

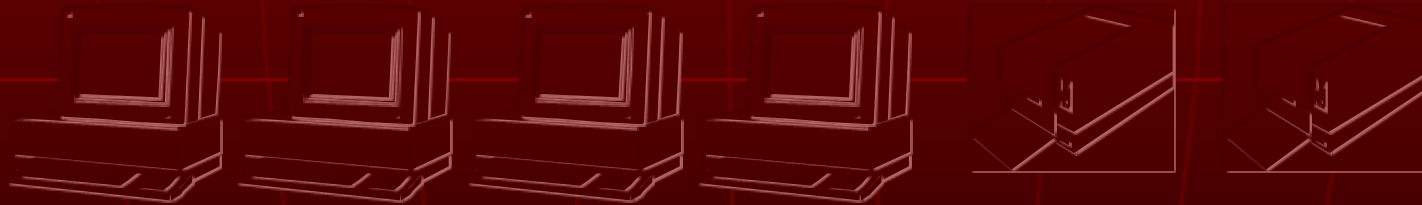


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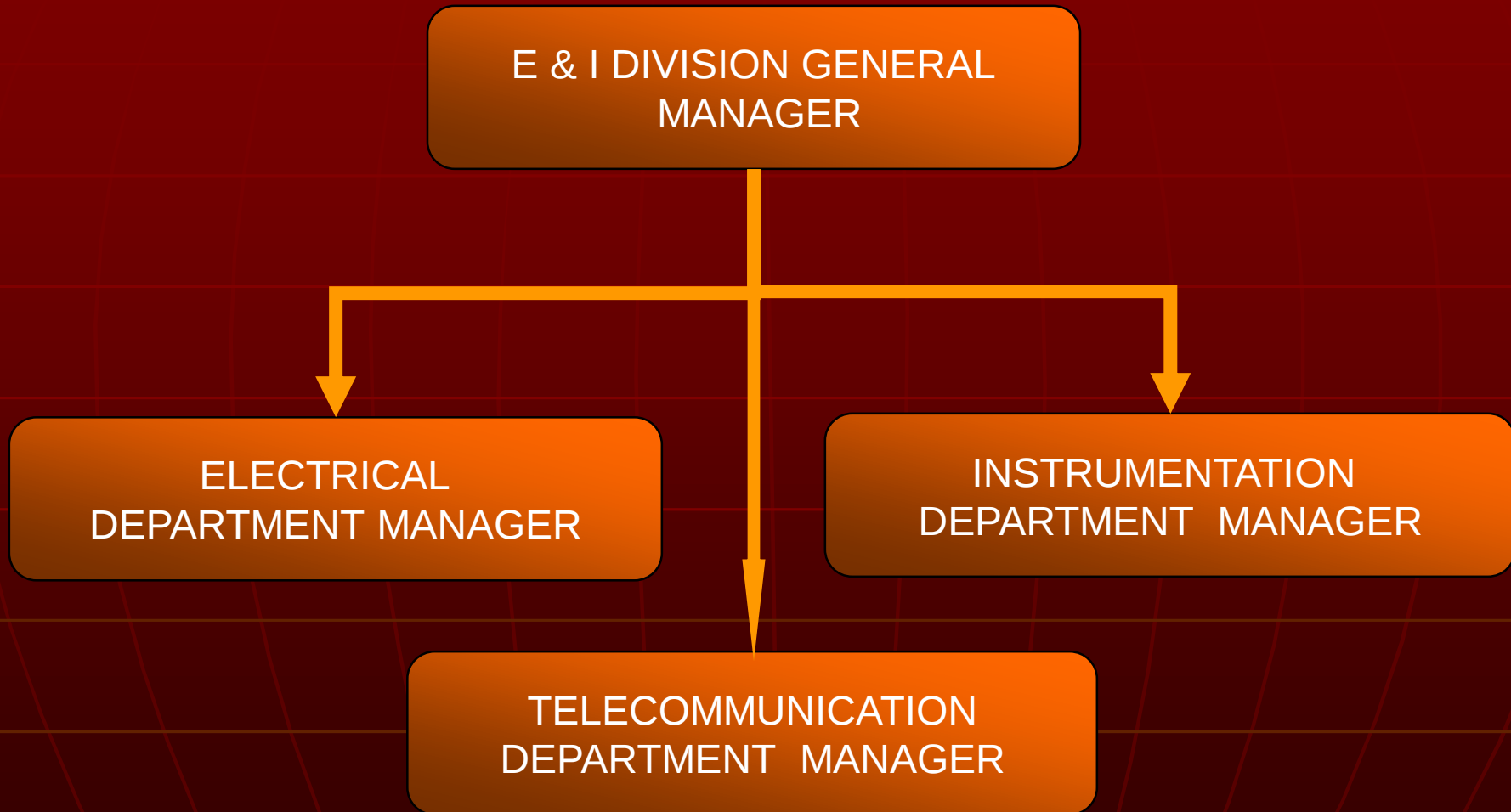
Engineering for the Petroleum and Process Industries



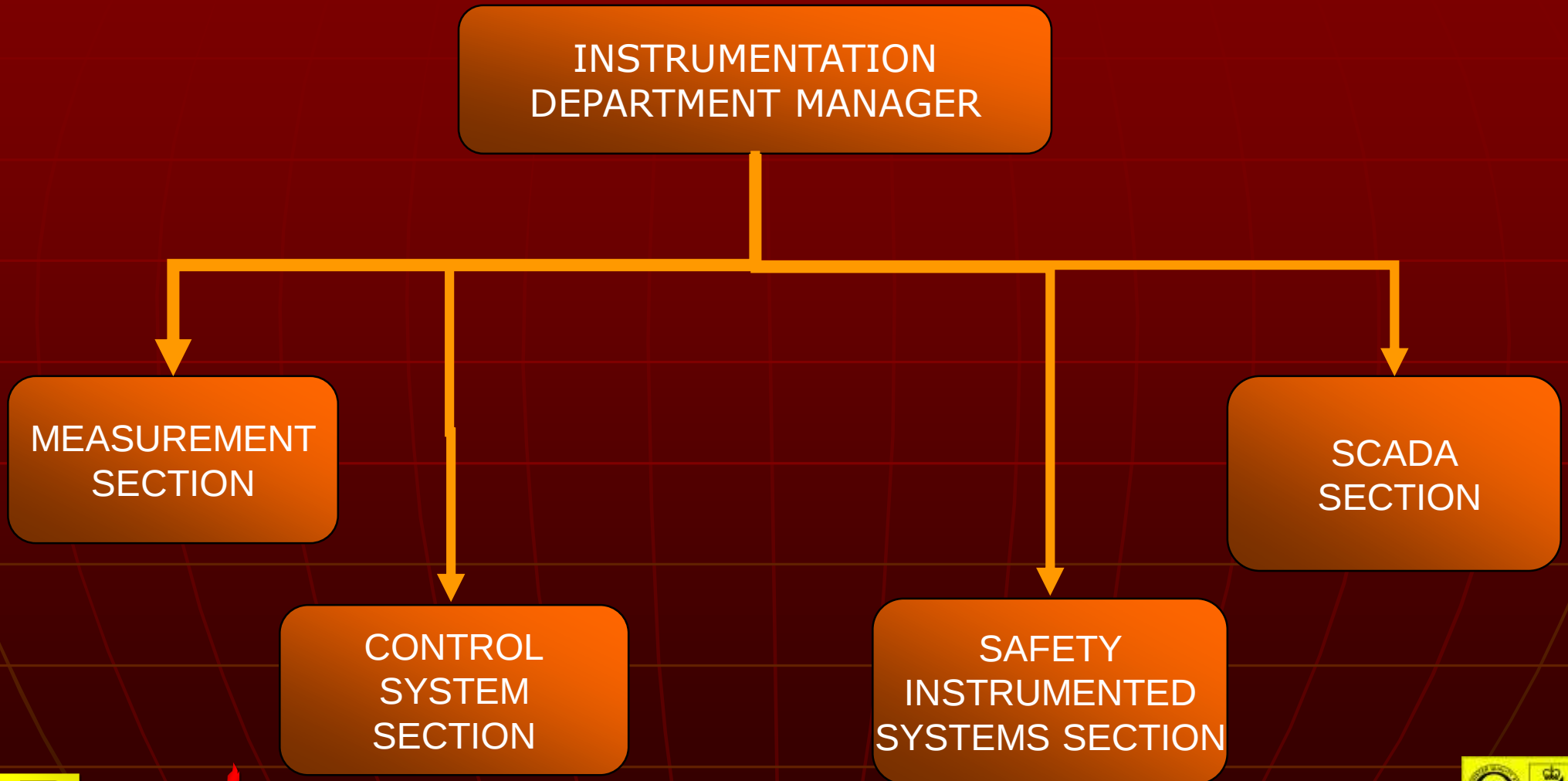
ELECTRICAL & INSTRUMENTATION ENGINEERING DIVISION



ELECTRICAL & INSTRUMENTATION ENGINEERING DIVISION FUNCTIONAL ORGANIZATION



INSTRUMENTATION DEPARTMENT FUNCTIONAL ORGANIZATION



What is instrumentation engineering?

- It's the activities involved in providing the instrumentation (measuring instruments/process control & logic functions hardware and software / final control elements)
Needed for proper operation of a process unit, plant , or facility.

The keywords are “proper operation”

Proper operation is the result of :

- Proper application of hardware
- Proper application of software
- Proper method of selecting hardware and software
 - Suitable for the project technical requirements
 - Ease of operation
 - Ease of maintenance
 - Ease of upgrade and / or expansion

- Proper review of manufacturer's engineering for the selected hardware & software
- Proper review of inspection manufacturer's finished products before shipment to site
- Proper installation
- Proper site check out and calibration

Scope of Department Activities.

-  Basic Engineering Activities
-  Detailed Engineering Activities
-  Participating in Procurement Activities
(e.g. Factory Acceptance Test)
-  Site Assistance (construction,
commissioning & start-up)

DELIVERABLES

- 📁 Instrument Index.
- 📁 Instrument Tagged Items Data Sheets
[Detailed Specifications].
- 📁 Control & Safety Systems Basic Design
Package:
 - Technical Specifications.
 - Architectural/conceptual Diagrams.
 - Input/Output Data Base Schedules.
 - Functional loop Diagrams.
 - Logic/Ladder Diagrams.
 - Control Rooms Equipment Conceptual
Layout Drawings.
 - Dynamic Graphics/Display Sketches.

DELIVERABLES [Continued]



Instrument Bulk Material Data Sheets & Specifications, e.g.: Instrument Cables Data Sheets, Junction Boxes Specifications, Elec./ Mechanical/ Pneumatic Bulk Material Specifications.



Plant Overall Instrument Cables Block Diagrams.



Control Building Equipment Layout & Cable Routing Details.

DELIVERABLES [Continued]



Field Instruments Hook-Ups [Elec./ Mechanical/ Pneumatic/ Supports].



Field Instruments Layouts (Elec./ Pneumatic).



Field Instrument Cable Routing With Tray/ Trench Sections & Road Crossing Details.



Cables/ Tubing Schedules.

DELIVERABLES [Continued]



Interconnecting Wiring Diagrams.



Instrument Loop Diagrams.



Calculations For Instruments Sizing; e.g.:
Flow Meters Sizing & Control Valves
Sizing.



MRQ's For Control & Safety Systems,
Tagged Items.

DELIVERABLES [Continued]



Technical Bid Evaluation Reports.



MRP'S For Control & Systems, Tagged Items.

SOFTWARE PACKAGES USED IN DESIGN ACTIVITIES

-  MMS [Material Management System].
-  AUTOSIM.
-  Boiler Simulation.

SOFTWARE PACKAGES USED IN DESIGN ACTIVITIES

[Continued]

-  Intools Package. [Full Range Application Modules + Infomaker Module]
-  Intergraph 2D/ 3D Plant Design.
-  Auto CAD.

CODES & STANDARDS USED IN DESIGN ACTIVITIES:

EUROPEAN STANDARDS:

-  BSI British Standards Institute
-  CENELEC Comité Européen de Normalisation Electrotechnique
-  DIN Deutsches Institut Für Normung
-  EN Euronorm
-  VDE Verband Deutscher Elektrotechniker

CODES & STANDARDS USED IN DESIGN ACTIVITIES

(continued):

AMERICAN STANDARDS:

	AGA	American Gas Association
	ANSI	American National Standards Institute
	API	American Petroleum Institute
	EIA	Electronic Industries Association
	FM	Factory Mutual Research
	IEEE	Institute Of Electrical & Electronic Engineers

CODES & STANDARDS USED IN DESIGN ACTIVITIES

(continued):

AMERICAN STANDARDS (Continued):

	ISA	Instrument Society Of America
	NEMA	National Electrical Manufacturers Association
	NFPA	National Fire Protection Association
	OSHA	Occupational Safety & Health Administration
	UL	Underwriters Laboratories

CODES & STANDARDS USED IN DESIGN ACTIVITIES:

INTERNATIONAL STANDARDS:



IEC

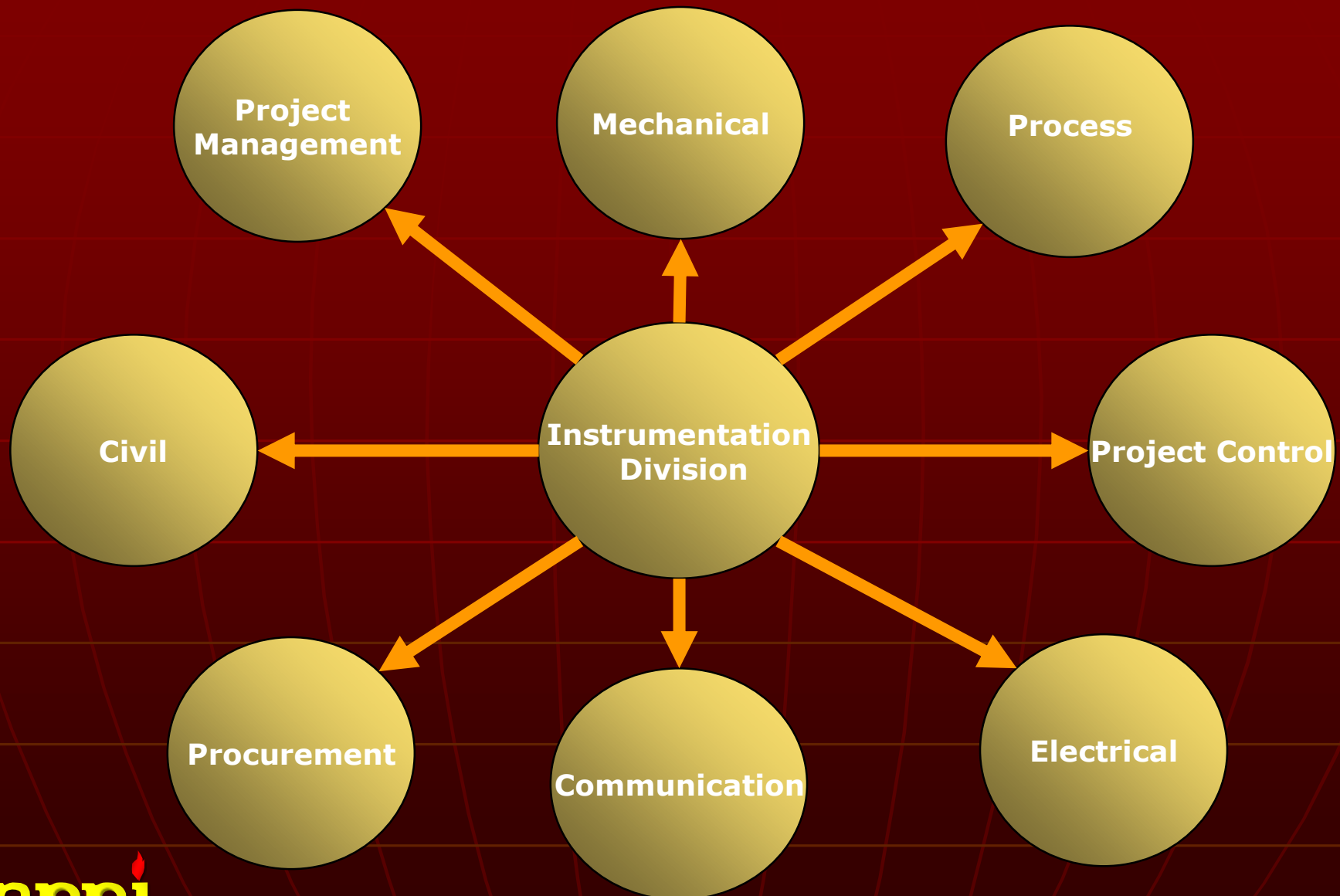
International Electrotechnical
Commission



ISO

International Standards Organization

Interface with other disciplines

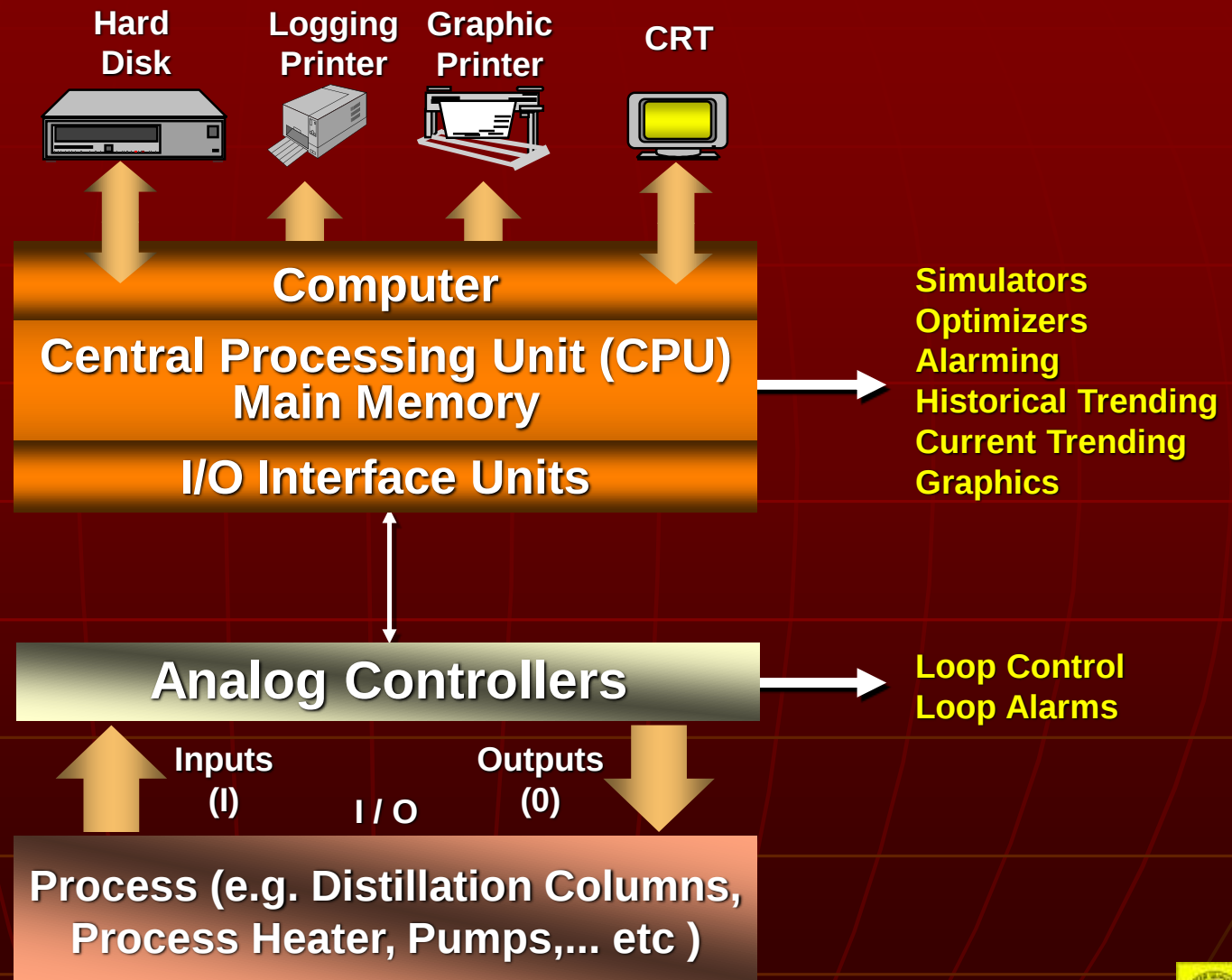


The Three Basic Types Of Computer Based Control Systems Available In The Market Are :

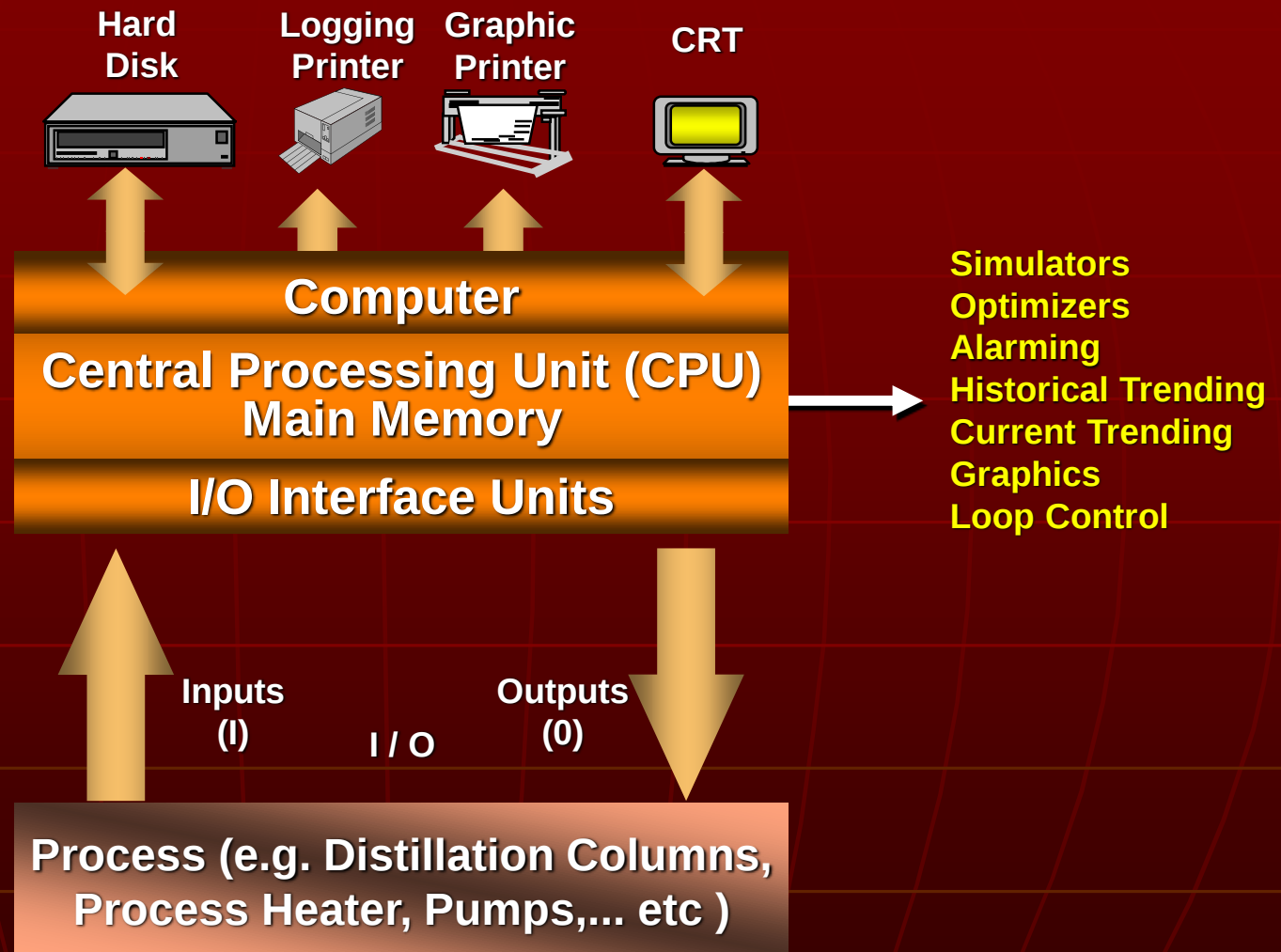
-  **The supervisory Digital Control System [SDC].**
-  **The Direct Digital Control System [DDC].**
-  **The Distributed Control System [DCS].**

The DCS Is the Most Recent type Of Computer Based Control Systems.

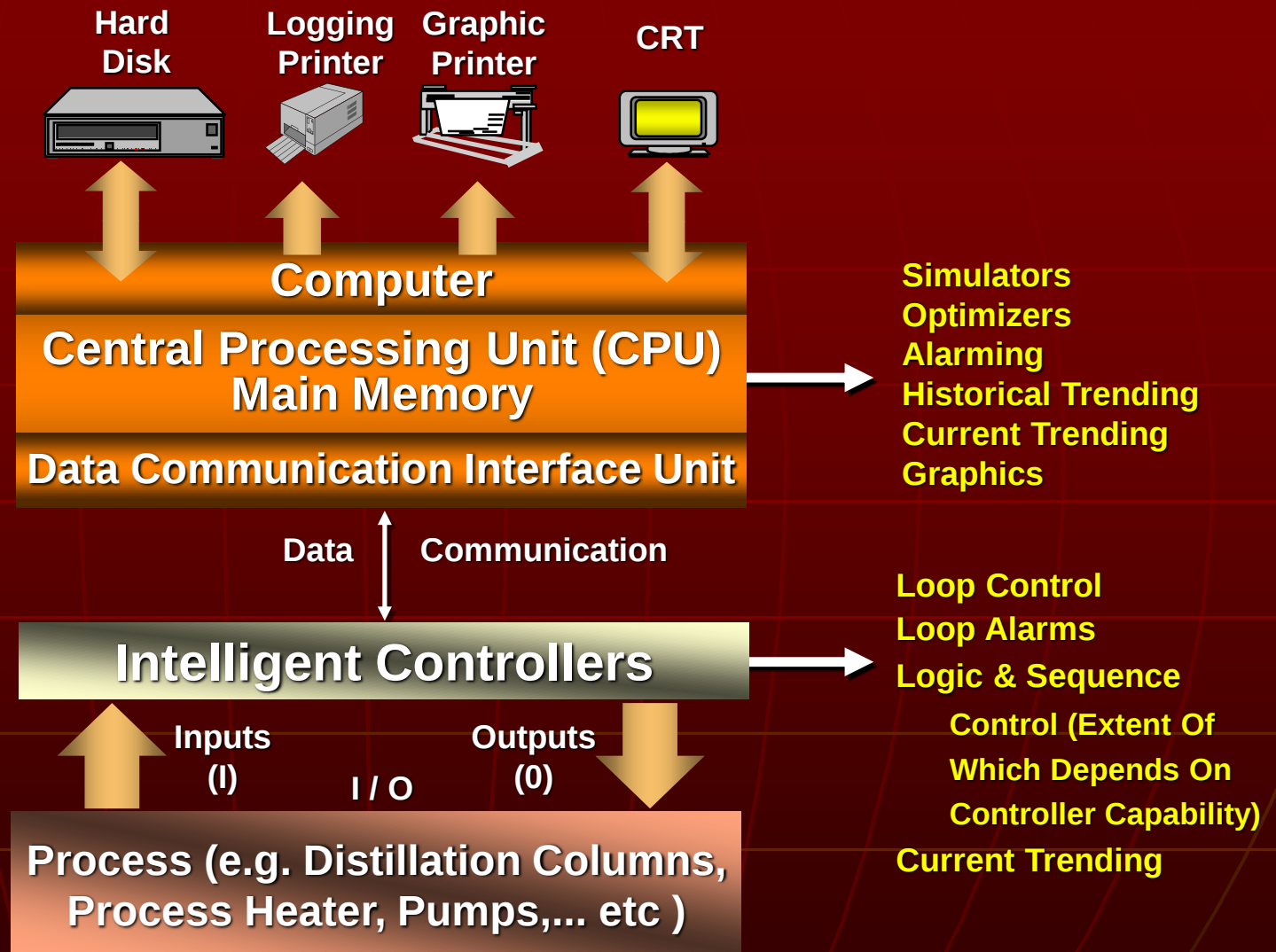
GENERALIZED DIAGRAM OF SDC



GENERALIZED DIAGRAM OF DDC



GENERALIZED DIAGRAM OF DCS



BASIC INDUSTRIAL AUTOMATION NEEDS

-  Highly Reliable Systems.
-  Integration & Interface With Emergency Shutdown and Fire & gas Systems.
-  Remote Control & Communications.
-  Reduced Installation Cost.

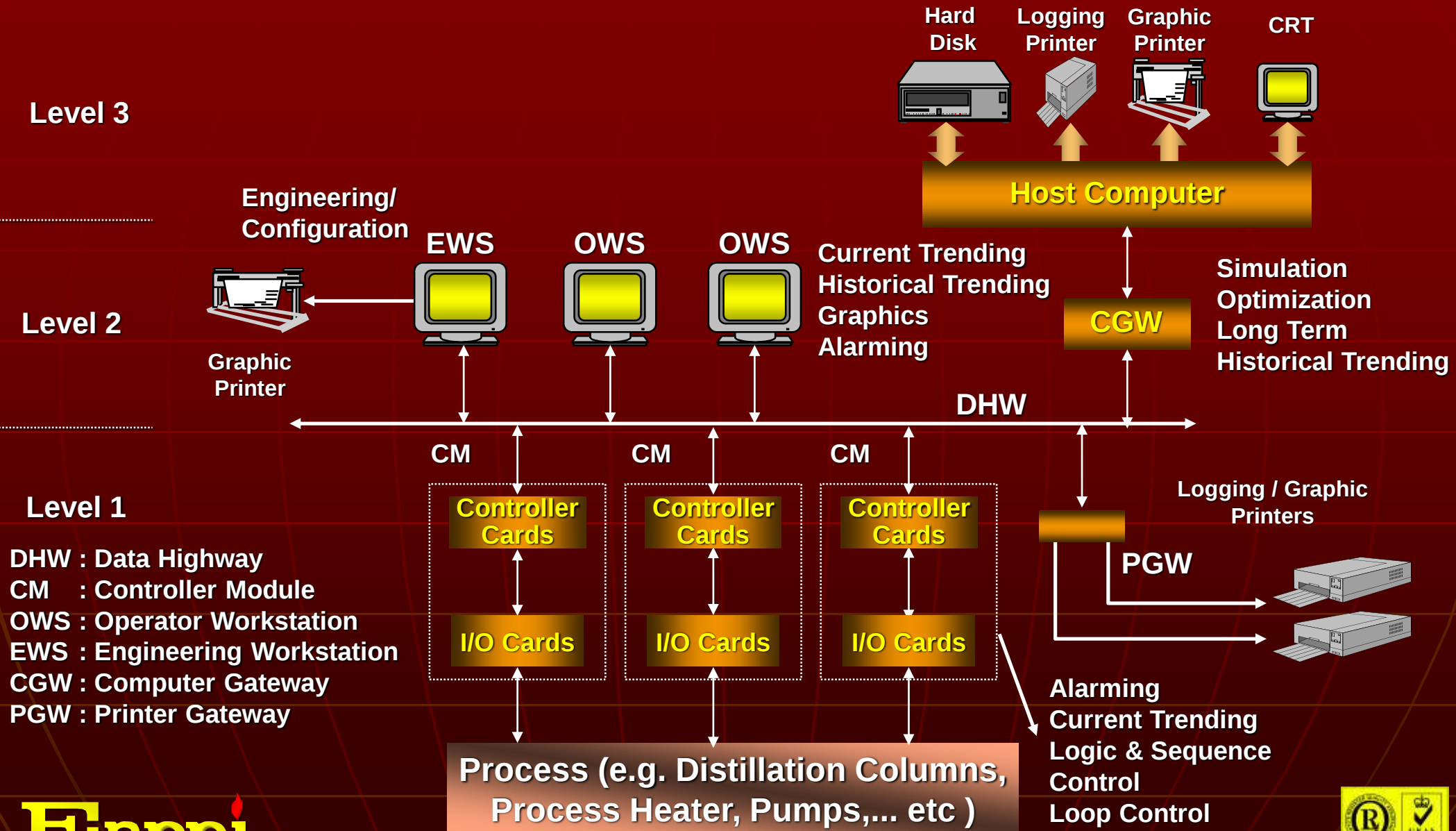
BASIC INDUSTRIAL AUTOMATION NEEDS [continued]

-  Reduced Operation Cost.
-  Better Performance.
-  Powerful, User Friendly Control Room Operations.
-  Alarm/Event Analysis.

BASIC INDUSTRIAL AUTOMATION NEEDS [continued]

- ✉ Easy To Implement Advanced Control Strategies.
- ✉ Capability of Continuously Coping With Evolving Industrial Automation Technologies & Standards.

SIMPLE BLOCK DIAGRAM OF A TYPICAL DCS



Thank You