



Integrated Energy and Communication Systems Architecture (IECSA) Overview and Status

Demand Response Enabling Technology
Development Project Workshop

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Joe Hughes, IECSA Project Manager



*Electricity
Innovation
Institute*

EPRI

Purpose of the Presentation

- Provide project overview
- Present project status
- Present how to engage the project
- Present a related project on developing the consumer communications portal

Background on interoperability and standardization...

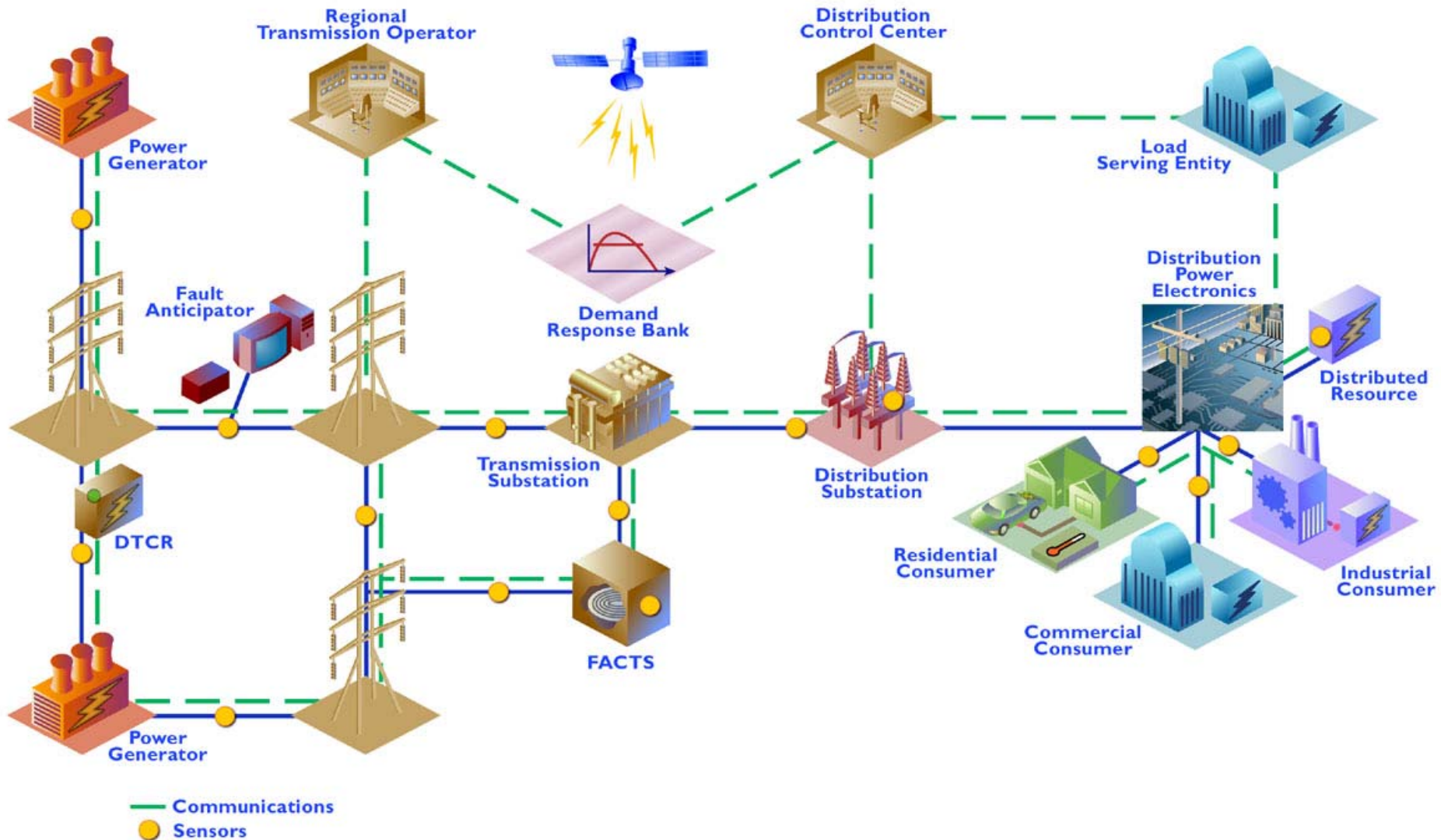


CALIFORNIA ISO

IECSA Project Origin

- One of the first projects under the Consortium for Electric Infrastructure for a Digital Society (CEIDS) Initiative
- Project is under the Electricity Innovation Institute (E2I) an EPRI Affiliate Non-Profit Company focused on Public partnership research and development
- Public and Private Funding including Government and non-utility members

CEIDS Vision of a Future:



Project Drivers

- Advanced automation and consumer communications necessary to upgrade overall energy system operation but..
- Typically: piecemeal automation..redundant infrastructures, proprietary system “lockin”, inability to scale, no security...leads to **“forklift upgrades”**
- Utility and Energy Industry needs to migrate to higher levels of integration of intelligent equipment
- Key Standards development taking place but fragmented across the industry
- Need to more solidly establish an approach to “Federated Services” across the industry...particularly for security and system management

IECSA Global Infrastructure Perspective

Standards-Developing Organizations and Consortia

International standards-developing organizations

ISO

JTC 1

IEC

CENELEC

CEN

National Organizations

Australia

ANSI(US)

British

Canada

Germany

Japan

Trade, technical, and government

API

ASHRAE

EIA

IEEE

NIST

ASC X12

Consortia and user groups

UCA Forum

IETF

ATM Forum

OMG

OSGi

BACNET Users

Residential In-Building integration issues...Standards, Standards everywhere...

1985



2000

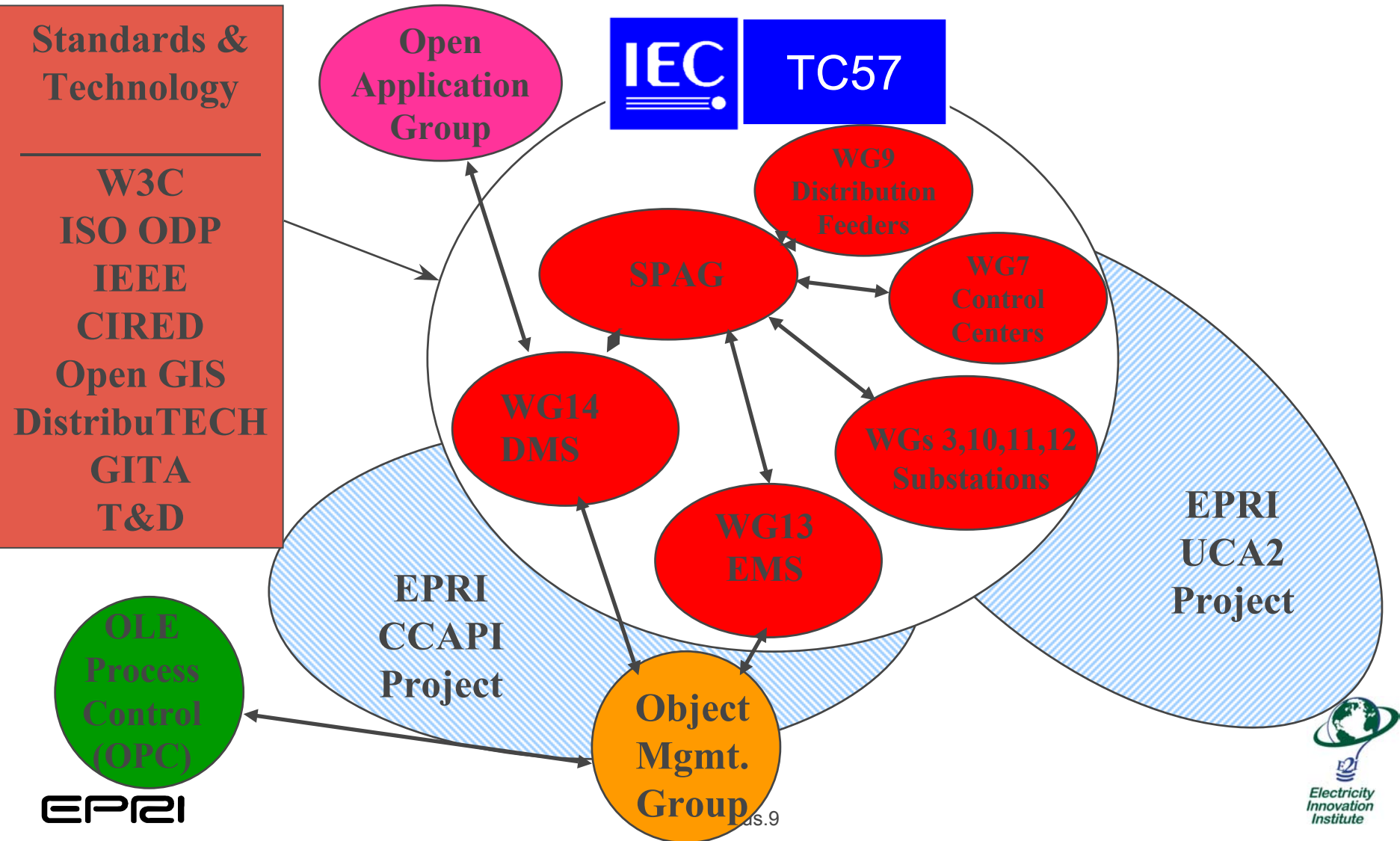
X-10™
CEBus©
LonWorks™
Smarthouse™



- X-10™
- CEBus©
- Lonworks™
- Smarthouse
- Firewire
- CAL/HPnP
- Home RF
- Bluetooth
- SWAP
- WLIF
- Home PNA
- Home API
- HES
- SNAP
- HOP
- UPnP
- ATM RBB
- Jini/Java
- HAVi
- OSGi
- IRDA
- VESA
- WLIF
- Europe...

• Other...

IEC TC 57 Integration Challenges

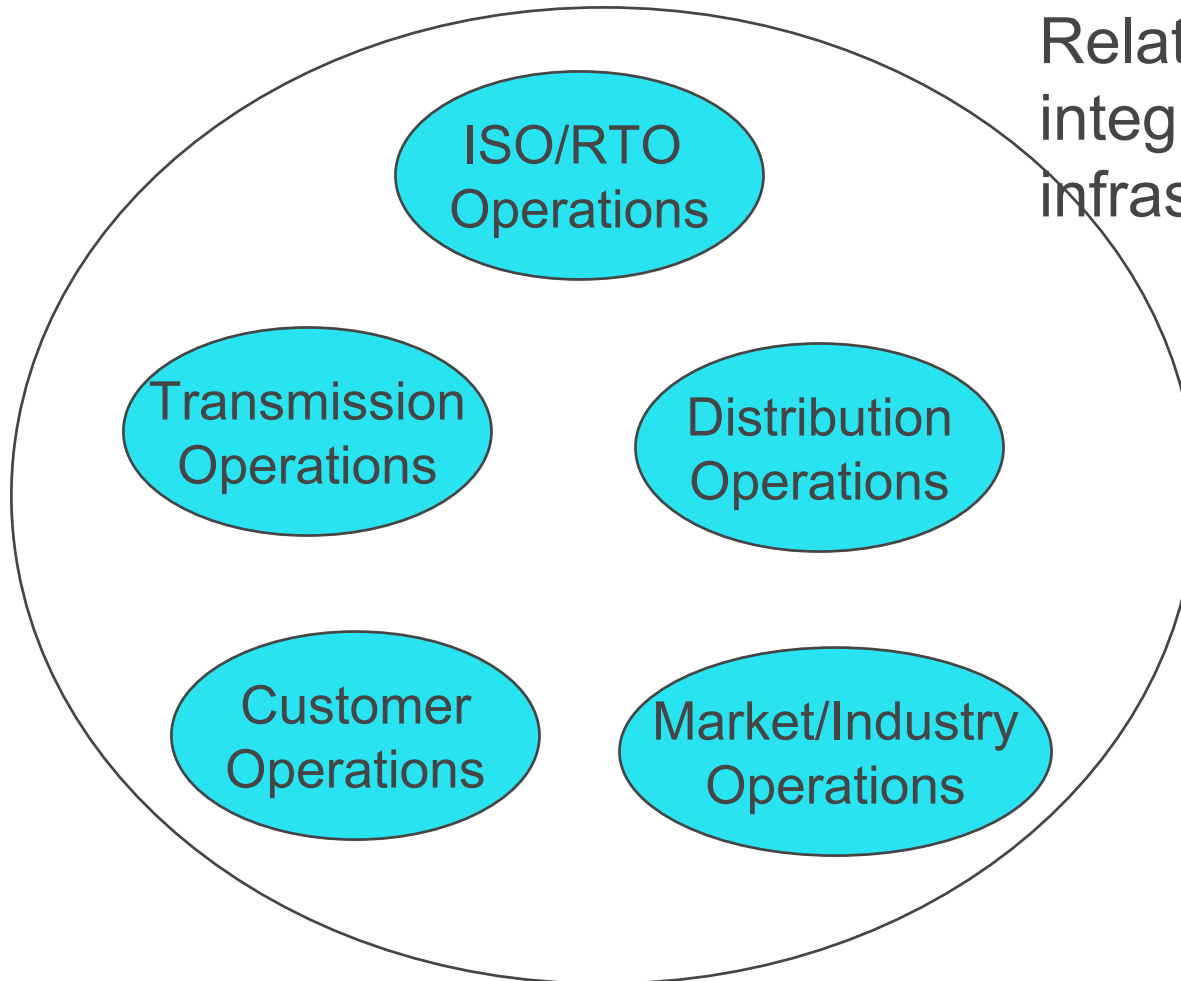


What is An Integrated Energy and Communications System Architecture (IECSA)?

IECSA is an open, standards-based set of blueprints for integrating the data communications networks and intelligent equipment necessary to support the power delivery infrastructure of the future.



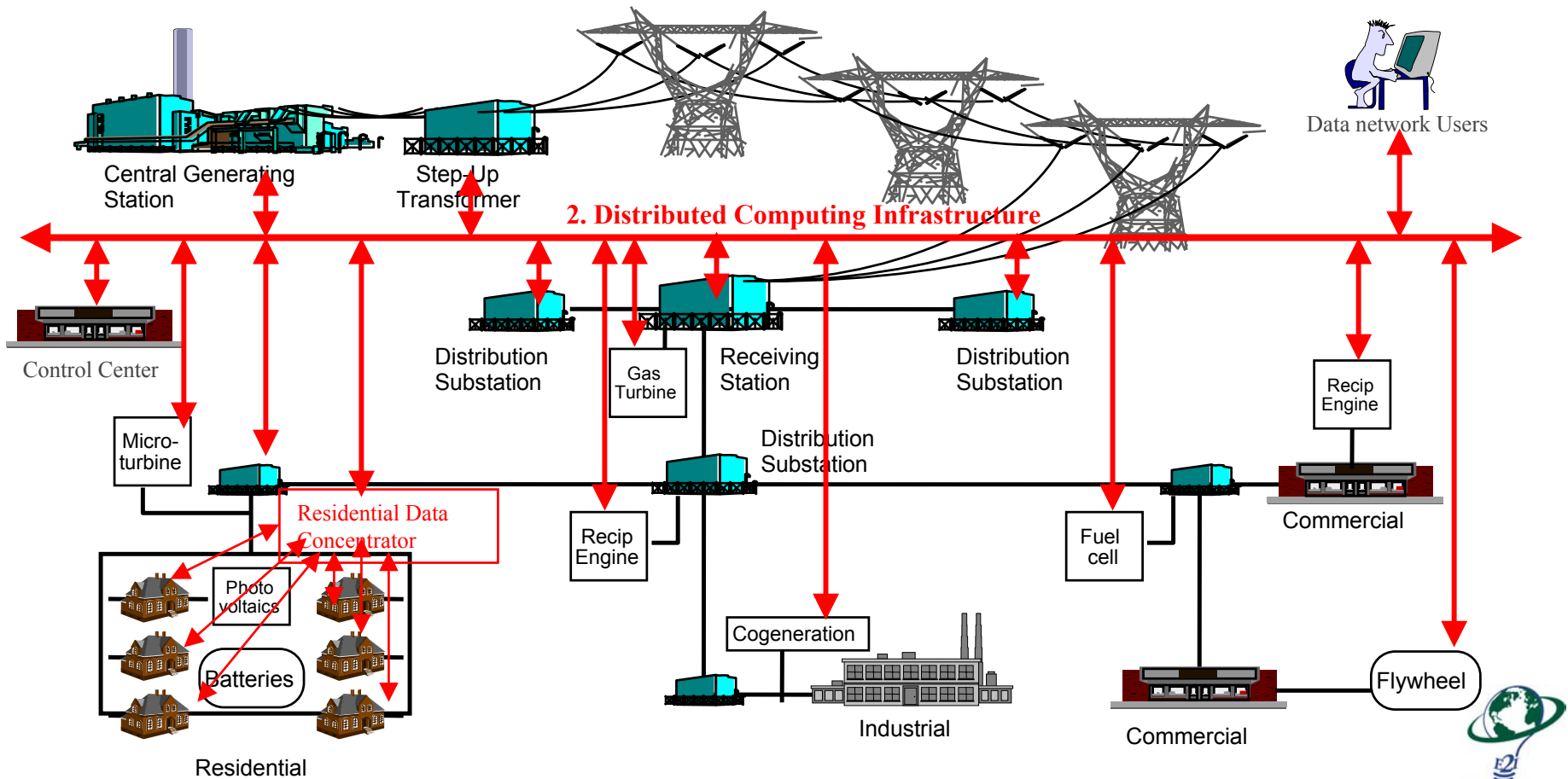
IECSA Project Scope



Relationship and integration with other infrastructures

Strong Codependence: 1) Network Communications/Distributed Computing and 2) Power/Energy Delivery infrastructures...

1. Power Infrastructure

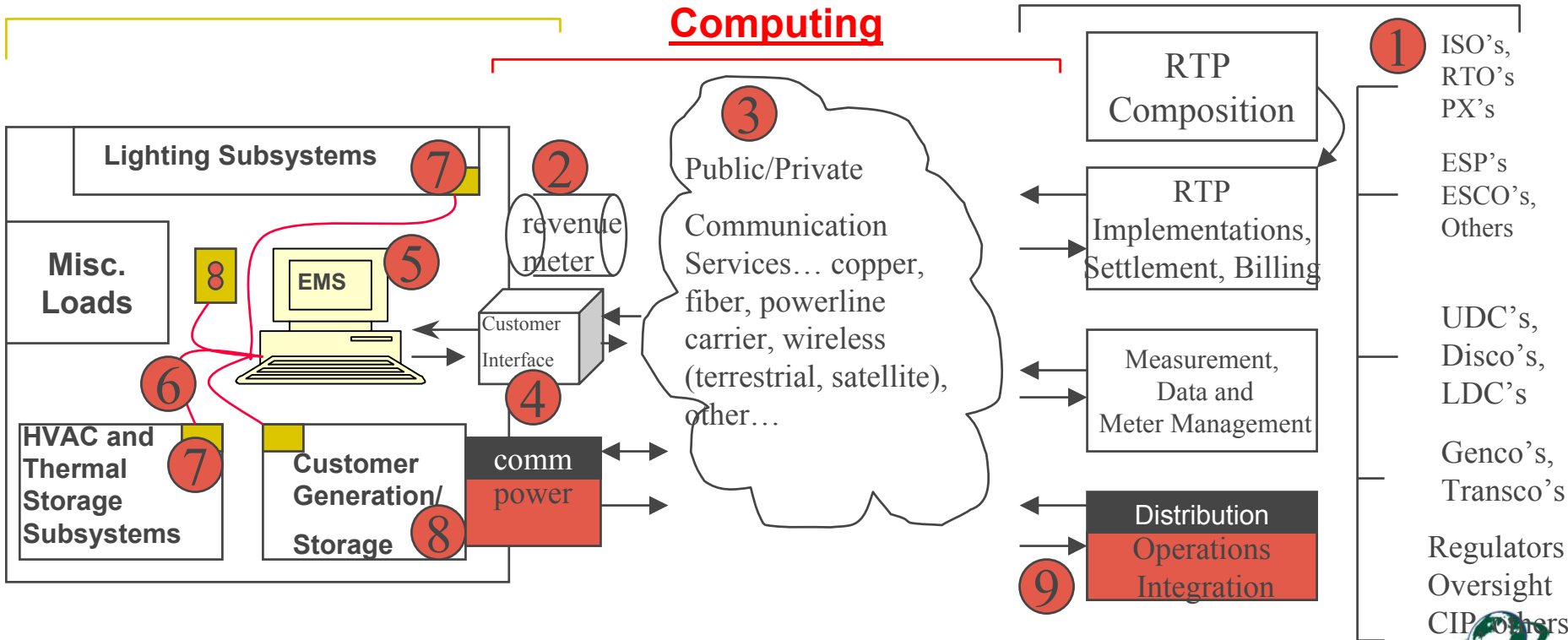


Customer Communication Architecture Scope

Customer Systems: In-building networks and networked equipment

Wide-Area Communications and Distributed Computing

Energy Industry Networked Applications



EXAMPLE: Scope Detail

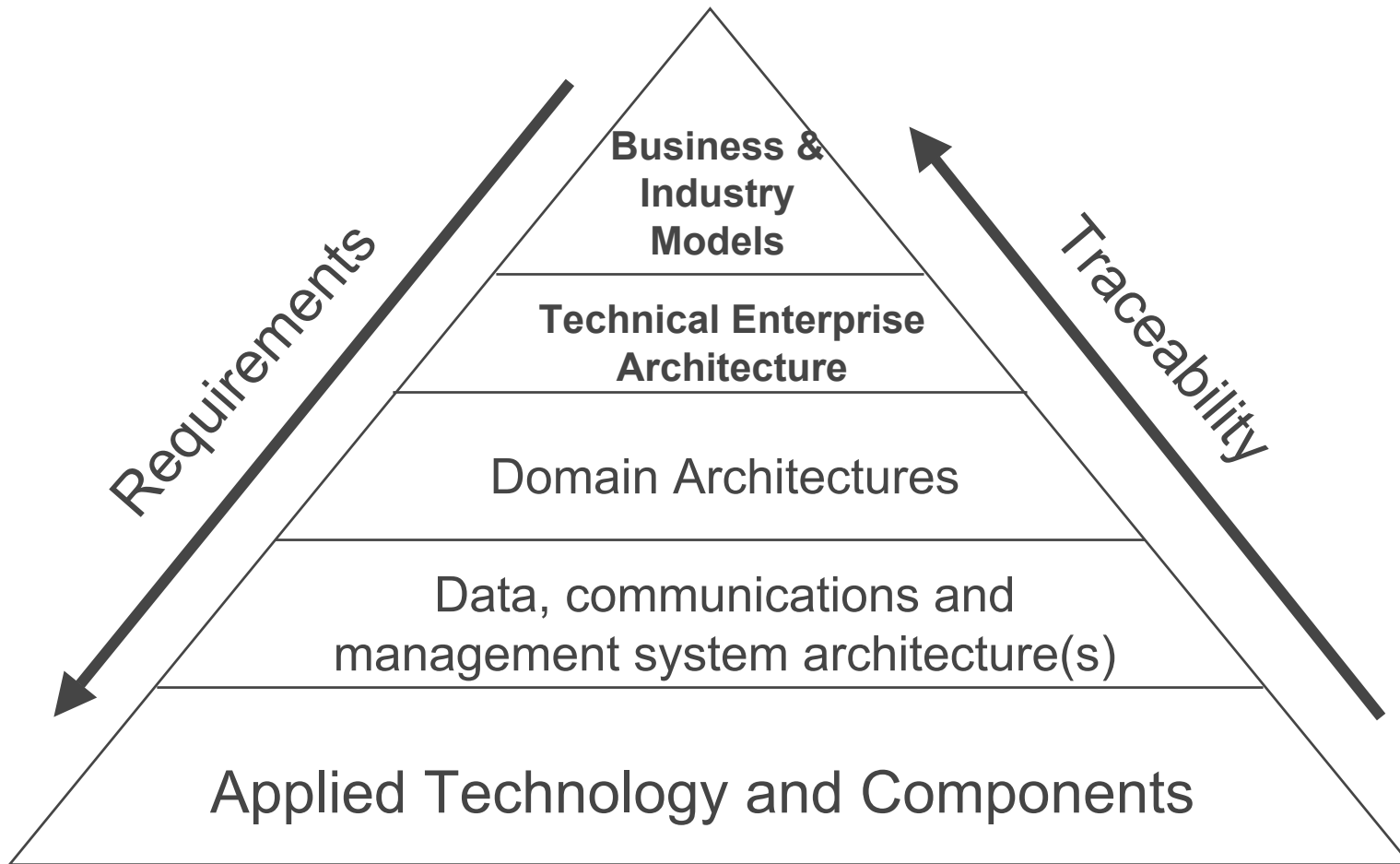
Application Domain: Consumer Services

1. Automatic meter reading (AMR)
2. Customer management
3. Customer trouble call management
4. Real-time pricing (RTP)
5. Load management
6. Building/home energy management services
7. Weather
8. Power Quality Monitoring
9. Power Quality Mitigation
10. Electric vehicle / home co-generation integration
11. Energy efficiency monitoring
12. Equipment Diagnostics
13. Indoor air quality monitoring
14. Ancillary Services Support
15. Third party service support
16. Transmission and distribution operations Support
17. Support Advanced Energy Services

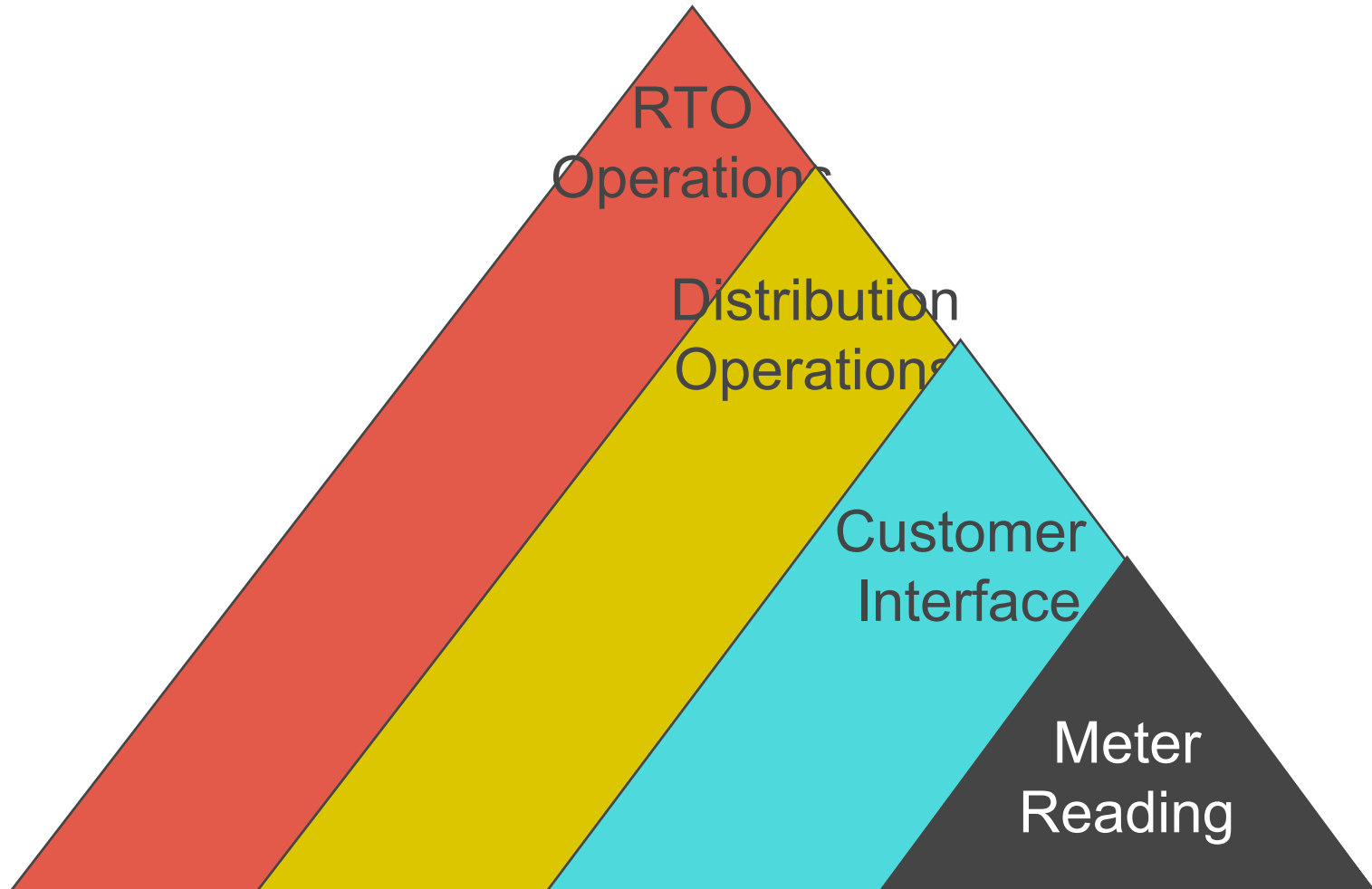
Why do an architecture?

- Body of knowledge...Necessary to **manage complexity**
- More completely and accurately **link business models, drivers and stakeholders** with supporting technical development processes
- Provides approaches to **capture vision** and “views from a height”
- Enables understanding of synergies/problems that lower level views miss
- A primary approach for **establishing and implementing security policies** across the enterprise/industry
- Currently there is **no complete open architecture** for metering, consumer portals and connecting consumers to markets

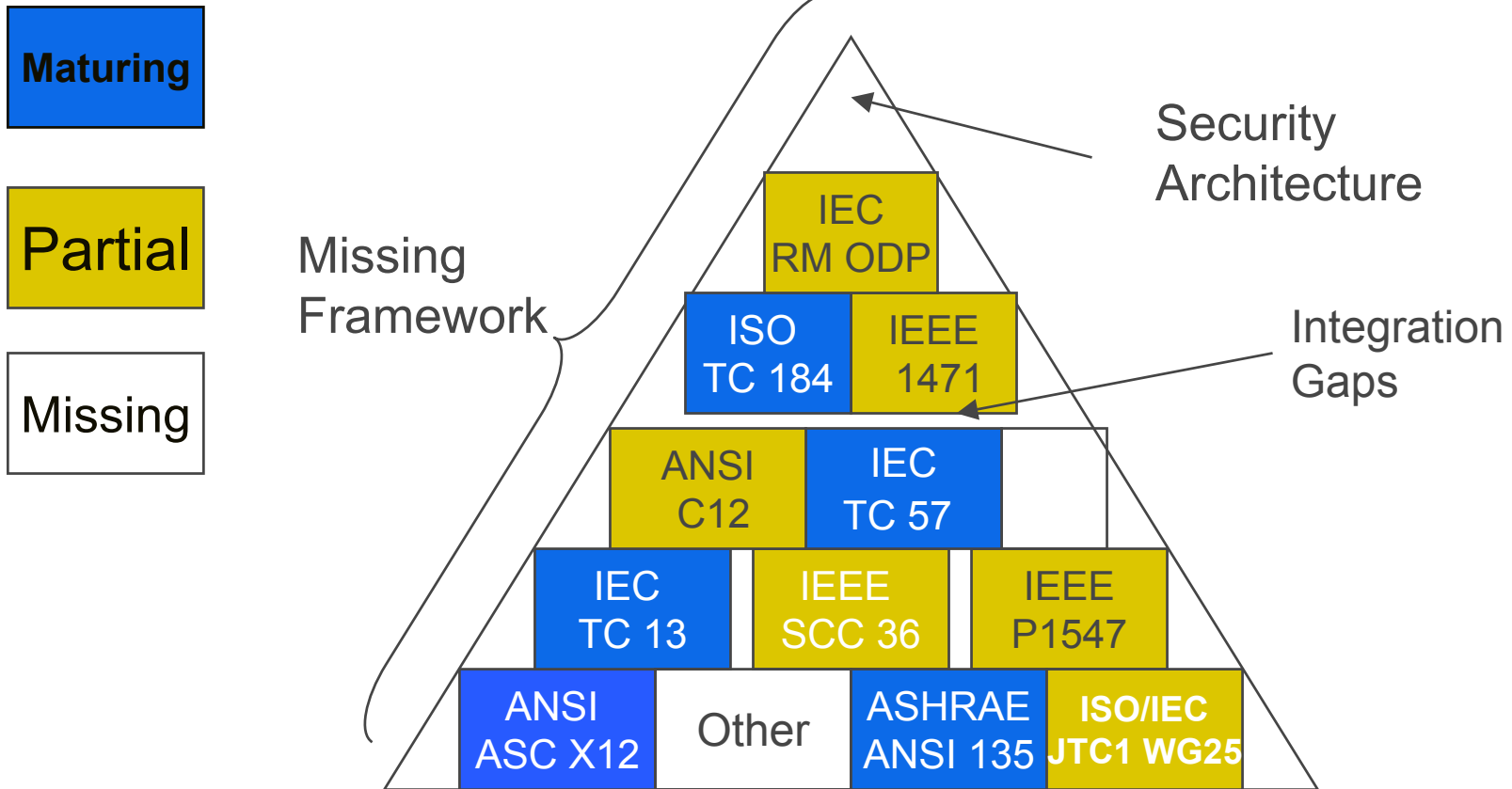
IECSA has an Architecture Development Focus



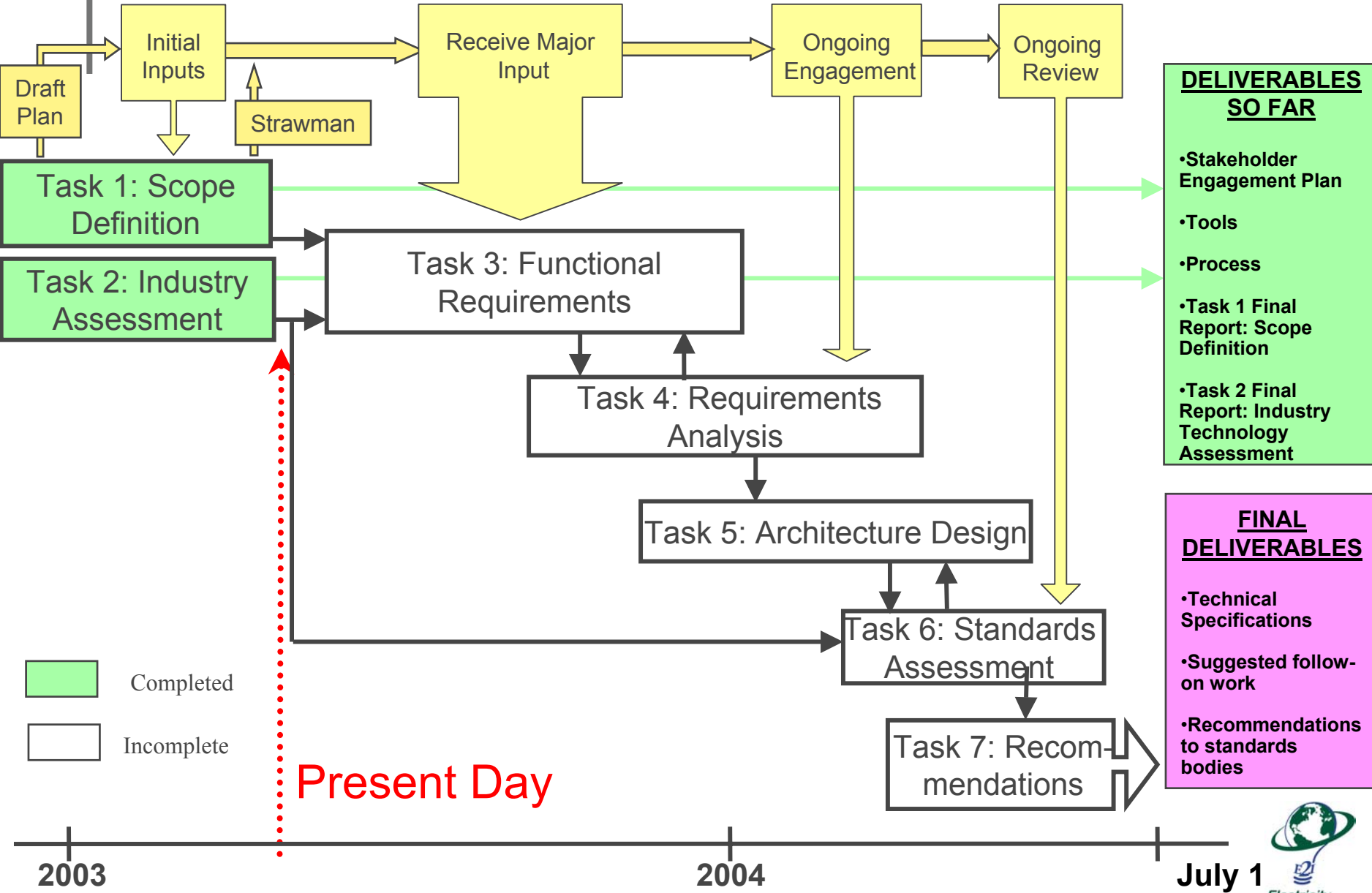
Architectures Treat Components and Subsystems as Parts of Larger Systems



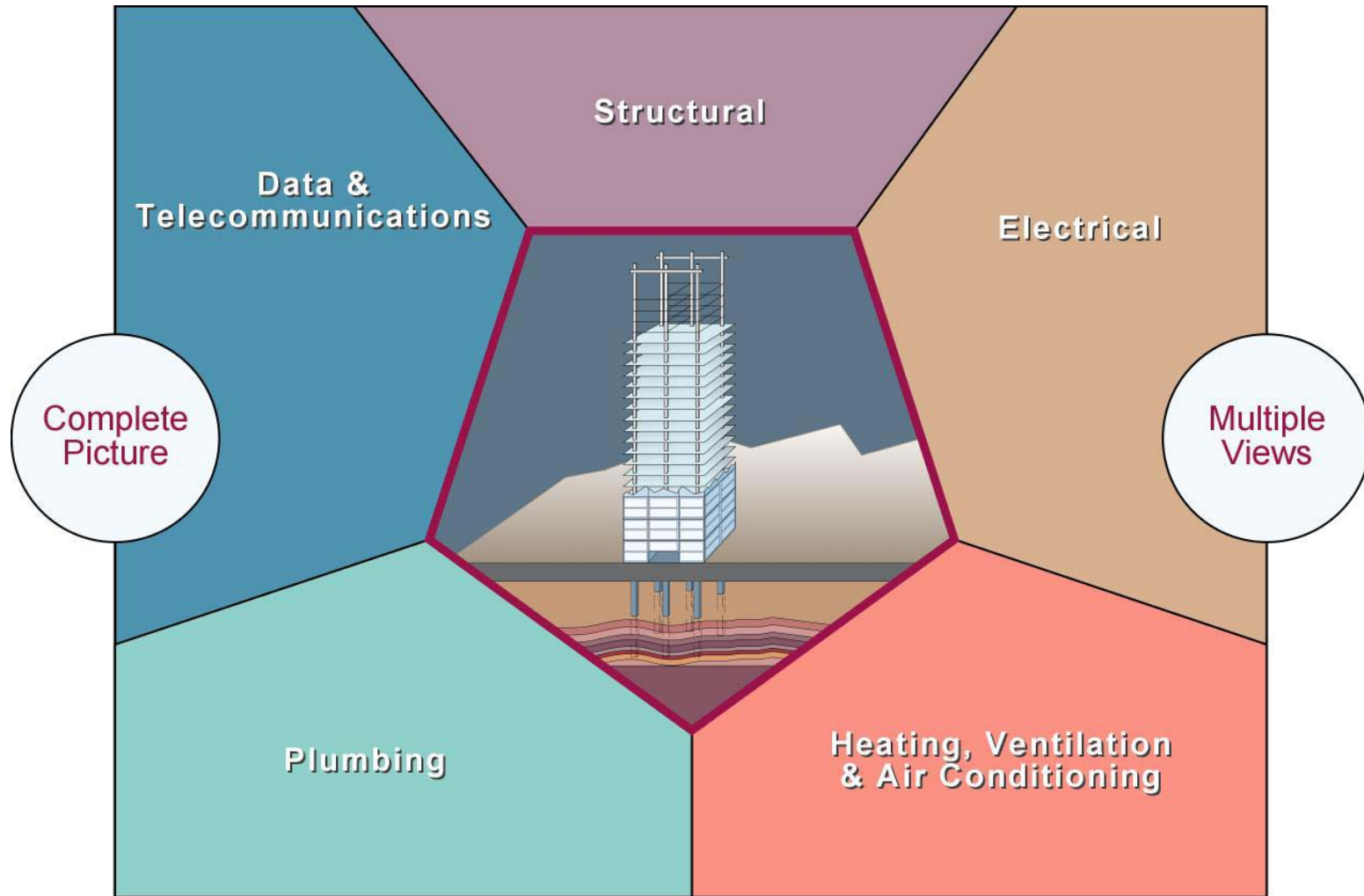
Integrated Energy and Communications Systems Architecture: Initial Standards Framework



IECSA: Systems Engineering Approach



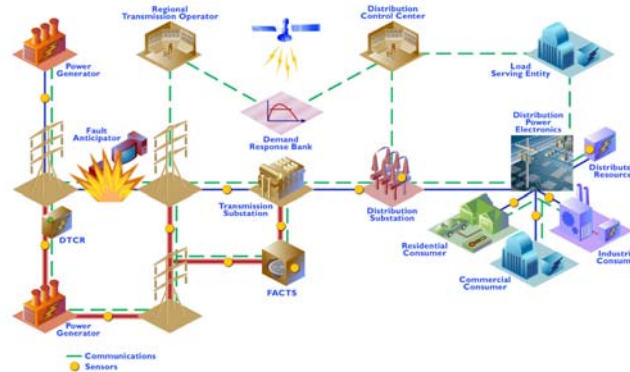
What Information Should the Blueprints for a Complete Building Architecture Contain?



Project Documentation Approach

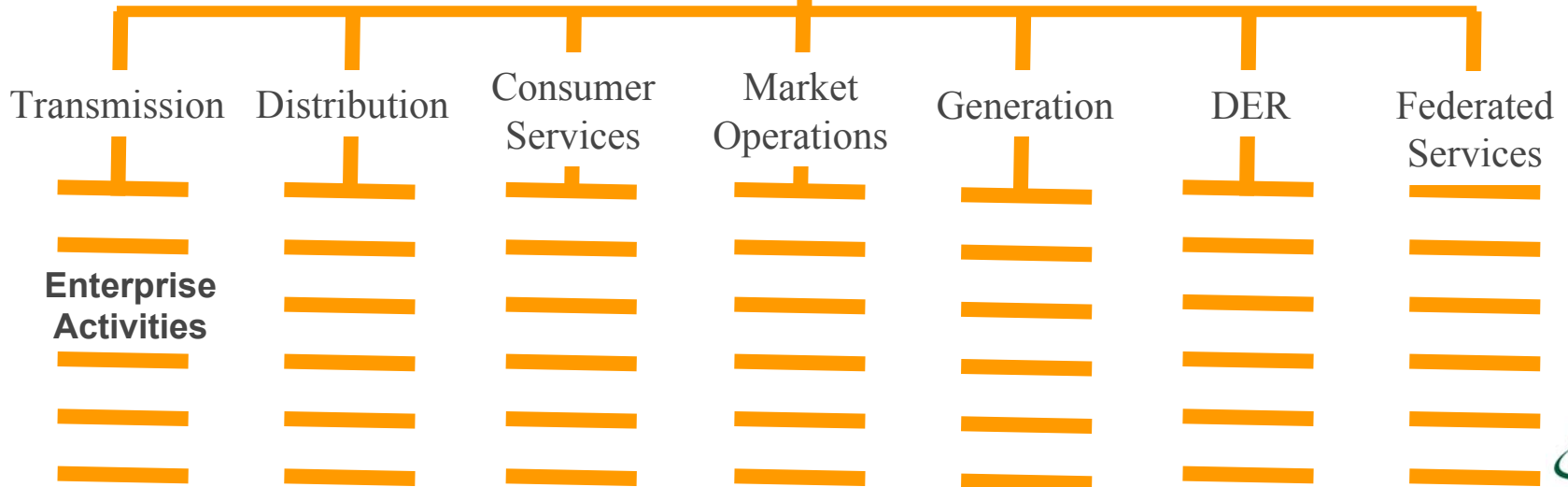
- Defined Industry Nomenclature: Standards Based to the Extent Possible
- Systems Engineering based
- ISO 10746 Reference Model for Open Distributed Processing
- Unified Modeling Language (UML) complements “Natural” Language Documents

Application Domains and Enterprise Activities



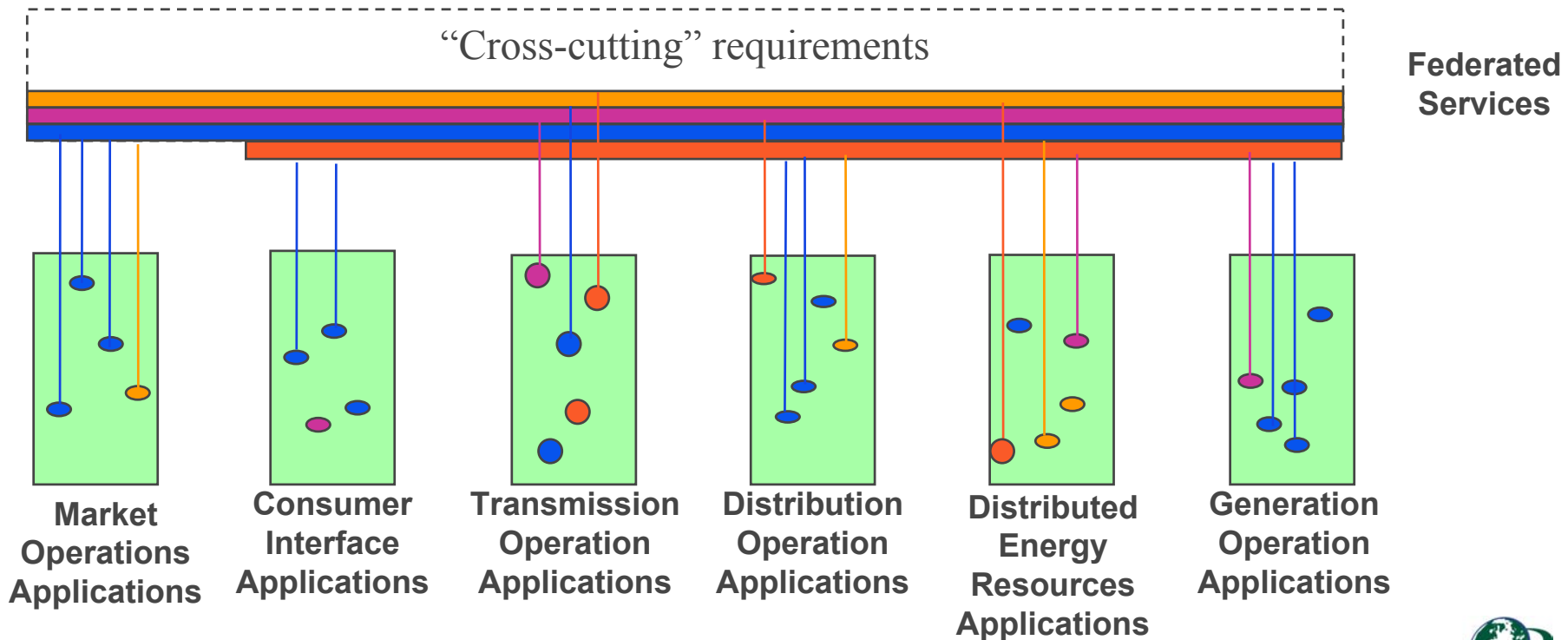
CEIDS Vision of the Future

Application Domains



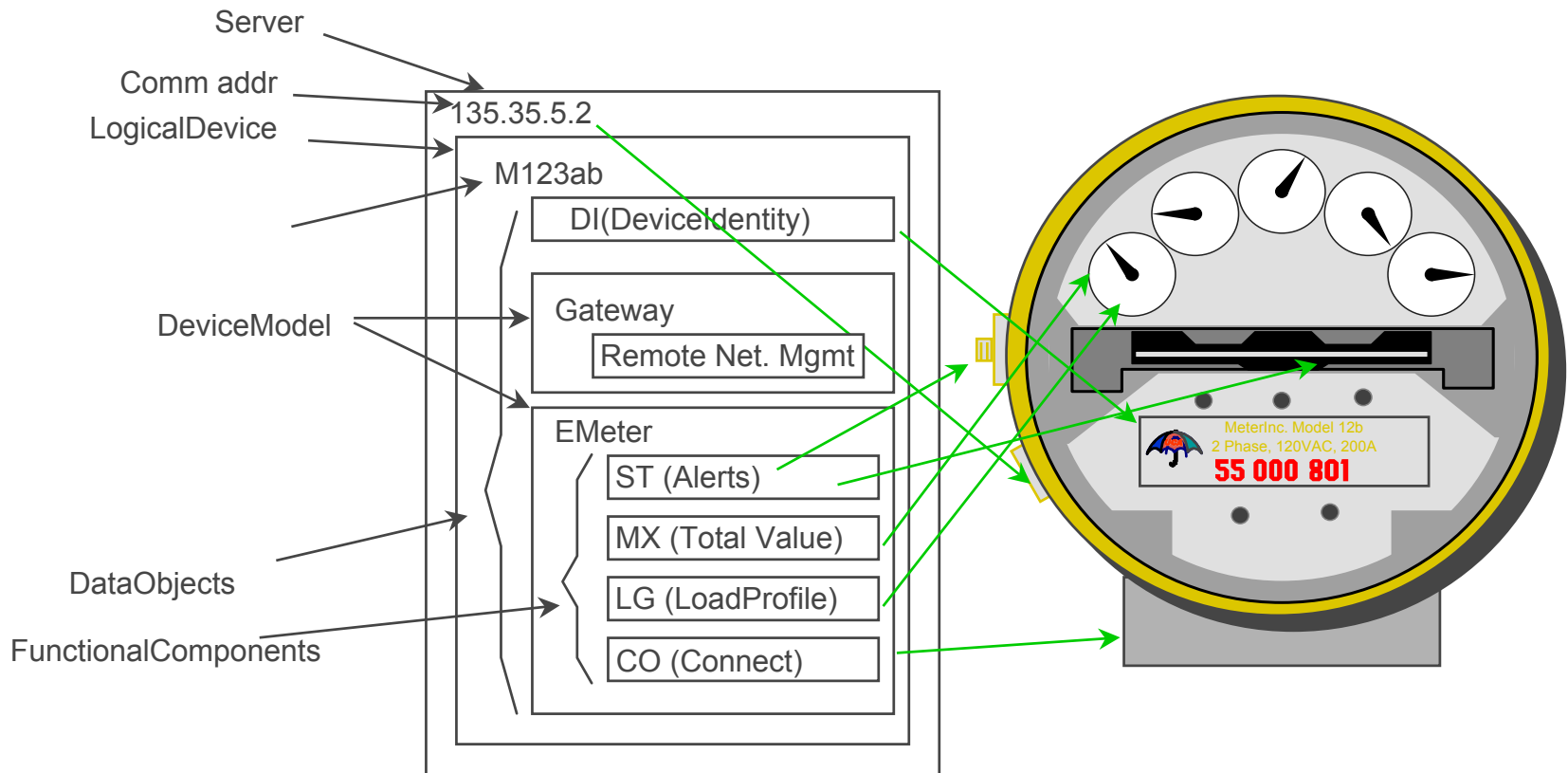
IECSA Focus on Enterprise and Industry-Wide Data Communications and Distributed Computing Architecture

Enterprise Security Policy
Common Data models
Network and Systems Management
Fast simulation and modeling

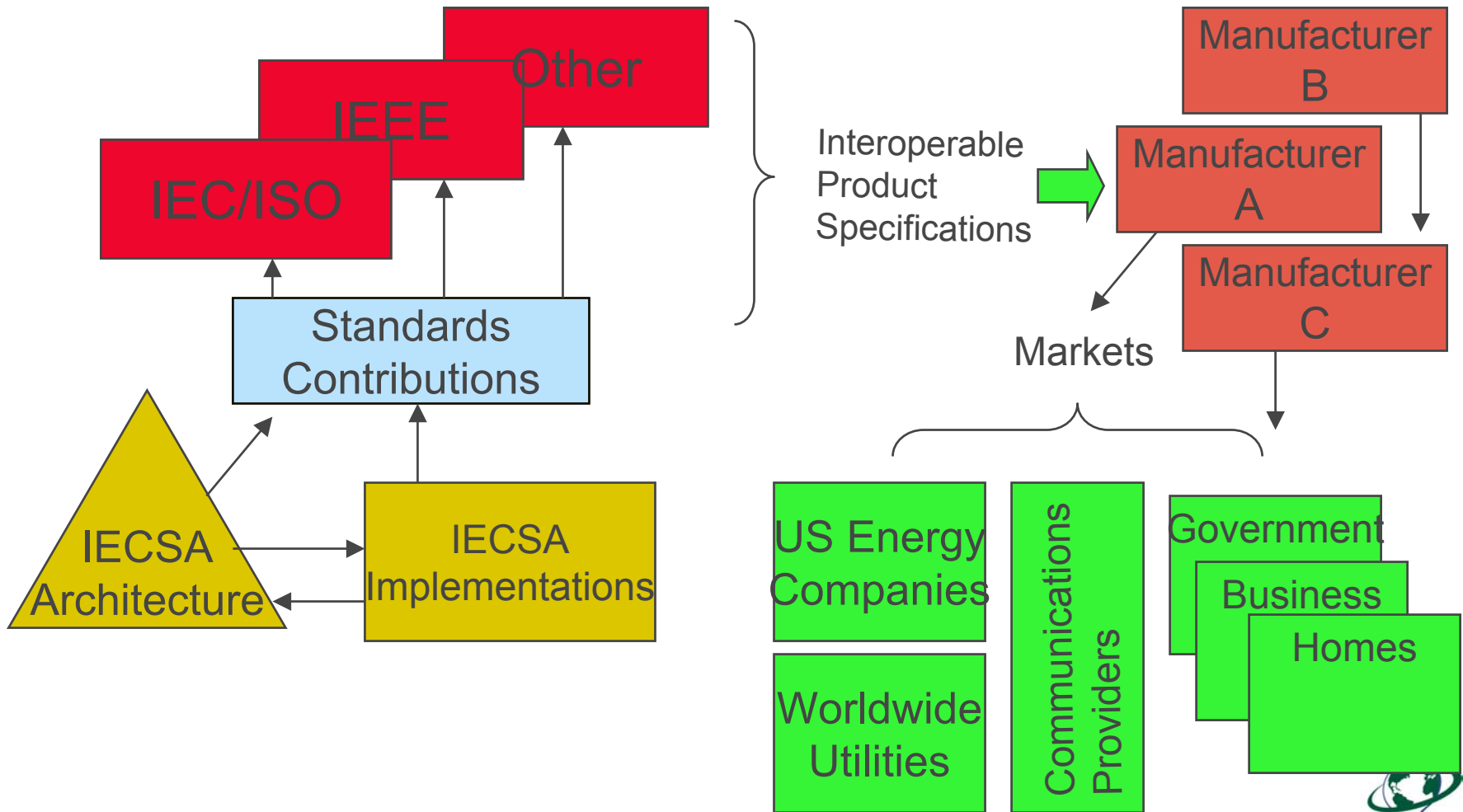


Project Outcomes: Contributions to Develop an Open Common Language for intelligent equipment

Common Applications Language Approach: IEC TC 57

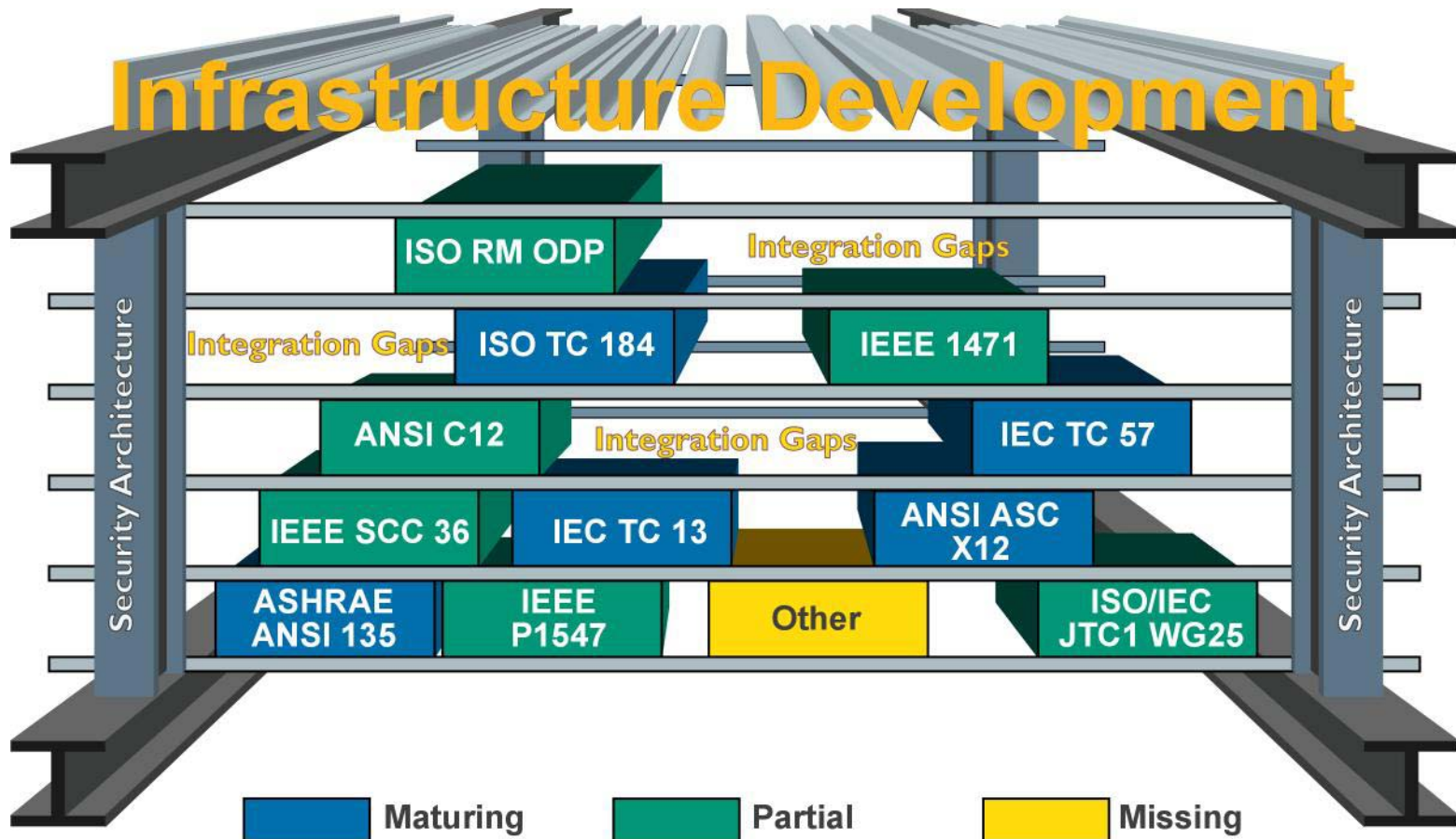


Pathway to Commercial Implementation



Task 2: Industry Assessment of Current Infrastructure Development (Sample)

Infrastructure Development



Stakeholder Engagement Plan

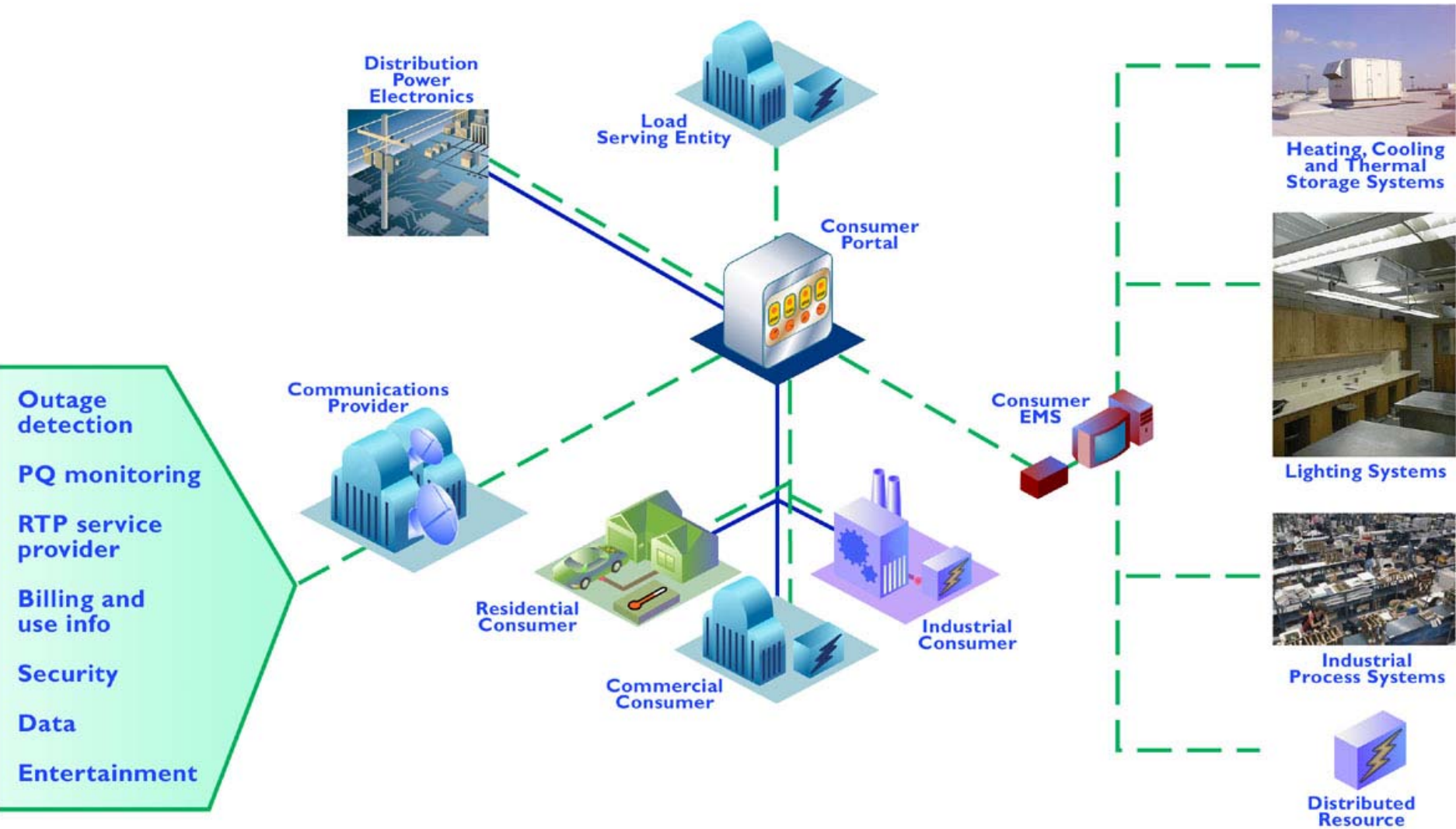
Identification of stakeholders:

- Types
- Levels
- Individuals

Strategies to appropriately engage them..

- One-on-one
- Workshops
- Web-conferences
- Existing conference & meetings
- Web site
- Literature source
- Other ?

Consumer Portal Project Overview



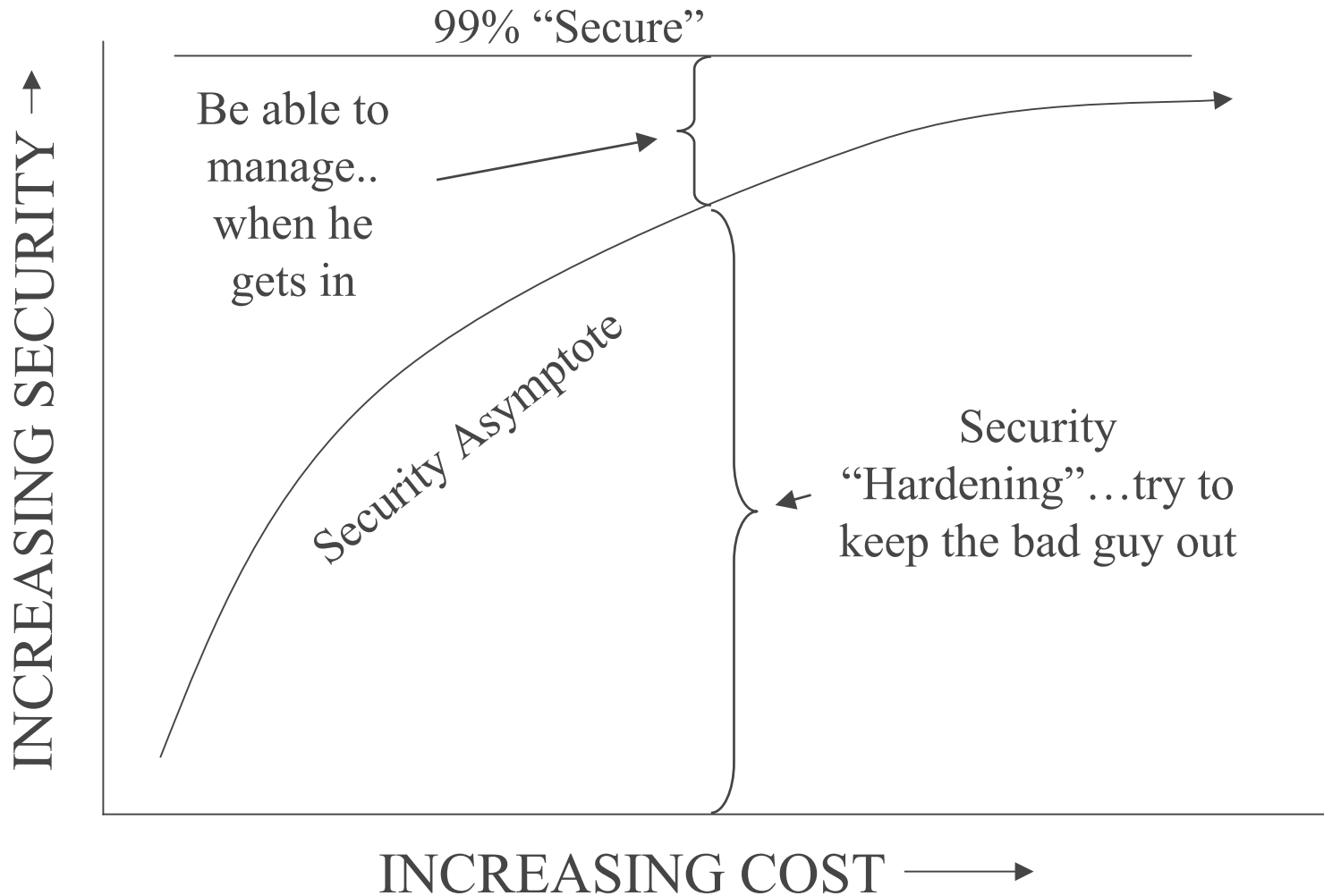
Consumer Portal Project Tasks

- Energy Industry System Requirements
 - Applications
 - Electric, Gas, Water, Efficiency Services and Other
 - Consumer Services Functions
 - Power Delivery Services Functions
 - System Management
 - Network Management
 - Remote Equipment Management
 - Distributed Applications Management
 - Security Management
- Assessment of Industry Infrastructure Development
- Valuing and Market Assessment

Security Architecture Development and Implementation.. Simplified

- 1. Establish security policies: understand what needs protecting and why
- 2. Understand the applications well enough to characterize threats and vulnerabilities
- 3. Place values on what you are protecting and assess risks
- 4. Design and Develop appropriately “balanced” approaches to protection
- 5. Implement the security infrastructure *with* (not after) the applications infrastructure
- 6. Manage and maintain the installed system

The Security Asymptote: There will always be residual risk...plan for it...



Energy Industry Security Policy Sources

- Federal
 - Homeland Security, CIO Council, GSA, FBI, NIST, NSA, FCC, Whitehouse, Legislation, DOD, Other...
- Regulators
 - FERC, NARUC, FCC, State PUC's, Other
- Trade and Standards Development Organizations
 - ANSI, IEC, IEEE, ISA, AGA,
- Consortia
 - NERC, NASBY, NEMA, IETF/W3C, TIA