

# ***Understanding Reference Models and Reference Architectures***

SATURN 2014  
Software Architecture Conference

Portland, Oregon

Armstrong Process Group, Inc.  
[www.aprocessgroup.com](http://www.aprocessgroup.com)

# Objectives

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- Discuss industry standard best practices regarding how to use reference models for categorizing architecture content for different purposes
  - Planning, lifecycle management, gap analysis and enterprise-wide alignment
- Discuss how reference architectures are used
  - And how they differ, but related to reference models
- How they relate to architecture/solution building blocks (per TOGAF)
- Review conceptual metamodel representing these concepts

# About APG

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- APG's mission is to
  - “Align information technology and systems engineering capabilities with business strategy using proven, practical processes delivering world-class results.”
- Industry thought leader in enterprise architecture, business modeling, process improvement, systems and software engineering, requirements management, and agile methods
- Member and contributor to
  - UML, SysML, SPEM, UPDM at the Object Management Group (OMG)
  - TOGAF and ArchiMate at The Open Group
  - Eclipse Process Framework (EPF) at the Eclipse Foundation
- Sparx Systems Value-Added Reseller
- IBM Advanced Business Partner

# SEI Definitions

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- Reference model
  - A division of functionality into elements together with the data flow among those elements
- Reference architecture
  - A reference model mapped onto software elements that implements the functionality defined in the reference model

# TOGAF Definitions

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- The terms reference architecture and reference model are not used carefully in most literature
- “Reference architecture” and “reference model” have the same relationship as “architecture” and “model”
  - Either can exist as either generic or an organization-specific state
- Typically, generic reference architectures provide architecture team with an outline of their organization-specific reference architecture that will be customized for a specific organization
- Does also incorporate OASIS SOA RM definition

# Reference Model – OASIS

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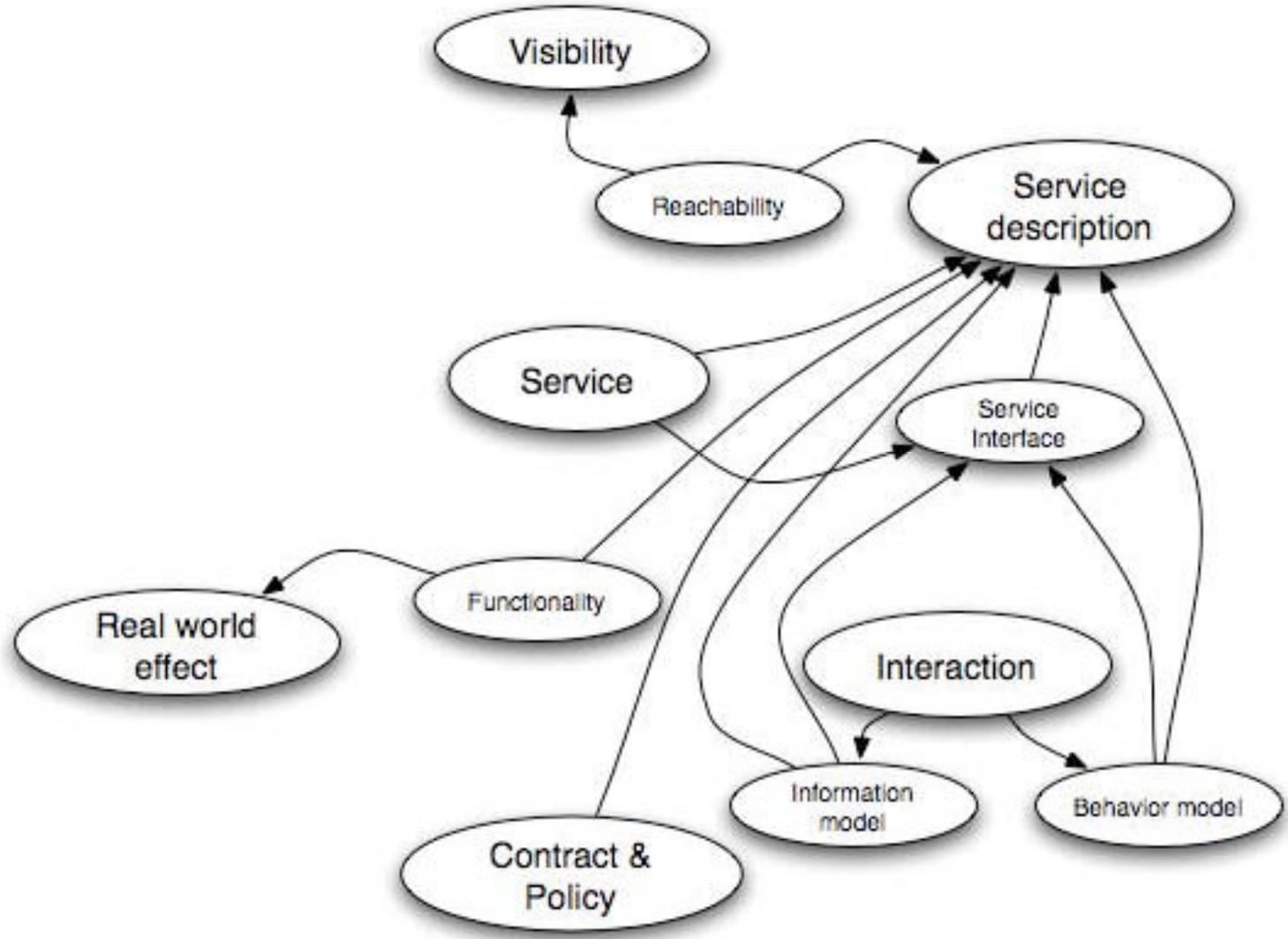
- An abstract framework for understanding significant relationships among the entities of some environment
  - For development of consistent standards or specifications supporting that environment
- Consists of minimal set of unifying concepts, axioms and relationships within particular problem domain
  - Independent of specific standards, technologies, implementations, or other concrete details
- OASIS Reference Model for SOA [SOA-RM] provides common language for understanding important features of SOA
  - Does not address the issues involved in constructing, using or owning a SOA-based system

## Reference Model – FEA

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- Structure which allows modules and interfaces of a system to be described in consistent manner
- Abstract framework for understanding significant relationships among entities of some environment
  - For development of consistent standards or specifications supporting that environment
- Based on small number of unifying concepts
  - May be used as basis for education and explaining standards to non-specialist
- Not directly tied to any standards, technologies or other concrete implementation details
  - Does seek to provide common semantics that can be used unambiguously across and between different implementations

# OASIS SOA Reference Model – Service Description



# EA TRM – Areas and Categories

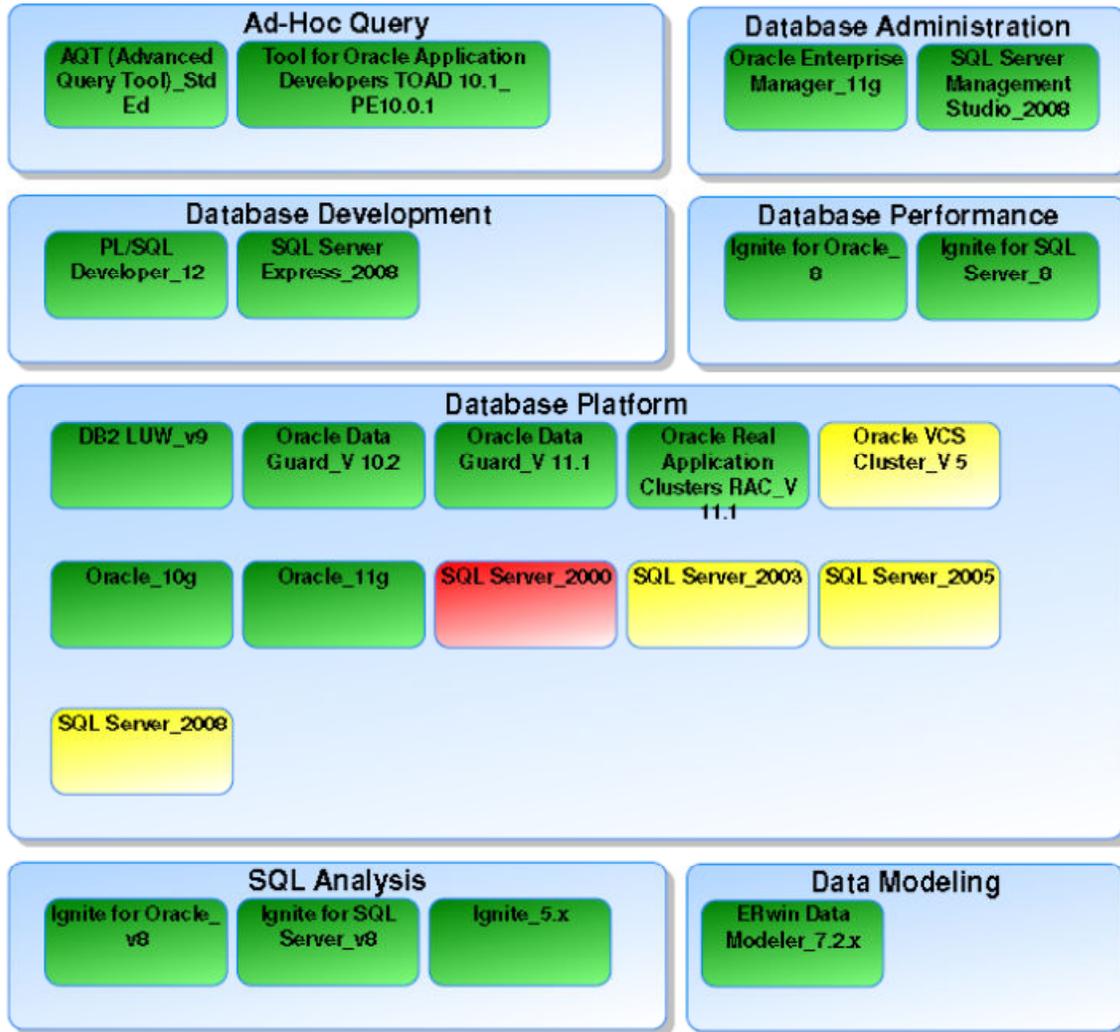


# EA TRM – Technology Component Catalog

Technology Area	Technology Category	Technology Component	Version	Lifecycle
Application Development, Design & Testing	Application Modeling	Rational Software Architect (RSA)_7.x	7.x	Standard
		Rational Software Modeler (RSM)_6.x	6.x	Retirement
		Rational Software Modeler (RSM)_7.x	7.x	Containment
		Rational XDE_7.x	7.x	Containment
	Caching	OpenSymphony OSCache_2.x	2.x	Standard
	Code Analyzer	Checkstyle_3.5	3.5	Containment
		Checkstyle_4.x	4.x	Containment
		Checkstyle_5.x	5.x	Standard
		EMMA_2.x	2.x	Standard
		FindBugs_1.2.x	1.2.x	Containment
		FindBugs_1.3.x	1.3.x	Standard
		JDepend_2.x	2.x	Standard
		OptimizeIt_1.x	1.x	Retirement
		PMD_4.x	4.x	Standard
		Sonar_2.x	2.x	Standard
	Code Builder	Apache Ant_1.x	1.x	Standard
		Apache Maven_2.x	2.x	Standard
		CruiseControl_2.x	2.x	Containment
		Hudson_1.x	1.x	Standard
	Code Formatter	Jalopy_1.0b11	1.0b11	Standard
	Code Metrics	JavaNCSS_1.x	1.x	Standard
	Compilers/Interpreters/JVM	IBM Cobol370_1.2	1.2	Standard
		JDK_1.5	1.5	Standard
	Defect Management	QualityCenter_9.2	9.2	Standard
	Development Framework	Apache Struts_1.x	1.x	Containment
		Grails_1.x	1.x	Standard
		Groovy_1.x	1.x	Standard
		Spring_2.5	2.5	Standard
		Struts_2.x	2.x	Standard
	General	Apache FOP_0.9x	0.9x	Standard
		Apache POI_3.x	3.x	Standard
		AspectJ_1.x	1.x	Standard

# EA TRM – Technology Area

## Database Technology Area Roadmap



**Technology Component Lifecycle**

- Standard (Green box)
- Containment (Yellow box)
- Retirement (Red box)

# US Department of Veterans Affairs TRM

Category Mapping Report x

www.va.gov/TRM/ReportVACategoryMapping.asp

Apps APG APG Web Mail Mimeo Box RedMine Associated NR Schools Salesforce Open Group LotusLive OMG OMG Other bookmarks

UNITED STATES  
DEPARTMENT OF VETERANS AFFAIRS

Search All VA Web Pages  
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One-VA TRM Home

Search One-VA TRM

Technology/Standard List

TRM Reports

Submit Idea to Improve TRM

TRM Glossary

Site Map

**ONE-VA TECHNICAL REFERENCE MODEL v14.4**

**VA Category Mapping Report**

The following table displays the VA Category mapping of each One-VA TRM entry:  
*TIP: To view constraint information hover the cursor over the constraint icon ⚠ to the right of the Entry Name.*

Domain	Area	Category	Entry Name
Application Technology	Application and Web Server Software	Application Server Software	Encoder-Plus For XP/Win7 ⚠
			FileNet P8 Platform
			Glassfish Server ⚠
			JBoss AS (Application Server) ⚠
			JBoss EAP (Enterprise Application Platform) ⚠
			Medical Domain Web Services (MDWS) ⚠
			New Atlanta ServletExec
			Oracle B2B Integration
			Oracle BPEL Process Manager
			Oracle Business Activity Monitoring (BAM)
			Oracle Business Rules
			Oracle Event Processing ⚠
			Oracle Human Workflow

# VA TRM Entry – JBoss AS

**Vendor Release Information**

The Vendor Release table provides the known releases for the TRM Technology, obtained from the vendor (or from the release source).

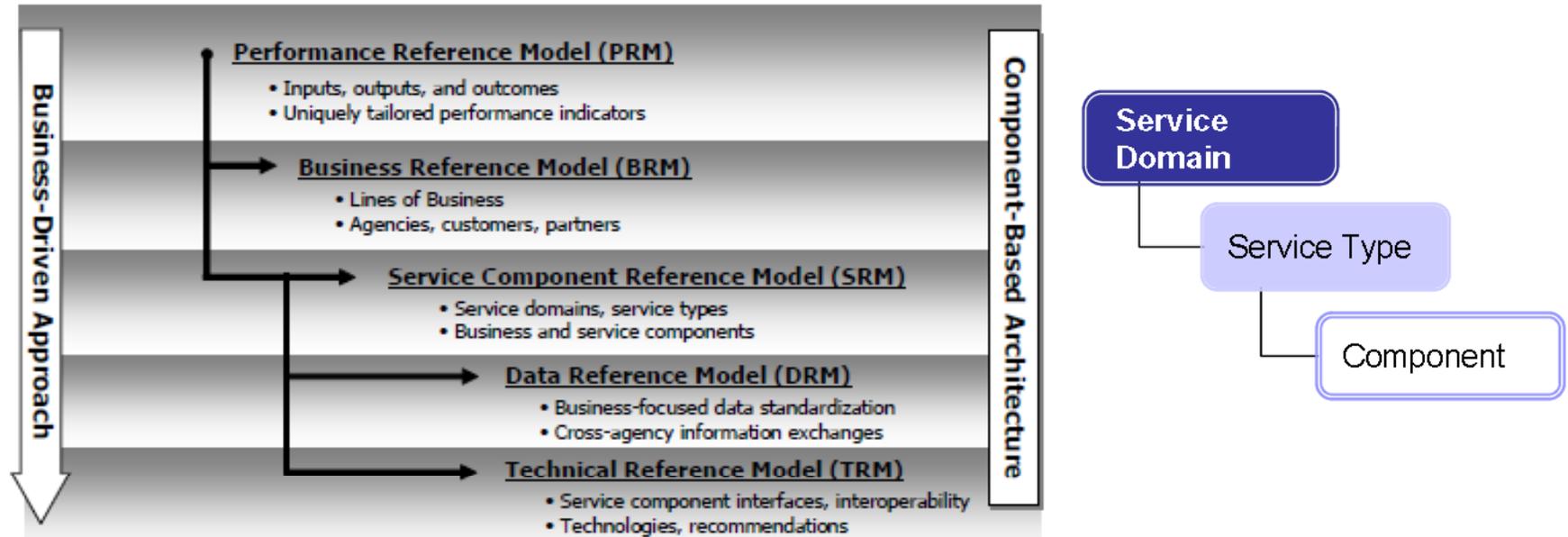
Version	Release Date	Vendor End of Life Date	Vendor Desupport Date
4.2.3 GA	07/18/2008		
5.x	12/05/2008		
5.1.0	05/23/2009		
6.x	12/28/2010		
6.1.0	08/16/2011		
7.x	07/12/2011		
7.1.0	02/16/2012		
7.1.1	03/09/2012		
7.1.2			

**Current VA Forecast (05/23/2013)**

The VA Forecast offers the current and future VA IT position regarding different releases of the TRM entry. The forecast is based on the best information-judgment on the current forecast date (see above). The consumer of this information has the responsibility to consult the organizations responsible for the desktop, testing, and-or production environments to ensure that the target version of the technology will be supported. Any major.minor version that is not listed in the VA Forecast Information is considered prohibited from use.

Release	CY2013				CY2014				CY2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
5.x	None	None	Prohibited									
6.x	None	None	Supported	Supported	Supported	Supported	Supported	Supported	Deprecated	Deprecated	Deprecated	Deprecated
7.x	None	None	Supported	Deprecated								

# OMB Federal Enterprise Architecture (FEA)



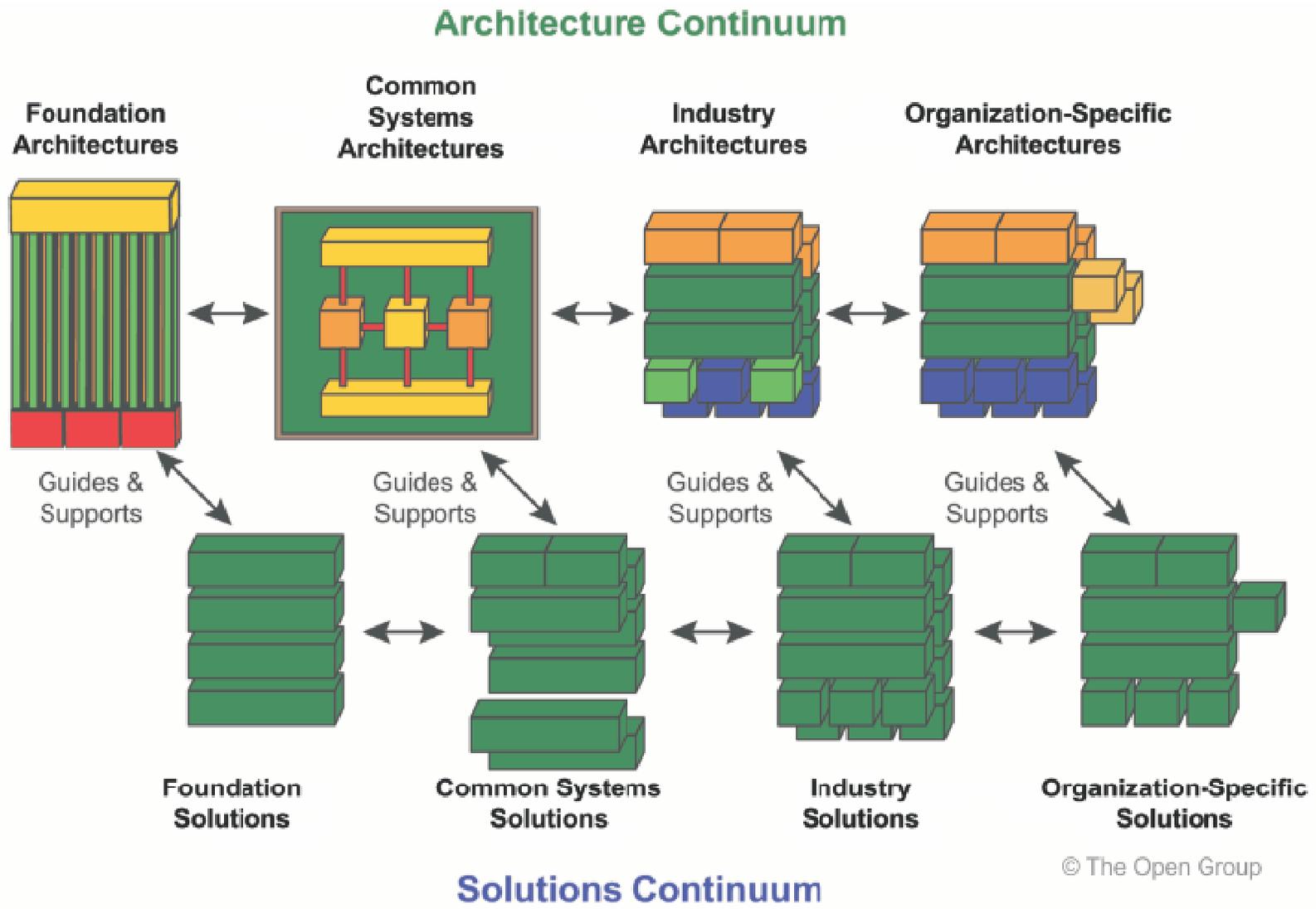
- Equips OMB and Federal agencies with **common language and framework**
  - Describe and analyze **investments**
  - Enhance **collaboration**
  - **Transform** Federal government
- Consists of set of **interrelated** “reference models”
  - Comprise framework for describing important elements of federal agency operations
- Agency investments can be better **managed** and **leveraged** across federal government

# FEA – Service Reference Model (SRM)



- Aids in recommending service capabilities to support reuse of business components and services across federal government
- Service domains
  - Customer Services
  - Process Automation
  - Business Management Services
  - Digital Asset Services
  - Business Analytical Services
  - Back Office Services
  - Support Services

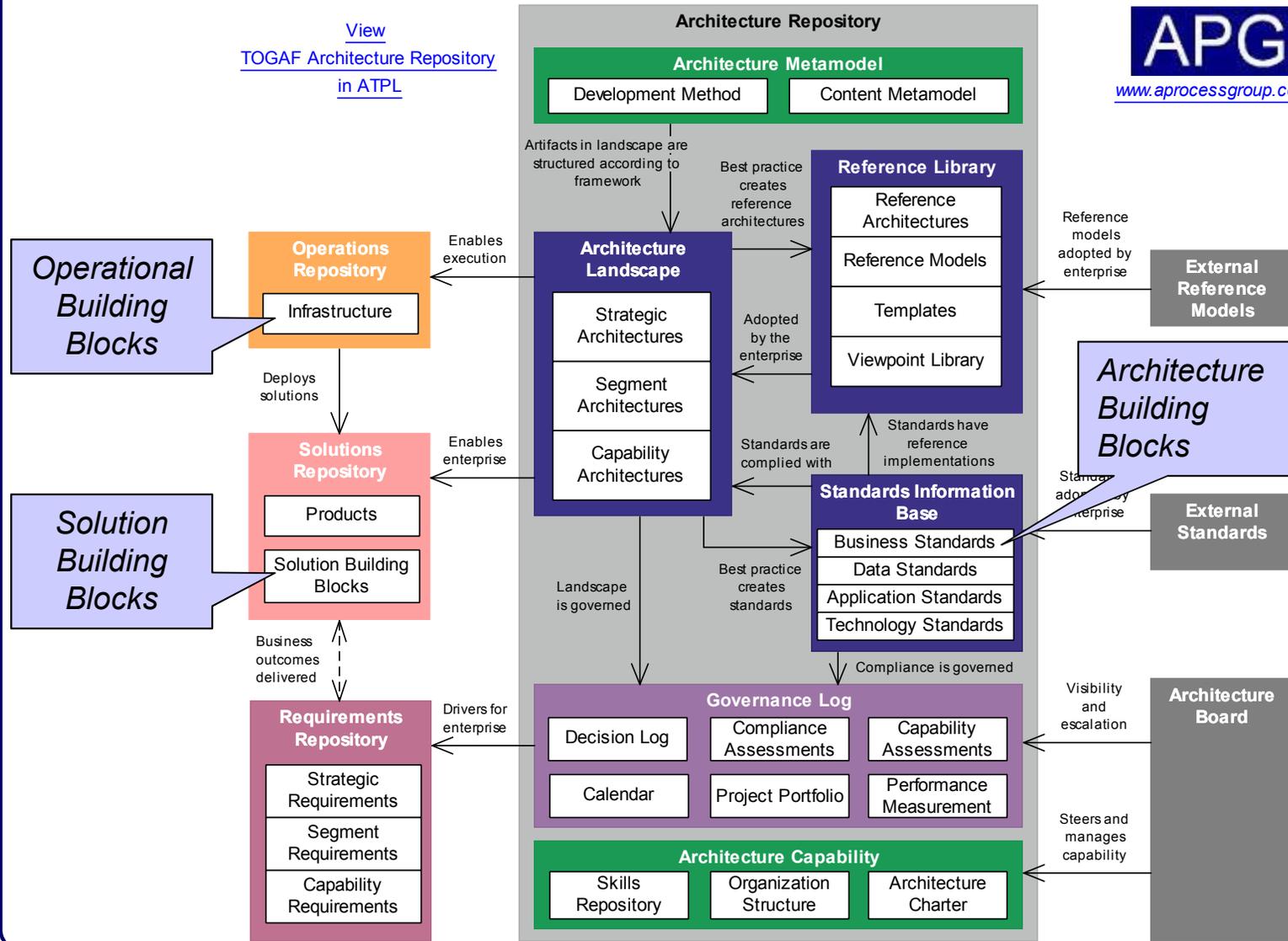
# TOGAF Enterprise Continuum



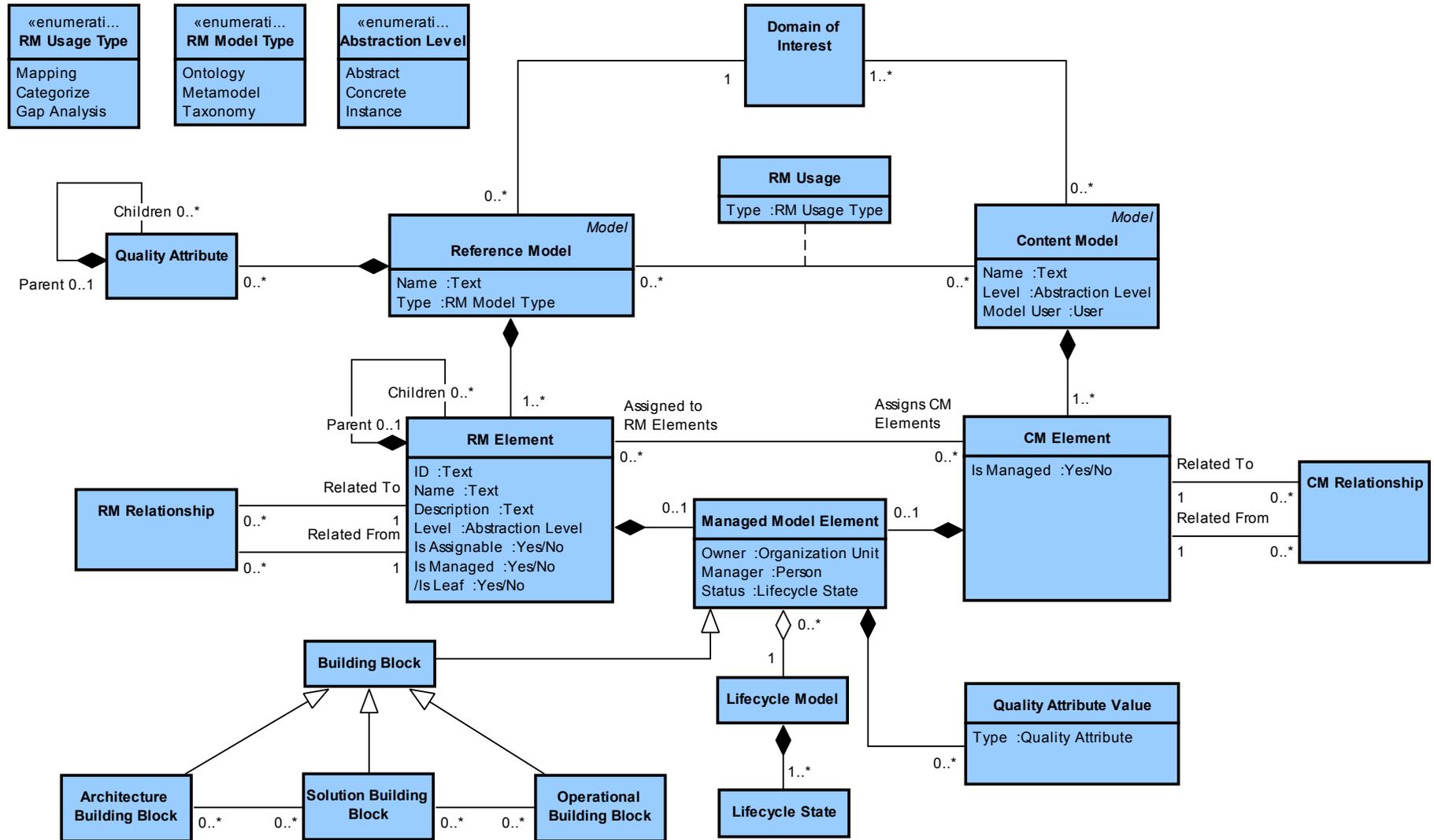
# TOGAF Enterprise Repositories



[View TOGAF Architecture Repository in ATPL](#)



# Reference Model – Conceptual Metamodel

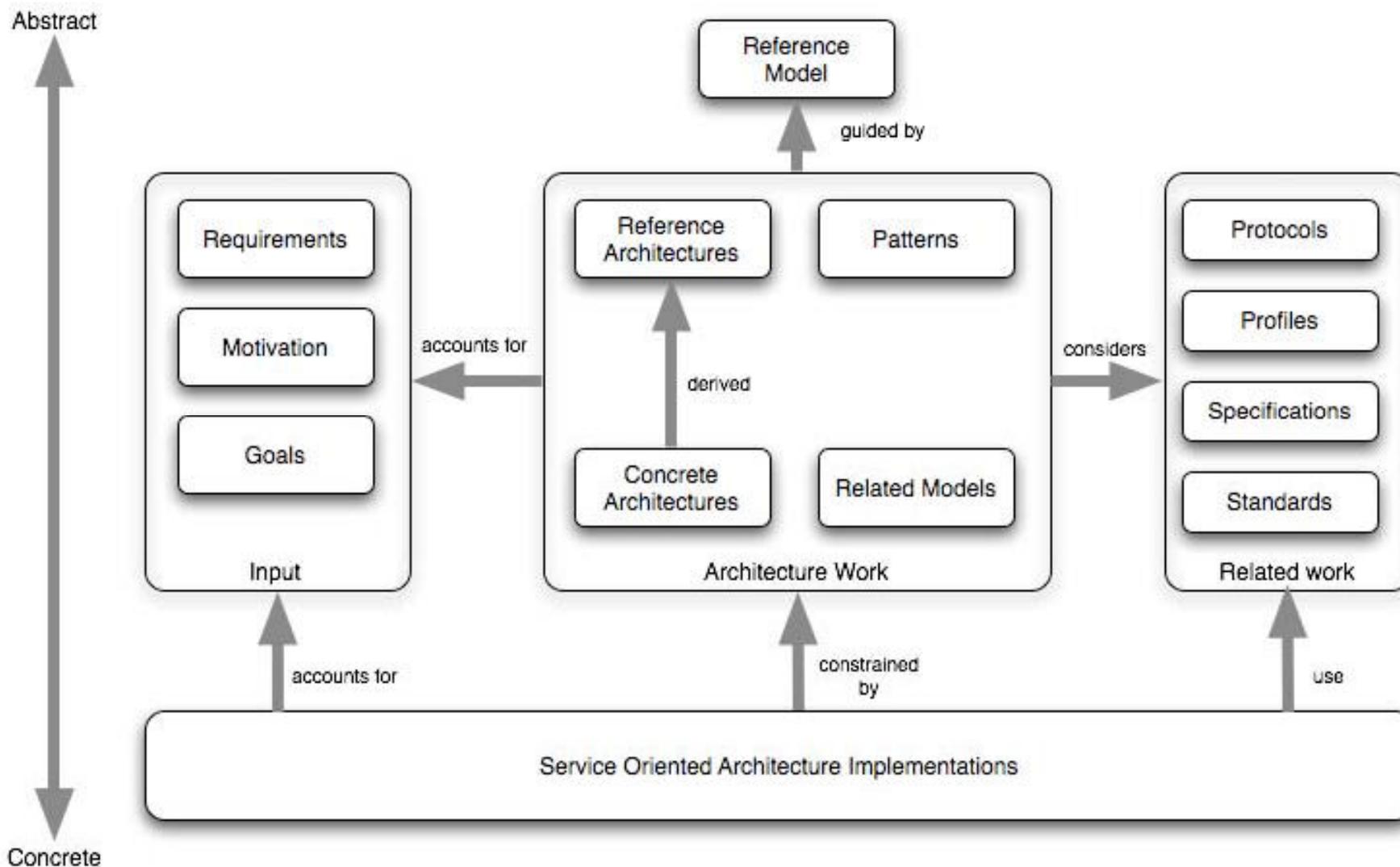


# Reference Architecture – OASIS Definition

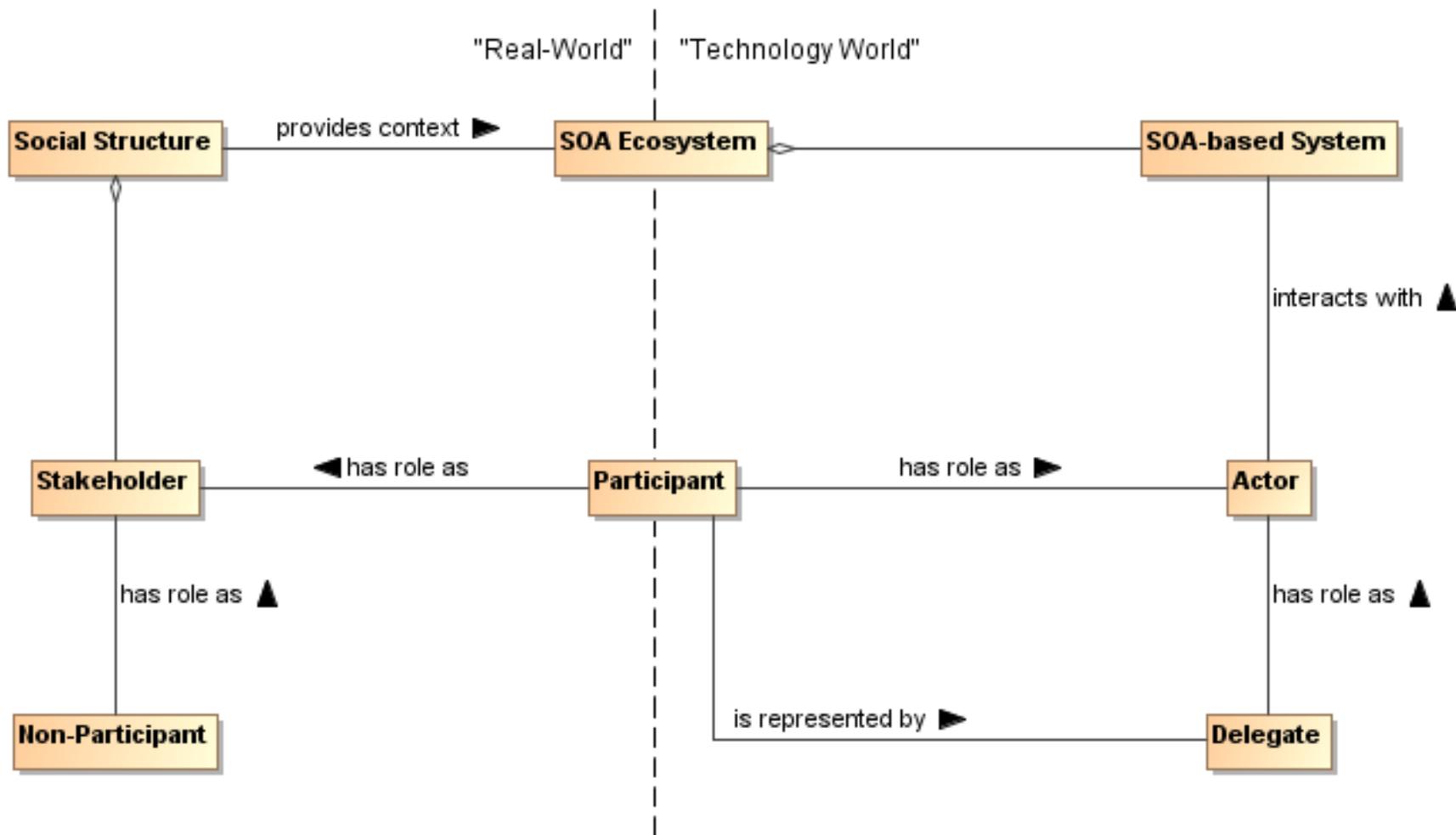
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- An architectural design pattern that indicates how an abstract set of elements and relationships realizes predetermined set of requirements in domain of interest
  - Independent of technologies, protocols, and products that are used to implement specific solutions
  - Differs from reference model in that reference models describe important concepts and relationships in the domain
- Shows more complete picture that includes showing what is involved in realizing the modeled entities
  - Independent of particular solution but instead applies to class of solutions
- Possible to define at many levels of detail or abstraction for different purposes
  - Not a concrete architecture, depending on requirements being addressed by the reference architecture
  - Generally will not completely specify all the technologies, components and their relationships in sufficient detail to enable direct implementation

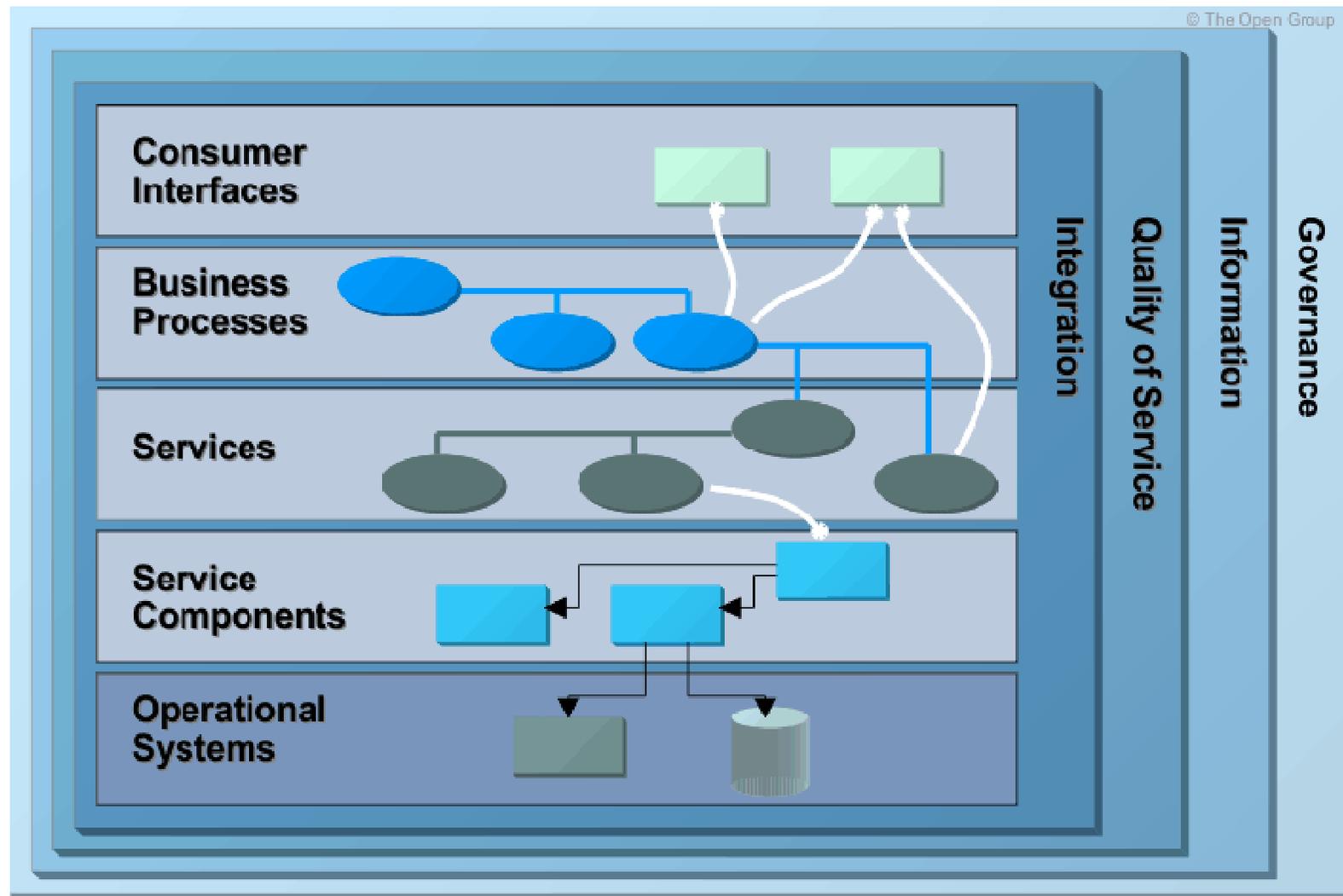
# OASIS RA-RM Context



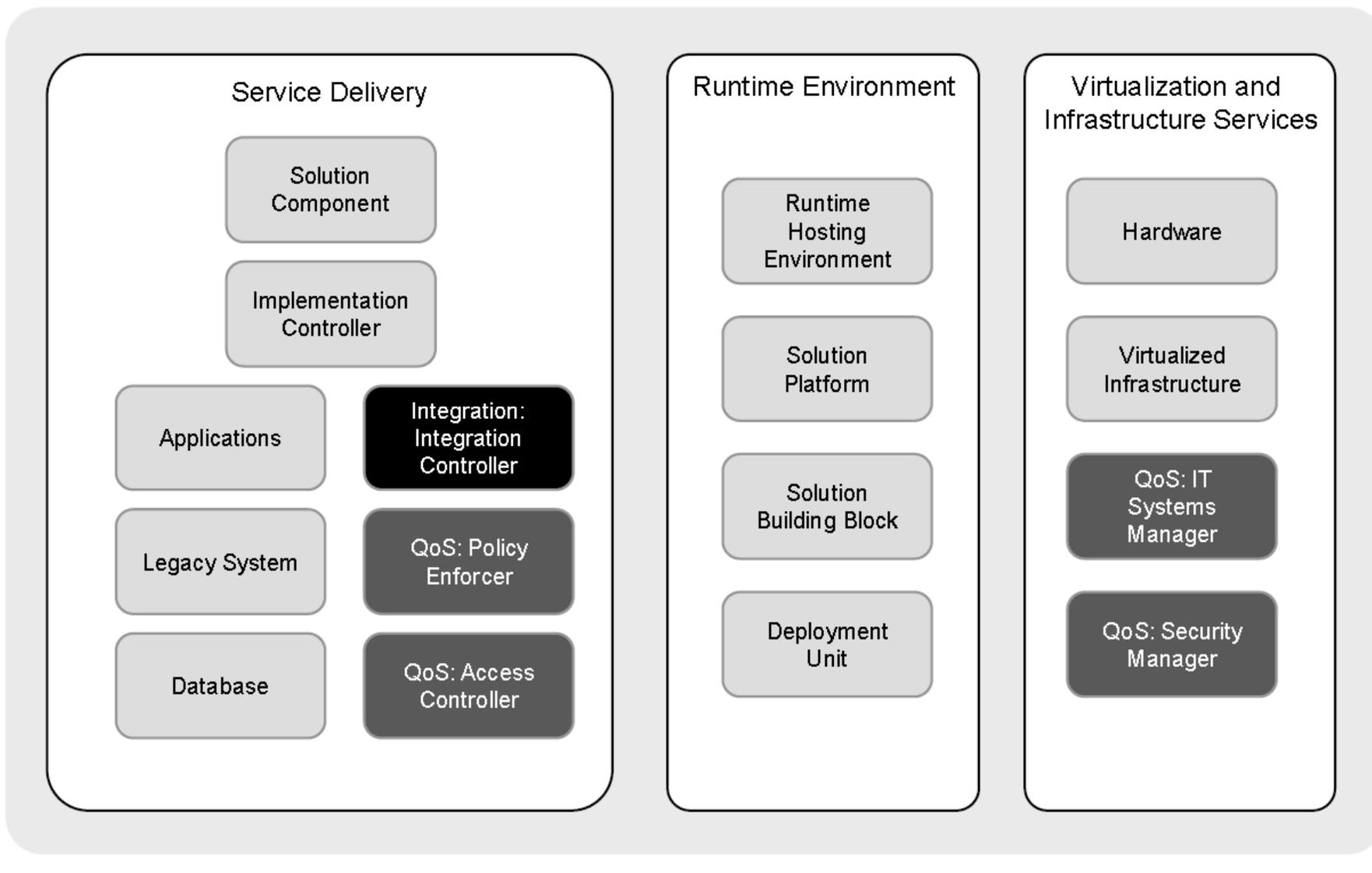
# OASIS RA – Social Structure



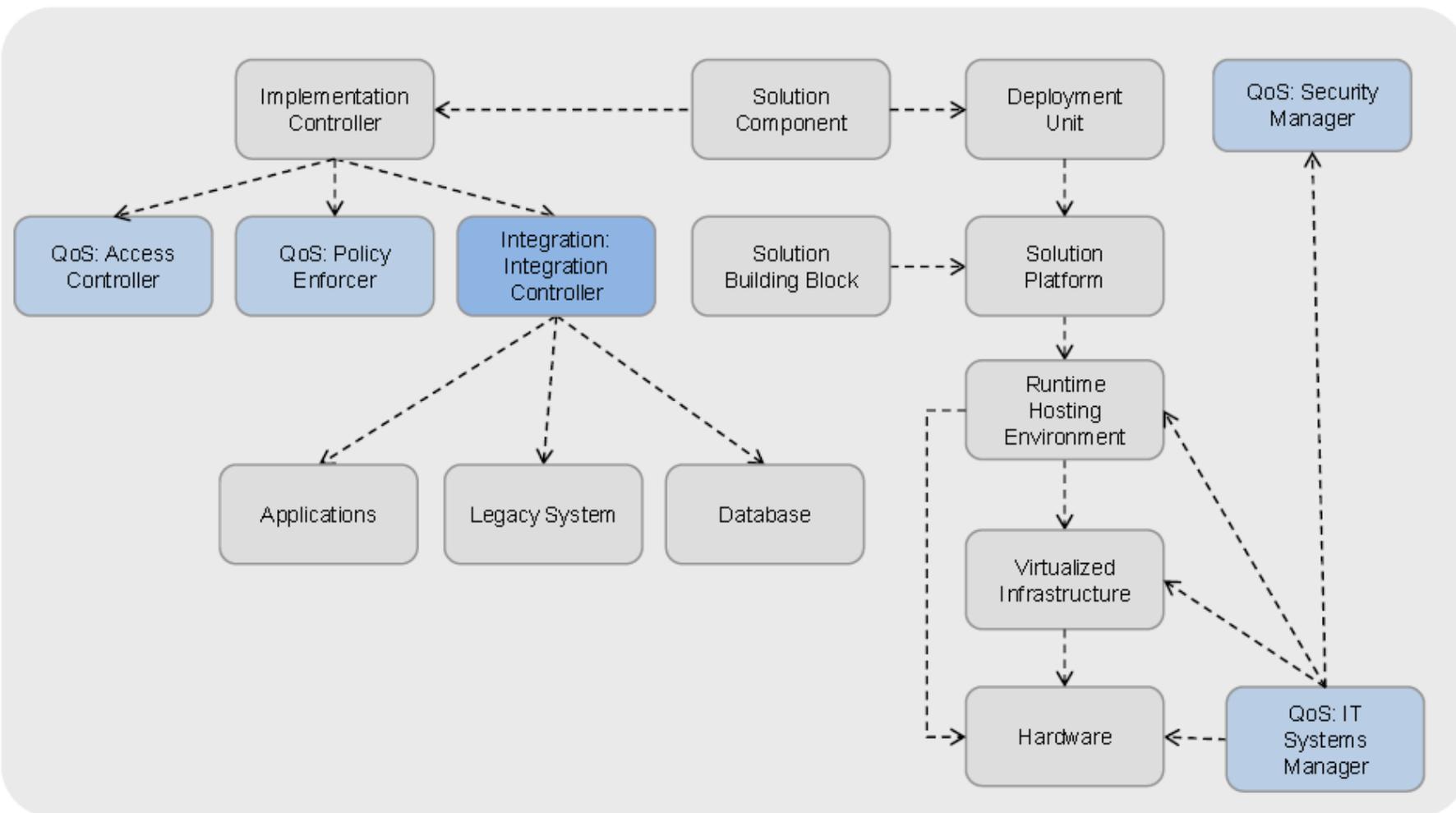
# Open Group SOA Reference Architecture



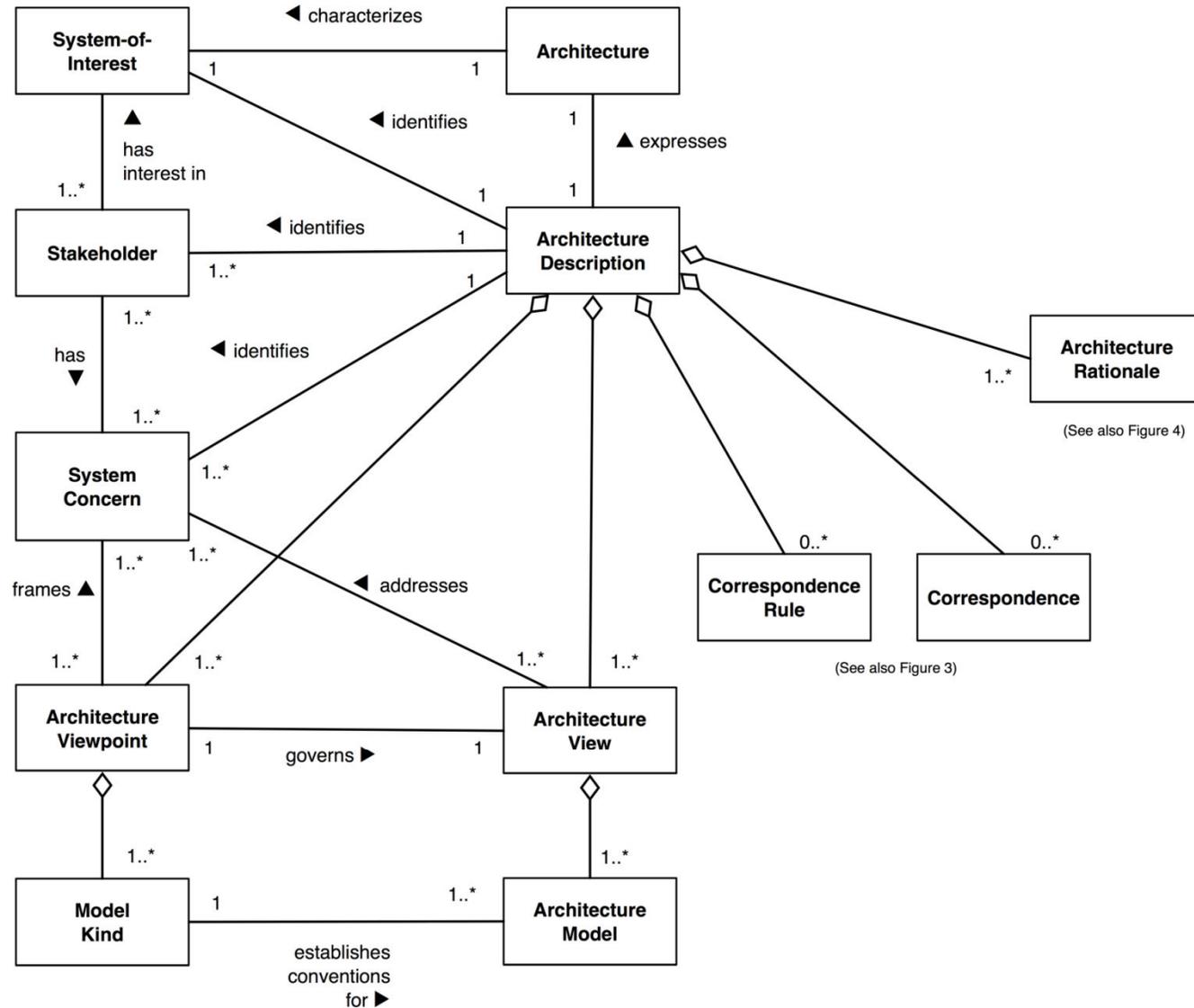
# OG SOA RA – Operational Layer Elements



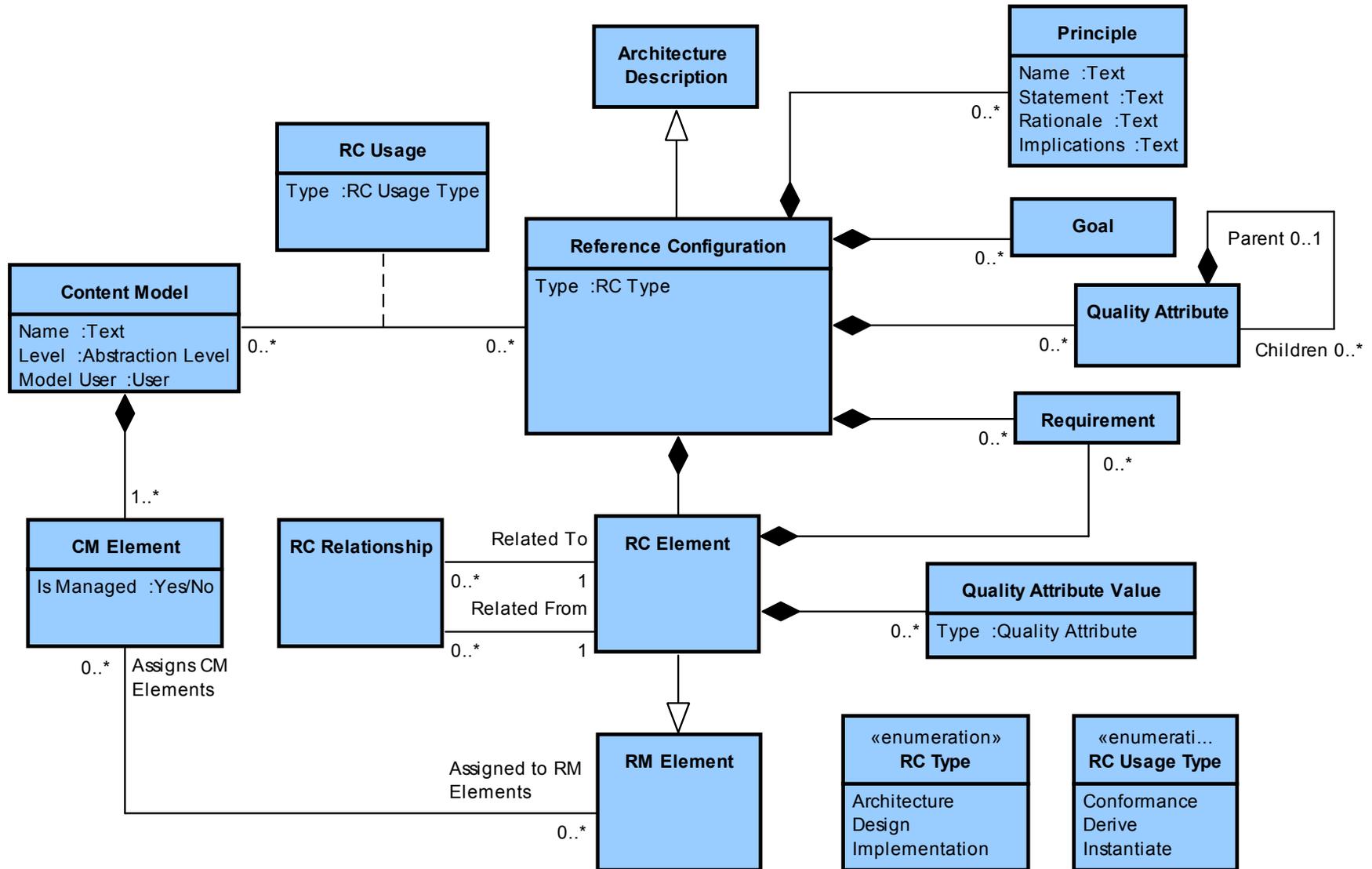
# OG SOA RA – Operational Layer – Relationships



# Architecture Description Standard



# Reference Configuration – Conceptual Metamodel



## Conclusion

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- Reference models used to represent properties of elements in a domain of interest
- Reference architectures represent configurations of reference model elements created to address specific requirements based on specific set of principles
  - Could be considered a set of patterns or a pattern language
- Content model elements can be mapped to reference model elements for categorization/organization purposes
  - Sometimes used for managing/governing groups of related content model elements
- Content model elements can be configured instantiations of reference architectures

# Q&A



<http://www.aprocessgroup.com>

***Thanks for your attention  
and participation!***

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