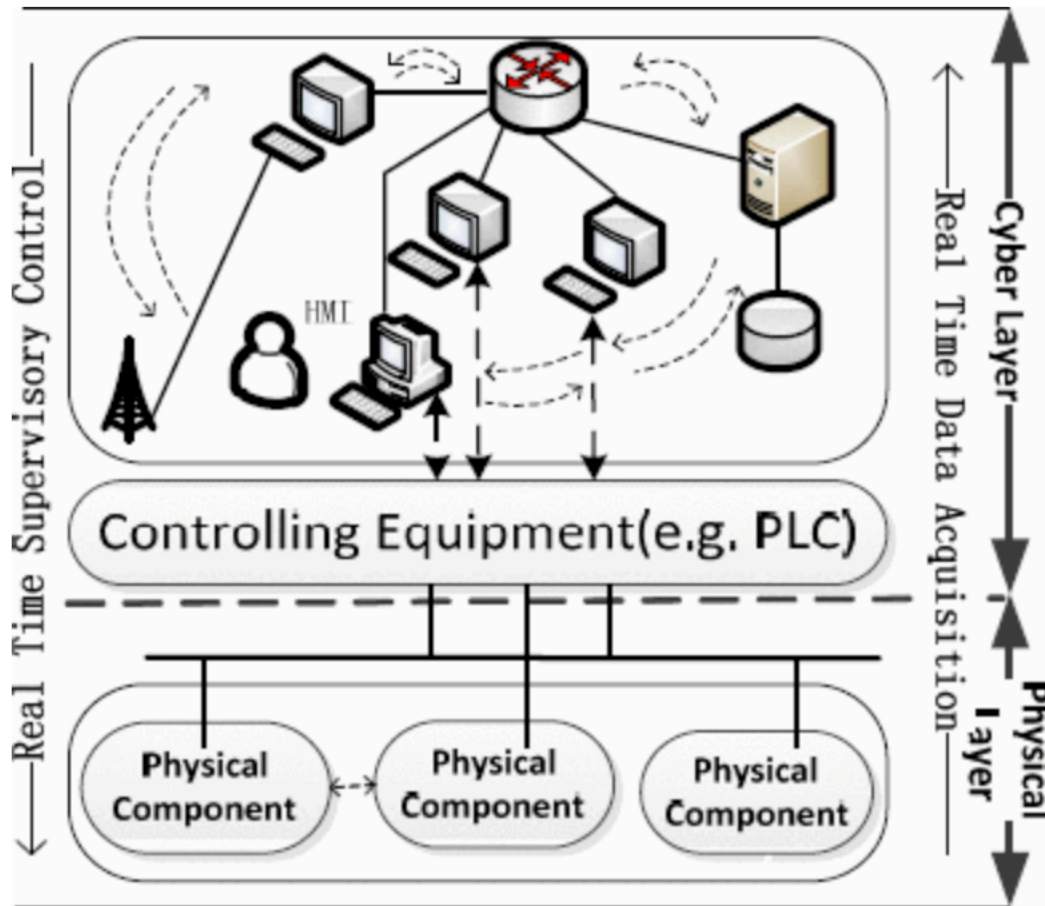


The Road Ahead



Typical CPS Framework



Smart-Grid Drivers for India

Customers:

1. Expand access to electricity
 - “Power for All”
2. Improve reliability of supply to all customers
 - No power cuts, no more DG sets and inverters!
3. Improve quality of supply
 - No more voltage stabilizers!
4. User friendly and transparent interface with utilities
5. Ability to save money by reducing peak consumption
6. Increased consumer engagement, also as a producer (“Prosumer”)

Utilities:

1. Reduction of T&D losses in all utilities to 15% or below
2. Peak load management
 - Multiple options
3. Reduction in power purchase costs
4. Better asset management
5. Increased grid visibility
6. Self healing grid
7. Renewable integration

Government & Regulators:

1. Satisfied customers
2. Financially sound utilities
3. Tariff neutral system upgrade and modernization
4. Reduction in emission intensity

Smart-Grid Activities

Advanced Meter Infrastructure.....

Peak Load Management

Power Quality Management.....

Outage Management.....

Micro-grids

Distributed Generation

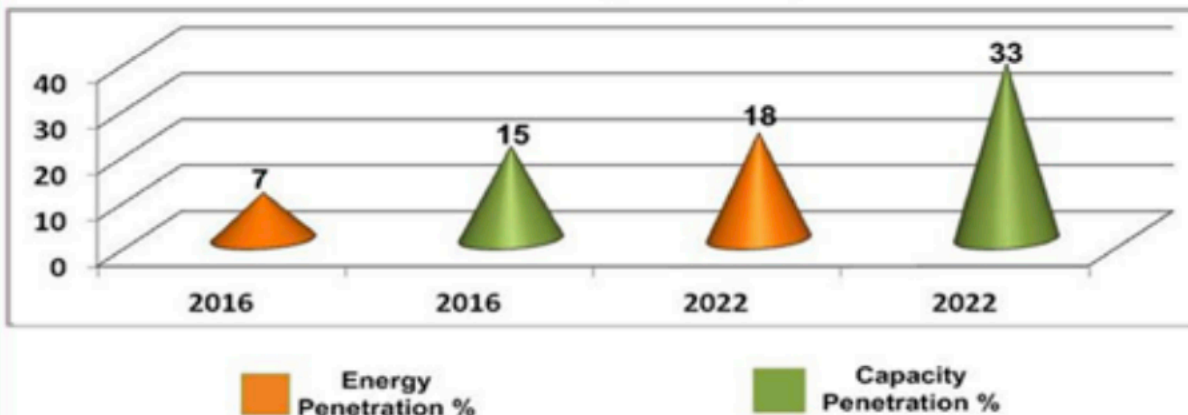
SAMAST

- Intra-state balancing, accounting, settlement
 - Scheduling,
 - Accounting,
 - Metering,
 - Settlement of Transactions

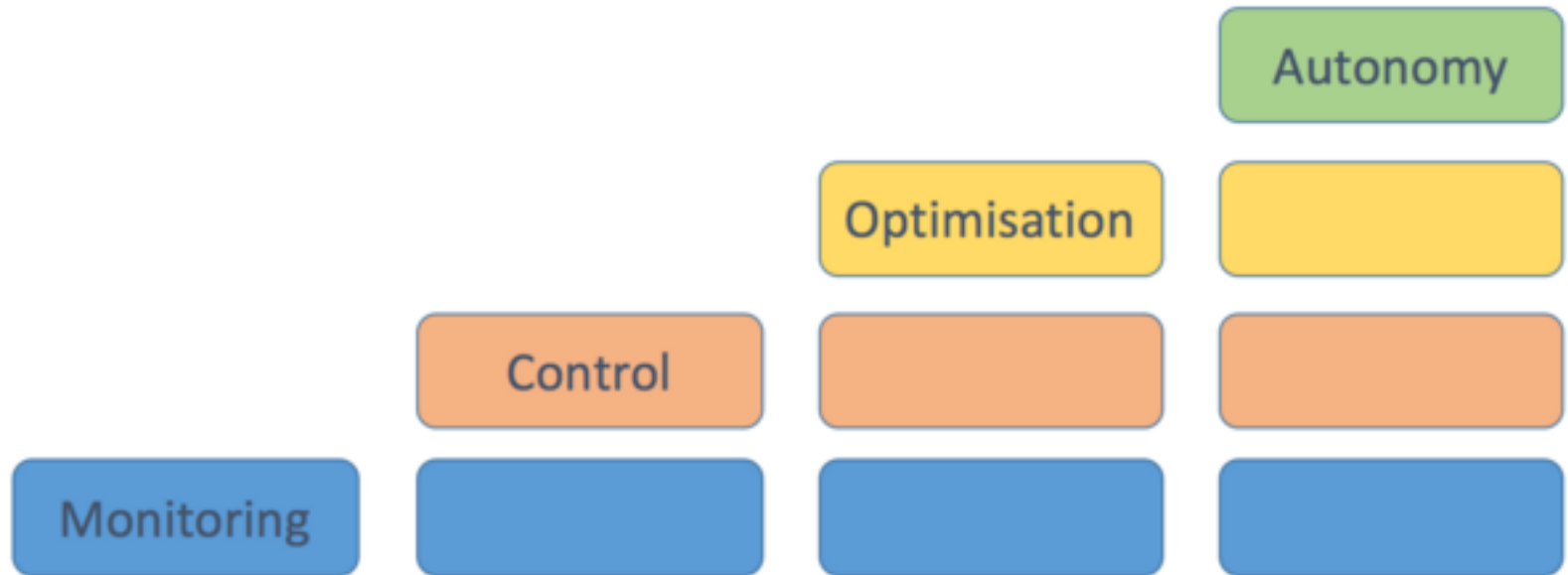
Data will play a key role

Renewable Addition Plan

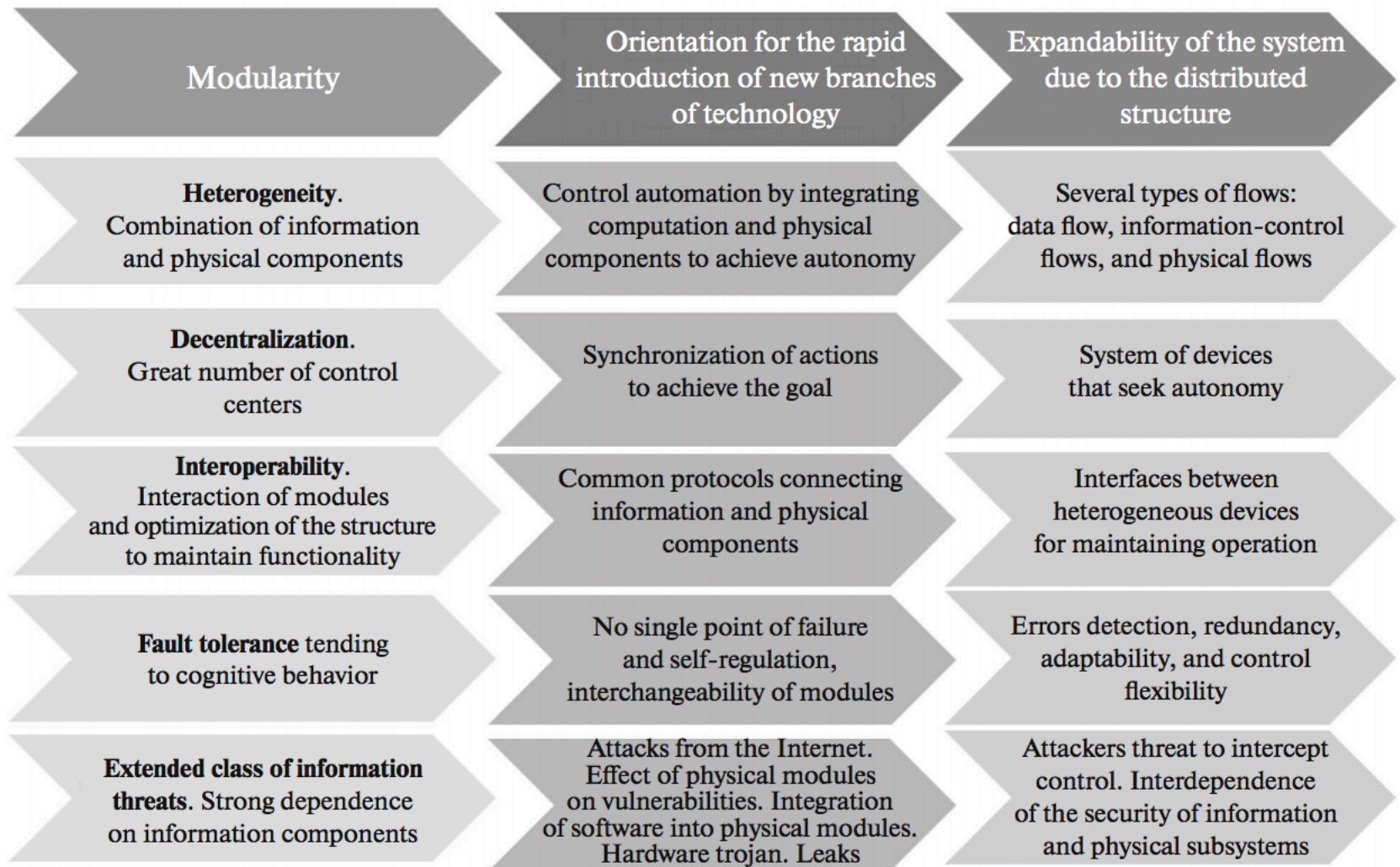
- Plan to add 1,00,000 MW Solar, 60,000 MW Wind, 10,000 MW Biomass and 5,000 MW small hydro by the end of 13th plan (2022)
 - About 20,000 MW through Solar Power Parks.
 - About 40,000 MW through Distributed Solar Generation.
 - About 40,000 MW through Roof Top Solar Generation.

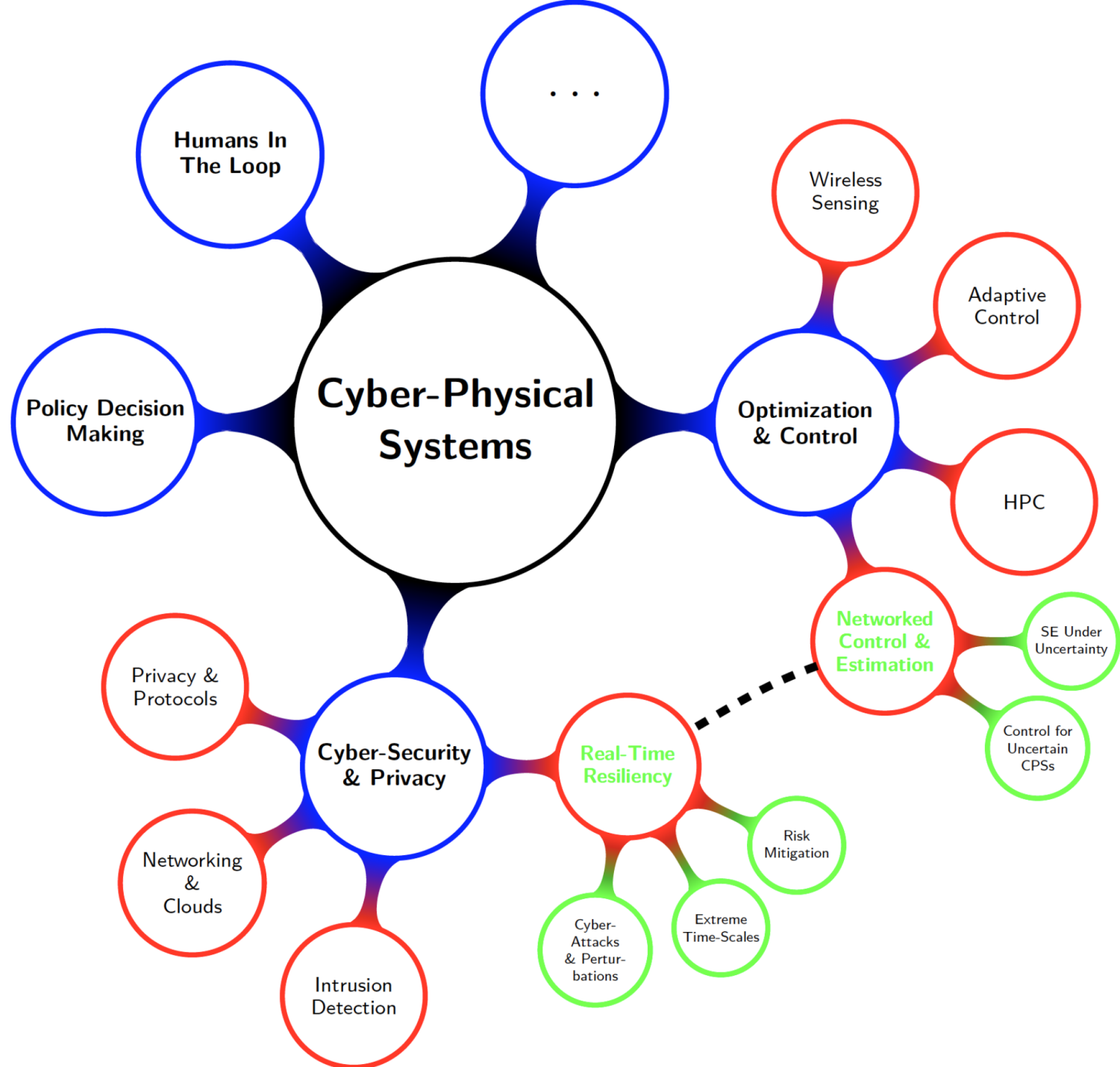


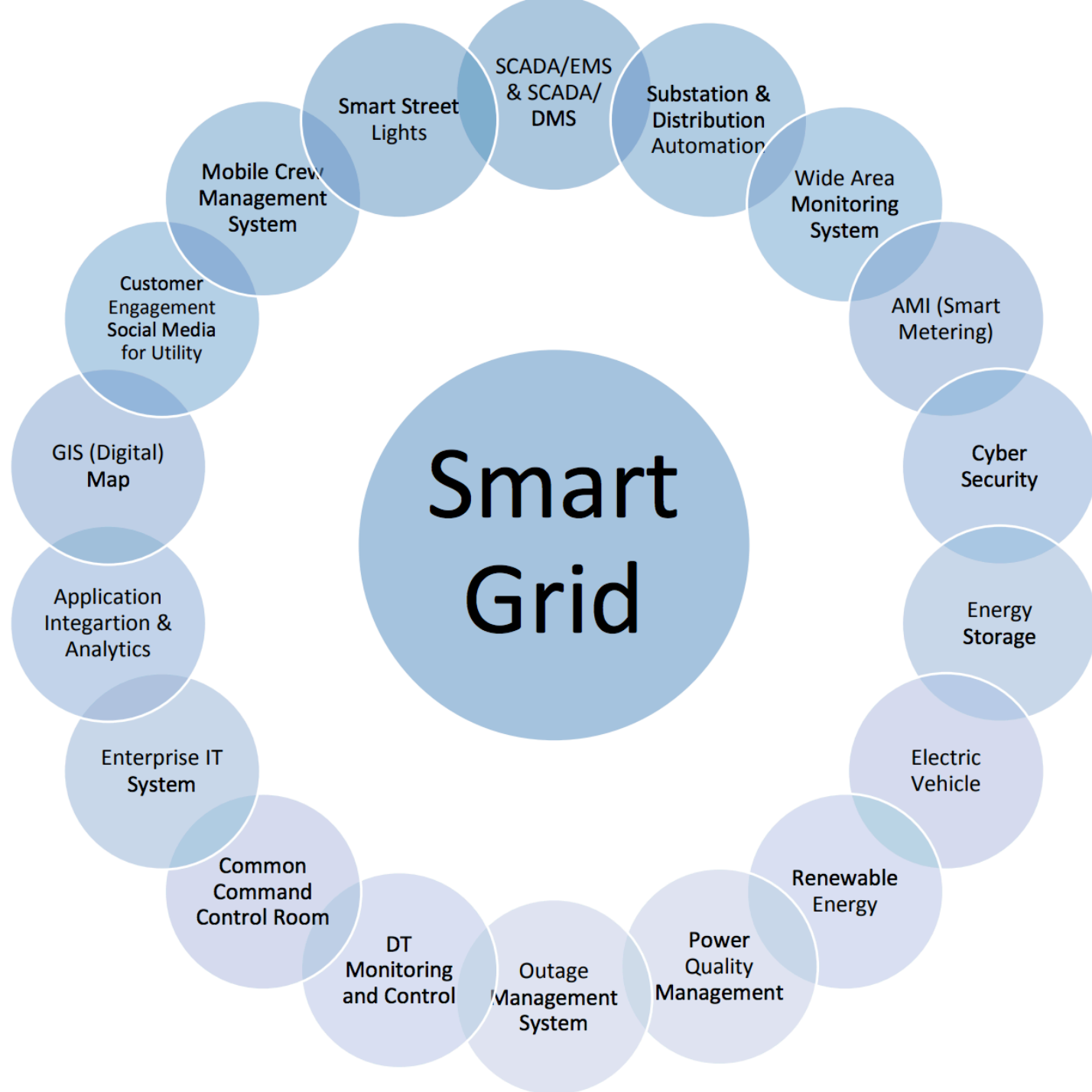
Role of Data in CPS



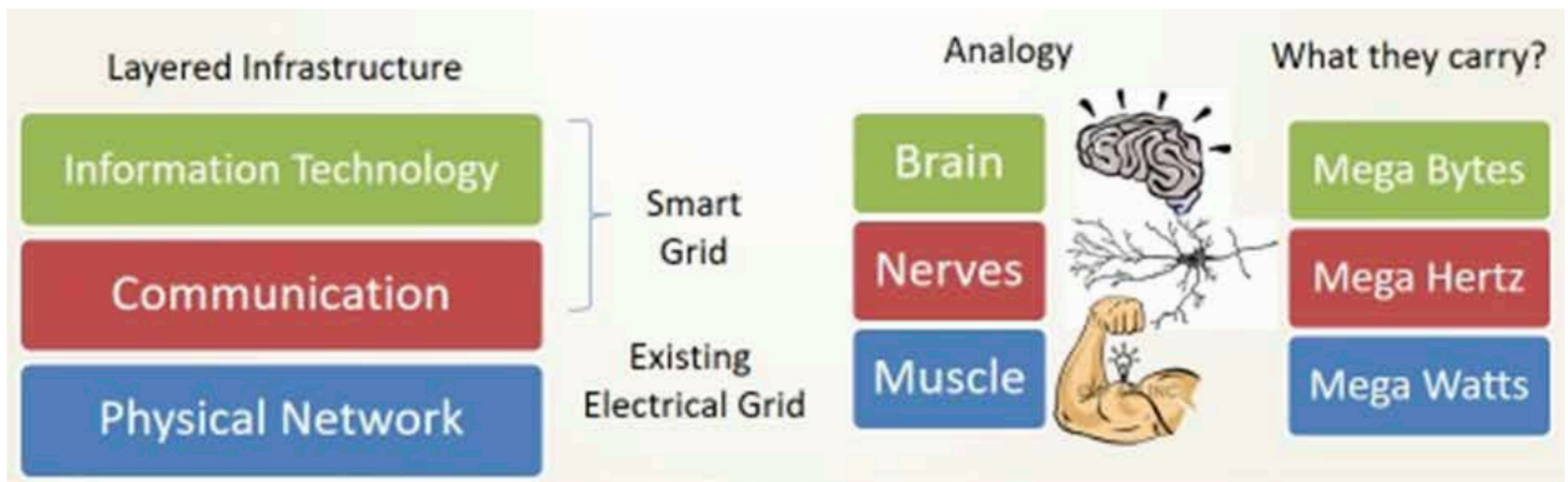
CPS Characteristics from Security Viewpoint







An Analogy



Event-driven Data Ecosystem

- **In real-time**
 - Authenticity & integrity
 - Reliability of actions
 - Incentives & Penalty enforcement
-
- ✓ Compliance
 - ✓ Audit & Regulation

Blockchain & Smart Contracts

- Immutable, reliable, distributed database
- Acts as a shared data-bus across CPS
- A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract.
- Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and irreversible.

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