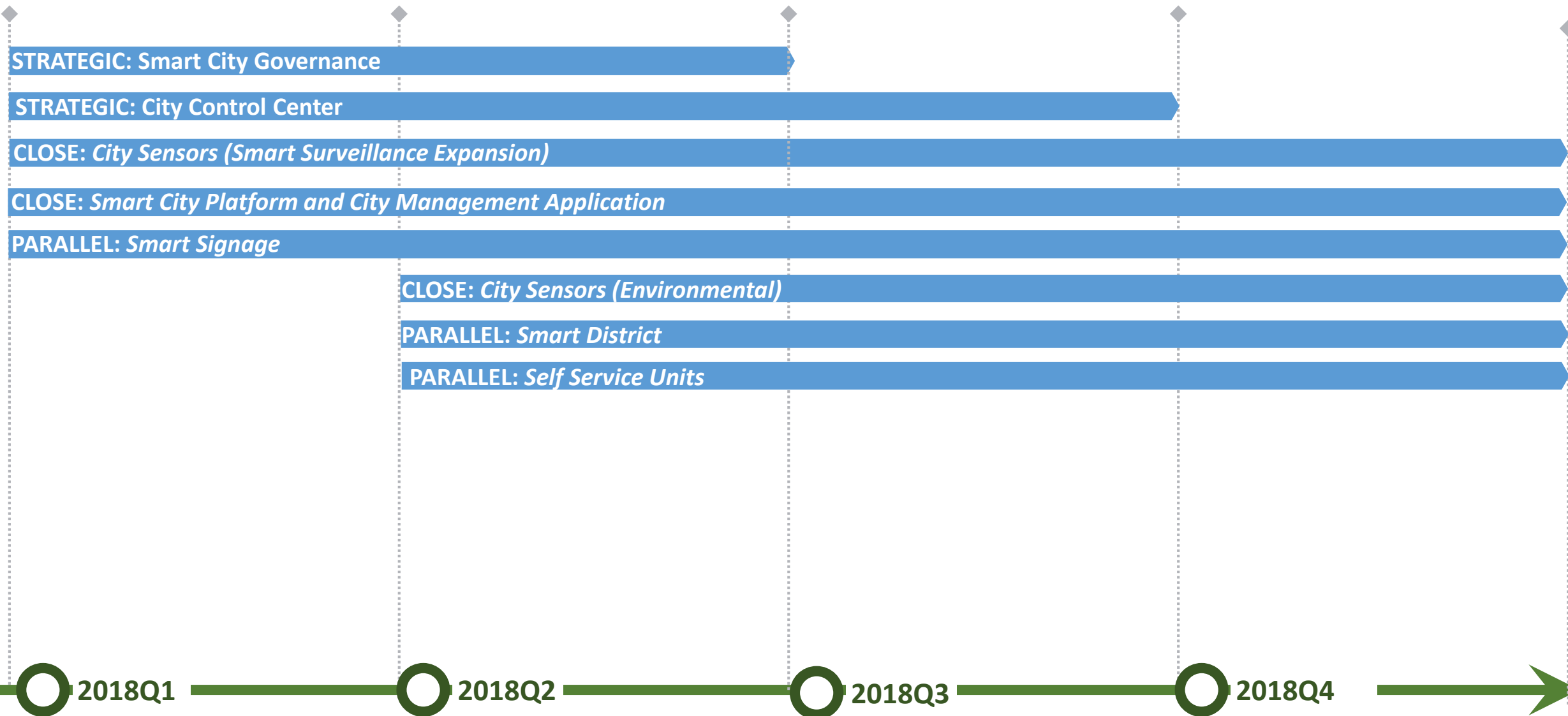


Source: MOMRA



# Roadmap – Committed Initiatives

## The Holy Capital



Source: MOMRA



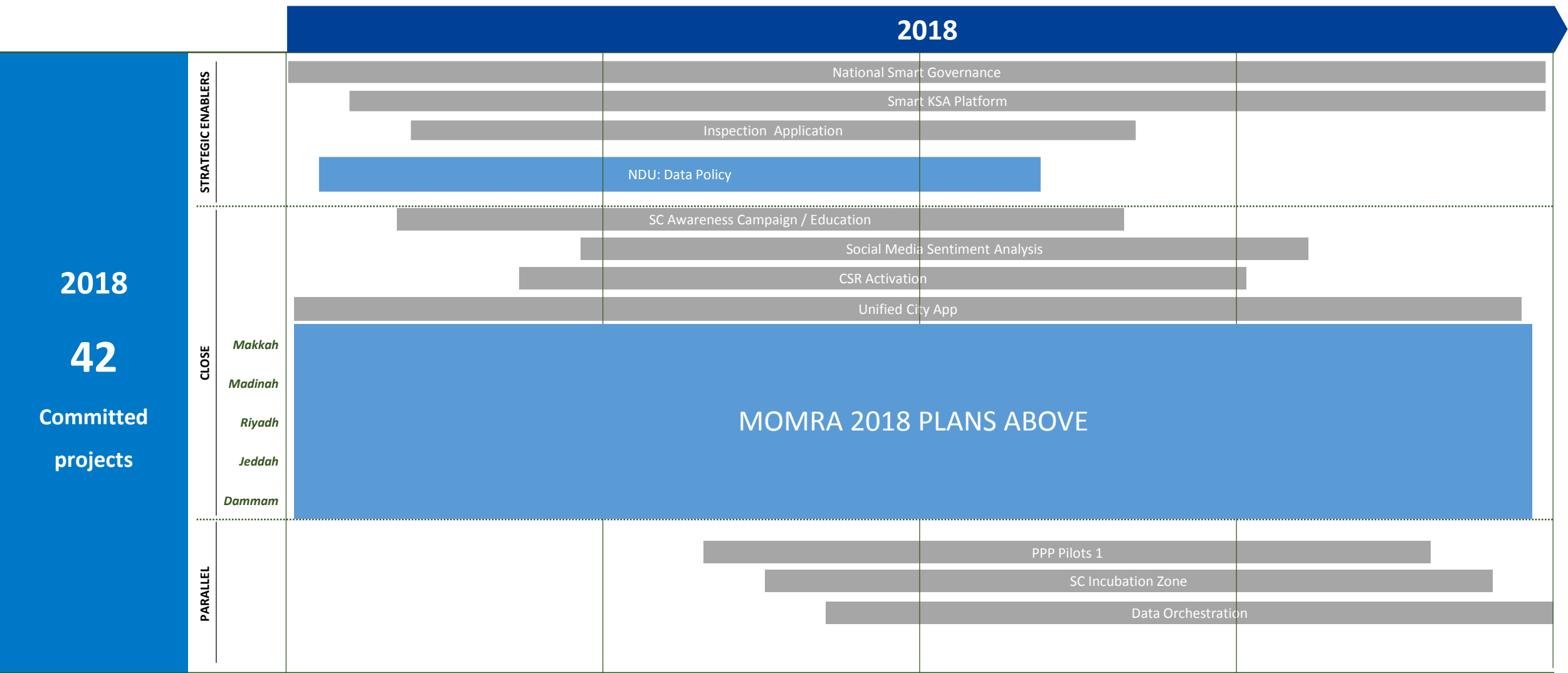
# Initiatives Roadmap (1/2)

Committed projects

High potential proposed projects

National Ministry scope\*

ILLUSTRATIVE  
REQUIRES DETAILED PLANNING



\* All other projects are carried out by cities

Source: NXN analysis



# Initiatives Roadmap (2/2)

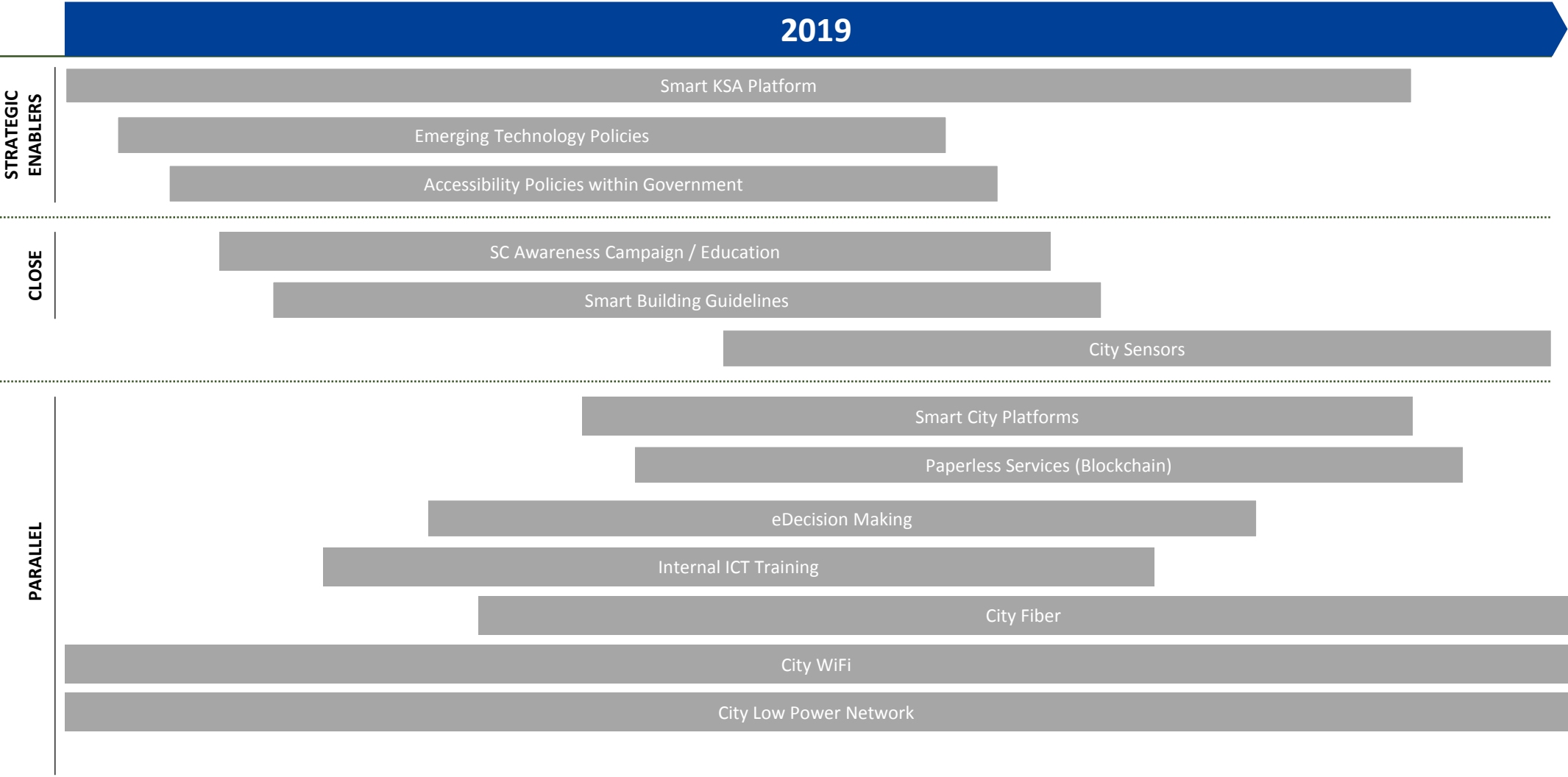


National Ministry scope\*

ILLUSTRATIVE  
REQUIRES DETAILED PLANNING

2018/19  
15

Committed  
projects  
of 40 High  
potential  
projects  
identified



\* All other projects are carried out by cities

Source: NXN analysis

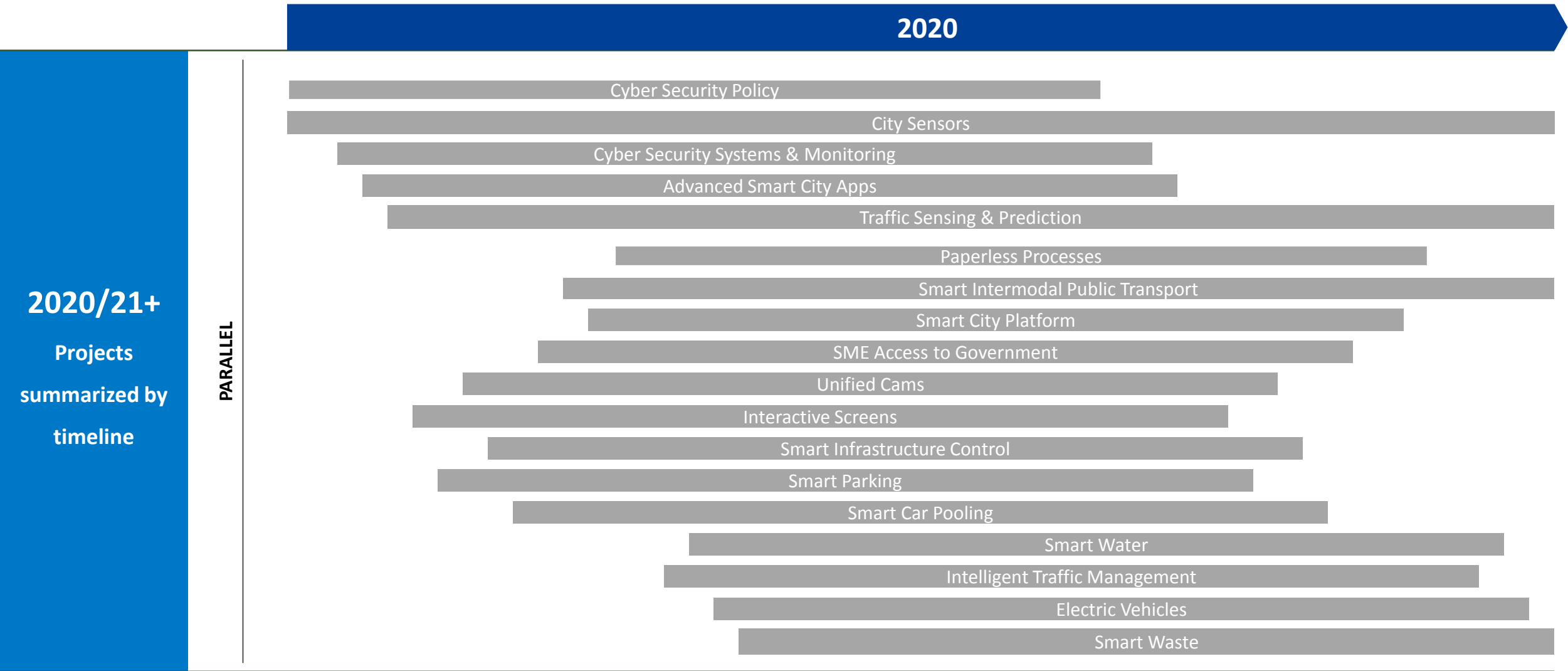


# Projects Summarized by Timeline



National Ministry scope\*

ILLUSTRATIVE  
REQUIRES DETAILED PLANNING



\* All other projects are carried out by cities



# Projects Summarized by Timeline



National Ministry scope\*

ILLUSTRATIVE  
REQUIRES DETAILED PLANNING

**2020/21+**  
Projects  
summarized by  
timeline

LONG TERM

**2021+**

Electronic Issue Voting

Emerging Technologies Training

Private Sector Accessibility Policies

Renewable Energy

Autonomous Vehicle Municipal Pilots

City Control Centre

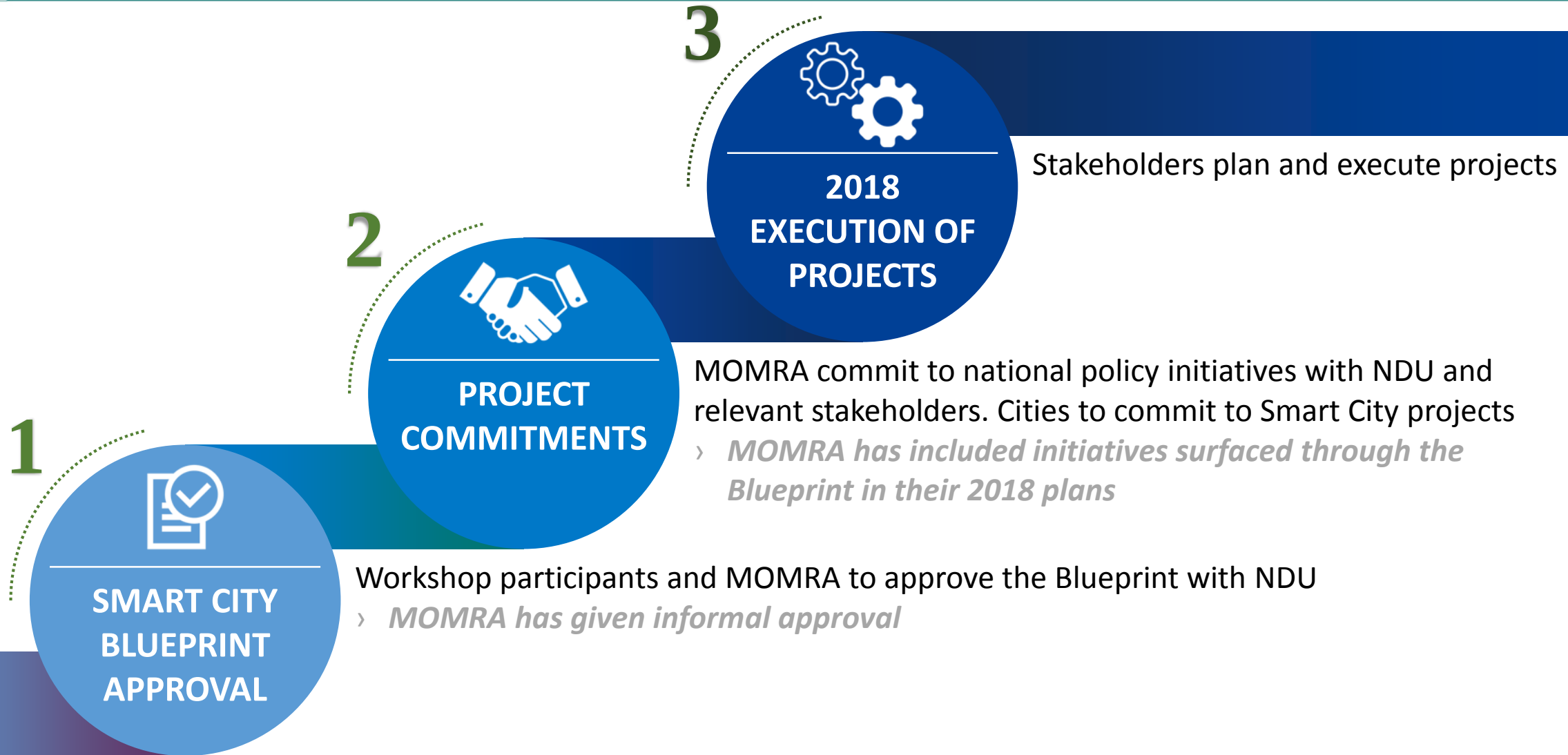
**UPGRADE OF PILOTS TO CITY SCALE**

\* All other projects are carried out by cities

Source: NXN analysis



## Next Steps



**INTRODUCTION**

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**VISION & FUTURE ASPIRATIONS**

**CHALLENGES**

**STRATEGIC GOALS & OBJECTIVES**

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**APPENDICES**

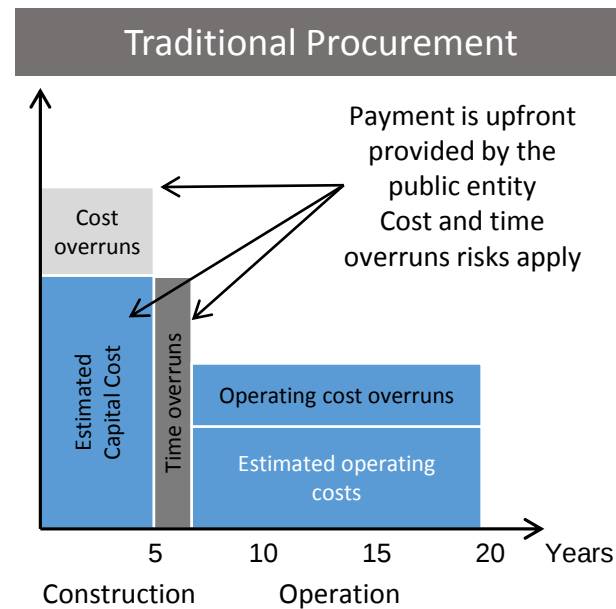




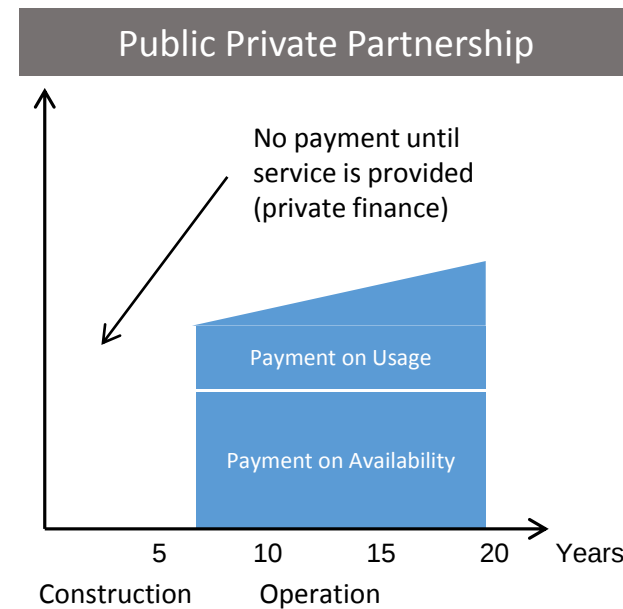
# PPP Deep Dive



# Public-Private Partnerships Provide Benefits in Comparison with Traditional Public Sector Procurement Practices - Parameters for PPP Engagement



**Financing:** Public budget  
**Funding:** Taxation  
**Delivery:** Public sector



**Financing:** Private equity & private debt  
**Funding:** User pay or state pay  
**Delivery:** Private sector

In addition to financial, funding and delivery benefits, in public-private partnership, the risk is shared between the private and public sectors as well as the initial capex which mitigates cost and time overrun problems.

## Potential Private Sector Companies

System Integrators  
Technology vendors  
Telecom operators  
Telco service providers  
SDI service providers

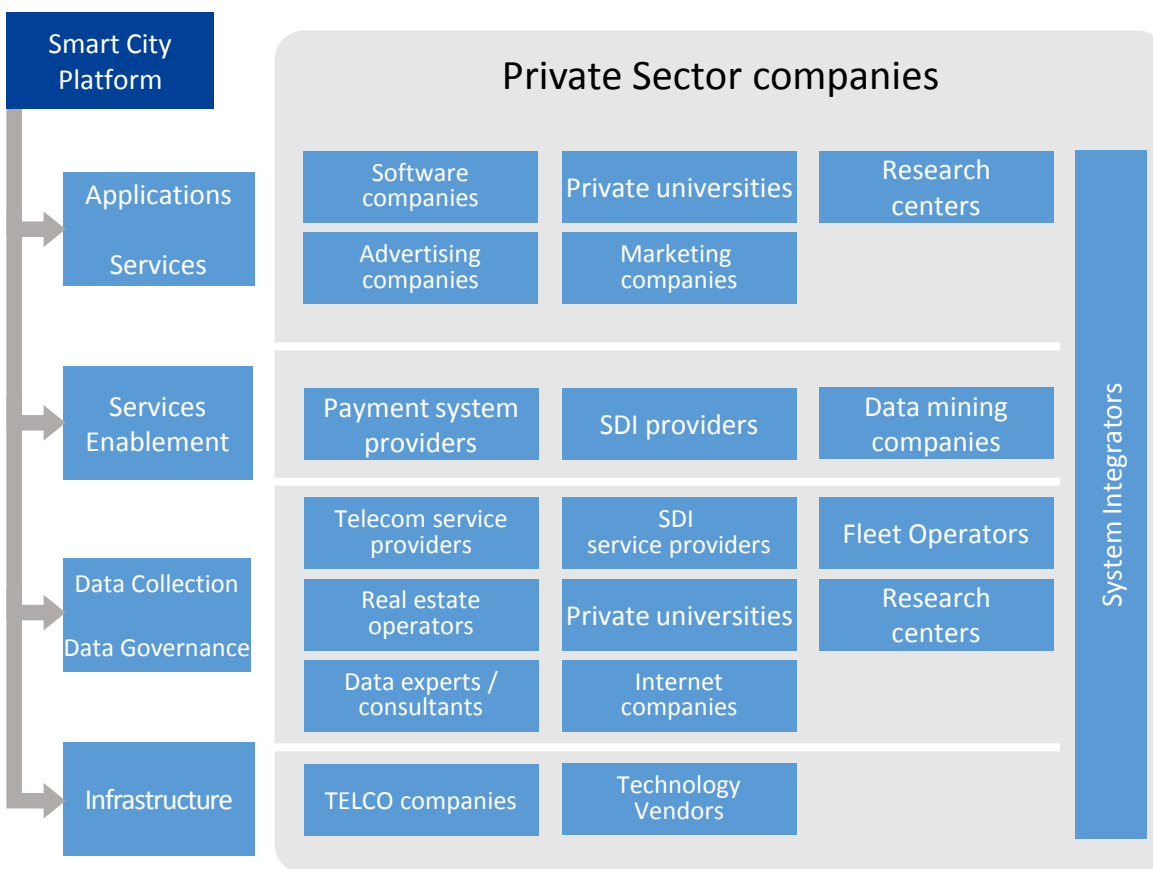
Fleet operators  
Real estate operators  
Private universities  
Research centers  
Social media companies

Payment system providers  
Data mining companies  
Application developers  
Marketing/Ad companies



# e.g. Private Sector Companies Contribute in Building the Smart City Platform

With a focus on the main layers of the platform, PPP plays a major role in the development of infrastructure, data, service enablement and applications.



On the multiple layers of the platform and on the services created outside of the platform, PPP brings high value for future cities.

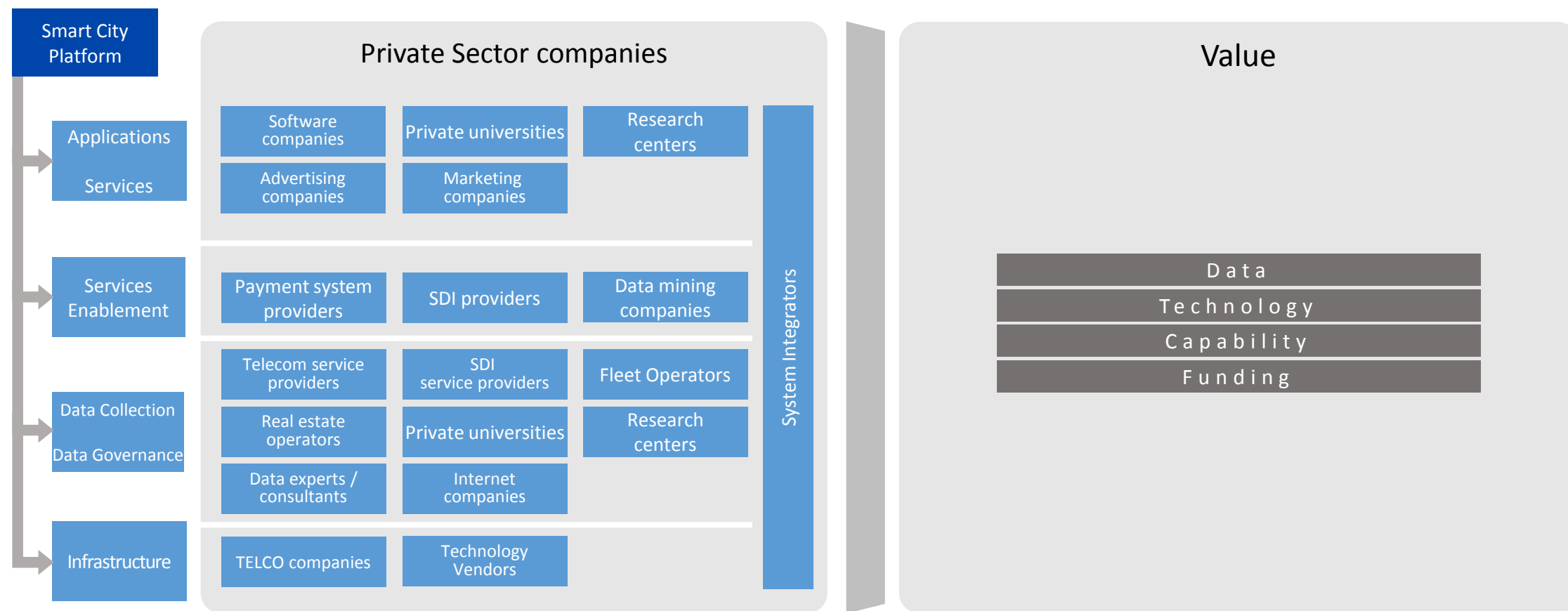
Software companies, universities and research centers collaborate in developing smart applications and services. They also contribute to city data and benefit from accessing the data and services of the platform.

In addition to data contribution, telecom companies and technology vendors bring expertise in building the Platform and the smart city infrastructure.

Most important are the system integrators that put all the pieces of the puzzle together, they benefit from the partnership and bring high value to future cities.

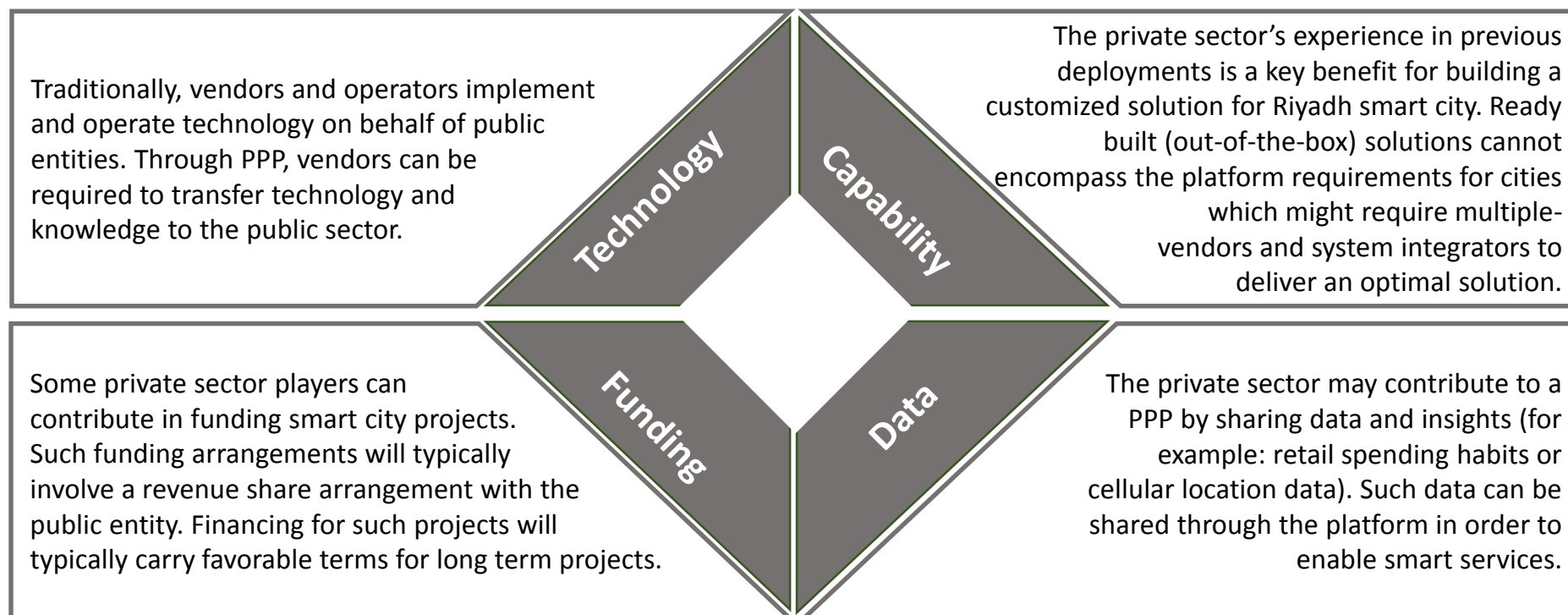


# PPP Brings Value to Future Smart Cities in Terms of Technologies, Capabilities, Funding and Access to Data





# The Four Areas of Value Creation for Cities Through Partnership with the Private Sector...





# PPP Models should Focus on Value for the City and Long Term Win for Both Public and Private Sector Partners

BUDGET

SOLUTIONS

- Special Purpose Vehicles
- BOT, BOO Leases
- Defrayed Capital Procurement
- Revenue Share Outsource
- Collaborative Purchasing



# Operations Models can Move Responsibility for Capital Investment to Private Sector Partners in Return for Time Based Licenses & Revenue Opportunities

BUDGET

SOLUTIONS

|                                                                    |                                    | CITY                           | PRIVATE SECTOR PARTNER           | Typical Timespan |
|--------------------------------------------------------------------|------------------------------------|--------------------------------|----------------------------------|------------------|
| [BOT]<br>BUILD – OPERATE –<br>TRANSFER                             | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         | 2 to 5 Years     |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |                  |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |                  |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |                  |
| [BOO]<br>BUILD – OWN – OPERATE /<br>SMART PLATFORM<br>AS A SERVICE | PLATFORM BUILD-UP & MAINTENANCE    |                                | PARTNERS                         | 5 to 10 Years    |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE | INPUT / REQS / FEEDBACK        | PARTNERS                         |                  |
|                                                                    | PLATFORM OPERATION                 |                                | PARTNERS                         |                  |
|                                                                    | SERVICE OPERATION                  |                                | PARTNER OPERATIONS               |                  |
| [JV]<br>JOINT VENTURE                                              | PLATFORM BUILD-UP & MAINTENANCE    | (JOINT INVESTMENT & OPERATION) |                                  | 10+ Years        |
|                                                                    | USE-CASE DEVELOPMENT & MAINTENANCE |                                |                                  |                  |
|                                                                    | PLATFORM OPERATION                 |                                |                                  |                  |
|                                                                    | SERVICE OPERATION                  | MUNICIAPAL OPERATIONS TEAM(S)  | ALTERNATIVELY PARTNER OPERATIONS |                  |

REVIEW CAN BE BUILT IN FOR DEALS OVER 5 YEARS

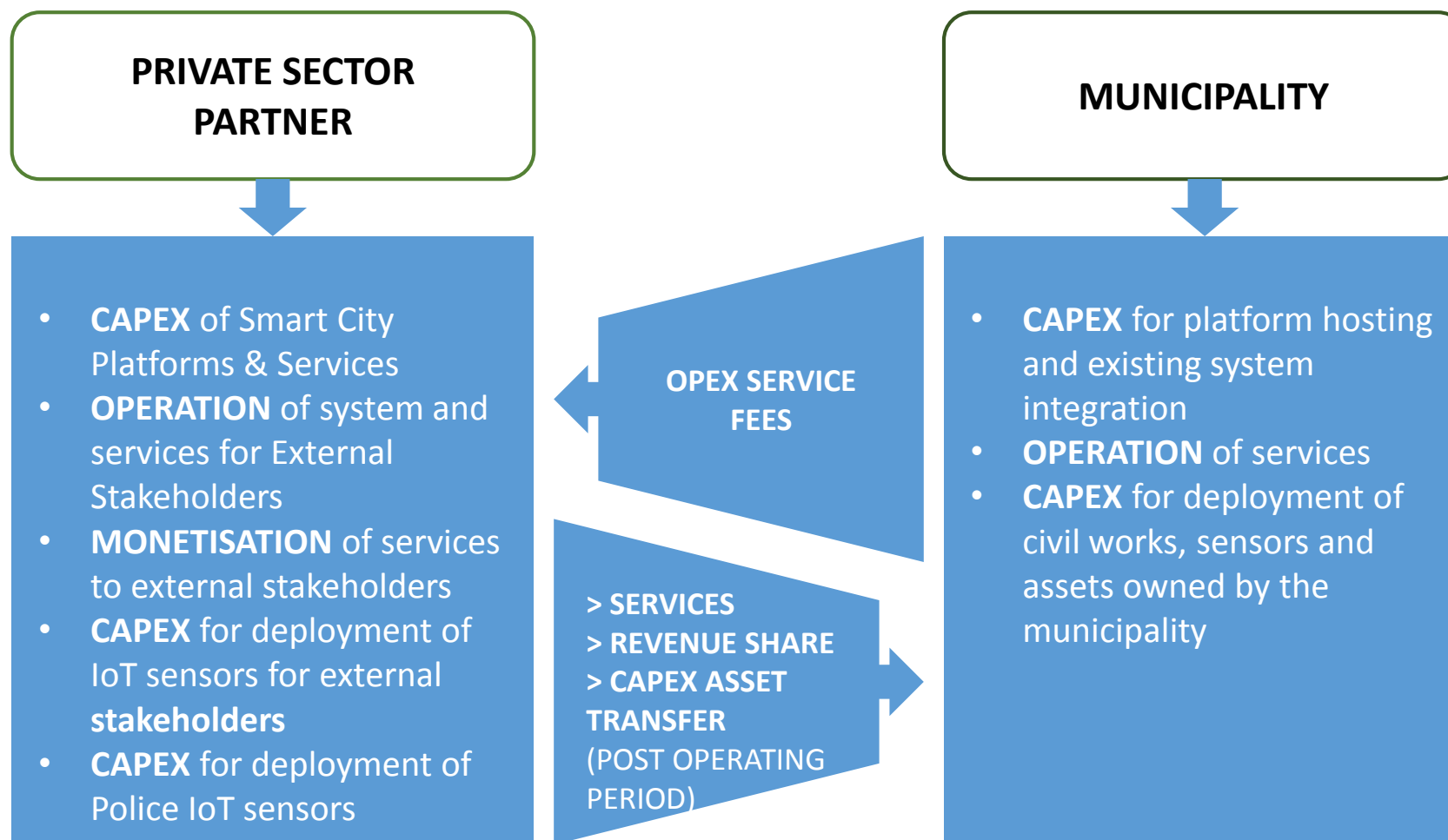
Source: NXN analysis



# Even in Models where Funds are Required from the Municipality, these can be in the Form of Monthly Fees Rather than Capex, at least for a Period

BUDGET

SOLUTIONS



Source: NXN analysis



# PPP Framework: Parameters for PPP Engagement

## Municipality Account

### Direct Revenues

- Fees
- Revenue Share
- Asset Lease

### Indirect Revenues

- Increase in licenses
- Increases in asset value
- People development

### Cost Savings

- Reduction in CAPEX
- Reduction in Opex
- Reduction is Licenses

## Public Sector Investment

- Asset Lease Time

## Private Sector Investment

### Direct Revenues

- Consumer / Company payments
- Advertising

### Indirect Revenues

- Leverage of services or infrastructure
- Leverage of licenses / reputation

## Private Sector Investment

- CAPEX
- Capability building



# PPP Framework:

## Run Through an Example – Smart City Platform

### Municipality Account

#### Direct Revenues

- Fees
- Revenue Share
- Asset Lease

**Monthly Basic Ops**  
**From platform usage and services**  
**N/A**

#### Indirect Revenues

- Increase in licenses
- Increases in asset value
- People development

**From new services and faster deployment**  
**ICT Platform**  
**ICT Skills**

### Public Sector Investment

**Internal organisation**  
**ICT Transformation**

#### Cost Savings

- Reduction in CAPEX
- Reduction in Opex
- Reduction in Licenses

**Minimal Setup Fees – no ICT capex**  
**Operation outsourced**  
**Reduction in licenses**



# PPP Framework:

## Run Through an Example – Smart City Platform

### Private Sector Investment

#### Direct Revenues

- Consumer / Company payments
- Advertising

**Data revenue share, public services revenue share, fees for new services**  
**From running advertising in services**

#### Indirect Revenues

- Leverage of services or infrastructure
- Leverage of licenses / reputation

**Use of infrastructure for further government services**  
**Leverage with other cities**

### Private Sector Investment

- CAPEX
- Capability building

**HW/SW**  
**Local skills sets such as data scientists**



# PPP Potential Services: Engagements that Cities can Consider for PPP

|                                |                      |                    |                        |                            |
|--------------------------------|----------------------|--------------------|------------------------|----------------------------|
| • Special Purpose Vehicles     | Smart City Platform  | 3D Printing Hub    | Digital ID             |                            |
| • BOT, BOO Deals & Leases      | Smart Parks          | City Unified Apps  | City Control Centre    | ↕<br>↕                     |
| • Defrayed Capital Procurement | Smart Street Light   | ITM                | Paperless Government   |                            |
| • Revenue Share Outsource      | Smart Parking        | License Management | Paperless Government   |                            |
| • Collaborative Purchasing     | CoE / Innovation Lab | Awareness          | Social Media sentiment | Municipal Data Preparation |



# BENCHMARK DATABASE OF INITATIVES



## Vision – Dimension & Focus Area Details

### Smart Economy

Smart Economic Infrastructure

PPP

Entrepreneurship / Innovation

Productivity

International Exposure

eCommerce

Smart Living

Smart Governance

Smart Society

Smart Environment

Smart Mobility

Smart Enablers



# Smart Economy

## Smart Economic Infrastructure

The basic infrastructure elements that support the development of the Smart Economy

### FOCUS AREAS

- **Smart City & Financial Systems** enabling national and city wide financial transactions
- **Smart Logistics** systems to improve transit times, external traffic impact, safety, accuracy of logistics
- **Smart Ports / Airports** systems to improve internal traffic, communications, safety, emergency response

### INITIATIVES

- Digital ID
- Electronic payments and currencies
- Customs handling and tracking for Containers, Trucks, Boxes
- Unified control center
- Digitized processes including international transactions
- Sensors of vehicles, goods and people flow
- Multi channel information and control systems
- Automated charging / tolling
- Automated sizing / weighing
- Vehicle / Goods parking management
- Digital ticketing / entry gates
- Predictive and real time vehicle / people traffic analytics



# Smart Economy

## PPP

The basic infrastructure elements that support the development of the Smart Economy

### FOCUS AREAS

- **POLICIES & FRAMEWORKS**
- **PPP IMPLEMENTATION**

### INITIATIVES

- National PPP Law and interpretation
- National PPP implementation framework
- National PPP Implementation Templates
- City PPP Strategy
- City PPP Governance
- City PPP Initiatives



# Smart Economy

## Entrepreneurship / Innovation

Enabling a new, non oil economy and job creation by supporting the creation of Smart City focused businesses

### FOCUS AREAS

- **Smart Economic Hubs** including free zones and specific activity districts
- **ICT Funding & Innovation** Initiatives such as Incubation and Hackathons
- **Incubation** allowing new technologies through the private sector
- **Improve efficiency of Company Creation**
- **Incubate and Track Innovation**

### INITIATIVES

- Smart City Business Incubation Tools
- City Data Dashboards relating to Business Relevant Metrics
- Crypto Currencies / E-Receipt / E-Expenses
- Mobile Payments
- E-Procurement
- Electronic Payment via PC or Mobile for all private enterprise activity
- Pre-Paid Services Account
- Mobile Access to Business and Personal Government Services
- Innovation programs by technology e.g. AI, Blockchain, robots, 3D printing, drones



# Smart Economy

## Productivity

Enhancing the efficiency of the local and national economy through Smart Initiatives & ICT

### FOCUS AREAS

- **ICT usage** in the Economy fostered by training, providing ubiquitous Internet connectivity and moving access to Government services to mobile and PC only
- **eCommerce** encouraged via advanced electronic payment facilities, accurate mapping and street indication
- **mCommerce** – availability of all Government services by mobile device

### INITIATIVES

- Digitization of all records
- Digitization of all forms and input requirements for Government services
- Digital Workflow implementation for repetitive government tasks
- WIFI or 4G/5G Everywhere
- Electronic Payment via PC or Mobile for all Government services
- Notification and digital workflow for all renewal activity with Government services
- Smart Inspectors



## International Exposure

Cities interfacing with international counterparts and adopting best practice

### FOCUS AREAS

- **International Embeddedness** fostered through presence in international Smart City forums and online communities. Mobile and PC online resources for businesses and associations
- **Smart Tourism and MICE** including mobile mapping / information apps, mobile transactions for tourist activities, mobile payments POS, online presence of the city

### INITIATIVES

- Membership of Smart City Forums
- Memberships of Standards Organisations impacting Smart City (e.g. ISO, ITU, UN, etc.)
- Presence of City Data in international systems for:
  - Government (E.g. Factbook)
  - Corporate (E.g. Research Analysts)
  - Individuals (E.g. Google Maps)
- Travellers Expenses Management system
- Omni channel Interactive Information portal
- Accurate and up to date Social Media and other Digital Marketing
- Participation in Competitions



# Smart Economy

## eCommerce

Creation and support of an eCommerce industry in KSA and standards for quality services

### FOCUS AREAS

- DIGITAL COMMERCE
- LOGISTICS
- PAYMENTS
- ENABLERS

### INITIATIVES

- Automated & world-class end-to-end digital commerce
- Smart Shipping & Customs
- Smart Warehousing & Fulfillment Centers
- Smart Delivery
- E & M Payments
- Cashless Penetration
- eCommerce Regulation
- Ecosystem incentivisation
- Enabling Platforms



# Vision – Dimension & Focus Area Details

Smart Economy

## Smart Living

Safety & Security

Healthcare

Education

Public Spaces

Buildings

Entertainment / Edutainment

Smart Governance

Smart Society

Smart Environment

Smart Mobility

Smart Enablers



## Safety & Security

Keeping city residents safe online and physically

### FOCUS AREAS

- **Public Safety Civil Defence** communication and operation management
- **Surveillance** systems that use the latest technologies
- **City Central control** integrating management of all city dimensions
- **Health and Safety** sensor systems

### INITIATIVES

- Crime Data Aggregation- Crime Information Warehouse
- Integrated Emergency Management and Response Center
- Smart Integrated Surveillance Systems (CCTV, Plate & Face recognition,...)
- Remote Buildings and Public Space monitoring
- Social media sentiment and predictive analysis for pre-emptive crowd management
- Child monitors
- Accident avoidance technology
- Health status sensors



# Smart Living > Healthcare

## Digital Healthcare Ecosystem - The Focus Areas

| QUALITY OF HEALTH              | CLIENT (PATIENT) JOURNEY                           | PRACTITIONER PERFORMANCE                                                                                                                                                                                                                                                          | CAPABLE WORKFORCE                             | CONNECTED WORKPLACE                         |
|--------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------|
| Home Care                      | Options to choose Facilities                       | Government Regulations, Policies & Legislation                                                                                                                                                                                                                                    | Human Capital Development                     | Clinical Decision Support Deployment        |
| Safety and Security            | Connectivity/Access                                | Governance and Standards                                                                                                                                                                                                                                                          | Learning Management Systems                   | Data Orchestration & Analytics              |
| Response Support               | Patient Flow Management                            | Incentivizing (Performance Measurement)                                                                                                                                                                                                                                           | Big Data and Analytics (AI)                   | HIS/ERP/PACS/BIG Data                       |
| Mobile/Wearable Devices        | Security                                           | Privacy & Cyber Security                                                                                                                                                                                                                                                          | Picture Archiving and Communication System    | Cloud                                       |
| Telemedicine                   | Traffic Flow Management (Activity Trackers - RTHS) | Big Data and Analytics (AI)                                                                                                                                                                                                                                                       | Resource Capacity, Capability & Culture (R&D) | Consumer Enablement - Patient Portals       |
| Education/ Training            | Centralized Monitoring & Management                | <b>The Focus Areas were developed through:</b> <ul style="list-style-type: none"> <li>Research and analysis to identify the key components of the digital healthcare ecosystems</li> <li>Assessing KSA's digital healthcare environment to include the key focus areas</li> </ul> |                                               | Traffic Flow Management (Activity Trackers) |
| Mobile Apps (Platforms and UX) | HIS/ERP/PACS/BIG Data                              |                                                                                                                                                                                                                                                                                   |                                               | Virtual Reality                             |
| Trust and Awareness            | Picture Archiving and Communication System         |                                                                                                                                                                                                                                                                                   |                                               | Centralized Command Centers                 |

Source: NXN analysis



# Smart People

## Education

Smart teachers, students, and infrastructure enabling optimal outcomes of education.

Digital transformation enabling enhanced roles and results for education sector stakeholders such as teachers, students, and the labor market.



### Focus Areas

- **Teacher Readiness**
- **Student Centricity**
- **Content & Curriculum**

### Initiatives

- Jamia
- SDI
- Virtual Schools
- Futuregate
- Saudi Digital Library



# Education – 3 Pillars – The Focus Areas

## Teacher Readiness

## Student Centricity

## Content and Curriculum

1

### Training & Qualifications

Basic criteria for teachers, including professional growth and development

2

### Knowledge Sharing

Two-way street: the ability to share and receive best practices, knowledge, and strategies with educators locally and internationally

3

### Administrative Competence

Ability to perform paperwork, grading, and administrative tasks quickly and efficiently

4

### Managing Student Behavior

Includes training on how to manage special needs



# Education – 3 Pillars – The Focus Areas

## Teacher Readiness

## Student Centricity

## Content and Curriculum

1

### Extracurriculars

Activities or forums that take place outside of class, designed to enrich the school experience

2

### Student Experience

This is not just the physical environment and classroom experience, but also emotional – involving relationships and rapport with teachers, other students, and administrators.

3

### Personalized Learning & Attention

Adequate attention to address student needs and to provide students with the best course plans for their strengths and interests

4

### End to end guidance

Continuous emotional, academic, and career guidance for students across the entire education journey



# Education – 3 Pillars – The Focus Areas

## Teacher Readiness

## Student Centricity

## Content and Curriculum

1

### Critical Skills Foundation

Defining the critical skills Saudi students should have when they leave the education sphere, such as public speaking, financial fluency, 4 C's creativity, critical thinking, communication, collaborative spirit

2

### Local & e-content

Interactive, customizable, and home-grown e-content for students and teachers

3

### Relevant Curriculum; E2E

A curriculum built around skills, not merely theory, with the end point in mind.

A curriculum built around application of theory and not just memorization of facts

4

### Accessibility

Equal opportunity of access for all students of all ages, incomes, backgrounds, genders, and geographic locations.



# Smart Living

## Public Spaces

External infrastructure that continues the fluid Smart City experience in public or exterior places

### FOCUS AREAS

- **Smart Municipal Furniture** enhances sensing and provides inputs to Smart Services
- **Digital Signage** enables two way communication between government and residents
- **Smart Parks and Recreation Facilities** provide relaxation and education opportunities enhanced by ICT

### INITIATIVES

- Public interactive information signage
- Smart Kiosks, benches
- Smart Street signs
- Mobile Community and Tourist information
- Interactive mobile applications for residents, tourists and MICE
- Ubiquitous Wifi
- RFID Ticketing
- Smart Park Dynamic Applications for Public Discovery, Ticketing, Mapping
- Child ID and tagging
- Augmented reality applications to increase resident/visitor information



# Smart Living

## Buildings

Ensuring quality and efficient accommodation for all city residents through ICT

### FOCUS AREAS

- **Smart Buildings** which optimize their living environment, maintenance and power consumption
- **Smart Home / Office** technology services which enhance the personal space, daily living and personal productivity
- **Smart Services connections** enable Smart Buildings and Offices with optimal power, networks and other infrastructure services

### INITIATIVES

- Intelligent Building Systems
- Building Energy Smart Meters
- Noise, Air quality sensors
- In building community network
- Connected building management systems for energy, security, lighting, cooling, cctv
- Mobile Application Home Light, Cooling, Security Control



## Entertainment / Edutainment

Ensuring quality and educational entertainment

### FOCUS AREAS

- **Policies**
- **Infrastructure**
- **Private Sector Collaboration**
- **Public Sector Initiatives**

### INITIATIVES

- National Smart Entertainment Strategy & Policies
- Entertainment and Edutainment enablers
  - Networks
  - Digital Enablers e.g. eBooking
  - Entertainment Spaces
- Entertainment collaborations with private sector
  - Cinemas
  - Open space entertainment screens
- Public sector edutainment initiatives
  - eLibraries, history trails, exhibitions



## Vision – Dimension & Focus Area Details

Smart Economy

Smart Living

**Smart Governance**

Smart Governance

Smart Government

Smart Urban Planning

Promotion & Inclusion

Smart Society

Smart Environment

Smart Mobility

Smart Enablers



# Smart Governance

## Smart Governance

Putting in place the municipal structure that enables Smart City initiatives

### FOCUS AREAS

- **Smart City Governance** structure to empower ICT across current silos
- **City Data Orchestration & Open Data**
- **Smart City Supply chain** and asset management of public and district assets

### INITIATIVES

- Smart City Governance including tracking and audit of Government service quality
- Systems to manage Government decision making
- City Data Platform – big data systems to collate and orchestrate all City data and make it available to Government and Public entities for analysis, reporting and usage within applications
- Digital ledgers, blockchain
- Asset sensors and tracking



# Smart Governance

## Smart Government

Advanced systems to enable more efficient government services and deliver new service classes

### FOCUS AREAS

- **100% Paperless Government Services**
- **e-Citizens interaction applications**

### INITIATIVES

- Online Government interactive applications for PC and Mobile to receive/record service applications, payment and issue notifications. Each Service issued by a Government entity can be processed 100% online
- Distributed ledger / blockchain government documents
- e-Citizens interaction applications to issue information and receive resident feedback, applications centre around Government services, business sectors and Visitor information



# Smart Governance

## Smart Urban Planning

Smart planning of the city

### FOCUS AREAS

- **Policies**
- **Enablers**
- **Initiatives**

### INITIATIVES

- National Smart Planning Policy
- City Smart Planning Enhancement Policy
- City Smart Planning Governance
- Smart City Data Platform
- Smart and Unified SDI
- 3D City
- Predictive Planning App



# Smart Governance

## Promotion & Inclusion

The use of technology to enhance citizen engagement and promotion of desired behaviors, services

### FOCUS AREAS

- **Public Communication**
- **Inclusion of diverse cultures and remote communities in communication and policy**

### INITIATIVES

- Public Communication of activities, potential issues of public security and Government services via appropriate communication channels including Web (Mobile and PC), Social Media, SMS, Call Centre, Public signage screens, interactive kiosks, broadcast (TV, Radio, Press)
- Inviolable digital feedback and intention voting with blockchain



## Vision – Dimension & Focus Area Details

Smart Economy

Smart Living

Smart Governance

**Smart Society**

Human Capital Development

Public Participation

Accessibility

Third Sector

Smart Environment

Smart Mobility

Smart Enablers



## Human Capital Development

Creating possibilities for citizens to occupy the new roles required to make Smart Services a reality

### FOCUS AREAS

- **New Skill Incentivization**
- **Online and ICT enhanced classroom** learning (PC and Mobile) for Work focused Qualifications
- **ICT Skills Development** online

### INITIATIVES

- Skill based token system
- Hackathon and interactive workshop environments
- Smart Resident and Visitor, a platform to generate participative processes in the city, connecting data, citizens and knowledge. The objective of the platform is to become a productive node to generate open indicators and distributed tools, and from here start the collective construction of cities by its own inhabitants
- Interactive class room environments / eLearning
- Technology role incentivization policy
- Smart Economic municipal hubs



## Public Participation

Engaging citizens in the creation of the Smart City and enhancing adoption through design feedback

### FOCUS AREAS

- **Public & Community Involvement** via Mobile and PC applications to feedback on specific services for each Government department
- **e-Community outreach** Communication Channels (Web – PC and Mobile, Social Media, Call Centres)
- **Mobile, automated feedback routing** and response management
- **Public Communication**

### INITIATIVES

- Digital feedback mechanisms
- Unchangeable intention voting systems
- Data visualization platforms
- Video communication



## Accessibility

Ensuring access to public services and private sector developments physically and digitally

### FOCUS AREAS

- **Accessibility Policies**
- **Accessibility Enablers**
- **Accessibility Initiatives**

### INITIATIVES

- Smart Enhancements to National Accessibility Policy
- Smart Enhancements to City Accessibility Policy
- Accessibility SDI Data
- Accessibility enhancements to digital services
- Accessibility inspection app
- Fix my Street/ Building for Accessibility App
- Accessibility features maintenance sensors
- Wheel Chair Accessible autonomous vehicles



## Third Sector

Enabling social action and CSR to benefit citizens

### FOCUS AREAS

- **Third Sector Policies**
- **Third Sector Enablers**
- **Third Sector Initiatives**

### INITIATIVES

- National Social Sector Policies
- City Roadmap of services that can / should be delivered through social action
- Social action tools portal “Help me help my community”
- CSR Portal “Help Your City with your CSR”
- CSR Engagement Campaigns with the private sector
- Incubation of social organizations
- Support for individual / group local action



## Vision – Dimension & Focus Area Details

Smart Economy

Smart Living

Smart Governance

Smart Society

**Smart Environment**

Sustainability

Energy

Water & Waste

Recycling

Environmental Conditions

Smart Mobility

Smart Enablers



# Smart Environment

## Sustainability

Reducing natural resource consumption and enhancing sustainable models with ICT

### FOCUS AREAS

- Green and **Self Sufficient Buildings** and Districts including Smart BSM/SMS, micro generation
- **Smart Urban Infrastructure** including street light management, power and water monitoring
- **Emissions Reduction** in building, transport, manufacturing

### INITIATIVES

- Smart Street Lights centrally controlled and hosting sensors
- CCTV, radar, infra red sensors connected to central control and automated systems to reduce emissions
- Predictive and real time analysis of traffic flow to reduce emissions
- Vehicle sharing App
- Omni Transport central co-ordination and multi channel communication of transport options
- Central and In Building Renewable power generation Integration



# Smart Environment

## Energy

Enhancing the efficiency of utilization of energy resources

### FOCUS AREAS

- **Smart District Cooling**
- **Source Diversification**
- **Mobile Application** for Consumer Energy Account Management
- **Smart Grid** Automation
- **In Building Energy Generation** (Fossil Based)
- **Smart Metering** and Management
- **Real Time Demand Response**

### INITIATIVES

- Renewable Energy from Solar, Wind, Waste
- Smart Grid integration of mutli site generation
- Micro grids set up for buildings and districts to use local generation
- Multi Generation & Distribution
- Connected Smart metering to manage consumption and digitize billing / management for industrial / commercial / domestic
- Predictive and real time consumption analysis
- User PC and Mobile Applications to control lights / cooling and view / manage account
- District and City Unified Control centers communicate
- Smart Grid real time demand management, outage preventions and response
- Methane reuse and management



## Water & Waste

Reducing natural resource consumption and enhancing sustainable models with ICT

### FOCUS AREAS

- **Smart Water Management**, including distribution management
- **Smart Waste Management**, including storage, transport, treatment, recycling management
- **Landfill environment management**, including air and water quality sensors

### INITIATIVES

- Centralised water and sewage distribution management system and automated leak detection, Drainage flow sensor network
- Digital Management of fountains, lakes, pools
- Unified desalination and water shed data management
- Water, Sewage and Waste Data to be included in central City data to be managed with SDI and other data such as power, traffic
- Waste Vehicle, container tracking
- Smart Water Urban Informatics. Responsive public interfaces will display sustainable infrastructure patterns, real-time
- "Trashtrack" use of wireless sensor networks to trace the movement of waste in the city



## Recycling

Specific sustainability policies and initiatives to encourage recycling and reuse

### FOCUS AREAS

- **Recycling Policies**
- **Recycling Enablers**
- **Recycling Initiatives**

### INITIATIVES

- National Recycling Policies
- Recycling Incentives
- Reuse and upcycling management systems
- Recycling Communication Campaigns
- Recycling sensors



# Smart Environment

## Environmental Conditions

Monitoring of environmental conditions with Smart Sensors

### FOCUS AREAS

- **Noise sensors**
- **Pollution sensors**
- **Environmental impact audit**

### INITIATIVES

- Noise, Air pollution sensors connected to central management
- Connected air conditioning air quality sensors
- Natural Resources Management systems by sensors including CCTV
- Open Data publication of environmental data
- Weather sensors



## Vision – Dimension & Focus Area Details

Smart Economy

Smart Living

Smart Governance

Smart Society

Smart Environment

**Smart Mobility**

Smart Travel

Traffic Management

Transportation

Sustainable Mobility

Social Mobility

Roads Infrastructure

Autonomous Vehicles

Smart Enablers



# Smart Mobility

## Smart Travel

Enhancing mobility for international travel, religious travel and tourism

### FOCUS AREAS

- **International Travel**
- **Religious Travel**
- **Smart Tourism**

### INITIATIVES

- International identity
- Smart Hajj and Umra
  - Identity
  - Crowd management
  - Public communication
- Digital identity for visitors
- Digital loyalty schemes
- Crypto Currency



# Smart Mobility

## Traffic Management

Increasing the efficiency of transportation and fluidity through ICT

### FOCUS AREAS

- **Smart Central Traffic Management** System connecting all CCTV, speed/flow sensing to enable real time traffic management via control center and predictive data analytics to plan traffic flow patterns and police intervention
- **New Transport Economic Models**
- **Smart Parking Management**, including payment/reservation, automated violation detection and parking free space notification

### INITIATIVES

- Smart Signal Control
- Smart Traffic Lights and Street Signs
- Smart Park Meters & Apps
- Traffic prediction and intelligent re-routing
- Parking management and information
- Empty and Illegal parking detection
- Remote Traffic Monitoring/Traffic Prediction
- Tolling and congestion charging



# Smart Mobility

## Transportation

Enhancing access to transportation through ICT

### FOCUS AREAS

- **Smart Public Transportation** including location / telemetry sensing, mobile payment / ticketing, electric vehicles charging, public information screens / apps to inform on service
- **Internet connectivity for passengers**
- **Central management** for optimization of delivery and incident management, predictive planning analysis

### INITIATIVES

- Smart Transportation (Mobility Directorate Plan, Orthogonal Bus Network)
- Fare Management System – single smart card allowing for payment of bus, train, taxi, road use charging and parking
- Integrated City Wide Transportation and Logistics operations and planning



# Smart Mobility

## Sustainable Mobility

Making mobility in the city more environmentally responsible

### FOCUS AREAS

- **Electric Vehicles**
- **Connected transport options**

### INITIATIVES

- Multimodal Transportation Direction and Booking Application
- Car Pooling and Bus Lanes
- Bike / Car Sharing
- Electric vehicle charging and location management
- Use of alternative fuel vehicles in public sector fleets
- Incentives for use of alternative fuel vehicles in private sector fleets



# Smart Mobility

## Social Mobility

Using Smart initiatives to ensure a fair society

### FOCUS AREAS

- **Social Mobility Policies**
- **Social Mobility Enablers**
- **Social Mobility Initiatives**

### INITIATIVES

- National Social Mobility Policies
- City Social Mobility Policies
- Smart Government >>
  - Smart Employment Apps
  - Smart Healthcare & Education Apps >>
  - Open Data >>
- Campaigns for access to smart services >>



# Smart Mobility

## Roads Infrastructure

Technology enhancements to the road infrastructure

### FOCUS AREAS

- **Smart Infrastructure**
  - Roads
  - Tunnels
  - Bridges
- **Smart Street Lighting**
- **Smart Sand Bank /Flood Detection**
- **Temperature Control**
- **Energy Production**
- **Traffic Segregation**

### INITIATIVES

- Sensors on street lighting for parking monitoring, crowd control, emergency and communication networks
- Roads, Tunnels, Bridges Management via CCTV, speed sensors, flow sensors and remote control of barriers / lights
- Street Lighting management for energy control, lighting quality and aid emergency response
- Temperature control surfaces monitoring
- Solar electricity generation on roads and public areas for transport vehicles
- Smart Bicycle tracks



## Autonomous Vehicles

A co-ordinated approach to the introduction of autonomous vehicles

### FOCUS AREAS

- **Autonomous Vehicle Policies**
- **Autonomous Vehicle Enablers**
- **Autonomous Vehicle Initiatives**

### INITIATIVES

- National Autonomous Vehicle Policy
- City Autonomous Vehicle Roadmap
- Civil Works for Autonomous Vehicle usage in the city
- Autonomous Vehicle Education
- Autonomous Vehicle usage in the public sector
- Incentives for Autonomous Vehicle usage in the private sector



## Vision – Dimension & Focus Area Details

Smart Economy

Smart Living

Smart Governance

Smart Society

Smart Environment

Smart Mobility

### **Smart Enablers**

Cyber Security

Connectivity / Access

Sensing / Actuating

Data Orchestration & Analytics

Technical Enablers

Policy Enablers & Smart City Act

Smart City Services & Applications

Centralized Monitoring & Management



## Cyber Security

Ensuring personal and entity security provides safe usage of new digital Smart City platforms and services.

### FOCUS AREAS

- **Cyber Security Policy**
- **Security Infrastructure**
- **Security Management**

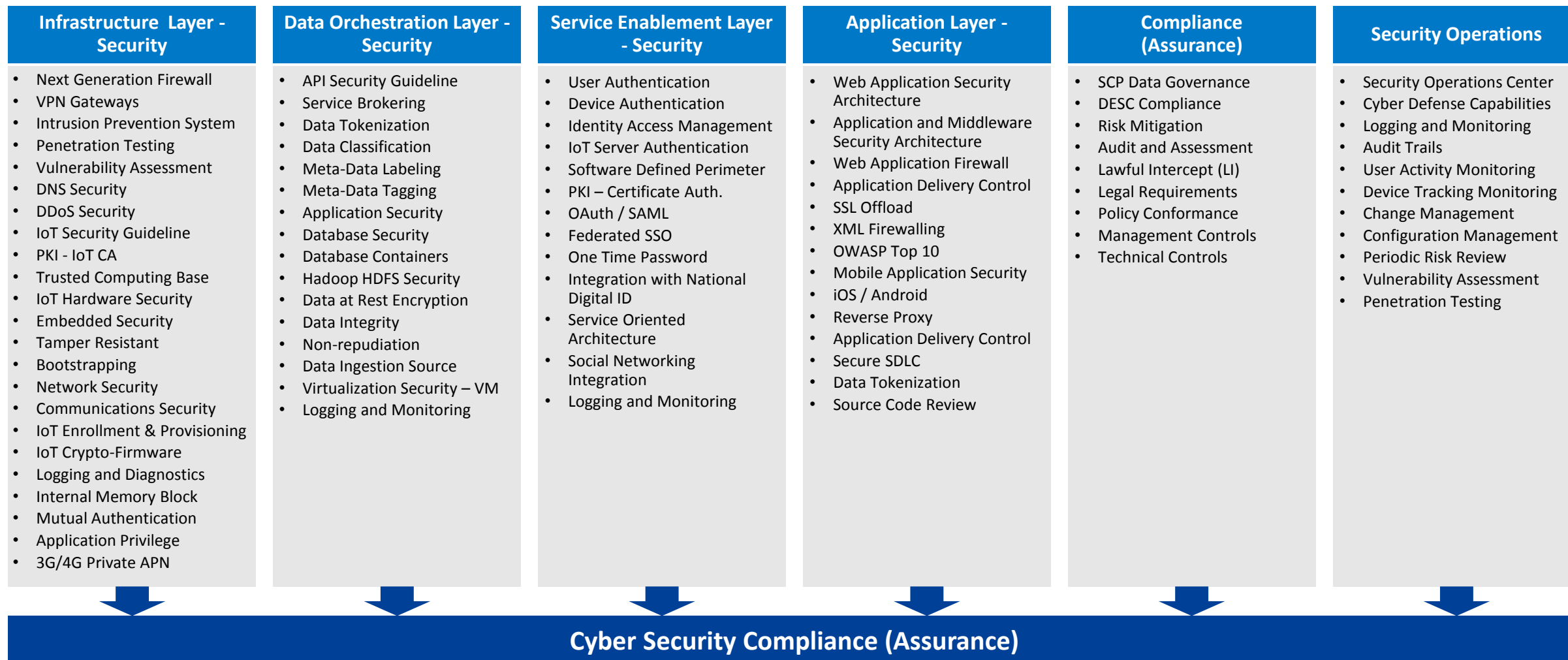
### INITIATIVES

- National Smart City Cyber Security Policy
- Security systems for Smart City Platform
- Security Operations
- Security Audit



# Cyber Security

**A program to ensure cyber security of Smart City initiatives should set out national standards and policies for the following topics:**





## Connectivity / Access

Cutting edge backbone communication infrastructure and access

### FOCUS AREAS

- **Public Wireless Access**
- **High Speed landline networks**
- **Low bandwidth/power wireless networks**

### INITIATIVES

- Public WiFi
- 4G / 5G GSM Data models
- Fibre to the home
- 6LoWPAN / NB-IOT / EC-GSM-IoT



## Sensing / Actuating

Expanding & commoditizing sensing capabilities with universal enablers.

### FOCUS AREAS

- **Sensors Standards**
- **Sensor Management**
- **Sensor Security**
- **End of the network computing**

### INITIATIVES

- Unified low bandwidth network
- Universal wide IoT Sensor management platform
- Dimension based Sensor use case identification
- IoT Sensor standards
- Sensor connectivity and pollution standards
- Legacy Sensor Data Collection
- Blockchain sensor data registration
- Edge analytics
- Computer vision edge image interpretation



## Data Orchestration & Analytics

Advanced data management for the whole city and breaking out of data silos is a cornerstone of smartness.

### FOCUS AREAS

- **Data acquisition**
- **Advanced Data Management Capabilities**
- **Analytics**

### INITIATIVES

- Smart City Platform
- Data regulations
- Government data sharing
- Government blockchain platform
- Blockchain use case identification
- Data ingestion capabilities for government and private sector / online sources
- Self service analytics capabilities
- Analytics use cases identification



## Technical Enablers

Smart City enablers at the national and local level

### FOCUS AREAS

- **National Enablers**
- **Local Enablers**

### INITIATIVES

- National Enablers
  - Smart Nation Platform
  - National entity data portal
  - Digital Identity >>
  - Digital Payment >>
  - SDI co-ordination
- City Enablers
  - Smart City Platform
  - City data portal



## Policy Enablers & Smart City Act

Smart City enablers

### FOCUS AREAS

- **National Policy Enablers**
- **Local Policy Enablers**
- **Smart City Act**

### INITIATIVES

- Smart Governance >>
- National Policy:
  - Data
  - Identity
  - SDI
- City Policy:
  - Data / ID / SDI
  - City Governance
  - Roadmap of initiatives



## Smart City Services & Applications

Enabling any application through a flexible platform, accessible to all relevant stakeholders

### FOCUS AREAS

- **Government Applications**
- **Private Sector Applications**
- **Dashboards**

### INITIATIVES

- Government Application Enablers
- Dimension based application identification
- Private Sector Smart City application incubation
- Data interpretation dashboards



## Centralized Monitoring & Management

Smart Cities need interconnectivity of systems and more effective control mechanisms.

### FOCUS AREAS

- **Unified Smart City Control**

### INITIATIVES

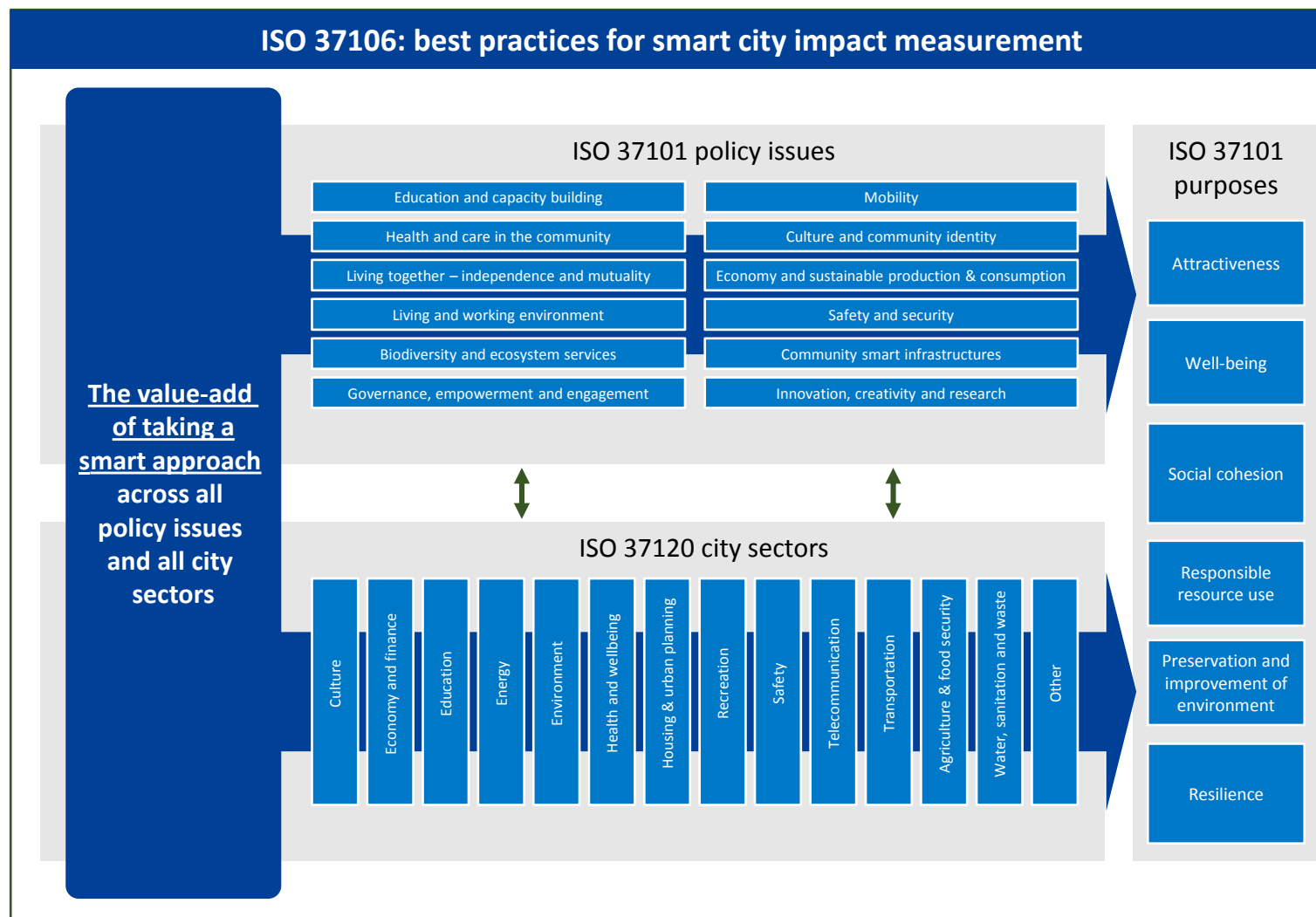
- Leverage of infrastructure and data orchestration to connect relevant control data
- Leverage of existing control centres
- Remote control application
- Unified SDI
- Enhanced human communication channels



BELOW REFLECTS THE ATTACHED KPIS SPREADSHEET >>



# The KPIs for KSA will also Include ISO Best Practice as Known to Date



## ISO 371020:

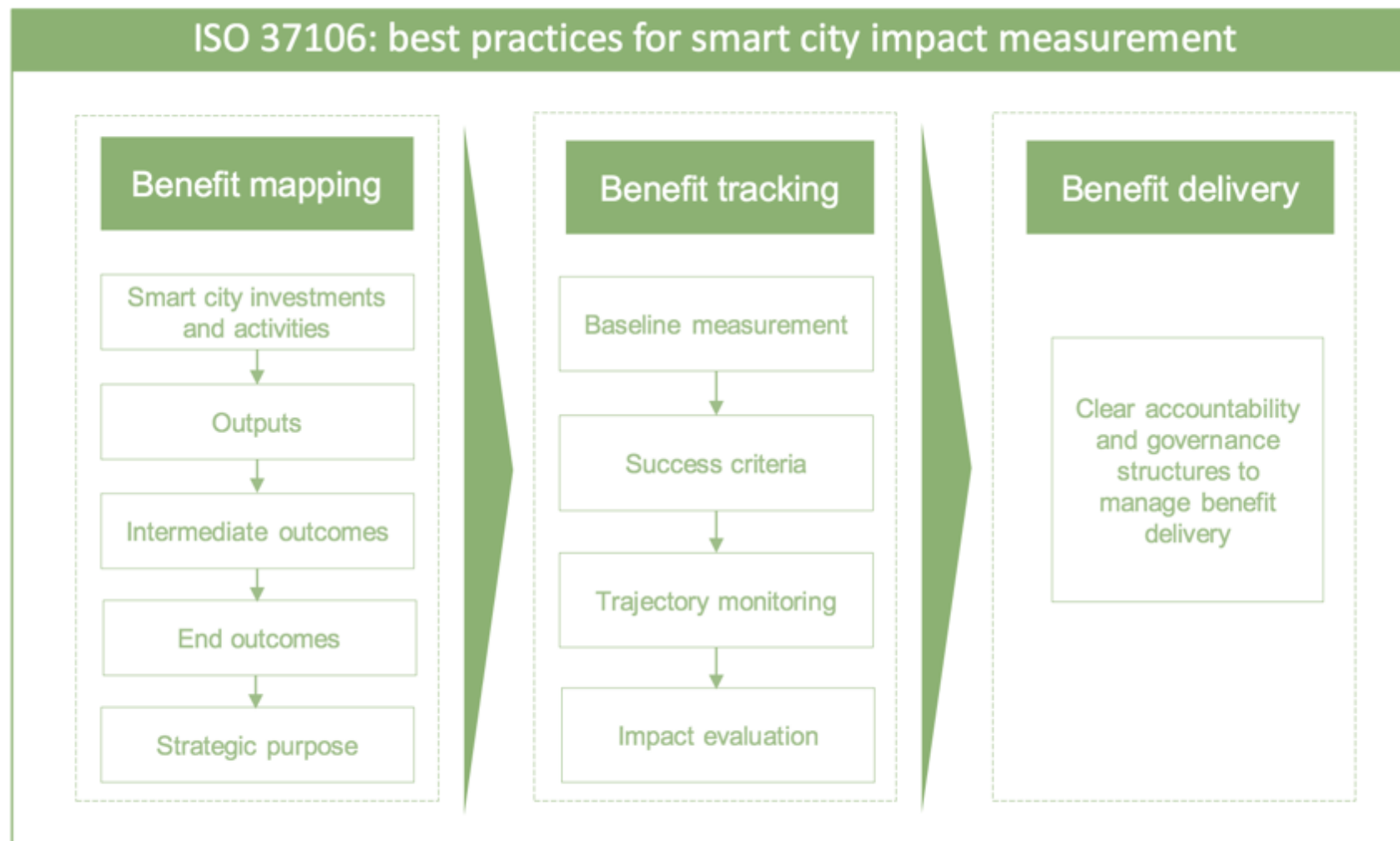
Defines performance indicators across the key sectors of a city

Previously  
© ISO 37120:2014

> Now under development  
© ISO/DIS 37120



# The Model for KSA will Follow ISO Best Practice





# Smart Economy (1/9)

| KPI SOURCE | INDICATOR                                             | METRIC OF INDICATOR                                                                                                                 | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | INITIATIVES                                                                                                                                                                                                                                                                            |
|------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Service Industry Employment                           | Proportion of employees working in start-ups and <b>creative</b> industry in the district compared to the total employed workforce. | <p>NOTE 1 – Creative industries refer to those ones that are based on individual creativity, skill and talent with the potential to create wealth and jobs through developing intellectual property. This includes thirteen sectors: advertising, architecture, the art and antiques market, crafts, design, designer fashion, film, interactive leisure software (i.e., video games), music, the performing arts, publishing, software, and television and radio.</p> <p><a href="http://s3platform.jrc.ec.europa.eu/documents/20182/84453/120420_CCI_Policy_Handbook_(FINAL).pdf">http://s3platform.jrc.ec.europa.eu/documents/20182/84453/120420_CCI_Policy_Handbook_(FINAL).pdf</a></p> <p>NOTE 2 – Expressed as a percentage.</p> | <ul style="list-style-type: none"> <li>• SME Incentives</li> <li>• Smart City Incubation Zone</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>                                                       |
|            | I3.2.3 Employment rate in knowledge-intensive sectors | Count by ratio of employees in knowledge-intensive areas to the overall employment number.                                          | <p>&gt;=10%, 100; 9%-10%, 90; 8%-9%, 80; 7%-8%, 70; 5%-7%, 60; 3%-5%, 50; 1%-3%, 40; &lt;1%, 0</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul> |



## Smart Economy (2/9)

| KPI SOURCE      | INDICATOR                                             | METRIC OF INDICATOR                                                                                                                    | VALUE ASSIGNED                                                                                          | INITIATIVES                                                                                                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Application of public e-commerce transactions         | Count by ratio of e-business transactions in all transactions.                                                                         | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0       | <ul style="list-style-type: none"> <li>• Cyber security</li> <li>• Digital ID</li> <li>• Electronic Payment</li> <li>• Automated &amp; world-class end-to-end digital commerce</li> <li>• Commerce Regulation</li> <li>• Ecosystem incentivization</li> <li>• Enabling Platforms</li> </ul> |
|                 | ICT related patents                                   | Count by number of patents per 100000 citizens.                                                                                        | >=100, 100; 90-100, 90; 70-90, 80; 50-70, 70; 30-50, 60; 20-30, 50; 10-20, 40; 2-10, 30; <2, 0          | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>      |
|                 | I3.1.5 Importance as decision-making center (HQ etc.) | Count by ratio of high tech enterprises which serve as global or regional research or operation center among all registered companies. | >=2%, 100; 1.8%-2%, 90; 1.5%-1.8%, 80; 1%-1.5%, 70; 0.5%-1%, 60; 0.3%-0.5%, 50; 0.1%-0.3%, 40; <0.1%, 0 | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance incl. Memberships of Standards Organisations impacting Smart City (e.g. ISO, ITU, UN, etc.)</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> </ul>                                  |



## Smart Economy (3/9)

| KPI SOURCE      | INDICATOR                                   | METRIC OF INDICATOR                                                                                                                               | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                            |
|-----------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I3.1.6 SSC new projects opportunities       | Count by ratio of high tech enterprises that can get initiatives, awards and other assistances and policies as a sponsorship in the realm of SSC. | >=40%, 100; 35%-40%, 90; 30%-35%, 80; 25%-30%, 70; 20%-25%, 60; 15%-20%, 50; 10%-15%, 40; <10%, 0 | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul> |
|                 | I3.1.7 Penetration of teleworking system    | Count by ratio of workers using the teleworking system.                                                                                           | >=40%, 100; 35%-40%, 90; 30%-35%, 80; 25%-30%, 70; 20%-25%, 60; 15%-20%, 50; 10%-15%, 40; <10%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul>                                                                                                                                                        |
|                 | I3.1.1 Percentage of R&D expenditure in GDP | Count by ratio of local investment in research and development in annual GDP.                                                                     | >=10%, 100; 8%-10%, 90; 6%-8%, 80; 4%-6%, 70; 3%-4%, 60; 2%-3%, 50; 1%-2%, 40; <1%, 0             | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul> |



## Smart Economy (4/9)

| KPI SOURCE      | INDICATOR                                           | METRIC OF INDICATOR                                              | VALUE ASSIGNED                                                                        | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|-----------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I3.1.8 Improvement of traditional industry with ICT | Count by ratio of GDP improvement due to technology upgrade.     | >=10%, 100; 8%-10%, 90; 6%-8%, 80; 4%-6%, 70; 3%-4%, 60; 2%-3%, 50; 1%-2%, 40; <1%, 0 | Paperless Services incl. blockchain to provide: <ul style="list-style-type: none"> <li>• Digitization of all records</li> <li>• Digitization of all forms and input requirements for Government services</li> <li>• Digital Workflow implementation for repetitive government tasks</li> <li>• Notification and digital workflow for all renewal activity with Government services</li> <li>• Inspection +940 App</li> </ul> |
|                 | Employees belonging to ICT sector                   | Proportion of City workers in ICT sector among all City workers. | >=10%, 100; 9%-10%, 90; 8%-9%, 80; 7%-8%, 70; 5%-7%, 60; 3%-5%, 50; 1%-3%, 40; <1%, 0 | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>                                                                                                                                       |



## Smart Economy (5/9)

| KPI SOURCE      | INDICATOR                                              | METRIC OF INDICATOR                                                           | VALUE ASSIGNED                                                                                          | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Public Companies providing e-services                  | Count by ratio of local ICT-related enterprises.                              | >=30%, 100; 28%-30%, 90; 25%-28%, 80; 20%-25%, 70; 15%-20%, 60; 10%-15%, 50; 5%-10%, 40; <5%, 0         | Paperless Services Including blockchain to provide: <ul style="list-style-type: none"> <li>• Digitization of all records</li> <li>• Digitization of all forms and input requirements for Government services</li> <li>• Digital Workflow implementation for repetitive government tasks</li> <li>• Notification and digital workflow for all renewal activity with Government services</li> <li>• Inspection +940 App</li> </ul> |
|                 | I3.1.3 Revenue share of knowledge-intensive enterprise | Count by ratio of technological enterprises among all registered enterprises. | >=2%, 100; 1.5%-2%, 90; 1%-1.5%, 80; 0.5%-1%, 70; 0.4%-0.5%, 60; 0.3%-0.4%, 50; 0.1%-0.3%, 40; <0.1%, 0 | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>                                                                                                                                           |



## Smart Economy (6/9)

| KPI SOURCE               | INDICATOR                                              | METRIC OF INDICATOR                                                                                                              | VALUE ASSIGNED                                                                                                                                                     | INITIATIVES                                                                                                                                                                                                                                                                                          |
|--------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>( <i>contd.</i> ) | I3.2.2 Percentage of knowledge economy in GDP          | Count by ratio of GDP that is contributed by knowledge economy.                                                                  | >=50%, 100; 45%-50%, 90; 40%-45%, 80; 35%-40%, 70; 30%-35%, 60; 25%-30%, 50; 20%-25%, 40; <20%, 0<br>[Editorial note: need data/document to support these values.] | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>               |
|                          | I1.2.2 Proportion of business based on cloud computing | Count by ratio of social, governance and enterprise businesses that utilize cloud based services, including IaaS, PaaS and SaaS. | >=60%, 100; 50%-60%, 90; 40%-50%, 80; 30%-40%, 70; 20%-30%, 60; 10%-20%, 50; 5%-10%, 40; <5%, 0                                                                    | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. Cloud and services on cloud such as AI, Blockchain</li> </ul> |
|                          | I3.1.2 Ratio of knowledge-intensive enterprises        | Count by ratio of technological enterprises among all registered enterprises.                                                    | >=2%, 100; 1.5%-2%, 90; 1%-1.5%, 80; 0.5%-1%, 70; 0.4%-0.5%, 60; 0.3%-0.4%, 50; 0.1%-0.3%, 40; <0.1%, 0                                                            | <ul style="list-style-type: none"> <li>• SME Incentives</li> <li>• Innovation Lab</li> <li>• Innovation Incubation Zones</li> <li>• Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul>                                                                           |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



# Smart Economy (7/9)

| KPI SOURCE               | INDICATOR                                                              | METRIC OF INDICATOR                                                                                                                                                  | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                   |
|--------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>( <i>contd.</i> ) | I3.2.1 Percentage of knowledge economy in total investment             | Count by ratio of enterprise investment into research and tech upgrade.                                                                                              | >=10%, 100; 8%-10%, 90; 6.5%-8%, 80; 5%-6.5%, 70; 3.5%-5%, 60; 2%-3.5%, 50; 0.5%-2%, 40; <0.5%, 0 | <ul style="list-style-type: none"> <li>• Smart National and Municipal Governance</li> <li>• SME Incentives</li> <li>• Innovation Lab</li> <li>• Innovation Incubation Zones</li> <li>• Innovation programs by technology e.g. AI, Blockchain, robots, 3D printings</li> </ul> |
|                          | I1.2.3 Proportion of business based on GIS (location, navigation etc.) | Count by ratio of social, governance and enterprise businesses that utilize GIS based services.                                                                      | >=30%, 100; 28%-30%, 90; 25%-28%, 80; 20%-25%, 70; 15%-20%, 60; 10%-15%, 50; 5%-10%, 40; <5%, 0   | <ul style="list-style-type: none"> <li>• Smart Enablers incl. GIS</li> <li>• GIS Orchestration</li> <li>• Predictive and real time vehicle / people traffic analytics</li> </ul>                                                                                              |
|                          | I4.1.1 Satisfaction with online commercial and financial services      | Count by ratio of satisfaction expression in paper / online interview.<br>[Editorial note: may need a template of paper interview, i.e. questionnaire, as an annex.] | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• ECommerce Enablers incl. Digital ID</li> <li>• Electronic Payment</li> <li>• Cyber security</li> <li>• Smart City Portal</li> <li>• Paperless Government</li> <li>• Enabling Platforms</li> </ul>                                    |



## Smart Economy (8/9)

| KPI SOURCE                      | INDICATOR                                                                                                | METRIC OF INDICATOR                                                                                                    | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                           |
|---------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | I4.4.1 Effectiveness of hatching smart tech from knowledge centers (research centers, universities etc.) | Count by ratio of successfully born smart tech companies from knowledge centers (research centers, universities etc.). | >=40%, 100; 35%-40%, 90; 30%-35%, 80; 25%-30%, 70; 20%-25%, 60; 15%-20%, 50; 10%-15%, 40; <10%, 0 | <ul style="list-style-type: none"> <li>• SME Access to Government incl. Incentives</li> <li>• Smart City Incubation Zone &amp; Centre of Excellence</li> <li>• Emerging technology policy incl. Innovation programs by technology e.g. Cloud and services on cloud such as AI, Blockchain, 3D printing hub</li> </ul> |
| <b>New or No Cat.</b>           | Services using Artificial Intelligence                                                                   | Number of services.                                                                                                    | 0<br>1 to 5<br>5 to 10                                                                            | <ul style="list-style-type: none"> <li>• Emerging Technology Policy &amp; Training</li> <li>• Robotic Automation</li> </ul>                                                                                                                                                                                           |
|                                 | Services using Blockchain or Distributed Consensus Systems                                               | Number of services.                                                                                                    | 0<br>1 to 5<br>5 to 10                                                                            | <ul style="list-style-type: none"> <li>• Emerging Technology Policy &amp; Training</li> <li>• Paperless Government (Blockchain)</li> </ul>                                                                                                                                                                            |
|                                 | Services using 3D Printing                                                                               | Number of services.                                                                                                    | 0<br>1 to 5<br>5 to 10                                                                            | <ul style="list-style-type: none"> <li>• Emerging Technology Policy &amp; Training</li> <li>• 3D Printing Hub</li> </ul>                                                                                                                                                                                              |



## Smart Economy (9/9)

| KPI SOURCE                                 | INDICATOR                           | METRIC OF INDICATOR | VALUE ASSIGNED         | INITIATIVES                                                                                                                                                                                                                            |
|--------------------------------------------|-------------------------------------|---------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>New or No Cat.</b><br>( <i>contd.</i> ) | Services using Predictive Analytics | Number of services. | 0<br>1 to 5<br>5 to 10 | <ul style="list-style-type: none"><li>• Emerging Technology Policy &amp; Training</li><li>• Intelligent Traffic Management</li><li>• Social Media sentiment analysis &amp; awareness</li><li>• Smart KSA &amp; City Platform</li></ul> |
|                                            | Services using big data             | Number of services. | 0<br>1 to 5<br>5 to 10 | <ul style="list-style-type: none"><li>• Emerging Technology Policy &amp; Training</li><li>• City wide Smart Parking</li><li>• Intelligent Traffic Management</li></ul>                                                                 |



## Smart Enablers (1/4)

| KPI SOURCE | INDICATOR                                                   | METRIC OF INDICATOR                                                                                                      | VALUE ASSIGNED                                                                                                                                                    | INITIATIVES                                                                                                                     |
|------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Availability of computers or similar devices                | Count by ratio of families possessing at least one workable PC or laptop.                                                | >=99%, 100; 98%-99%, 90; 96%-98%, 80; 94%-96%, 70; 92%-94%, 60; 90%-92%, 50; 85%-90%, 40; <85%, 0                                                                 | <ul style="list-style-type: none"> <li>• Smart Education</li> <li>• Smart City ICT Training</li> </ul>                          |
|            | Availability of Internet access in households               | Count by ratio of internet accessible families.                                                                          | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                 | <ul style="list-style-type: none"> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul>                                      |
|            | Availability of fixed broadband subscriptions               | Count by number of subscriptions (people).                                                                               | The number of subscribed inhabitants per 100 maps to the score between 0 and 100. If subscription number exceeds 100 per 100 inhabitants, the score is still 100. | <ul style="list-style-type: none"> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul>                                      |
|            | International Internet bandwidth                            | Count by the actual measured megabits per second (Mbit/s).                                                               | >=1000Mbit/s, 100; 600-1000Mbit/s, 90; 400-600Mbit/s, 80; 200-400Mbit/s, 70; 100-200Mbit/s, 60; 10-100Mbit/s, 50; 1-10Mbit/s, 40; <1Mbit/s, 0                     | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul> |
|            | Availability of Wi-Fi in public areas                       | Number of public points in the district where users can access the Internet using IEEE 802.11-based wireless technology. | Achieve 100% District Coverage.                                                                                                                                   | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul> |
|            | 11.1.3 Wireless-broadband subscriptions per 100 inhabitants | Count by number of subscriptions (people).                                                                               | The number of subscribed inhabitants per 100 maps to the score between 0 and 100. If subscription number exceeds 100 per 100 inhabitants, the score is still 100. | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul> |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



## Smart Enablers (2/4)

| KPI SOURCE      | INDICATOR                                               | METRIC OF INDICATOR                                                                                 | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                            | INITIATIVES                                                                                                                                                                                                 |
|-----------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Availability of electronic and mobile payment platforms | Existence of electronic and mobile payment platforms to facilitate access for district inhabitants. | YES, 100<br>NO, 0                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• Electronic Payment</li> <li>• Smart City Platform</li> <li>• Smart Nation Platform</li> <li>• National Identity Data Portal</li> <li>• Digital Identity</li> </ul> |
|                 | Information security of public services and systems     | Checklist                                                                                           | <p>NOTE 1 – The verification contains examination in four aspects, incl. a) legislation; b) regulations enforced in public service and facilities; c) regulations properly enforced for web services; and d) the coverage rate of qualified systems.</p> <p>NOTE 2 – This indicator is determined by the sum of YES answers reported.</p> | <p>Cyber Security Policy incl.:</p> <ul style="list-style-type: none"> <li>• Security systems for Smart City Platform</li> <li>• Security Operations</li> <li>• Security Audit</li> </ul>                   |
|                 | I1.2.6 Level of children online protection              | Count by ratio of children (under 16) whose internet behavior is under supervision and protection.  | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 50%-60%, 50; 40%-50%, 40; <40%, 0                                                                                                                                                                                                                                         | <p>Cyber Security Policy incl.:</p> <ul style="list-style-type: none"> <li>• Security systems for Smart City Platform</li> <li>• Security Operations</li> <li>• Security Audit</li> </ul>                   |



## Smart Enablers (3/4)

| KPI SOURCE                      | INDICATOR                                                                                | METRIC OF INDICATOR                                                                                                                                                                                | VALUE ASSIGNED                                                                                                                       | INITIATIVES                                                                                                                     |
|---------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | Compliance with WHO endorsed exposure guidelines                                         | Each of the 10 checklist items is given a YES or NO answer. YES for mark 1, and NO for 0. EMF indicator is determined by the weight sum of the yes answer. Checklist will be provided to District. | >=9.0, 100; 8.0-9.0, 90; 7.0-8.0, 80; 6.0-7.0, 70; 5.0-6.0, 60                                                                       | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul> |
|                                 | 11.1.5 EMF consideration (Design Efficiency, Safety Compliance and Consumer Information) | Each of the 10 checklist is given a YES or NO answer. YES for mark 1, and NO for 0. EMF indicator is determined by the weight sum of the yes answer.                                               | >=9.0, 100; 8.0-9.0, 90; 7.0-8.0, 80; 6.0-7.0, 70; 5.0-6.0, 60; 4.0-5.0, 50; 3.0-4.0, 40; <3.0, 0<br>[Note: 0-10 will map to 0-100.] | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Fiber</li> <li>• City Fiber Wi-Fi</li> </ul> |
| <b>NTP 2020</b>                 | % of populated territories that have scanned & updated spatial maps                      | Percentage (%).                                                                                                                                                                                    | Baselines – 62<br>2020 Target – 100                                                                                                  | <ul style="list-style-type: none"> <li>• Enablers including: GIS Orchestration</li> </ul>                                       |
| <b>New or No Cat.</b>           | Number of robots in municipal services                                                   | Number of services.                                                                                                                                                                                | 0<br>1 to 5<br>5 to 10                                                                                                               | <ul style="list-style-type: none"> <li>• Emerging Technology Policy &amp; Training incl. Robotic Automation</li> </ul>          |



## Smart Enablers (4/4)

| KPI SOURCE                                 | INDICATOR                                              | METRIC OF INDICATOR | VALUE ASSIGNED         | INITIATIVES                                                                                                                                                                                                                                                 |
|--------------------------------------------|--------------------------------------------------------|---------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>New or No Cat.</b><br>( <i>contd.</i> ) | Services using cloud, big data and mobile applications | Number of services. | 0<br>1 to 5<br>5 to 10 | <ul style="list-style-type: none"><li>• Emerging Technology Policy &amp; Training</li><li>• Digital ID</li><li>• Electronic Payment</li><li>• GIS Coordination</li><li>• Paperless Government</li><li>• City Unified Apps</li><li>• City Enablers</li></ul> |



# Smart Environment (1/14)

| KPI SOURCE | INDICATOR                                                                                   | METRIC OF INDICATOR                                                                            | VALUE ASSIGNED                                                                                                                     | INITIATIVES                                                                                                                                                                                                                                                          |
|------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Application of ICT based monitoring system for particles and toxic substances (air quality) | Count by ratio of highly dangerous toxic substance sources under control with the help of ICT. | >=99%, 100; 98%-99%, 90; 96%-98%, 80; 94%-96%, 70; 92%-94%, 60; 90%-92%, 50; 85%-90%, 40; <85%, 0                                  | <ul style="list-style-type: none"> <li>• City Sensors incl. noise, air pollution sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> </ul>                                                                        |
|            | Air pollution intensity                                                                     | Count by number of air quality sensors per square kilo meter.                                  | >=10, 100; 1-10, 90; 0.1-1, 80; 0.01-0.1, 70; 0.001-0.01, 60; <0.001, 0<br>[Editorial note: need document to support this values.] | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. noise, air pollution sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> <li>• Publication of Environmental Data</li> </ul> |
|            | GHG emissions                                                                               | Tonnes CO2 eq/inh per capita.                                                                  | Duplicate should be removed                                                                                                        | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. noise, air pollution sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> <li>• Publication of Environmental Data</li> </ul> |



## Smart Environment (2/14)

| KPI SOURCE      | INDICATOR                                                     | METRIC OF INDICATOR                                                                                   | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | INITIATIVES                                                                                                                                                                                                                                                          |
|-----------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | GHG emissions per sector/per capita                           | eCO2 / capita.                                                                                        | NOTE 1 – Methodologies for determining GHG emissions include but not limited to: The Global Protocol for Community-Scale Greenhouse; Gas Emission Inventories (GPC); BSI Norm: PAS 2070 on Specification for the assessment of greenhouse gas emissions of a city; Intergovernmental Panel on Climate Change IPCC; Guidelines for National Greenhouse Gas Inventories; Global Protocol for Community-Scale GHG Emissions (GPC), (2012 Accounting and Reporting Standard).<br>NOTE 2 – This indicator can be subdivided into major city sectors (transportation, industry, commercial buildings, residential buildings, etc.). | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. noise, air pollution sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> <li>• Publication of Environmental Data</li> </ul> |
|                 | I2.2.5 Level of fossil fuel usage with ICT measures (per GDP) | Count by ratio of average industrial fossil fuel consumption saved this year compared with last year. | >=7%, 100; 6%-7%, 90; 5%-6%, 80; 4%-5%, 70; 3%-4%, 60; 2%-3%, 50; 1%-2%, 40; <1%, 0<br>[Editorial note: need document to support these values.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. fuel consumption sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> <li>• Publication of Environmental Data</li> </ul>     |



# Smart Environment (3/14)

| KPI SOURCE                      | INDICATOR                                                                | METRIC OF INDICATOR                                                                                                                                                                                     | VALUE ASSIGNED                                                                                                                                                                                          | INITIATIVES                                                                                                                           |
|---------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | Electricity use for street lighting                                      | kw per kilometer.                                                                                                                                                                                       | NOTE 1 – Calculate as: Numerator: Total consumption of electricity; Denominator: Number of city inhabitants. Express as kWh / day / capita. This is taken from KPI - Electricity consumption per capita | LED including: <ul style="list-style-type: none"> <li>• Smart Street Light Pilots</li> <li>• City wide Smart Street Lights</li> </ul> |
|                                 | Energy saving in households                                              | Count by ratio of average civilian electricity consumption saved this year compared with last year.                                                                                                     | >=5%, 100; 4.5%-5%, 90; 4%-4.5%, 80; 3%-4%, 70; 2%-3%, 60; 1%-2%, 50; 0.5%-1%, 40; <0.5%, 0                                                                                                             | <ul style="list-style-type: none"> <li>• Publication of Environmental Data</li> <li>• All renewables incl. Smart Meters</li> </ul>    |
|                                 | 12.2.2 Level of industrial electricity usage (per GDP) with ICT measures | Count by ratio of average industrial electricity (including charging electricity driven vehicles) consumption saved this year compared with last year.                                                  | >=5%, 100; 4.5%-5%, 90; 4%-4.5%, 80; 3%-4%, 70; 2%-3%, 60; 1%-2%, 50; 0.5%-1%, 40; <0.5%, 0                                                                                                             | <ul style="list-style-type: none"> <li>• Publication of Environmental Data</li> <li>• All renewables incl. Smart Meters</li> </ul>    |
|                                 | Application of city water monitoring through ICT                         | Count by ratio of urban water resources under protection with ICT measures.<br>[Editorial note: suggest to add a formula: **/**. Water resources can be measured by area? Length? Number of resources?] | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 50%-60%, 50; 40%-50%, 40; <40%, 0                                                                                                       | <ul style="list-style-type: none"> <li>• Publication of Environmental Data incl. Smart Meters</li> </ul>                              |



# Smart Environment (4/14)

| KPI SOURCE      | INDICATOR                       | METRIC OF INDICATOR                                                                                                                                                                                 | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                                                                                                                           | INITIATIVES                                                                                                                                                                                        |
|-----------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Quality of city water resources | Count by ratio of water pollutant resources under automatic inspection.<br>[Editorial note: suggest to add a formula: **/**. Water resources can be measured by area? Length? Number of resources?] | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 50%-60%, 50; 40%-50%, 40; <40%, 0                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>National Smart Governance City Sensors incl. Quality of water sensors connected to central management</li> <li>Publication of Environmental Data</li> </ul> |
|                 | Recycling of waste              | Percentage                                                                                                                                                                                          | NOTE 1 – SDG indicator 12.4.2* may be “Treatment of waste, generation of hazardous waste, hazardous waste management, by type of treatment”.                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>National Recycling</li> <li>Recycling Policies incl. Recycling Incentives</li> <li>Recycling Communication Campaigns</li> </ul>                             |
|                 | Green areas surface             | Square kilometer/capita m2 /100,000 inhabitants                                                                                                                                                     | NOTE 1 – Green space includes parks, & nature areas that are publicly accessible.<br>NOTE 2 – Calculate as: Numerator: Total area of green space in the city; Denominator: One 100,000th of the city’s population. Express as: m2 / 100,000 inhabitants.<br>NOTE 3 – SDG indicator 11.7.1 is “The average share of the built-up area of cities that is open space for public use for all, disaggregated by age group, sex and persons with disabilities. | <ul style="list-style-type: none"> <li>Municipal Smart Governance</li> <li>Publication of Environmental Data</li> <li>CSR Activation</li> <li>Charity Involvement</li> </ul>                       |



# Smart Environment (5/14)

| KPI SOURCE      | INDICATOR                                                           | METRIC OF INDICATOR                                                                                                                                    | VALUE ASSIGNED                                                                                                                     | INITIATIVES                                                                                                                                                                                                               |
|-----------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I 2.1.6 Proportion of noise monitoring by means of ICT measures     | Count by number of noise sensors per square kilo meter.                                                                                                | >=10, 100; 1-10, 90; 0.1-1, 80; 0.01-0.1, 70; 0.001-0.01, 60; <0.001, 0<br>[Editorial note: need document to support this values.] | <ul style="list-style-type: none"> <li>National Smart Governance City Sensors incl. noise sensors connected to central management</li> <li>Publication of Environmental Data</li> </ul>                                   |
|                 | I2.1.7 Solid waste disposal management with ICT measures            | Count by ratio of solid waste recycled under automatic inspections with the help of ICT (automatically recycled waste/overall urban waste collection). | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 50%-60%, 50; 40%-50%, 40; <40%, 0                                  | <ul style="list-style-type: none"> <li>National Smart Governance City Sensors incl. water sensors, bin connected to central management</li> <li>Publication of Environmental Data</li> </ul>                              |
|                 | I2.2.3 Level of civilian water usage (per capita) with ICT measures | Count by ratio of average civilian water consumption saved this year compared with last year.                                                          | >=5%, 100; 4.5%-5%, 90; 4%-4.5%, 80; 3%-4%, 70; 2%-3%, 60; 1%-2%, 50; 0.5%-1%, 40; <0.5%, 0                                        | <ul style="list-style-type: none"> <li>National Smart Governance City Sensors incl. Smart Meters, Quality of water, leakage sensors connected to central management</li> <li>Publication of Environmental Data</li> </ul> |



# Smart Environment (6/14)

| KPI SOURCE      | INDICATOR                                                                | METRIC OF INDICATOR                                                                             | VALUE ASSIGNED                                                                                                          | INITIATIVES                                                                                                                                                                                                                   |
|-----------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I2.2.4 Level of industrial water usage (per GDP) with ICT measures       | Count by ratio of average industrial water consumption saved this year compared with last year. | >=5%, 100; 4.5%-5%, 90; 4%-4.5%, 80; 3%-4%, 70; 2%-3%, 60; 1%-2%, 50; 0.5%-1%, 40; <0.5%, 0                             | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Smart Meters, Quality of water, leakage sensors connected to central management</li> <li>• Publication of Environmental Data</li> </ul> |
|                 | I2.2.6 Level of rare metal/noble metal usage (per GDP) with ICT measures | Count by ratio of average rare metal consumption saved this year compared with last year.       | >=5%, 100; 4.5%-5%, 90; 3.5%-4%, 80; 2.5%-3%, 70; 1.5%-2%, 60; 1%-1.5%, 50; 0.5%-1%, 40; <0.5%, 0                       | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Rare metal tracking connected to central management</li> <li>• Publication of Environmental Data</li> </ul>                             |
|                 | I2.1.2 Effect of flood control monitoring by means of ICT measures       | Count by ratio of flood that cause no fatal damage or huge loss due to early warning with ICT.  | >=100%, 100; 95%-100%, 90; 90%-95%, 80; 85%-90%, 70; 80%-85%, 60; 70%-80%, 50; 60%-70%, 40; <60% or data unavailable, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Flood monitoring sensors connected to central management</li> <li>• Publication of Environmental Data</li> </ul>                        |



# Smart Environment (7/14)

| KPI SOURCE      | INDICATOR                                | METRIC OF INDICATOR                                                                                        | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | INITIATIVES                                                                                                                                                                                                                                                                                             |
|-----------------|------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Quality of piped water                   | Percentage                                                                                                 | <p>NOTE 1 – Calculate as: Numerator: Number of city inhabitants with improved water sources; Denominator: Total city population.</p> <p>NOTE 2 – Improved water sources include: piped water, public tap, borehole or pump, protected well, protected spring or rainwater.<br/> <a href="http://www.unwater.org/downloads/TFIMR_Annex_FinalReport.pdf">http://www.unwater.org/downloads/TFIMR_Annex_FinalReport.pdf</a></p> <p>NOTE 3 – SDG indicator 6.1.1 is “Percentage of population using safely managed drinking water services”.</p> | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> </ul>                                                                                     |
|                 | Water supply system management using ICT | Proportion of the water supply systems under automatic monitoring using ICT so as to ensure water quality. | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (8/14)

| KPI SOURCE      | INDICATOR                                    | METRIC OF INDICATOR                                                  | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                             |
|-----------------|----------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | City fresh water sources monitored using ICT | ITU metric                                                           | TBD                                                                                               | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |
|                 | Availability of smart water meters           | Count by ratio of smart water meter devices in overall water meters. | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (9/14)

| KPI SOURCE      | INDICATOR                                                                                                                                                                                      | METRIC OF INDICATOR                                                                                                                | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                             |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Leakage in water supply system                                                                                                                                                                 | Percentage of water leakage (unaccounted water and illegal water taps) in the water supply system.                                 | To follow DM measures                                                                             | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |
|                 | I6.4.7 Improvement of underground pipelines and spatial integrated administration with ICT measures<br>[Editorial note: may need a short and good phrase for this indicator. See fg-ssc-0252.] | Count by ratio of digital documented and spatial integrated administration of underground pipelines among all underground network. | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (10/14)

| KPI SOURCE      | INDICATOR                                                     | METRIC OF INDICATOR                                                                         | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                             |
|-----------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I6.3.2 Improvement of waste water recycling with ICT measures | Count by ratio of water recycled this year with the help of ICT surveillance or management. | >=50%, 100; 45%-50%, 90; 40%-45%, 80; 35%-40%, 70; 30%-35%, 60; 25%-30%, 50; 20%-25%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |
|                 | Sewage system management using ICT                            | Count by number of sensors per kilometer in overall sewage network.                         | >=10, 100; 8-9, 90; 5-8, 80; 3-5, 70; 1-3, 60; <1, 0                                              | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (11/14)

| KPI SOURCE               | INDICATOR                            | METRIC OF INDICATOR                                                        | VALUE ASSIGNED                                               | INITIATIVES                                                                                                                                                                                                                                                                                             |
|--------------------------|--------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>( <i>contd.</i> ) | Drainage system management using ICT | Count by number of sensors per kilometer in overall urban drainage system. | >=10, 100; (8,9), 90; (5,8), 80; (3,5), 70; (1,3), 60; <1, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |
|                          | Sewage system coverage               | ITU metric - % of city households.                                         | TBD                                                          | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Quality of water sensors/smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Smart Water</li> <li>• Smart Waste</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (12/14)

| KPI SOURCE      | INDICATOR                                                                  | METRIC OF INDICATOR                                                                                                                 | VALUE ASSIGNED                                                                                                                                                                                                                                                                              | INITIATIVES                                                                                                                                                                                                                                      |
|-----------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Availability of smart electricity meters                                   | Count by ratio of smart electricity meter devices in overall electricity meters.                                                    | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• National Smart Governance City Sensors incl. Smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Enablers incl. Unified GIS</li> </ul>                 |
|                 | I6.3.2 Reliability of electricity supply system                            | Number                                                                                                                              | NOTE 1 – This is also known as SAIFI – System Average Interruption Frequency Index (dimensionless number).<br>NOTE 2 – Calculate as: Numerator: Total number of customer interruptions; Denominator: Total number of customers served. Must be reversed - for electricity outage frequency. | <ul style="list-style-type: none"> <li>• National Smart Governance incl. Smart Grid real time demand management, outage preventions and response</li> </ul>                                                                                      |
|                 | I6.1.1 Application level of energy saving technologies in public buildings | Count by ratio of public buildings that have energy saving systems, including energy conservation systems and clean energy systems. | >=95%, 100;85%-95%,90;75%-85%,80;65%-75%,70;55%-65%,60;45%-55%,50;35%-45%,40;<35%, 0                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance City Sensors incl. Smart meters connected to central management</li> <li>• Publication of Environmental Data</li> <li>• Enablers incl. Unified GIS</li> </ul> |



# Smart Environment (13/14)

| KPI SOURCE                      | INDICATOR                                                                                             | METRIC OF INDICATOR                                                                       | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | I6.4.6 Electricity supply system management with ICT measures                                         | Count by ratio of electricity supply systems under management with ICT help (Smart Grid). | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>National Smart Governance incl. Smart Grid real time demand management, outage preventions and response</li> </ul>                                                                                 |
|                                 | I6.4.3 Gas system management with ICT measures                                                        | Count by number of sensors per 10 kilometers in overall urban gas system.                 | >=10, 100 ;(8,9), 90; (5,8), 80; (3,5),70; (1,3), 60; <1, 0                                       | <ul style="list-style-type: none"> <li>National Smart Governance incl. Smart Gas Grid real time demand management, outage preventions and response</li> </ul>                                                                             |
| <b>NTP 2020</b>                 | Percent of population served by rainwater drainage and prevention of the dangers of flooding networks | Percentage (%)                                                                            | Baselines – 25<br>2020 Target – 35                                                                | <ul style="list-style-type: none"> <li>Smart Infrastructure Control including: Drainage flow sensor network</li> </ul>                                                                                                                    |
|                                 | Population satisfaction index for pest-free environment                                               | Percentage (%)                                                                            | Baselines – 40<br>2020 Target – 90                                                                | <ul style="list-style-type: none"> <li>National &amp; Municipal Smart Governance</li> <li>Paperless Services</li> <li>eDecision Making</li> <li>Enablers including: Sensors</li> <li>Inspection + 940 App</li> <li>Smart Waste</li> </ul> |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



## Smart Environment (14/14)

| KPI SOURCE                         | INDICATOR                          | METRIC OF INDICATOR | VALUE ASSIGNED                     | INITIATIVES                                                                                                                                                         |
|------------------------------------|------------------------------------|---------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP 2020</b><br><i>(contd.)</i> | Percent recycled and treated waste | Percentage (%)      | Baselines – 15<br>2020 Target – 40 | <ul style="list-style-type: none"><li>• Recycling Policy</li><li>• Enablers including: Recycling sensors</li><li>• Reuse and upcycling management systems</li></ul> |



# Smart Governance (1/7)

| KPI SOURCE | INDICATOR                                                                                        | METRIC OF INDICATOR                                                                               | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Compliance with national Rules and Regulations to ensure Privacy Protection in District Services | Compliance with national Rules and Regulations to ensure Privacy Protection in District Services. | YES, 100<br>No, 0                                                                                 | <ul style="list-style-type: none"> <li>• Data Policy</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                             |
|            | I4.1.3 Convenience of government services                                                        | Count by ratio of convenience expression in paper / online interview.                             | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | Paperless Services Including blockchain to provide: <ul style="list-style-type: none"> <li>• Digitization of all records</li> <li>• Digitization of all forms and input requirements for Government services</li> <li>• Digital Workflow implementation for repetitive government tasks</li> <li>• Notification and digital workflow for all renewal activity with Government services</li> <li>• Smart City Apps</li> <li>• Inspection +940 App</li> </ul> |



## Smart Governance (2/7)

| KPI SOURCE      | INDICATOR                                                                    | METRIC OF INDICATOR                                                                                                                               | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | Provision of online systems for administering public services and facilities | Count by ratio of government administrative businesses processed online.                                                                          | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• SC Awareness / Education Campaigns</li> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> <li>• Paperless Services</li> <li>• Emerging technology policies</li> </ul> |
|                 | I5.3.2 Appliance of smart community services                                 | Count by ratio of communities that is assisted with smart community services.<br>[Editorial note: need to make it clear of “community services”.] | >=90%, 100; 80%-90%, 90; 70%-80%, 80; 60%-70%, 70; 50%-60%, 60; 40%-50%, 50; 30%-40%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> <li>• Paperless Services</li> <li>• Emerging technology policies</li> </ul>                                                                                                                                                              |
|                 | I5.3.1 Digital access to urban planning and budget document                  | Count by ratio of urban planning and budget documents which is digitally accessible.                                                              | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Data Policy</li> <li>• Smart KSA Platform</li> </ul>                                                                                                                                                                                                                                                                                  |



## Smart Governance (3/7)

| KPI SOURCE                      | INDICATOR                                                                                                                                  | METRIC OF INDICATOR                                                                 | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                             |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | I5.3.4 Percentage of open government information / data                                                                                    | Count by ratio of unclassified government documents / data available to the public. | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Data Policy</li> <li>• Smart KSA Platform</li> </ul>                                                                                                                           |
| <b>NTP 2020</b>                 | Percent of cities' urban plan projects approved                                                                                            | Percentage (%)                                                                      | Baselines – Calculation in Progress<br>2020 Target – 85                                           | <ul style="list-style-type: none"> <li>• Smart City App including Predictive Planning App</li> <li>• Municipal Smart Governance including City Smart Planning Governance</li> </ul>                                     |
|                                 | Satisfaction level of population, private sector, and governmental agencies in their participation in the planning process                 | Percentage (%)                                                                      | Baselines – Calculation in Progress<br>2020 Target – 60                                           | <ul style="list-style-type: none"> <li>• Smart City App including Predictive Planning App</li> <li>• Municipal Smart Governance including City Smart Planning Governance</li> <li>• SC Awareness / Education</li> </ul> |
|                                 | Percent improvement in the-population growth rate in small- and medium-sized cities compared to the population growth rate in major cities | Percentage (%)                                                                      | Baselines – Calculation in Progress<br>2020 Target – 25                                           | <ul style="list-style-type: none"> <li>• Smart City App including Predictive Planning App</li> <li>• Municipal Smart Governance including City Smart Planning Governance</li> </ul>                                     |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



## Smart Governance (4/7)

| KPI SOURCE                           | INDICATOR                                       | METRIC OF INDICATOR | VALUE ASSIGNED                                                   | INITIATIVES                                                                                                                                                                                                      |
|--------------------------------------|-------------------------------------------------|---------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP 2020</b><br>( <i>contd.</i> ) | Improvement rate in the cities prosperity index | Percentage (%)      | Baselines – Calculation in Progress<br>2020 Target – 18          | <ul style="list-style-type: none"> <li>• Smart City Centre of Excellence</li> <li>• Smart City Incubation Zone</li> </ul>                                                                                        |
|                                      | Percent of budget financed by internal revenue  | Percentage (%)      | Baselines – 11<br>2020 Target – 40                               | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> </ul>                                                              |
|                                      | Percent Uncollected Municipal revenue           | Percentage (%)      | Baselines – 20<br>2020 Target – 8                                | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• Paperless Services</li> <li>• Inspection +940 App</li> </ul> |
|                                      | The Ministry “Integrity” Index                  | Number              | Baselines – Calculation in Progress<br>2020 Target – Under study | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• eDecision Making</li> <li>• Inspection +940 App</li> </ul>   |



## Smart Governance (5/7)

| KPI SOURCE                           | INDICATOR                                                           | METRIC OF INDICATOR | VALUE ASSIGNED                      | INITIATIVES                                                                                                                                                                                             |
|--------------------------------------|---------------------------------------------------------------------|---------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP 2020</b><br>( <i>contd.</i> ) | Percent of Ministry's KPTs achieved                                 | Percentage (%)      | Baselines – 69<br>2020 Target – 85  | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• eDecision Making</li> </ul>                         |
|                                      | Percent completion of official real estate registration (cadastral) | Percentage (%)      | Baselines – 0.5<br>2020 Target – 50 | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> </ul>                                                 |
|                                      | Percent decrease in land disputes                                   | Percentage (%)      | Baselines – -3<br>2020 Target – 50  | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• Enablers including GIS Orchestration</li> </ul> |
|                                      | Percent of high priority services delivered within their set times  | Percentage (%)      | Baselines – 66<br>2020 Target – 90  | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• eDecision Making</li> </ul>                         |



## Smart Governance (6/7)

| KPI SOURCE                           | INDICATOR                                                                      | METRIC OF INDICATOR | VALUE ASSIGNED                                          | INITIATIVES                                                                                                                                                                                                                                                                                                       |
|--------------------------------------|--------------------------------------------------------------------------------|---------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP 2020</b><br>( <i>contd.</i> ) | Satisfaction Index<br>(for individuals and businesses) with municipal services | Percentage (%)      | Baselines – Calculation in Progress<br>2020 Target – 75 | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• Enablers including GIS Orchestration</li> <li>• SC Awareness &amp; Education</li> <li>• Inspection + 940 App</li> <li>• Accessibility Policies</li> </ul> |
|                                      | Percent of public health complaints resolved within 72 hours                   | Percentage (%)      | Baselines – 80<br>2020 Target – 100                     | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• eDecision Making</li> <li>• Smart Health</li> </ul>                                                                                                           |
|                                      | Percent projects completed on time                                             | Percentage (%)      | Baselines – 14<br>2020 Target – 70                      | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• PPP Policy</li> <li>• Procurement Policies</li> <li>• eDecision Making</li> </ul>                                                                                                                                   |



## Smart Governance (7/7)

| KPI SOURCE                         | INDICATOR                                                                        | METRIC OF INDICATOR | VALUE ASSIGNED                     | INITIATIVES                                                                                                                                                                |
|------------------------------------|----------------------------------------------------------------------------------|---------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NTP 2020</b><br><i>(contd.)</i> | Percent projects that exceeded 6% of their budgets                               | Percentage (%)      | Baselines – 44<br>2020 Target – 3  | <ul style="list-style-type: none"><li>• National &amp; Municipal Smart Governance</li><li>• PPP Policy</li><li>• Procurement Policies</li><li>• eDecision Making</li></ul> |
|                                    | Percent projects that are delayed more than 20% beyond targeted completion dates | Percentage (%)      | Baselines – 66<br>2020 Target – 20 | <ul style="list-style-type: none"><li>• National &amp; Municipal Smart Governance</li><li>• PPP Policy</li><li>• Procurement Policies</li><li>• eDecision Making</li></ul> |



# Smart Living (1/7)

| KPI SOURCE | INDICATOR                                                        | METRIC OF INDICATOR                                                                                     | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | I4.1.12 Satisfaction with housing conditions                     | Count by ratio of satisfaction expression about housing conditions during paper / online interview.     | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | Smart Building Guidelines incl. Intelligent Building Systems <ul style="list-style-type: none"> <li>• Building Energy Smart Meters</li> <li>Noise, Air quality sensors</li> <li>• In building community network</li> <li>• Connected building management systems for energy, security, lighting, cooling, cctv</li> <li>• Mobile Application Home Light, Cooling, Security Control</li> </ul> |
|            | I4.1.10 Convenience for citizens to access educational resources | Count by ratio of convenience expression about getting education resources in paper / online interview. | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Education</li> </ul>                                                                                                                                                                                                                                                                                                                           |
|            | Use of electronic medical records                                | Count by ratio of residents who have electronic health records.                                         | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul>                                                                                                                                                                                                                                                               |
|            | Healthy life years (HLY)                                         | Years per age bracket.                                                                                  | TBD                                                                                               | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• Smart Health</li> </ul>                                                                                                                                                                                                                                                                                         |



## Smart Living (2/7)

| KPI SOURCE                      | INDICATOR                                                                                                                          | METRIC OF INDICATOR                                                                                                                                                                                             | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                           |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | I4.3.2 Usage rate of electronic medical records                                                                                    | Count by ratio of hospitals that actually use and updates electronic medical records.                                                                                                                           | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul>                                       |
|                                 | I4.3.4 Coverage rate of household e-health service<br>[Editorial note: need document to support it, and indicator may be revised.] | Count by ratio of families that have e-health services.<br>[Editorial note: One of e-health services: tele-medicine. This indicator may be measured as Number of patients involved in tele-medicine treatment.] | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul>                                       |
|                                 | I4.3.3 Sharing rate of resource and electronic information among hospitals                                                         | Count by ratio of resource and electronic information sharing among hospitals / clinics.                                                                                                                        | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul>                                       |
|                                 | I4.1.9 Convenience of urban medical care                                                                                           | Count by ratio of convenience expression about getting medical care in paper / online interview.                                                                                                                | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul>                                       |
|                                 | I4.1.8 Satisfaction with food / drug safety monitoring                                                                             | Count by ratio of satisfaction expression about food and drug safety in paper / online interview.                                                                                                               | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Municipal Smart Governance</li> <li>• Smart Healthcare</li> <li>• Enablers incl. Blockchain</li> <li>• City Fibre</li> </ul> |



## Smart Living (3/7)

| KPI SOURCE               | INDICATOR                                | METRIC OF INDICATOR                                                                                                            | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                  |
|--------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>( <i>contd.</i> ) | Adoption of ICT for disaster management  | Count by number of various sensors per square kilometer in disaster-prone regions.                                             | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart City Platform</li> <li>• City Control Centre incl. Integrated Emergency Management and Response Center</li> <li>• Accident avoidance technology</li> </ul>                                                                                    |
|                          | Availability of ICT based safety systems | Count by land coverage ratio of video surveillance.<br>[Editorial note: density? Number of cameras/kilometers, or per street.] | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart City Platform</li> <li>• City Control Centre</li> <li>• Unified Cams (CCTV, Plate &amp; Face recognition, ...)</li> <li>• Social media sentiment and predictive analysis for pre-emptive crowd management</li> <li>• Cybersecurity</li> </ul> |
|                          | Disaster and emergencies alert accuracy  | Count by ratio of disasters that is alerted ahead or timely each year.                                                         | >=20, 100; 15-20, 90; 10-15, 80; 5-10, 70; 1-5, 60; <1, 0                                         | <ul style="list-style-type: none"> <li>• Smart City Platform</li> <li>• City Control Centre incl. Integrated Emergency Management and Response Center</li> <li>• Accident avoidance technology</li> </ul>                                                                                    |



## Smart Living (4/7)

| KPI SOURCE      | INDICATOR                                                      | METRIC OF INDICATOR                                                                           | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                     |
|-----------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I4.1.7 Satisfaction with counter measures against disaster     | Count by ratio of satisfaction expressions about anti-disaster in paper / online interview.   | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• Smart City Platform</li> <li>• City Control Centre incl. Integrated Emergency Management and Response Center</li> <li>• Accident avoidance technology</li> </ul>                                                                       |
|                 | I4.1.2 Satisfaction with environmental safety                  | Count by ratio of satisfaction expression in paper / online interview.                        | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Sensors incl. noise, air pollution sensors connected to central management</li> <li>• Connected air conditioning air quality sensors</li> <li>• Publication of Environmental Data</li> </ul> |
|                 | I4.1.6 Satisfaction with crime prevention and security control | Measured by Security Feeling in paper / online interview. Add Crime rate and case solve rate. | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• National Smart Governance</li> <li>• City Sensors incl. Unified Cams, Child monitors, crowd sensors and Crime Data Aggregation</li> <li>• Crime Information Warehouse</li> <li>• Publication of Environmental Data</li> </ul>          |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



## Smart Living (5/7)

| KPI SOURCE      | INDICATOR                                                          | METRIC OF INDICATOR                                                                                           | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>(contd.) | I4.1.11 Perception on proof against risk of poverty                | Count by ratio of satisfaction expression about anti-poverty during paper / online interview.                 | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> <li>• CSR Engagement</li> <li>• Charity Involvement</li> <li>• Private Sector Accessibility Policies</li> </ul>                                                                                                                                 |
|                 | I4.4.2 Penetration of e-learning system                            | Count by ratio of citizens / residents benefiting from e-learning ( can be through paper / online interview). | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0 | National Smart Education incl. Jamia, GIS, Virtual Schools, Futuregate, Saudi Digital Library                                                                                                                                                                                                                                                                                                           |
|                 | I6.1.2 Percentage of public buildings with integrated technologies | Count by ratio of public buildings with building management systems, communication and control systems, etc.  | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Municipal Smart Governance</li> <li>• Smart Building Guidelines incl. Connected building management systems for energy, security, lighting, cooling, cctv</li> <li>• Mobile Application Home Light, Cooling, Security Control</li> <li>• Building Energy Smart Meters</li> <li>• Noise, Air quality sensors</li> <li>• Intelligent Building Systems</li> </ul> |



## Smart Living (6/7)

| KPI SOURCE               | INDICATOR                                           | METRIC OF INDICATOR                                                                                                                                                                  | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU<br>( <i>contd.</i> ) | I6.1.3 Proportion of smart home automation adoption | Count by ratio of families that enjoy smart home tech.                                                                                                                               | >=60%, 100; 55%-60%, 90; 50%-55%, 80; 40%-50%, 70; 30%-40%, 60; 20%-30%, 50; 10%-20%, 40; <10%, 0 | <ul style="list-style-type: none"> <li>• Municipal Smart Governance</li> <li>• Smart Building Guidelines incl. Connected building management systems for energy, security, lighting, cooling, cctv</li> <li>• Mobile Application Home Light, Cooling, Security Control</li> <li>• Building Energy Smart Meters</li> <li>• Noise, Air quality sensors</li> <li>• Intelligent Building Systems</li> </ul> |
|                          | Integrated management in public buildings           | Proportion of District Authority/ Manager Buildings using integrated ICT systems to automate building management and create flexible, effective, comfortable and secure environment. | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Smart Building Guidelines incl. Intelligent Building Systems</li> <li>• Building Energy Smart Meters</li> <li>• Noise, Air quality sensors</li> <li>• In building community network</li> <li>• Connected building management systems for energy, security, lighting, cooling, cctv</li> <li>• Mobile Application Home Interactive Screens</li> </ul>           |



# Smart Living (7/7)

| KPI SOURCE | INDICATOR                                                                                  | METRIC OF INDICATOR | VALUE ASSIGNED                        | INITIATIVES                                                                                                                                                                                                                                           |
|------------|--------------------------------------------------------------------------------------------|---------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NTP 2020   | Per capita open space and public places                                                    | Square Meter/capita | Baselines – 3,5<br>2020 Target – 4,43 | Smart Parks including: <ul style="list-style-type: none"> <li>• Public interactive information signage</li> <li>• Smart Kiosks, benches</li> <li>• Smart Street signs</li> <li>• Ubiquitous Wifi</li> </ul>                                           |
|            | Population satisfaction index with cities' cleanliness                                     | Percentage (%)      | Baselines – 40<br>2020 Target – 70    | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• Enablers including: Sensors</li> <li>• Inspection + 940 App</li> <li>• Smart Waste</li> </ul> |
|            | Percent decrease in the public health incidences (food poisoning and transmitted diseases) | Percentage (%)      | Baselines – 69<br>2020 Target – 20    | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• Enablers including: Sensors</li> <li>• Inspection + 940 App</li> <li>• Smart Waste</li> </ul> |



# Smart Mobility (1/3)

| KPI SOURCE | INDICATOR                                                                  | METRIC OF INDICATOR                                                                                   | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                                                                                                  | INITIATIVES                                                                                                                                                                                                            |
|------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | I4.1.5 Satisfaction with quality of public transport                       | Count by ratio of satisfaction expression about public transport quality in paper / online interview. | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>• Smart Inter Modal Public Transport</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul>                                                                     |
|            | I4.1.4 Convenience of smart traffic information administration and service | Count by ratio of convenience expression about smart traffic in paper / online interview.             | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>• Smart Parking</li> <li>• Intelligent Traffic Management</li> <li>• Traffic Sensing and Prediction</li> </ul>                                                                  |
|            | Use of public transport                                                    | % of travelers                                                                                        | TBD                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• Smart Inter Modal Public Transport</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul>                                                                     |
|            | Road traffic efficiency                                                    | Ratio                                                                                                 | <p>NOTE 1 – Travel Time Index (TTI) is a measure of congestion that focuses on each trip and each distance of travel and relates to traffic efficiency.</p> <p>NOTE 2 - Ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds.</p> <p>NOTE 3 – Calculate as Numerator: Travel time in the peak period; Denominator: Travel time in free-flow. Expressed as a ratio</p> | <ul style="list-style-type: none"> <li>• Smart Parking</li> <li>• Intelligence Traffic Management</li> <li>• Smart Inter Modal Public Transport</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul> |



## Smart Mobility (2/3)

| KPI SOURCE                      | INDICATOR                                                  | METRIC OF INDICATOR                                                           | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | Availability of online bicycle/car sharing system          | Proportion of district area covered by an online bike/car sharing system.     | Target of 100%                                                                                    | <ul style="list-style-type: none"> <li>• Smart Car Pooling</li> <li>• Electric Vehicles</li> </ul>                                                                                                                     |
|                                 | Availability of traffic monitoring using ICT               | Count by number of road sensors per kilometer in overall urban road coverage. | >=10, 100; 8-9, 90; 5-8, 80; 3-5, 70; 1-3, 60; <1, 0                                              | <ul style="list-style-type: none"> <li>• Smart Parking</li> <li>• Intelligence Traffic Management</li> <li>• Smart Inter Modal Public Transport</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul> |
|                                 | Availability of parking using ICT                          | Proportion parking spaces with ICT based parking guidance systems.            | >=95%, 100; 90%-95%, 90; 80%-90%, 80; 70%-80%, 70; 60%-70%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Smart Parking</li> <li>• Intelligence Traffic Management</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul>                                               |
|                                 | Availability of real-time traffic information              | Count by ratio of bus stops with electronic bulletin boards.                  | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Intelligence Traffic Management</li> <li>• Smart Inter Modal Public Transport</li> </ul>                                                                                      |
|                                 | 16.4.2 Street lighting system management with ICT measures | Count by number of sensors per kilometer in overall street lighting system.   | >=10, 100; (8,9), 90; (5,8), 80; (3,5), 70; (1,3), 60; <1, 0                                      | <ul style="list-style-type: none"> <li>• LED including: Smart Street Light Pilots; City wide Smart Street Lights; Smart Infrastructure Control</li> </ul>                                                              |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



## Smart Mobility (3/3)

| KPI SOURCE                      | INDICATOR                                                                                                                       | METRIC OF INDICATOR                                      | VALUE ASSIGNED                                                                                    | INITIATIVES                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITU</b><br>( <i>contd.</i> ) | 16.2.2 Coverage of parking guidance systems                                                                                     | Count by ratio of parking lots under automatic guidance. | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0 | <ul style="list-style-type: none"> <li>• Smart Parking</li> <li>• Intelligence Traffic Management</li> <li>• Smart Car Pooling</li> <li>• Autonomous Vehicles</li> </ul>                                                                                                                                                                                                      |
| <b>NTP 2020</b>                 | Deficiency rate in the avg length of roads/capita in cities compared with the overall avg length of roads/capita in the kingdom | Meter/capita                                             | Baselines – 0,69<br>2020 Target – 0,42                                                            | <ul style="list-style-type: none"> <li>• Smart Infrastructure Control</li> </ul>                                                                                                                                                                                                                                                                                              |
| <b>New or No Cat.</b>           | Number of Autonomous vehicles                                                                                                   | Number of services                                       | 0<br>1 to 5<br>5 to 10                                                                            | <ul style="list-style-type: none"> <li>• Emerging Technology Policy &amp; Training including National Autonomous Vehicle Policy; City Autonomous Vehicle Roadmap; Civil Works for Autonomous Vehicle usage in the city; Autonomous Vehicle Education; Autonomous Vehicle usage in the public sector; Incentives for Autonomous Vehicle usage in the private sector</li> </ul> |

Source: ITU, NTP, NDU, MOMRA, NXN analysis



# Smart Society (1/3)

| KPI SOURCE | INDICATOR                                                       | METRIC OF INDICATOR                                                                                       | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                        | INITIATIVES                                                                                                                                                                                                                                                                                              |
|------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Availability of cultural resources online                       | Proportion of cultural institutions and events in the district for which online participation is offered. | NOTE 1 – Cultural resources online include: events and activities provided online, and watched or listened through electric/virtual media.<br>NOTE 2 – Calculated as: Numerator: Number of cultural institutions and events for which online participation is offered; Denominator: Total number of cultural institutions and events. | <ul style="list-style-type: none"> <li>• Entertainment</li> <li>• Charity Involvement</li> <li>• National Smart Education incl. Saudi Digital Library</li> </ul>                                                                                                                                         |
|            | Availability of online city information and feedback mechanisms | Count by ratio of adjuration successfully handled online.                                                 | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• SC Awareness / Education Campaigns</li> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> </ul> |



## Smart Society (2/3)

| KPI SOURCE | INDICATOR                                                                               | METRIC OF INDICATOR                                                                                       | VALUE ASSIGNED                                                                                                                                                                                                                                                                                                                                | INITIATIVES                                                                                                                                                                                                                                                                                              |
|------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Online civic engagement                                                                 | Count by ratio of residents involved on-line in various urban administration issues.                      | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• SC Awareness / Education Campaigns</li> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> </ul> |
|            | Existence of strategies, rules and regulations to enable ICT literacy among inhabitants | Checklist                                                                                                 | <p>NOTE 1 – The verification contains examination in four aspects, including a) legislation; b) regulations enforced in public service and facilities; c) regulations properly enforced for web services; and d) the coverage rate of qualified systems.</p> <p>NOTE 2 – This indicator is determined by the sum of YES answers reported.</p> | <ul style="list-style-type: none"> <li>• Internal ICT Training</li> <li>• Smart City Incubation Zone</li> <li>• SC Awareness / Education</li> </ul>                                                                                                                                                      |
|            | I5.1.1 Immigration-friendly environment contributed by ICT measures                     | Count by number of government and social immigration services that have user friendly online assistances. | >=10, 100; 9, 90; 8, 80; 7, 70; 6, 60; 5, 50; 4, 40; <=3, 0                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> <li>• CSR Engagement</li> <li>• Charity Involvement</li> </ul>                                                                                   |



## Smart Society (3/3)

| KPI SOURCE | INDICATOR                                                                                                                | METRIC OF INDICATOR                                                                            | VALUE ASSIGNED                                                                                                                                                           | INITIATIVES                                                                                                                                                                                                                                                                                              |
|------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITU        | Use of online city services                                                                                              | Percentage                                                                                     | NOTE 1 – Calculate as: Numerator: Number of public service transactions conducted online; Denominator: Total number of public service transactions (online and offline). | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• SC Awareness / Education Campaigns</li> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> </ul> |
|            | 15.1.2 Improvement of turnout at city hearings by means of ICT<br>[Editorial note: this indicator may need improvement.] | Count by ratio of attendance at city forums / hearings and measure of ICT role in improvement. | >=80%, 100; 70%-80%, 90; 60%-70%, 80; 50%-60%, 70; 40%-50%, 60; 30%-40%, 50; 20%-30%, 40; <20%, 0                                                                        | <ul style="list-style-type: none"> <li>• National &amp; Municipal Smart Governance</li> <li>• Paperless Services</li> <li>• eDecision Making</li> <li>• SC Awareness / Education Campaigns</li> <li>• Electronic Issue Voting</li> <li>• Smart Enablers incl. City Apps, Analytics, Open Data</li> </ul> |
|            | Application of services to support persons with specific needs                                                           | Count by density of impediment removal systems.                                                | >=95%, 100; 85%-95%, 90; 75%-85%, 80; 65%-75%, 70; 55%-65%, 60; 45%-55%, 50; 35%-45%, 40; <35%, 0                                                                        | <ul style="list-style-type: none"> <li>• Accessibility Policies within Government</li> <li>• Private sector accessibility policies</li> </ul>                                                                                                                                                            |

# Thanks



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