RTO Software Standards

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Overview

- Why do we need standardization?
- What do we need to standardize?
- Evolution of Market Design and Software Design
- RTO Software Architecture
- CIM and “Application Bus”
- Security
- Modularity - Component Based System Design
- Testing and Validation
- Conclusion

Why do we need standardization?

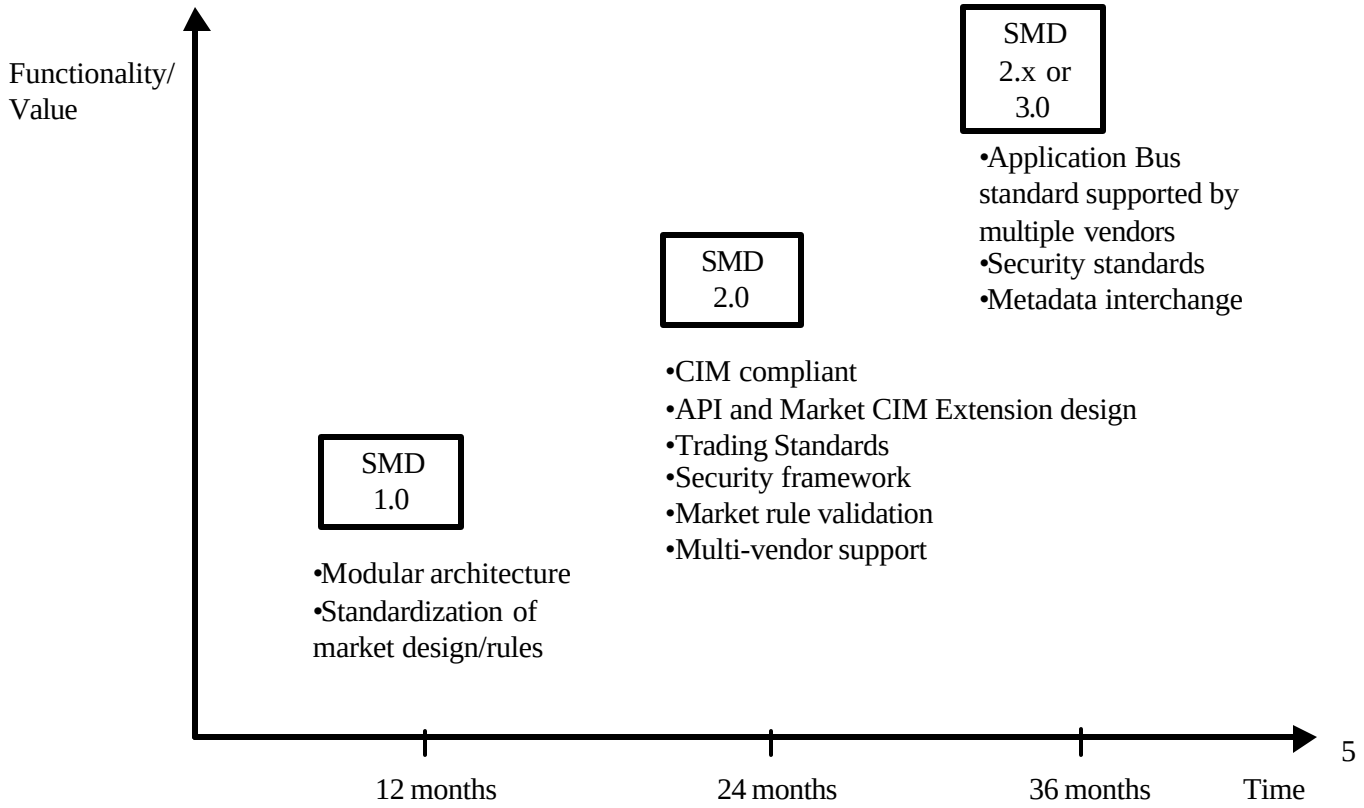
- Will drive costs (and risks) down.
- Will ensure multi-vendor interoperability.
- Essential to making the Standard Market Design (SMD) concept work on a broad scale.
- Will help the industry to mature and stabilize.

Standardization Principles

- Need to ensure compatibility and communication between software components/applications from different vendors.
- Need to be able to validate that software complies with market design/rules.
- Must allow for continued innovation and vendor differentiation, therefore:
  - Do not standardize technologies used.
  - Do not standardize algorithms used.

  However:
  - Must ensure that the “black boxes” talk.

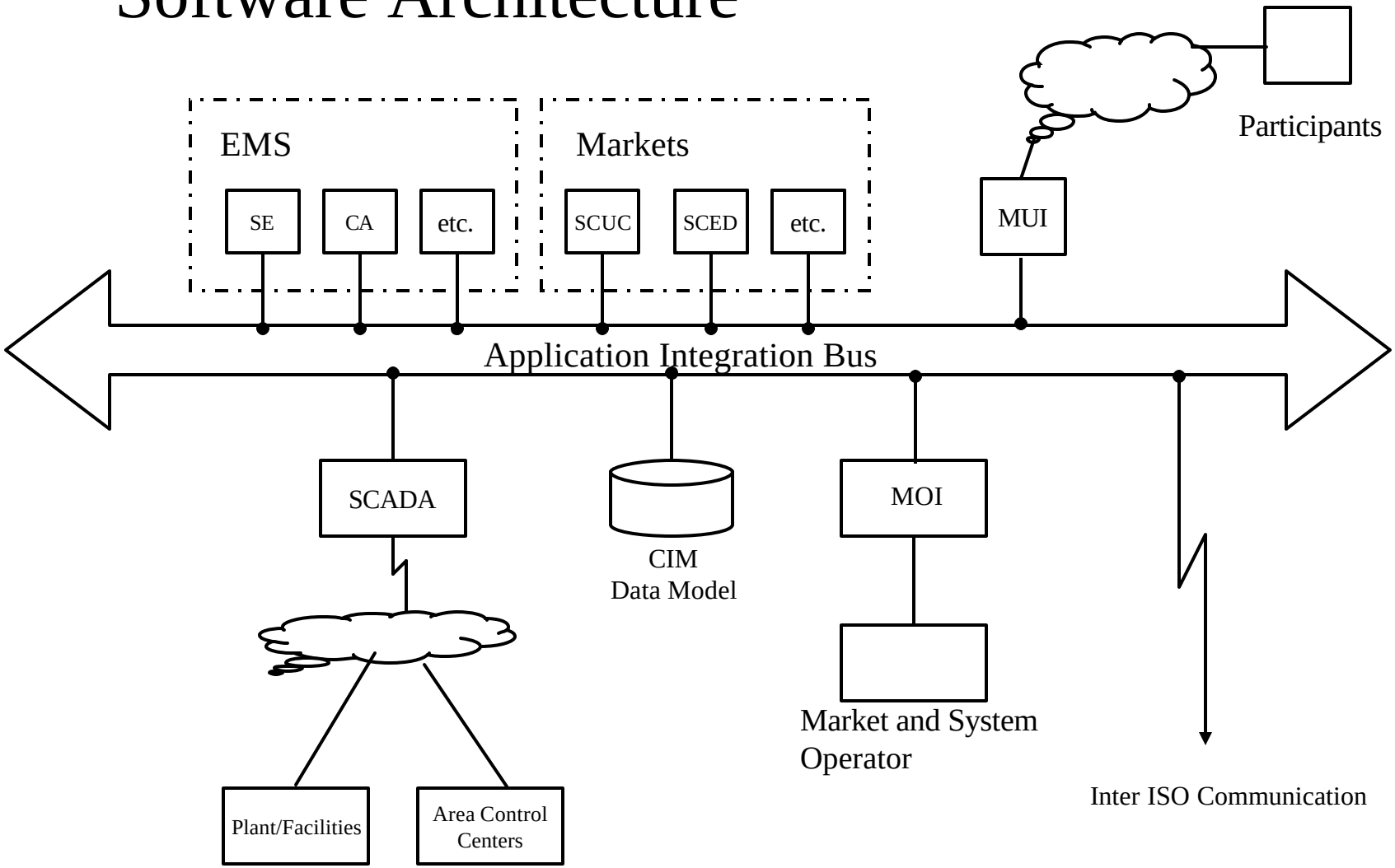
Possible Evolution of SMD and Industry Software Standards



What do we need to standardize? -- Making the "black boxes" talk.

- Market design and rules -- direct influence on software architecture and implementation.
- High level architecture -- to ensure modular approach to implementation. (*Guiding principle: standardized market design/rules, application framework and building blocks, and principles of inter-operation. Allow for regional differences in the details as long as they do not inhibit the flow of transactions between RTOs.)*
- Data model/data management – CIM – extend CIM to Markets and trading.
- "Application Bus" -- standard protocol for communication between applications.
- Security framework.
- Participant Interaction – data input, publishing, and reporting.

Software Architecture



CIM

- CIM – industry accepted standard for Control Center EMS data exchange.
- Has been developed and tested among major EMS vendors as a part of EPRI-led CCAPI project.
- Allows for Network Model exchange.
- Supports advanced network applications, energy scheduling and energy accounting functions.
- Enables multi-vendor integration.
- Requires design and implementation of Market extension to be able to handle market-clearing applications and trading.

“Application Bus”

- Enterprise Application Integration (EAI) technology based on the central metadata repository.
- Significantly increases effectiveness of application integration within an enterprise reducing time and cost of building data bridges.
- Industry accepted technology.
- Implemented by several major Power Industry vendors.
- Is part of CCAPI standardization effort.
- Has to be extended to handle Market side applications.

Security

- Establish common security framework:
  - Digital certificates.
  - Authentication servers.
  - Authorization servers.
  - Profile based security.
- External and internal data encryption.
- High availability – failover capability and backup centers.

Modularity – Component Based System Design

- Enables easy repartitioning between hierarchical levels
- Hierarchical – ability to distribute functions across hierarchical levels
- Distributed – ability to run on multiple nodes of the network, including wide area networks
- Scalable – no degradation in performance with the growth of the problem size
- Multi-tier – split presentation, business logic and data
- Rule based design and construction

Testing and Validation

- Central standards authority for validating that software is:
  - CIM compliant
  - Application Integration Bus compliant

  EPRI is a good choice.
- Each RTO has to conduct regular internal and external auditing to ensure that output of software complies with market rules (could be performed by a standards authority if there is one national standard for market design/rules)
- Each RTO has to meet software security standards

Conclusion

- Don’t be too ambitious on scope -- but have a clear vision.
- A neutral body should be the “keeper of the standards”. (Should not be a vendor or an ISO/RTO.)
- Standardize the data model, data interchange first.
- Security standards are a requirement.
- Standardization is a slow process -- we need to get started now. Industry funding will be required.