Architectural Elements Categorization

Smart Grid Architecture Committee (SGAC)
Architecture Development Team

Release 0.9

Smart Electric Power Alliance

Proceed With Caution

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- The following material is offered as **guidance** for practitioners involved in Enterprise Architecture.
- This is not a tutorial and the assumption is made that the reader has at least a basic understanding of enterprise architecture frameworks and semantic information concepts.
- Background information on enterprise architecture and semantic frameworks, including TOGAF, Zachman, SOA, and OWL, is widely available and as near as a Google query.

Agenda

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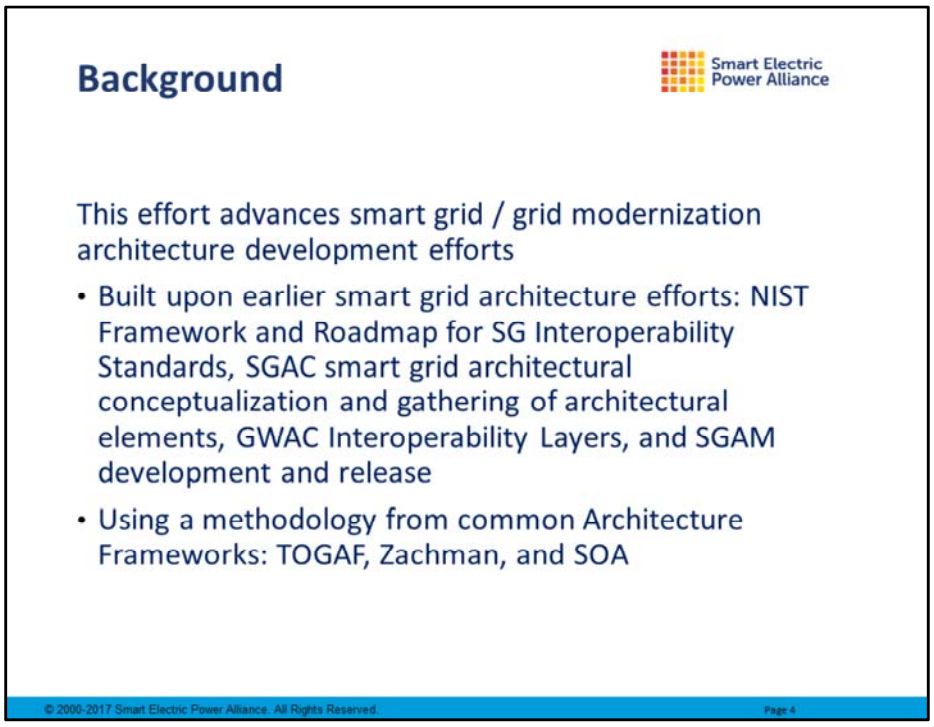
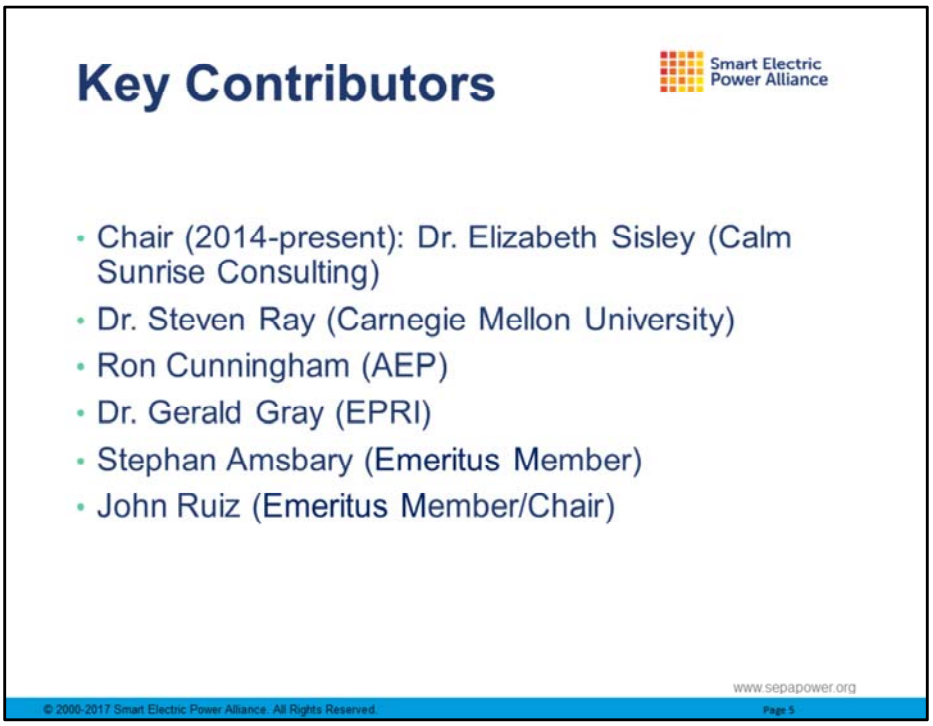
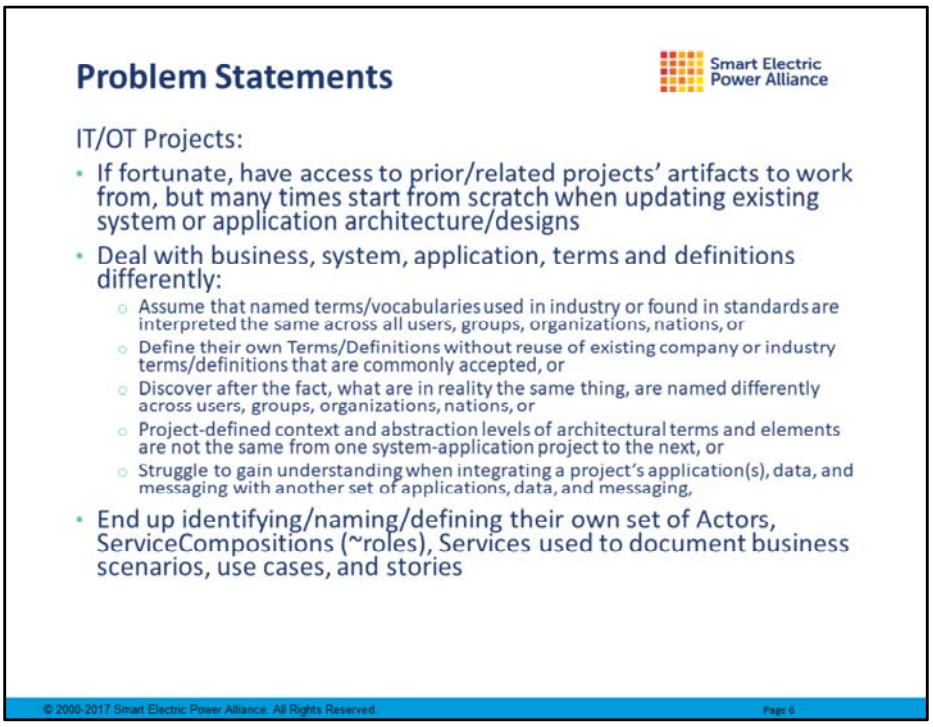
- Background
- Key Contributors
- Problem Statements
- Objective/Goal
- Contributions
- Data Reduction/Normalization Process
- Architectural Element Categorization Guidance
- Neutral Concepts Model Approach
- Potential Future Phase



NIST- National Institute of Standards and Technology
SGIP- Smart Grid Interoperability Panel
GWAC - Gridwise Architecture Council
SGAM – Smart Grid Architecture Model (European Union)
SOA- Service Oriented Architecture
TOGAF- The Open Group Architecture Framework



AEP – American Electric Power
EPRI- Electric Power Research Institute



IT - Information Technology
OT – Operations Technology

Objectives/Goals

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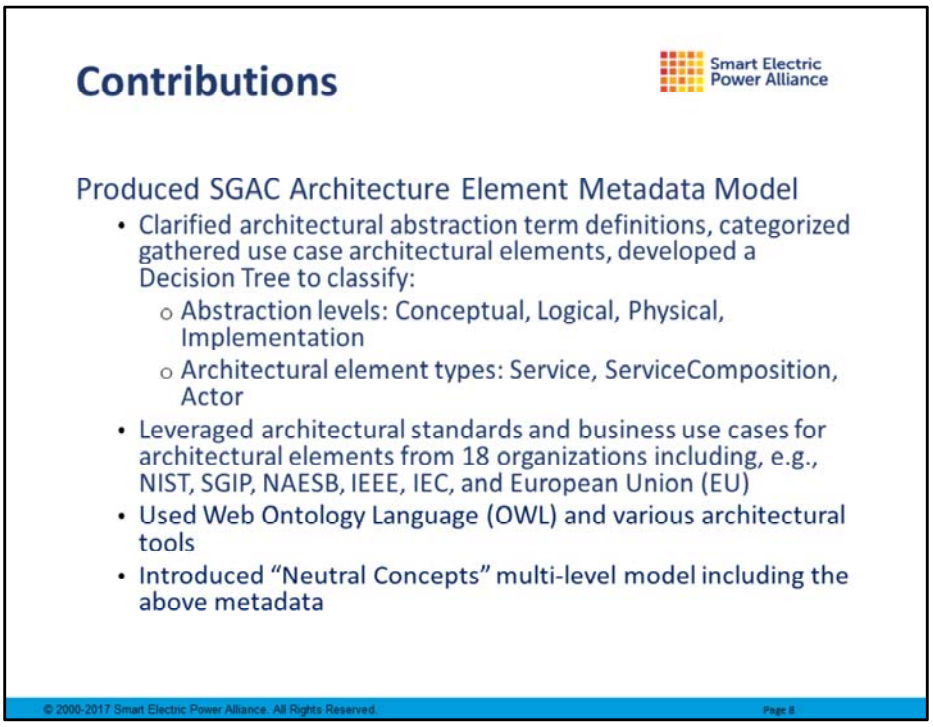
- Provide Guidance/Examples on how to align from one project's set of architectural/business elements to another. Alternately encourage reuse of a reduced number of sets of architectural/business terms via understanding how a setA-element relates to a setB-element
- Build up a common set of architectural/business elements and the relationships between them, that can be used, interpreted, understood, and modeled the same way across projects and organizations
- Reduce the time/effort of each project's re-identifying/re-naming/re-defining Actors, ServiceCompositions (~roles), Services, relationships, and associated missteps from one integration to the next
- Help create a common vocabulary of terms and elements that is expected to make it easier to create new business use cases/stories that in turn are used to help identify the business requirements and services/capabilities that are used in project business scenarios and use case development, and advancing interoperability standards work



NAESB- North American Energy Standards Board
IEEE- Institute of Electrical and Electronics Engineers
IEC- International Electrotechnical Commission

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DATA REDUCTION/NORMALIZATION PROCESS

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Data Summary

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SGAC gathered a set of Use Case elements from 18 organizations and performed initial categorization of elements to Conceptual, Logical, Physical architecture abstraction levels. Combined set was also categorized as:

- **~ 180 Actors**
- **~ 230 ServiceCompositions (~role)**
- **~ 800 Services**

Submitting Organizations

- NIST (AMI Systems, Electric Transportation, Distribution Grid Mgmt, WASA, Demand Response, Electric Storage, Conceptual Model, and Reference Diagram)
- NAESB
- CSWG NISTIR 7628
- IEEE P2030 Draft 3
- EIS
- EU Commission
- EU WGSP Vers 0.5
- SGAC Conceptual Arch
- IEC TC57-WG19 & TC8 (SyC) WG6 DER Actor/Roles
- EU SC-CG WP1
- ENTSO-E role model
- AhG Charging
- IEC61968 IRM
- IEC SG3
- GUC
- DKE Repository
- SMCG
- EG3

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Data Reduction & Normalization Process

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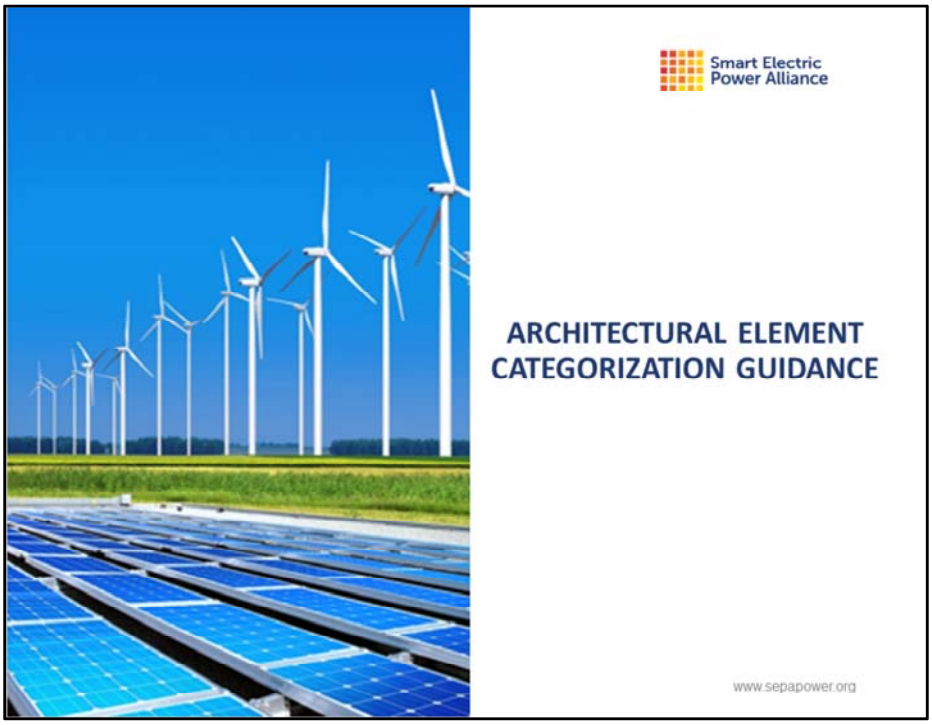
For each named Element, in TopBraid Composer's (TBC) OWL model:

- Where there were multiple submissions, definitions were reviewed to normalize entries
  - When definitions were either identical or very similar, or one had a missing definition – source data was consolidated, and all references kept for traceability
  - A few elements remain ambiguous, and will need to be reviewed by the submitting organizations for determination
    - These are flagged via a SeeAlso relation in TBC: listing one or more likely related elements
    - A few have no similar entries but are missing definitions, these remain uncategorized
- Elements that are redundant or out of scope (such as 'ActorA' and 'ActorB') were marked as deprecated, but kept within the model

Elements were then categorized as described in the following slides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Architectural Abstraction Level and Element Categorization Guidance

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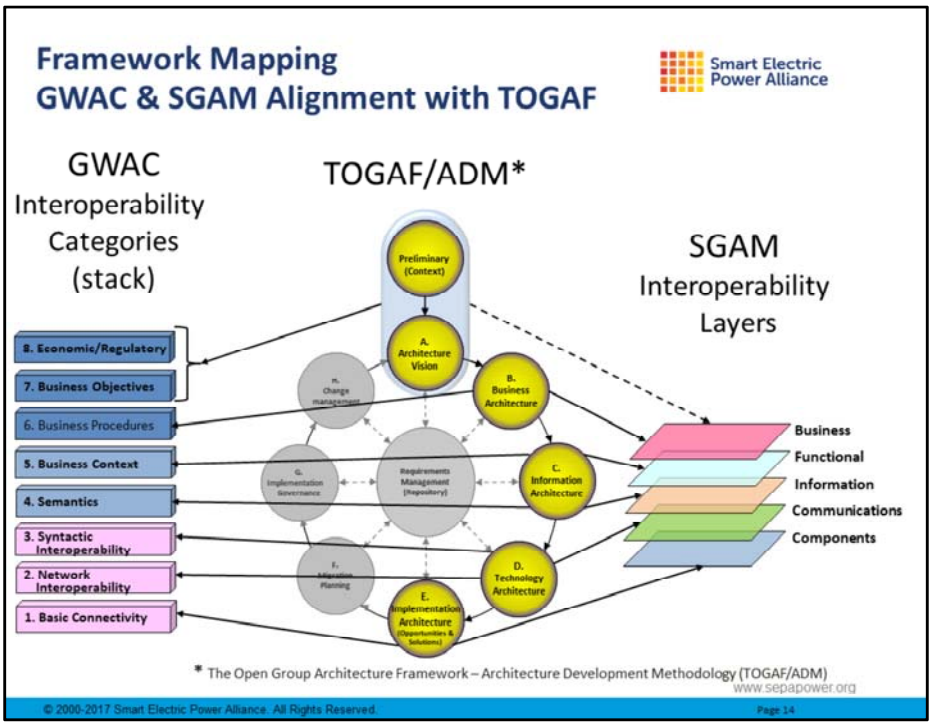
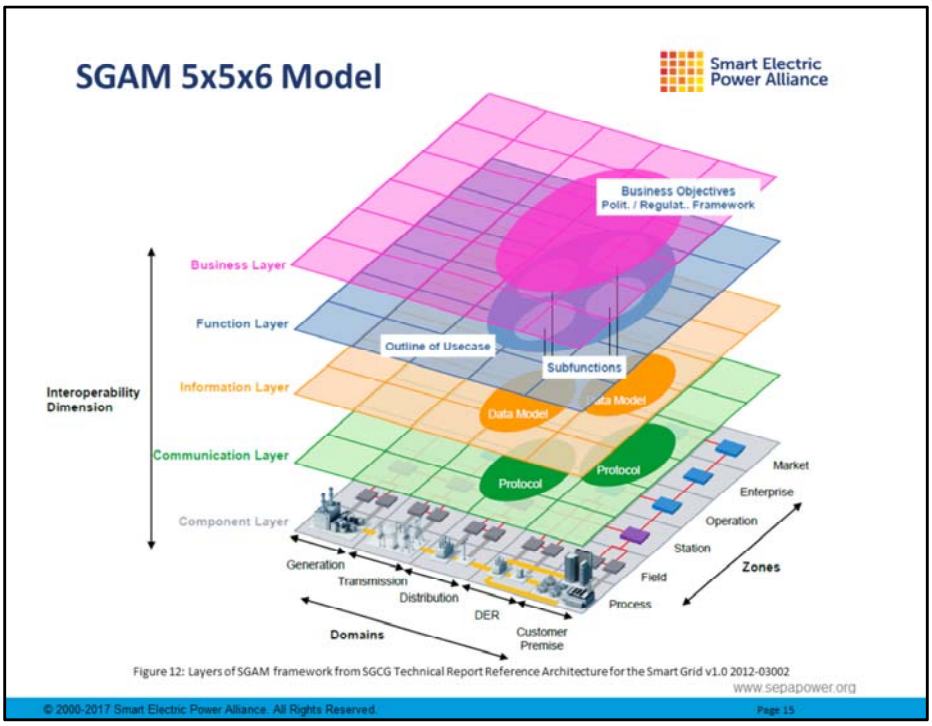
- Architecture Abstraction Levels
  - Conceptual, Logical, Physical, Implementation
- Service Oriented Architecture (SOA) Elements
  - Categorization of Elements into Actors, Services, and ServiceCompositions (~roles)
- Categorization Guidance Decision Tree



GWAC – GridWise Architecture Council
SGAM – Smart Grid Architecture Model


SGAM 5x5x6 Model
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Business Objectives
Polit. / Regulat.. Framework
Business Layer
Function Layer
Outline of Usecase
Subfunctions
Information Layer
Data Model
Communication Layer
Protocol
Component Layer
Interoperability Dimension
Market
Enterprise
Operation
Station
Field
Process
Zones
Generation
Transmission
Distribution
DER
Customer Premise
Domains
Figure 12: Layers of SGAM framework from SGCG Technical Report Reference Architecture for the Smart Grid v1.0 2012-03002
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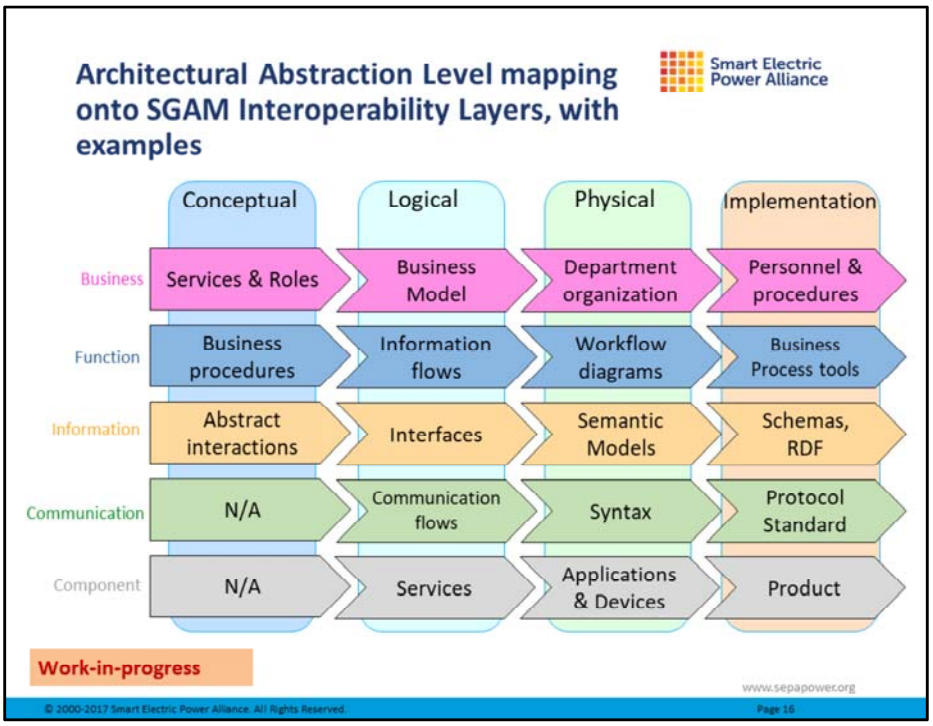
Architectural Abstraction Level mapping onto SGAM Interoperability Layers, with examples
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Conceptual
Logical
Physical
Implementation
Business
Services & Roles
Business Model
Department organization
Personnel & procedures
Function
Business procedures
Information flows
Workflow diagrams
Business Process tools
Information
Abstract interactions
Interfaces
Semantic Models
Schemas, RDF
Communication
N/A
Communication flows
Syntax
Protocol Standard
Component
N/A
Services
Applications & Devices
Product
Work-in-progress
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Architectural Abstraction Iterations within TOGAF

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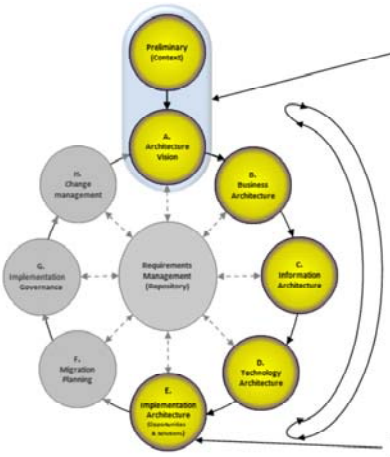
TOGAF/ADM



Context

Conceptual
Logical
Physical

Implementation

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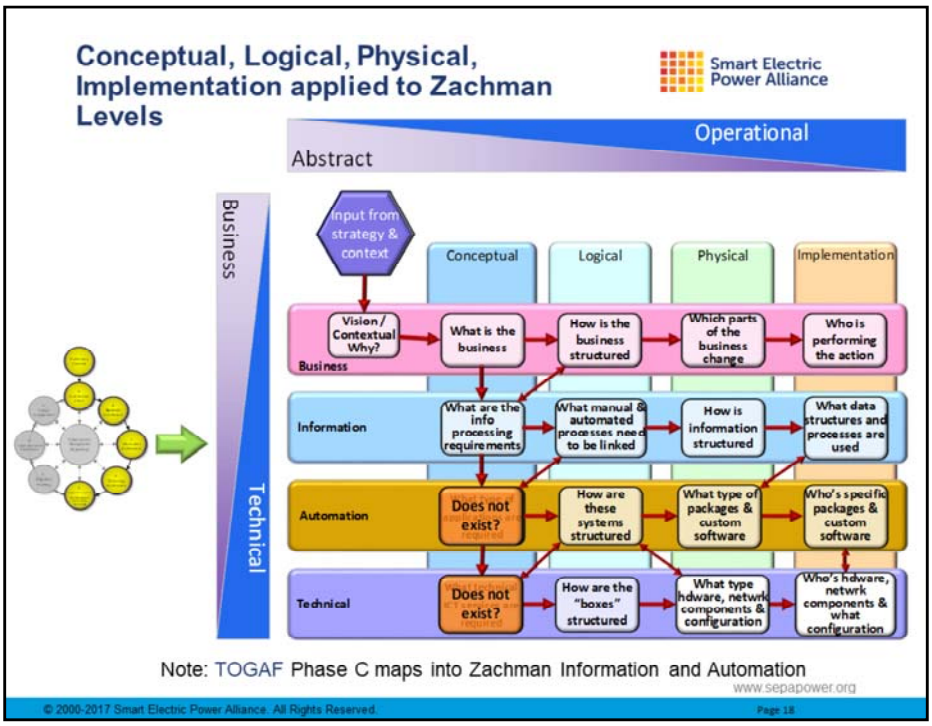
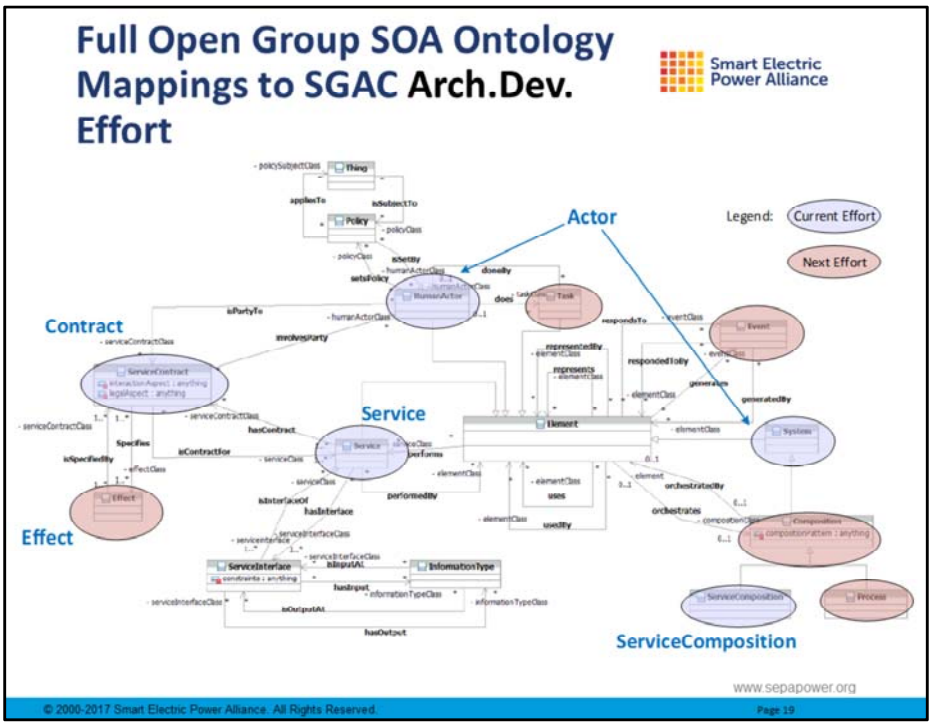


The 2 lower left orange shaded cells under Conceptual Level are to indicate that the Automation and Technical aspects are not applicatable at his high level of Architecture Abstraction (the ? Mark indicates still need to conform this with the Zachman International e.g.

- Automation ask – What type of applications are required
- Technical ask – What technology ICT (Information Computing Telecommunications) services are required.

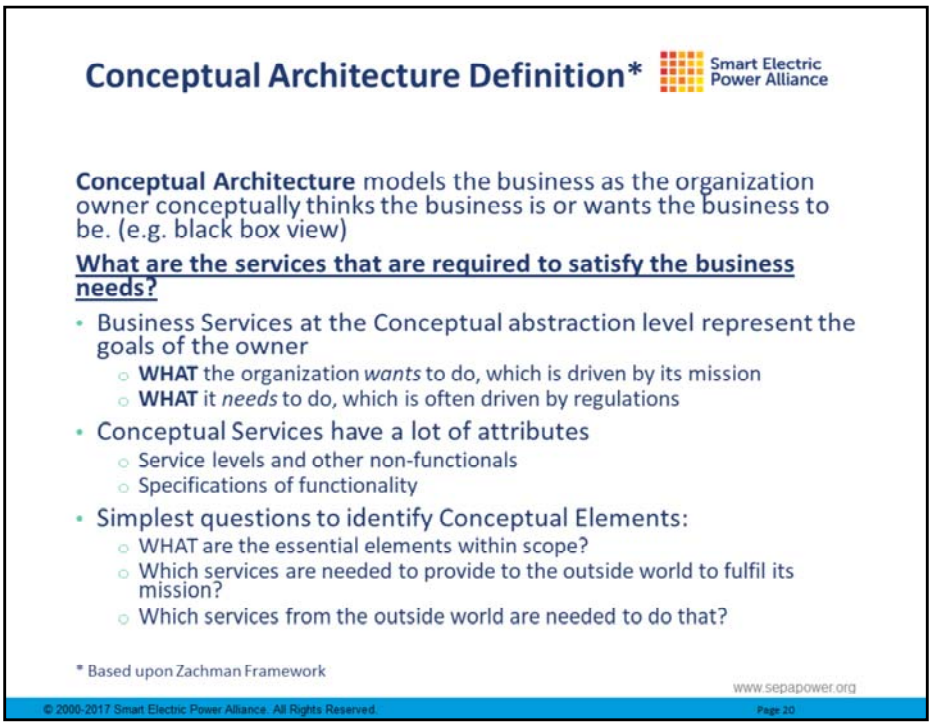


Source of SOA metamodel – The Open Group "Service-Oriented Architecture Ontology Version 2.0" Figure 1: SOA Ontology – Graphic Overview

We choose Actor, Service, ServiceComposition, and Contract (not yet populated) for our modeling. Contracts is where the business contracts (Conceptual level) and non-functional (Logical and Physical levels) information will be represented.

Note:

1) Effect is not currently in the ADWP OWL model.
2) SOA element and thing are used in different context that SOA. SGAC uses element as in the phrase "architectural element" that includes e.g. Actors, Service, ServiceComposition, Contract. Thing is used in the SGAC Architecture Element Metadata Model as a general class, but not otherwise called out.



Zachman Example of Conceptual, Logical, Physical Abstractions

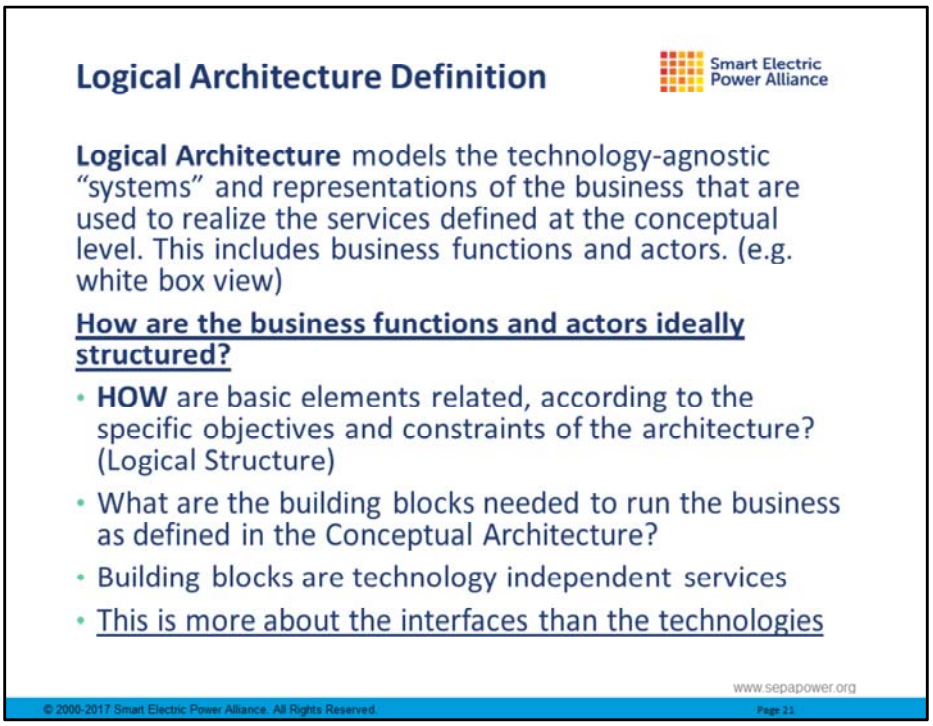
•The '*Owner*': '**CONCEPTUALLY**... I would like a pot of flowers in the center of my patio about 10 feet off the ground. They would be purely for ascetic reasons, but I want the pot to be BIG and the flowers to be real.'

•The '*Designer*': 'Hmmmm. Let me see now... the physics of this situation would suggest that there are two **LOGICAL** alternatives... either 1) you would have to have a pedestal about 10 feet high, the weight it would have to sustain is max of 100 pounds so if it was 10 square inches in area (cross-section) the material would have to hold 10 lbs per sq. inch. You're second alternative 2) would be to hang it from something above the pot... do you have a roof over the patio?? If not, that would mean we would have to construct a tripod to suspend the pot from the apex. Do you care if you see the tripod? Hmmmm. I recommend you go with the pedestal.'

•The '*Builder*:' 'Hmmmm... the Architect is suggesting a pedestal that would be 10 feet high and sustain 10 pounds per square inch. That Architect wouldn't recognize a lathe if he fell on one... but here's what we could do... we could **PHYSICALLY** build the thing in three pieces and then glue it together with superglue... just in case, we could make flanges on the pieces so we could bolt the pieces together to make sure they don't come apart. Your

other alternative is to have it made in Japan and ship it in one piece and then we could install it by drilling a hole in the patio, sinking the base down 2 feet and filling in the hole with cement.

Reference: http://www.zachman.com/ea-articles-reference/58-conceptual-logical-physical-it-is-simple-by-john-a-zachman



Technology specific details are included in the Physical abstraction level.

Physical Architecture Definition

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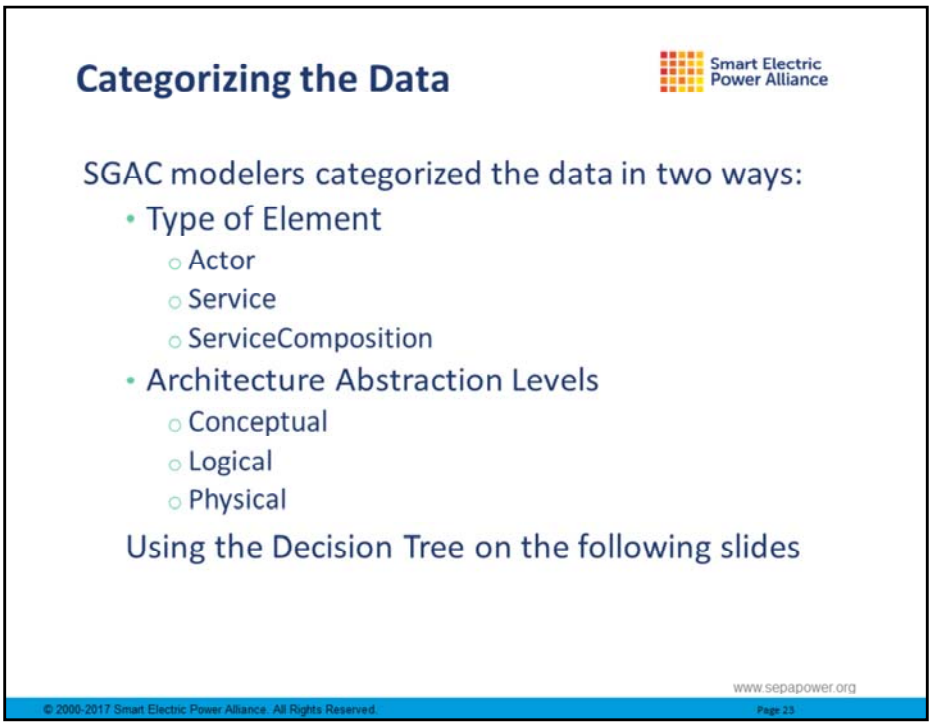
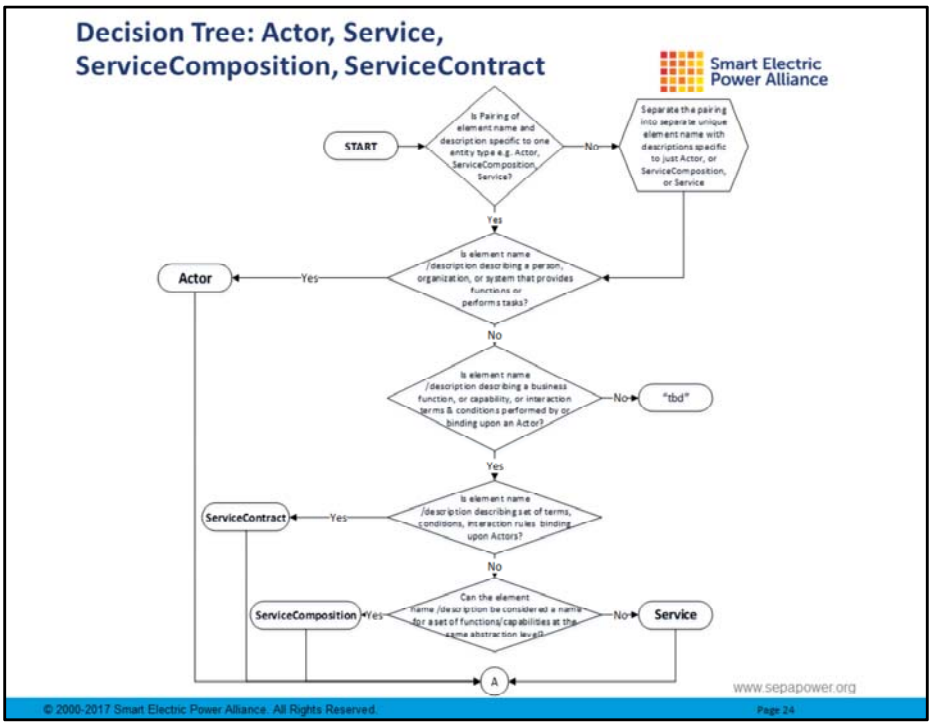
Physical Architecture further constrains the Logical architecture. This is the abstraction level where application and system architecture/design/technology choices are made that address and may constrain the business, application, and data model. This level represents HOW the Architecture ideally is being designed, excluding further Implementation level restrictions.

Addresses what actors, software and processes are necessary

- **HOW** elements of structure will be realized, according to architecture and design strategies and implications, and with **WHAT** will this be achieved?
- Describes physical implementation components. This set of components is a representation of components or building blocks an architect will use:
  - A person
  - A process
  - A piece of software
  - A piece of infrastructure
- Provides technical implementation specifications; the details needed for white box development processes (eg: ITIL, Rational Unified Process, Software Development Life Cycle, Agile), vendor solutions, and manual processes (TOGAF Phase E).



The data did not contained Contracts or Implementation category items

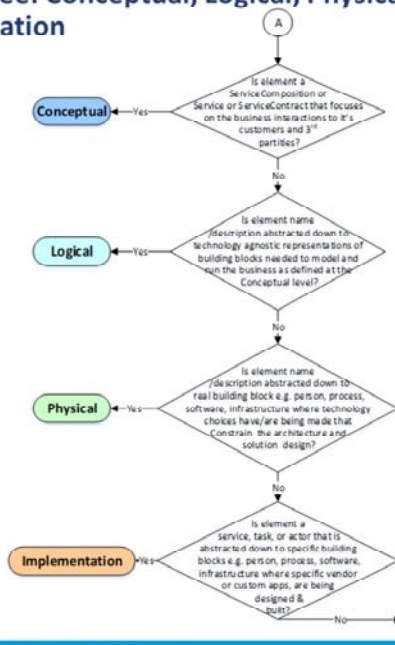


The typing to “tbd” is to account for the gathered set of terms, not being able to mapped to SOA terms or elements of immediate architectural interest e.g. measured terms like voltage, current, rate-of-change

Also more detail can be added to especially the Actor and Service to a call out sets of elements at the same abstraction level that all at the same set of inherited attributes but are different sub-classifications of that named inherited set e.g. think parents/offspring where the offspring are the set of common siblings.

https://members.sgip.org/kws/groups/sgip-sgac-awp/documents/working309/document?document_id=9837

Decision Tree: Conceptual, Logical, Physical, Implementation



At a context level, treat the business as "black box" noting the major functions & capabilities that business has with 3rd parties

Within the business context treat the business as "white box" to further detail and describe the functions & capabilities performed within the business and with 3rd parties

Building block specifications, requirements, descriptions, non-functionals are created

Actual technology and implementation configurations are made

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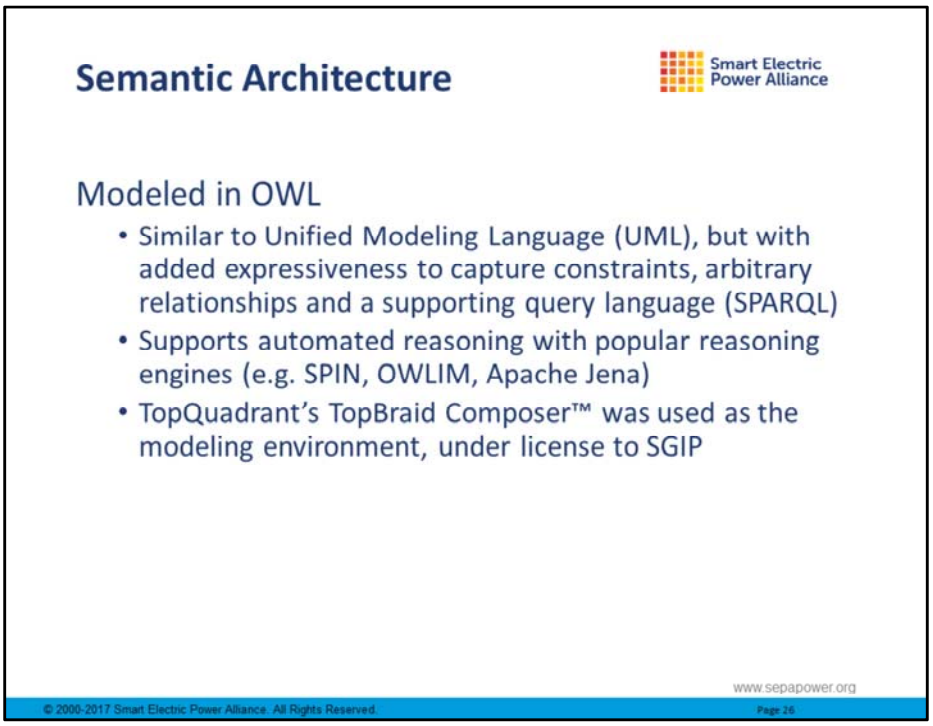
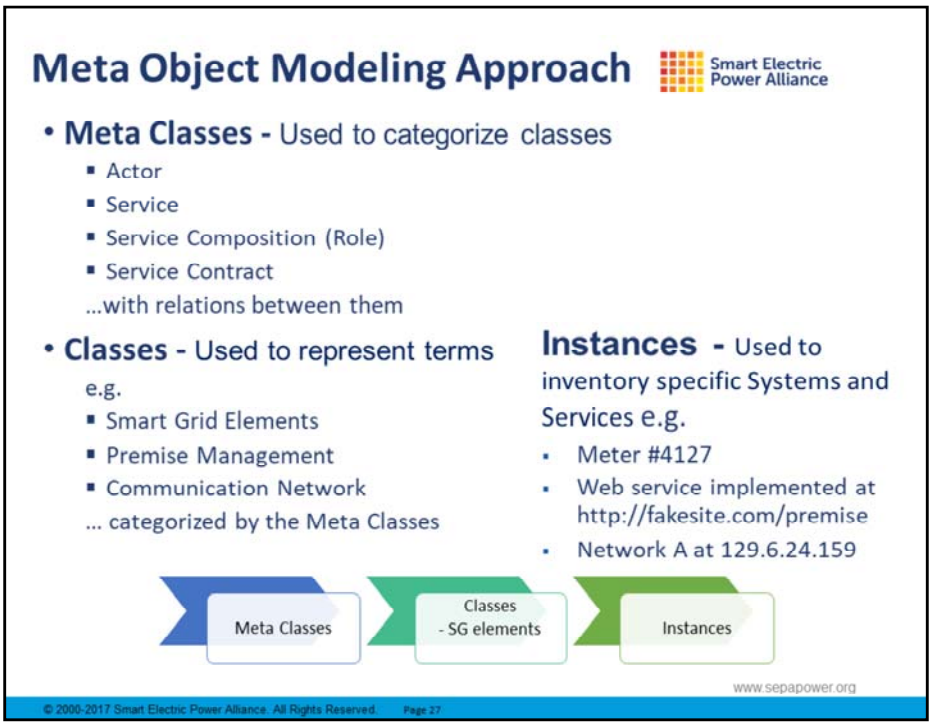
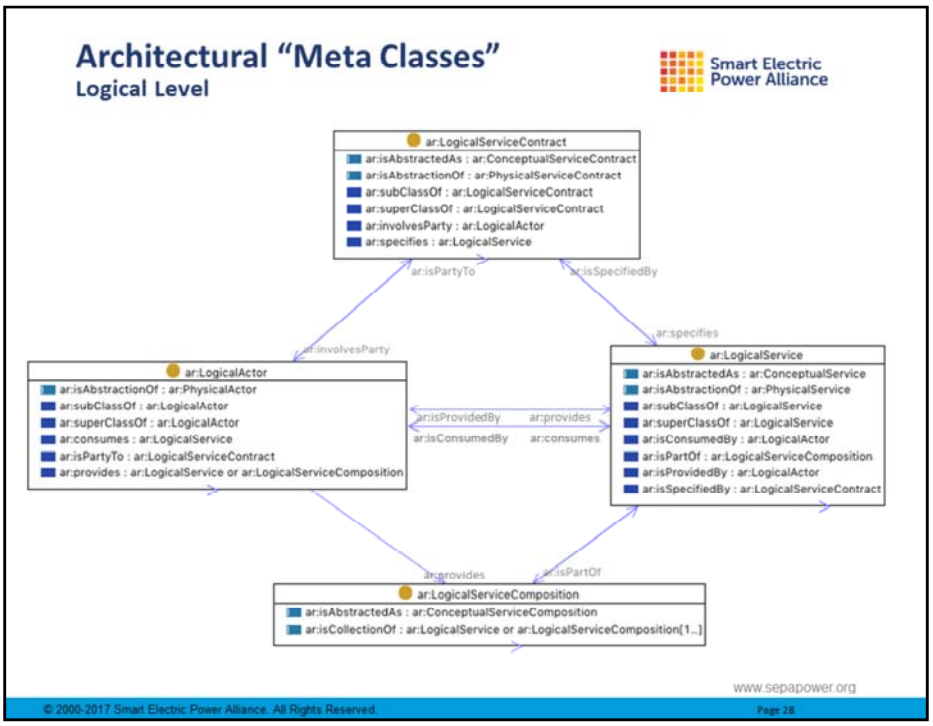


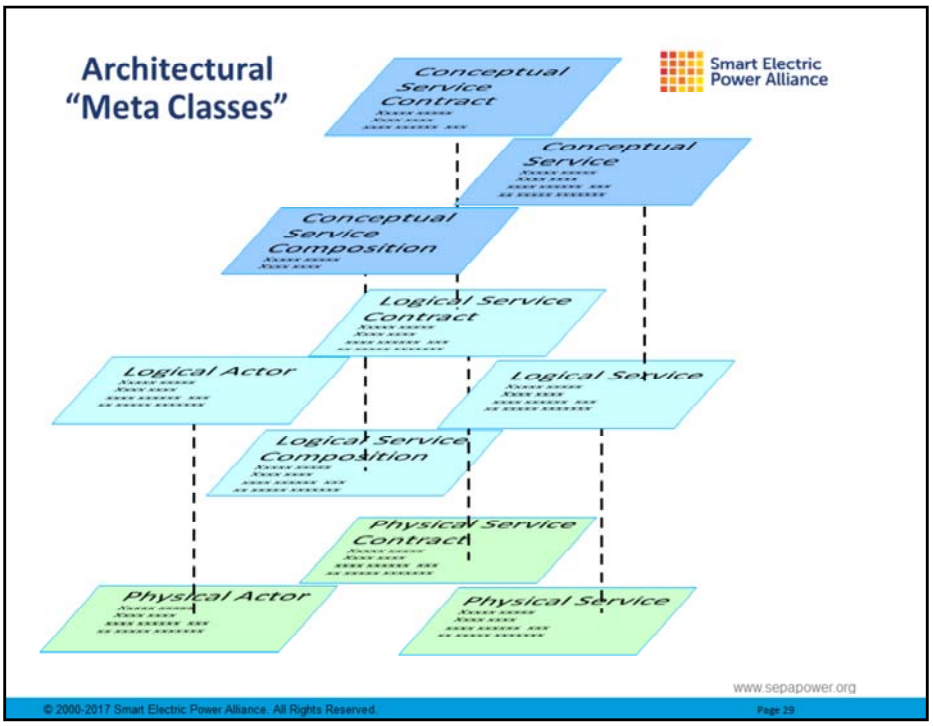
SPARQL – SPARQL Protocol And RDF Query Language
SPIN – SPARQL Inferencing Notation
OWLIM - family of semantic repositories and describes many of its features that make it a world-leading RDF storage, reasoning and query-answering platform.



The architectural model uses three levels. Another way of describing this process is that terms collected from smart grid standards are modeled as Classes. These classes are categorized into a small number of Meta Classes. Actual systems and services in operation are Instances of the Classes.



The Meta Classes have defined relationships.



The Meta Classes are organized into three levels of abstraction: Conceptual, Logical and Physical

Abstraction Levels Applied to SOA

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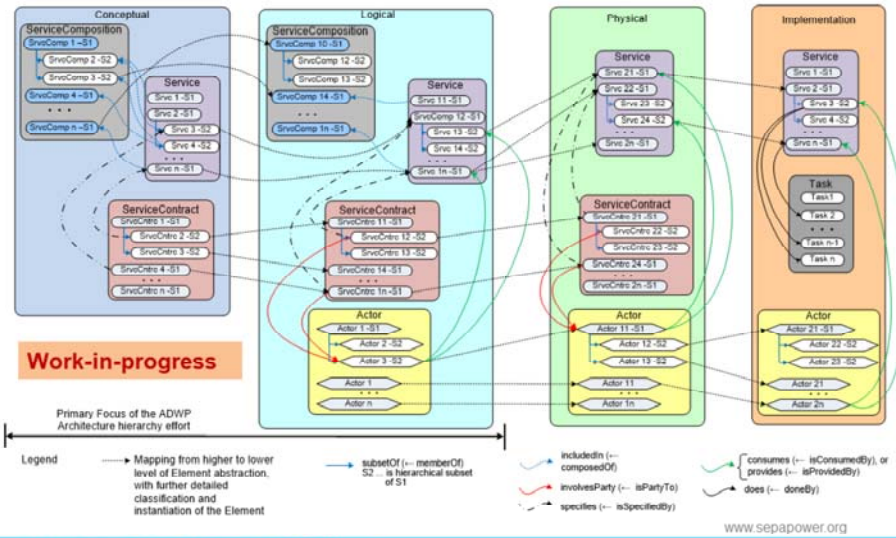

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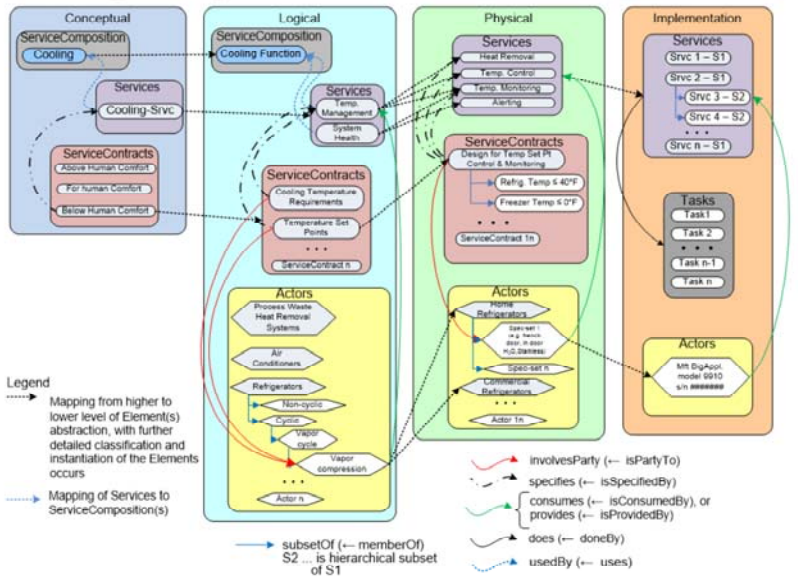
Cooling Example



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Categorization Guidelines for Architectural Elements

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Categorize the original elements

- Identify elements as Actors, Services, ServiceCompositions, and ServiceContracts
- Identify the Architecture Abstraction Levels
  - **Conceptual** - these are the business-to-business (B2B) relationships, the B2C (consumer), and the B2R (regulatory & policy). Thus a black-box view of the business.
  - **Logical** – this is where Actors come in, but there are also Services. This is a white-box view of the business, showing the internal elements and their relationships.
  - **Physical** - the representation of a Specification, where the required features (functional and non-functional) are included. Technology approaches are chosen.
  - **Implementation** – actual technology product choices and implementation configuration decisions are made.

Categorization Guidelines for the Elements

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- Semantics should be explicitly documented to reduce ambiguity
- An Actor is considered to be a person, organization, or system that has at least one role (ServiceComposition) that initiates or interacts with other Actors. Actors may be internal or external to an organization
- A ServiceComposition is the usual or expected function, or context, in which an actor consumes/provides a service. An Actor may play a number of roles
- At the highest level, a Conceptual ServiceComposition represents the goals of the stakeholder (e.g.: Energy Provider). A Conceptual ServiceComposition will have many defining characteristics
- A Logical ServiceComposition decomposes/partitions a conceptual role into functional components. At the Logical level is where the mapping from roles to Actors occurs
- There is no such thing as a Physical ServiceComposition. At this level an Actor simply offers services according to advertised interfaces. Similarly, there is no such thing as a Conceptual Actor
- A Conceptual ServiceComposition maps to one or more Logical Service Compositions, which get related to one or more Logical Services which are consumed or provided by Logical Actors
- A Physical Actor is an instantiation of a Logical Actor. A Physical Actor performs a set of actions which is a Physical instantiation of a Logical ServiceComposition

Summary

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- Created an OWL model (SOA focused), that shows the relationships of the elements across the Conceptual, Logical, Physical abstraction levels
- Started work on:
  - using a specific real world use case set of Actors, Services, messages to vet out the OWL model;
  - relating the use case set of elements to the gathered set of elements using a "neutral concepts" OWL model of the business scenario that the use case came from;
- Intent is to create the appropriate relationships of one set of elements to another for the purposes of helping identify a common vocabulary of architectural/business terms and elements.

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NEUTRAL CONCEPTS MODEL APPROACH

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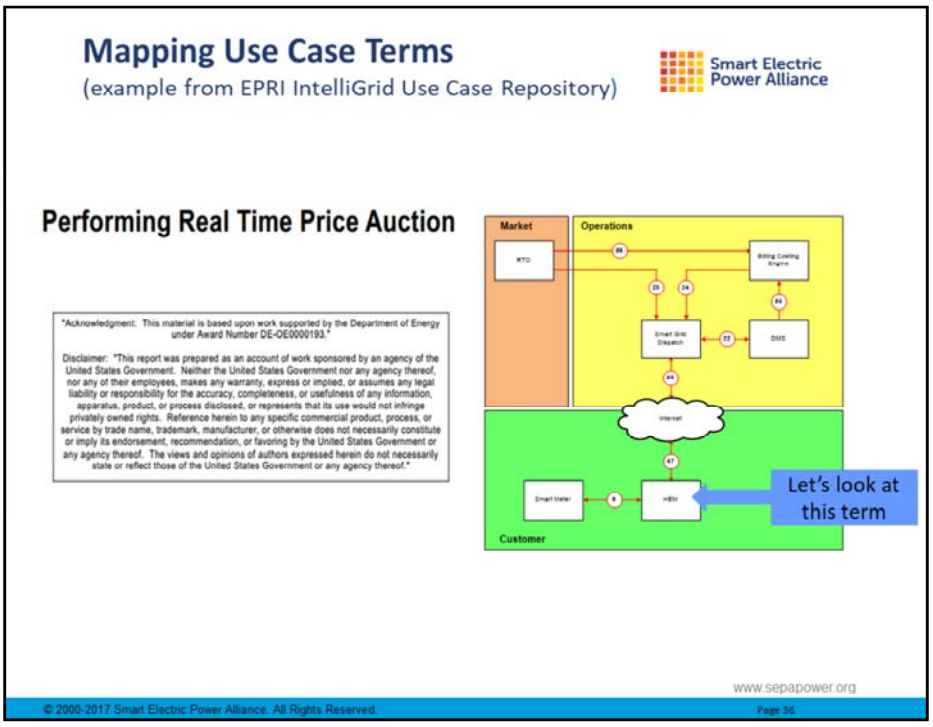
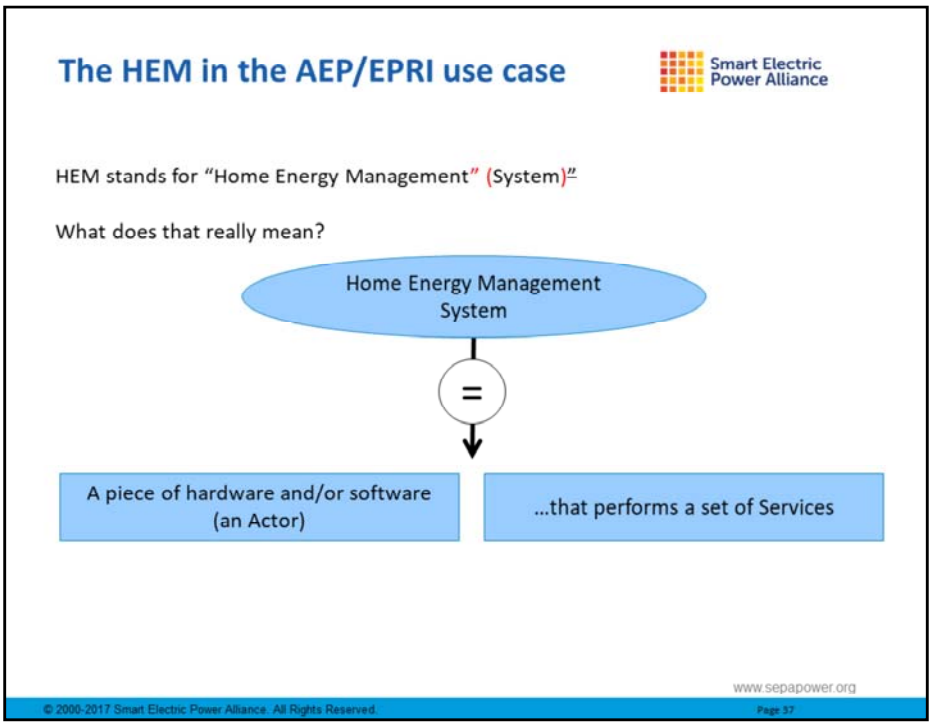
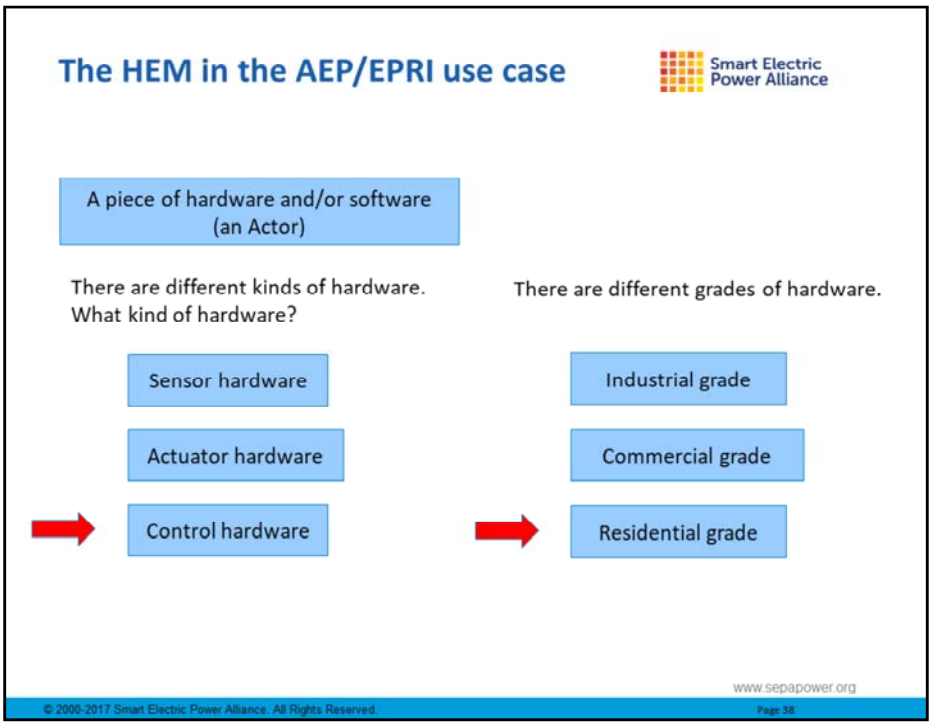


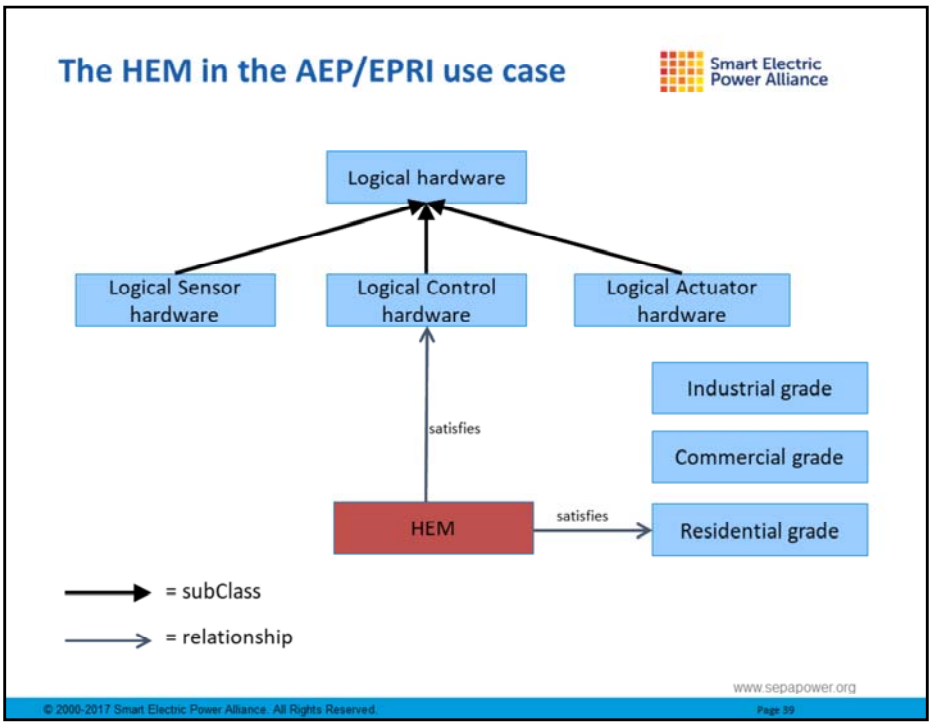
To illustrate how the categorization works in a use case, let's consider a use case example from AEP "AEP Performing Real Time Price Auction", located in EPRI's Use Case Repository http://smartgrid.epri.com/Repository/Repository.aspx. In particular, let's focus on the term called HEM, for Home Energy Manager.



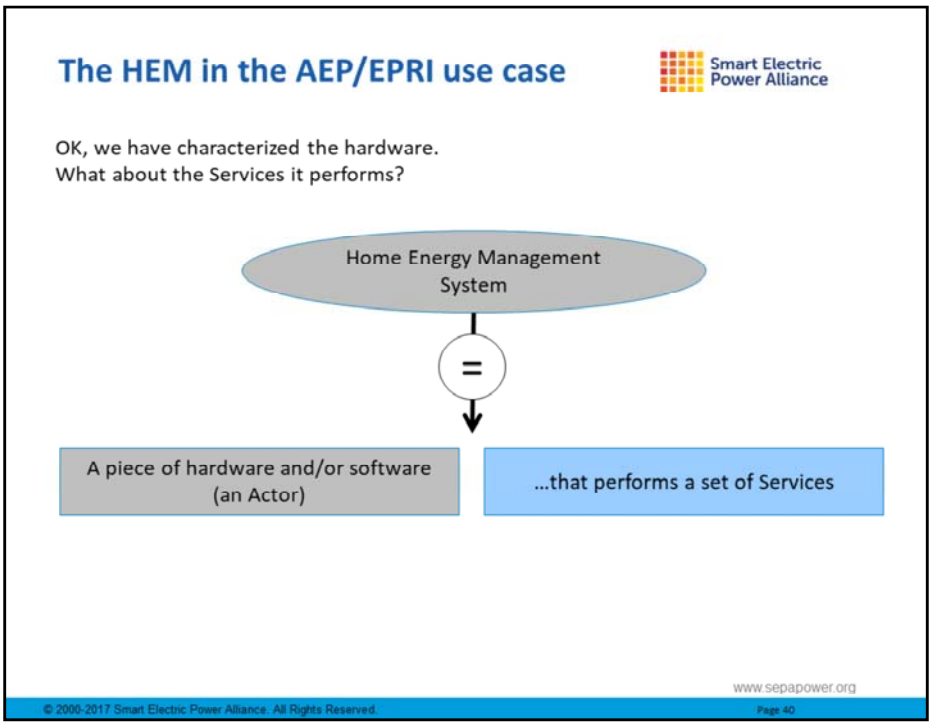
We can tease apart the words "Home Energy Management System" to suggest that it is an Actor that provides a set of Services



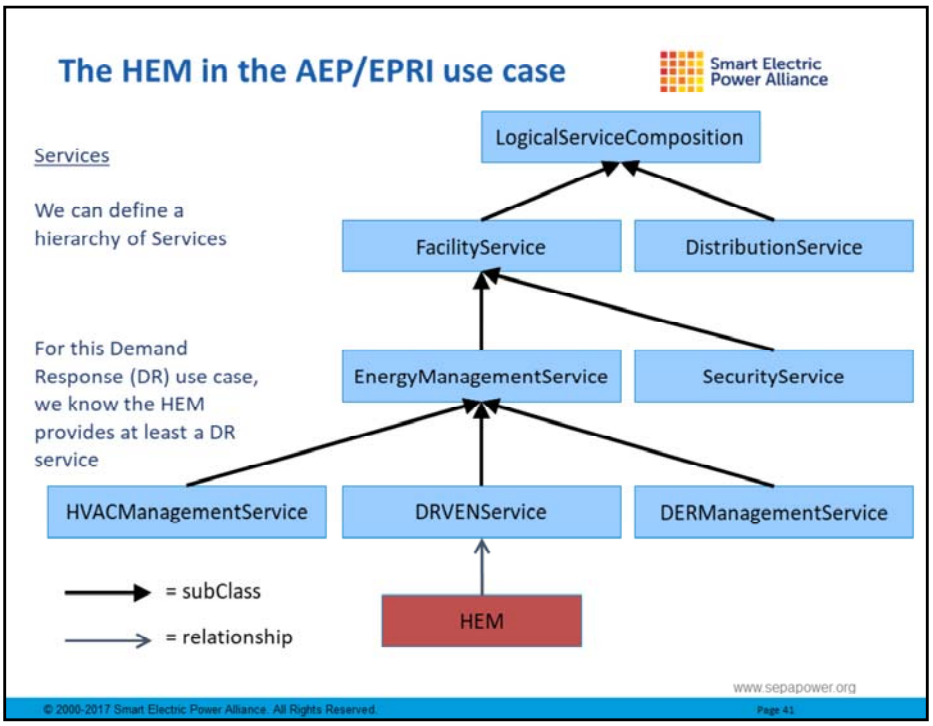
Since the collected terms may not cover all possible kinds of Actors, a Neutral Model is helpful to cover all possibilities. For example, you could classify different subclasses of hardware, such as Sensor hardware, Actuator hardware, Control hardware, etc. Similarly, it might be useful to partition hardware by quality grade.



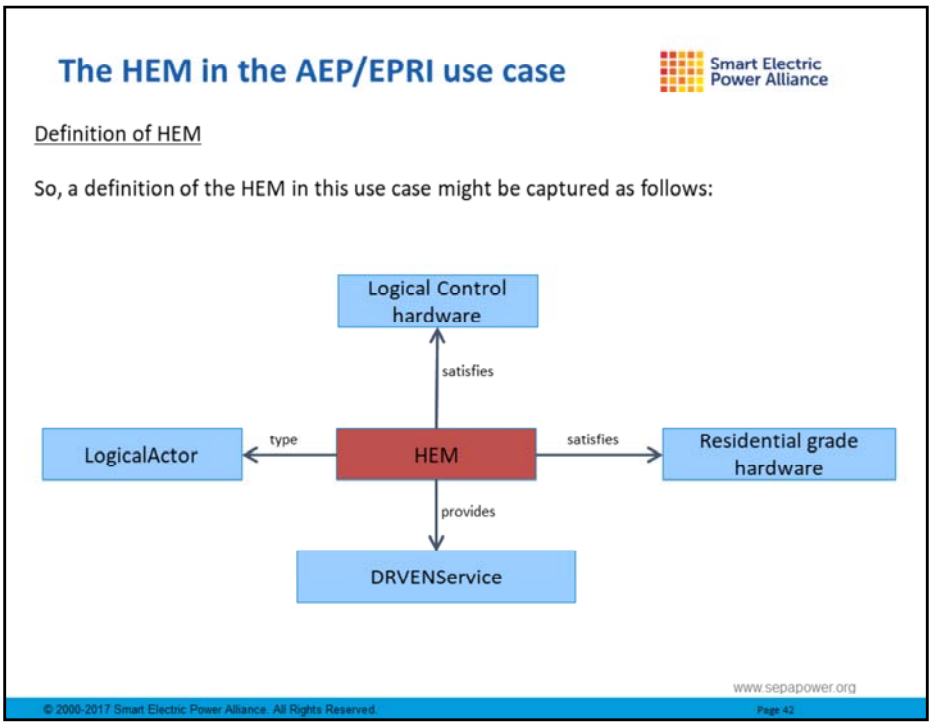
The HEM can be classified under both of these (and other) schemes as shown here. The implication of the “satisfies” relation is that it meets all the specifications defined for the relevant classifications.



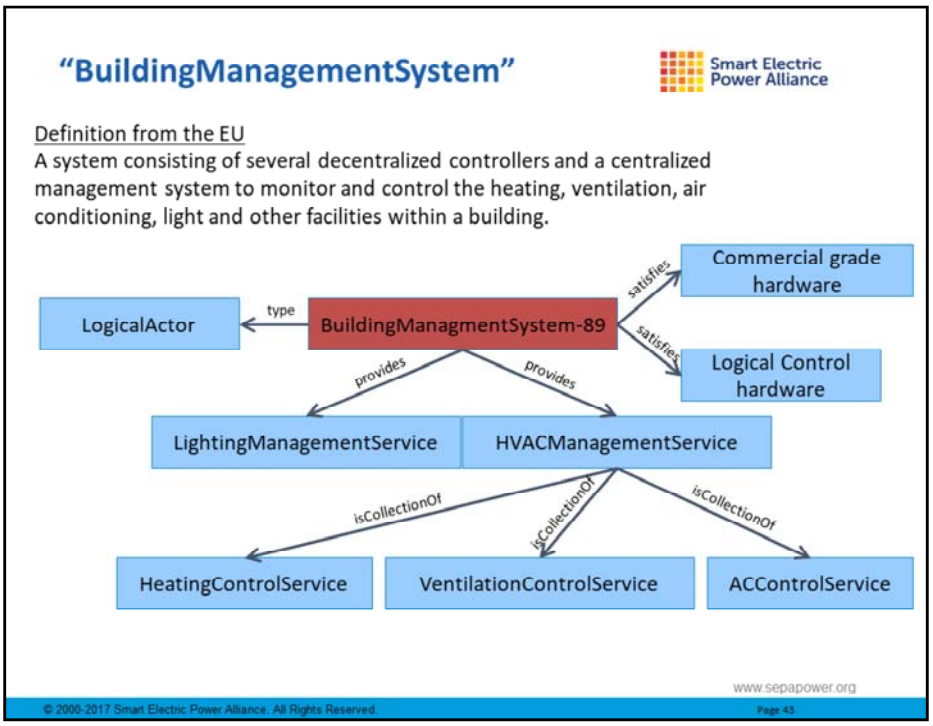
Next, we can examine the kinds of services provided.



Again, the Neutral Model can give the context for classifying services.
HVAC – Heating, Ventilation, Air Conditioning
DRVEN – Demand Response Virtual End Node
DER – Distributed Energy Resource

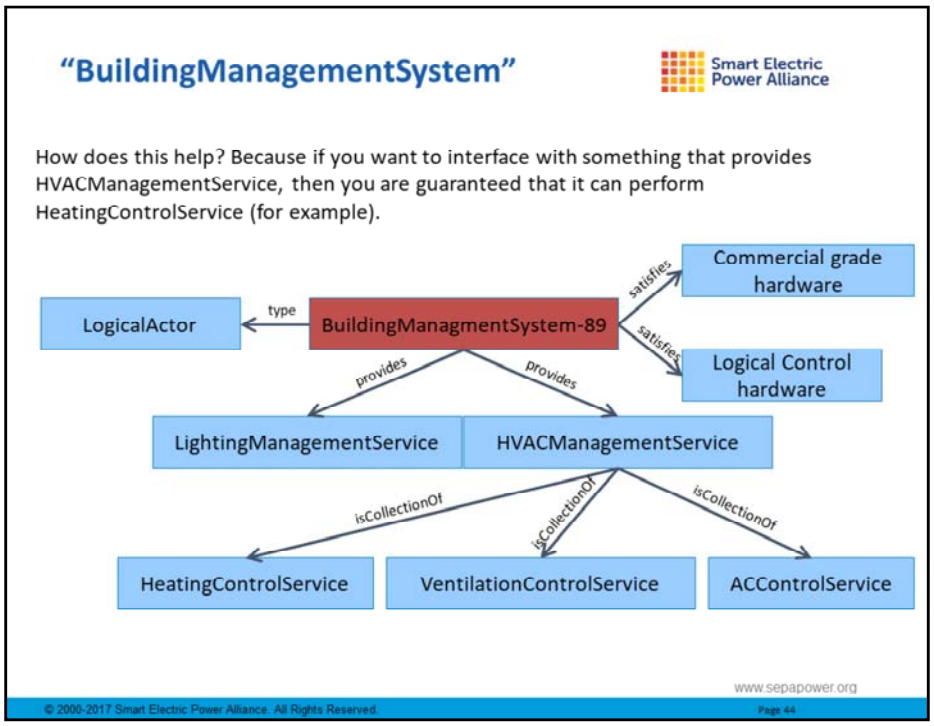


We end up with this partial characterization for HEM, which is captured in a computer-sensible form that can be used for reasoning.
DR: demand response
VEN: virtual end node, from OpenADR

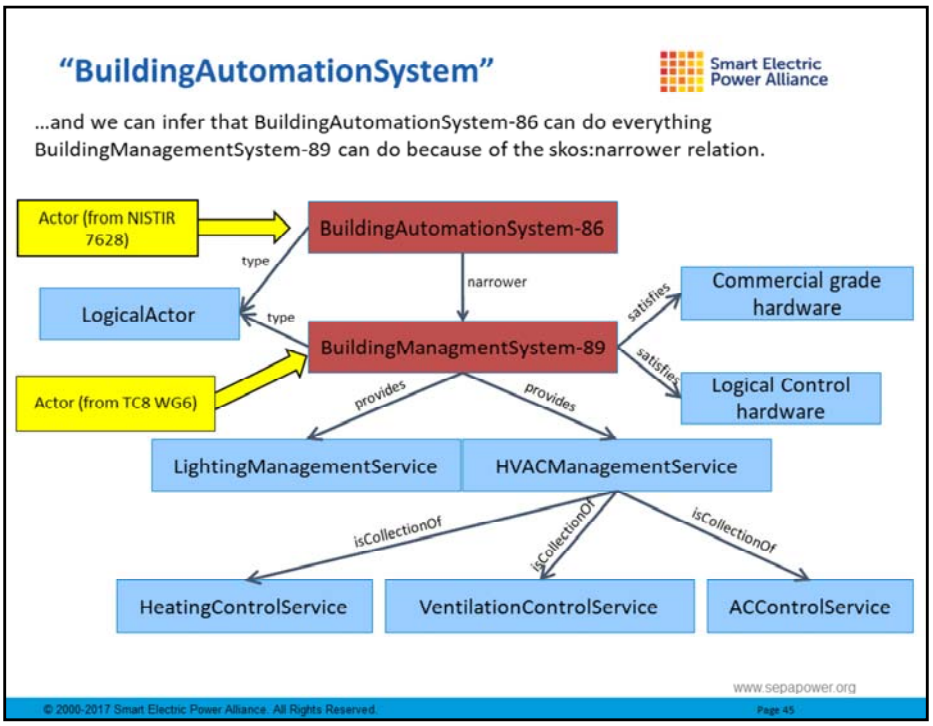


Let's look at some other terms in our collection. From the description of BuildingManagementSystem-89, we can establish the associations to a Neutral Model as shown.

HVAC is heating, ventilating, and air conditioning
ACControlService is air conditioning control service



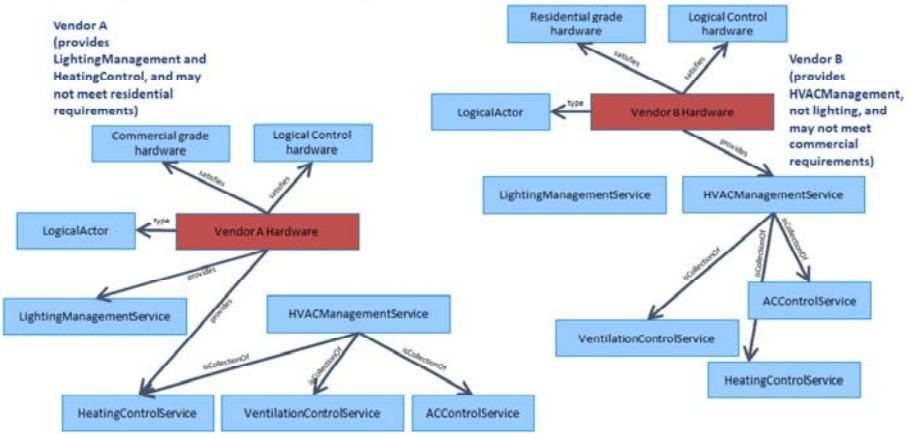
How does this help? Because if you want to interface with something that provides HVACManagementService, then you are guaranteed that it can perform HeatingControlService (for example).



…and we can infer that BuildingAutomationSystem-86 can do everything BuildingManagementSystem-89 can do because of the skos:narrower relation. This is because BuildingAutomationSystem-86 is declared to be a special case of BuildingManagementSystem-89 …. a system that is also automated.

Implications

Because all this information is represented formally in a semantic language (OWL), it is possible to perform logical reasoning on it. Therefore, if we correctly categorize systems and services, we can begin to automatically identify where interoperability is possible, and where there will be problems.



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POTENTIAL FUTURE PHASE

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Potential Future Phase

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- Add relationships between concepts based on latest tool capabilities
- Populate and expand Neutral Concepts model
- Expand interoperability between modeling tools

Future Phase - Details

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Adding Relationships

- Serves to validate and clarify the initial categorizations
- Reveals ambiguities, missing concepts, distinctions between terms. **This is a key effort in the next phase.**
- Ties together concepts originating from different domains (as in the BuildingAutomationSystems example)
- Formalizes the terms in a computable manner

Future Phase - Details

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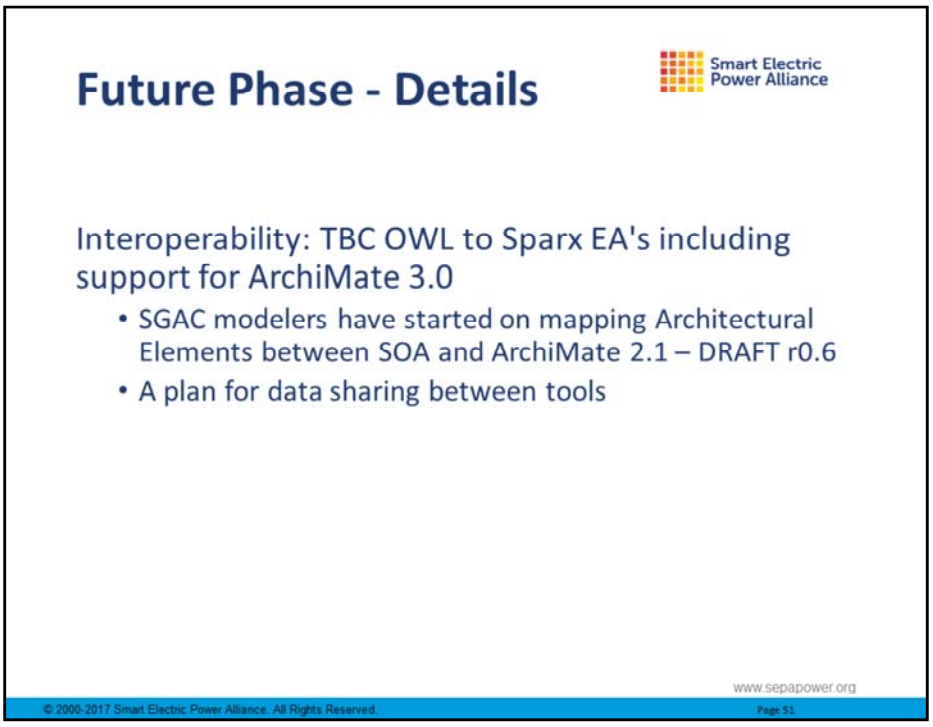
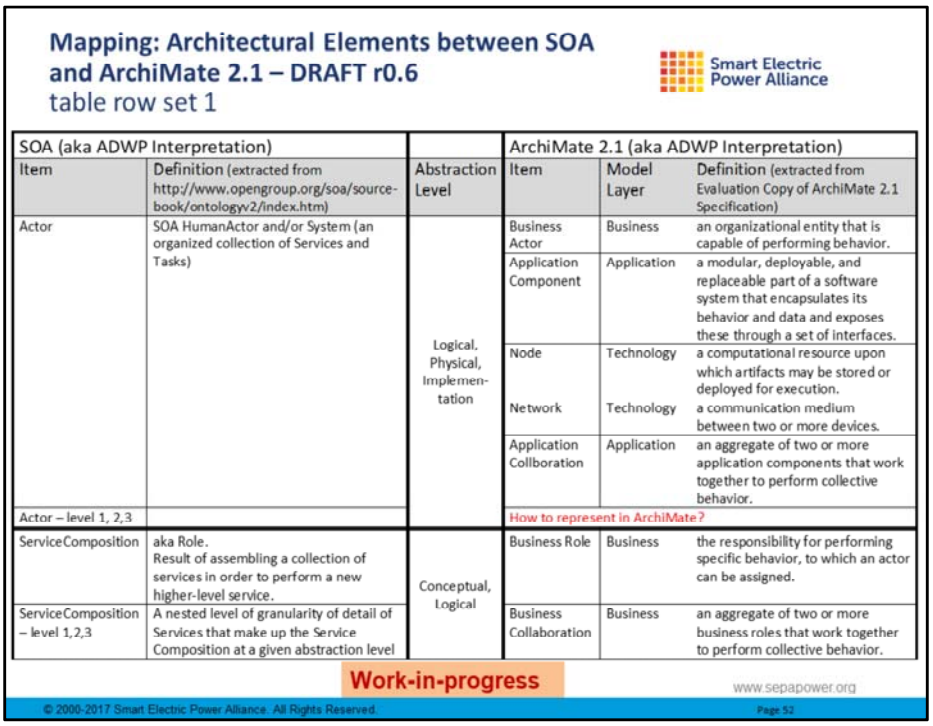
Populating the Neutral Concepts Model

- Provides the concepts that didn't happen to show up in the contributed terms/vocabularies (as in the HEM example)
- Provides abstractions (superclasses) that tie together terms
- Provides context for contributed terms



Mappings from https://members.sgip.org/kws/groups/sgip-sgac-awp/documents/working309/document?document_id=9836



Mapping: Architectural Elements between SOA and ArchiMate 2.1 – DRAFT r0.6

table row set 1

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SOA (aka ADWP Interpretation)			ArchiMate 2.1 (aka ADWP Interpretation)		
Item	Definition (extracted from http://www.opengroup.org/soa/source-book/ontologyv2/index.htm)	Abstraction Level	Item	Model Layer	Definition (extracted from Evaluation Copy of ArchiMate 2.1 Specification)
Actor	SOA HumanActor and/or System (an organized collection of Services and Tasks)	Logical, Physical, Implemen-tation	Business Actor	Business	an organizational entity that is capable of performing behavior.
			Application Component	Application	a modular, deployable, and replaceable part of a software system that encapsulates its behavior and data and exposes these through a set of interfaces.
			Node	Technology	a computational resource upon which artifacts may be stored or deployed for execution.
			Network	Technology	a communication medium between two or more devices.
			Application Collboration	Application	an aggregate of two or more application components that work together to perform collective behavior.
Actor – level 1, 2,3			How to represent in ArchiMate?		
ServiceComposition	aka Role. Result of assembling a collection of services in order to perform a new higher-level service.	Conceptual, Logical	Business Role	Business	the responsibility for performing specific behavior, to which an actor can be assigned.
ServiceComposition – level 1,2,3	A nested level of granularity of detail of Services that make up the Service Composition at a given abstraction level		Business Collaboration	Business	an aggregate of two or more business roles that work together to perform collective behavior.

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This comparison was done between SOA r2 with ArchiMate 2.1. Need to vet this mapping with ArchiMate 3.0 for what has changed that might address some of the raised points.

Mapping: Architectural Elements between SOA and ArchiMate 2.1 – DRAFT r0.6
table row set 2

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Service	a logical representation of a repeatable activity that has a specified outcome. It is self-contained and is a 'black box' to its consumers.	Conceptual, Logical, Physical, Implemen-tation	• Business Service	Business	a unit of functionality that a system exposes to its environment, while hiding internal operations, which provides a certain value (monetary or otherwise) Fulfills a business need for a customer (internal or external to the organization).
			Application Service	Application	exposes automated behavior
			Infrastructure Service	Technology	an externally visible unit of functionality, provided by one or more nodes, exposed through well-defined interfaces, and meaningful to the environment
Service – lvl 1,2,3			How to represent in ArchiMate?		
Task	an atomic Activity within a Process flow	Implemen-tation	Application Function	Application	a behavior element ~~that groups~~ of automated behavior that can be performed by an application component
ServiceContract	defines the terms, conditions, and interaction rules that interacting participants must agree to (directly or indirectly). explicitly regulate both the interaction aspects and the legal agreement aspects of using a service.	Conceptual, Logical, Physical	Contract	Business	a formal or informal specification of an agreement that specifies the rights and obligations associated with a product
ServiceContract – levels 1,2,3			How to represent in ArchiMate?		

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Mapping: Architectural Elements between SOA and ArchiMate 2.1 – DRAFT r0.6

table row set 3

Event	Something that happens		Business Event	Business	something that happens (internally or externally) and influences behavior.
			Business Function	Business	a behavior element that groups behavior based on a chosen set of criteria (typically required business resources and/or competences).
			Infrastructure Function	Technology	a behavior element that groups infrastructural behavior that can be performed by a node.
			Business Process	Business	a behavior element that groups behavior based on an ordering of activities. It is intended to produce a defined set of products or business services.

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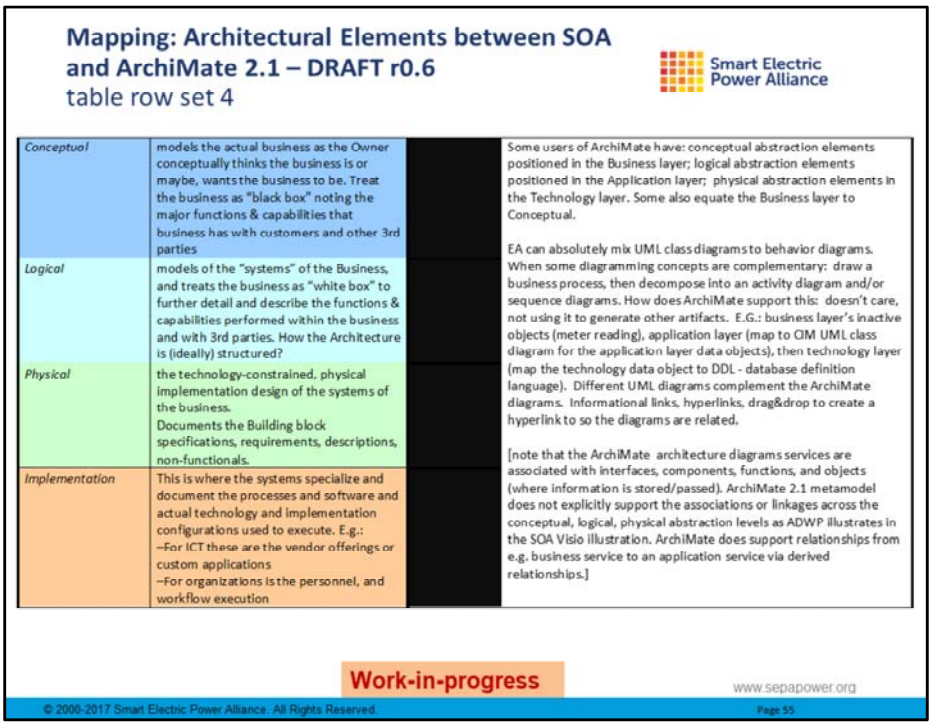

Mapping: Architectural Elements between SOA and ArchiMate 2.1 – DRAFT r0.6
table row set 4

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Conceptual	models the actual business as the Owner conceptually thinks the business is or maybe, wants the business to be. Treat the business as "black box" noting the major functions & capabilities that business has with customers and other 3rd parties		Some users of ArchiMate have: conceptual abstraction elements positioned in the Business layer; logical abstraction elements positioned in the Application layer; physical abstraction elements in the Technology layer. Some also equate the Business layer to Conceptual. EA can absolutely mix UML class diagrams to behavior diagrams. When some diagramming concepts are complementary: draw a business process, then decompose into an activity diagram and/or sequence diagrams. How does ArchiMate support this: doesn't care, not using it to generate other artifacts. E.G.: business layer's inactive objects (meter reading), application layer (map to CIM UML class diagram for the application layer data objects), then technology layer (map the technology data object to DDL - database definition language). Different UML diagrams complement the ArchiMate diagrams. Informational links, hyperlinks, drag&drop to create a hyperlink to so the diagrams are related. [note that the ArchiMate architecture diagrams services are associated with interfaces, components, functions, and objects (where information is stored/passed). ArchiMate 2.1 metamodel does not explicitly support the associations or linkages across the conceptual, logical, physical abstraction levels as ADWP illustrates in the SOA Visio illustration. ArchiMate does support relationships from e.g. business service to an application service via derived relationships.]
Logical	models of the "systems" of the Business, and treats the business as "white box" to further detail and describe the functions & capabilities performed within the business and with 3rd parties. How the Architecture is (ideally) structured?		
Physical	the technology-constrained, physical implementation design of the systems of the business. Documents the Building block specifications, requirements, descriptions, non-functionals.		
Implementation	This is where the systems specialize and document the processes and software and actual technology and implementation configurations used to execute. E.g.: –For ICT these are the vendor offerings or custom applications –For organizations is the personnel, and workflow execution		

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Conceptual level models the actual business as the Owner conceptually thinks the business is or maybe, wants the business to be. Treat the business as "black box" noting the major functions & capabilities that business has with customers and other 3rd parties Some users of ArchiMate have: conceptual abstraction elements positioned in the Business layer; logical abstraction elements positioned in the Application layer; physical abstraction elements in the Technology layer. Some also equate the Business layer to Conceptual.

EA can absolutely mix UML class diagrams to behavior diagrams. When some diagramming concepts are complementary: draw a business process, then decompose into an activity diagram and/or sequence diagrams. How does ArchiMate support this: doesn't care, not using it to generate other artifacts. E.G.: business layer's inactive objects (meter reading), application layer (map to CIM UML class diagram for the application layer data objects), then technology layer (map the technology data object to DDL - database definition language). Different UML diagrams complement the ArchiMate diagrams. Informational links, hyperlinks, drag&drop to create a hyperlink to so the diagrams are related.

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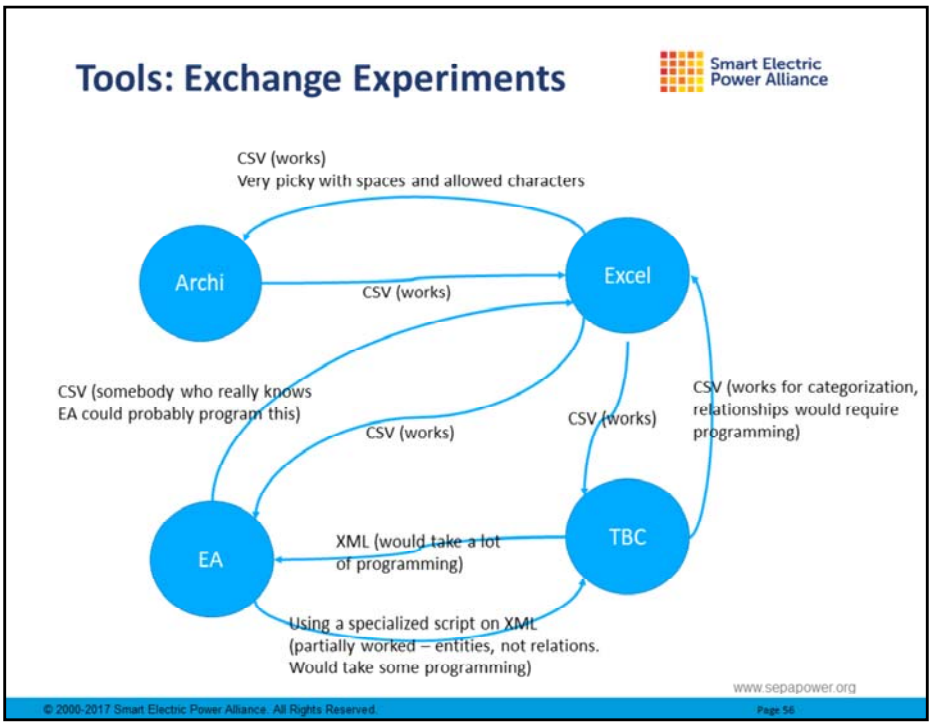
Physical level models the technology-constrained, physical implementation design of the systems of the business.
Documents the Building block specifications, requirements, descriptions, non-functionals.



ArchiMate – is a specification by The OpenGroup. Several vendors have built tools that provide varing degrees of conformance to a specific ArchiMate spec release.
ArchiMate tools tested included: a) Archi, b) Sparx EA including tool support for ArchiMate
The modeling tools being used by ADWP includes: Top Quadrant's TopBraideComposer – Maestro edition, Sparx EA, spreadsheets e.g. Microsoft's Excel

Tools: Archi v3.x Export Format

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ID	Type	Name
5544b54c	ArchimateModel	(new model)
b5995997	BusinessActor	Business Actor 3
fef227a6	BusinessActor	CustomerAppliance
d89934c8	BusinessFunction	Business Function
59de4964	BusinessRole	Business Role
8066cb08	BusinessRole	Business Role 2
9cdbbc83	BusinessService	ApplianceControl
ff57a9b5	ApplicationService	Application Service
8ff1067d	InfrastructureService	Infrastructure Service
d5d8a675	Junction	Junction

Tools: Archi Import Format

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ID	Type	Name	Documentation
1	BusinessRole	EnergyDispatcher	Actor Role in charge of dispatching Electricity usually at the transmission level
2	ApplicationComponent	Access Point ie. Data Aggregation Point	Collects and aggregates all data fromto end devices through Neighbourhood andor Field Area andor AMI networks. These devices are IEEE 802.11n compliant. They interface the Backhaul WAN.
3	BusinessService	Account Management	Business function or service that manages supplier and customer business accounts.
4	ApplicationComponent	Account Management System	Business function or service that manages supplier and customer business accounts.
5	BusinessRole	Actuator	An actuator is a transducer that accepts a signal and converts it to a physical action. In other words
7	BusinessRole	Aggregator	The role that combines curtailment
8	ApplicationComponent	AMI Head-end	Provides the Interface to the Advanced Metering Infrastructure and manages the information exchanges between third party systems. The head-end is the command application for AMI solution. Optionally it manages required or desired meter reading schedules
9	ApplicationComponent	AMI Operator	General operator of the AMI system
10	ApplicationComponent	AMI Service Engineer	External actor responsible for the installation

Tools: Valid Sparx EA 12.1 Import Types – Partial List

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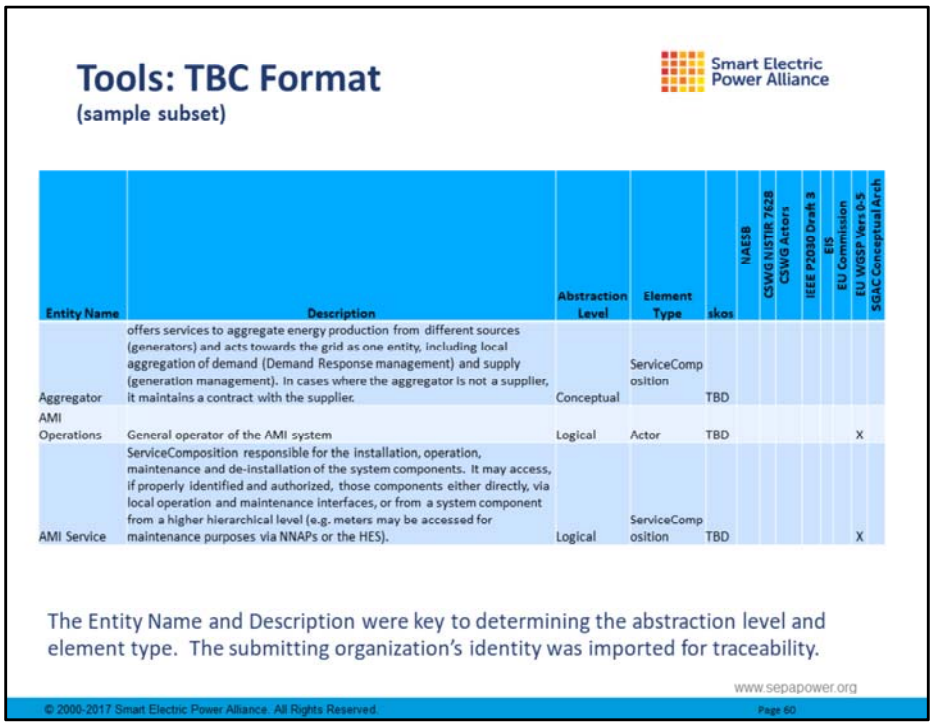
Type	*String*	Read/Write The element type (such as Class, Component). Note that **Type** is case sensitive inside Enterprise Architect and should be provided with an initial capital (proper case); valid types are:

Action	**InteractionFragment**
Activity	**InteractionOccurrence**
ActivityPartition	**InteractionState**
ActivityRegion	**Interface**
Actor	**InterruptibleActivityRegion**
Artifact	**Issue**
Association	**Node**
Boundary	**Note**
Change	**Object**
Class	**Package**
Collaboration	**Parameter**
Component	**Part**
Constraint	**Port**
Decision	**ProvidedInterface**
DeploymentSpecification	**Report**
DiagramFrame	**RequiredInterface**
EmbeddedElement	**Requirement**
Entity	**Screen**
EntryPoint	**Sequence**
Event	**State**
ExceptionHandler	**StateNode**
ExitPoint	**Synchronization**
ExpansionNode	**Text**
ExpansionRegion	**TimeLine**
Feature	**UMLDiagram**
GUIElement	**UseCase**



This is a small sample of the Excel spreadsheet that contains the data from the 18 submitting organizations, showing Entity Name, Description, and submitting organization. The ADWP modelers added the Abstraction Level, and Element Type as described in this slide deck. The skos field would show the relationship to ADWP Neutral Concepts Model, as planned but TBD.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Thank you
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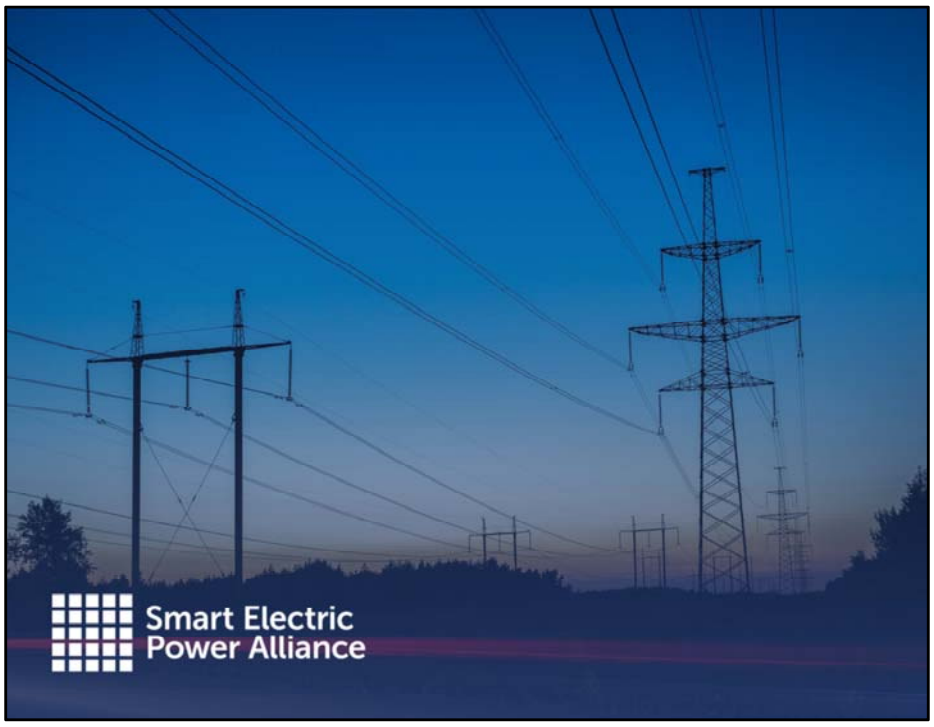
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