OBJECT MANAGEMENT GROUP

Architectural Ecosystem (AE) AB SIG

Introduction

Cory Casanave
Object Management Group
Model Driven Solutions

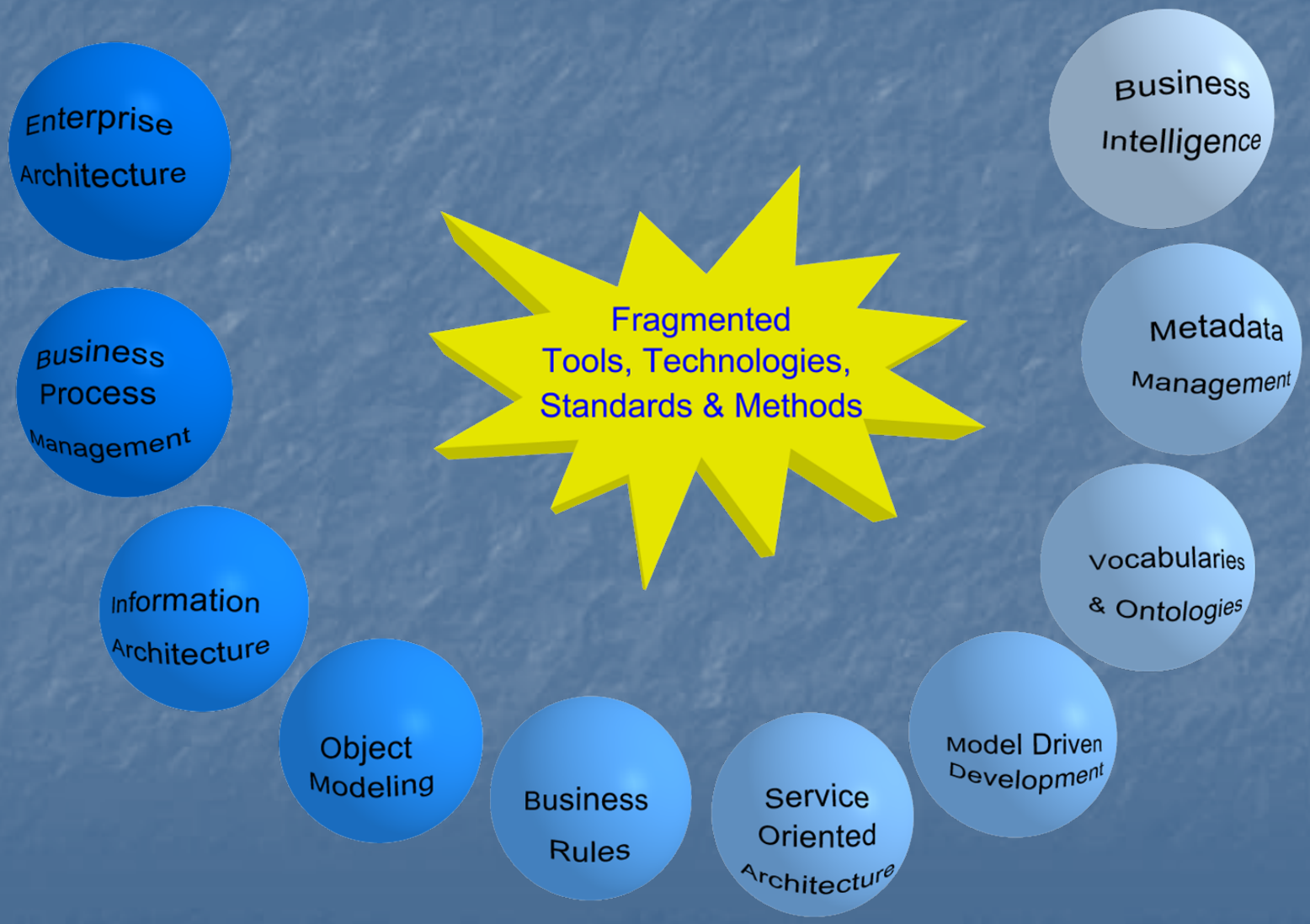
Speaker Introduction

- Cory Casanave
  - Co-Chair of Architecture Ecosystem SIG
  - OMG Board Of Directors
  - DAS – Open Government Vocabularies Workgroup
  - CEO Model Driven Solutions – Architectural services for closing the gap between business and technology
    - Enterprise, Business, System and System of Systems architectures, Service Oriented, Integration, Business process and Information Architectures, Semantic Web, Executable Model Driven Architectures, Analytics
  - Founder – Modeldriven.org, open source community for executable modeling and model integration
  - Contact: cory-c at modeldriven dot com

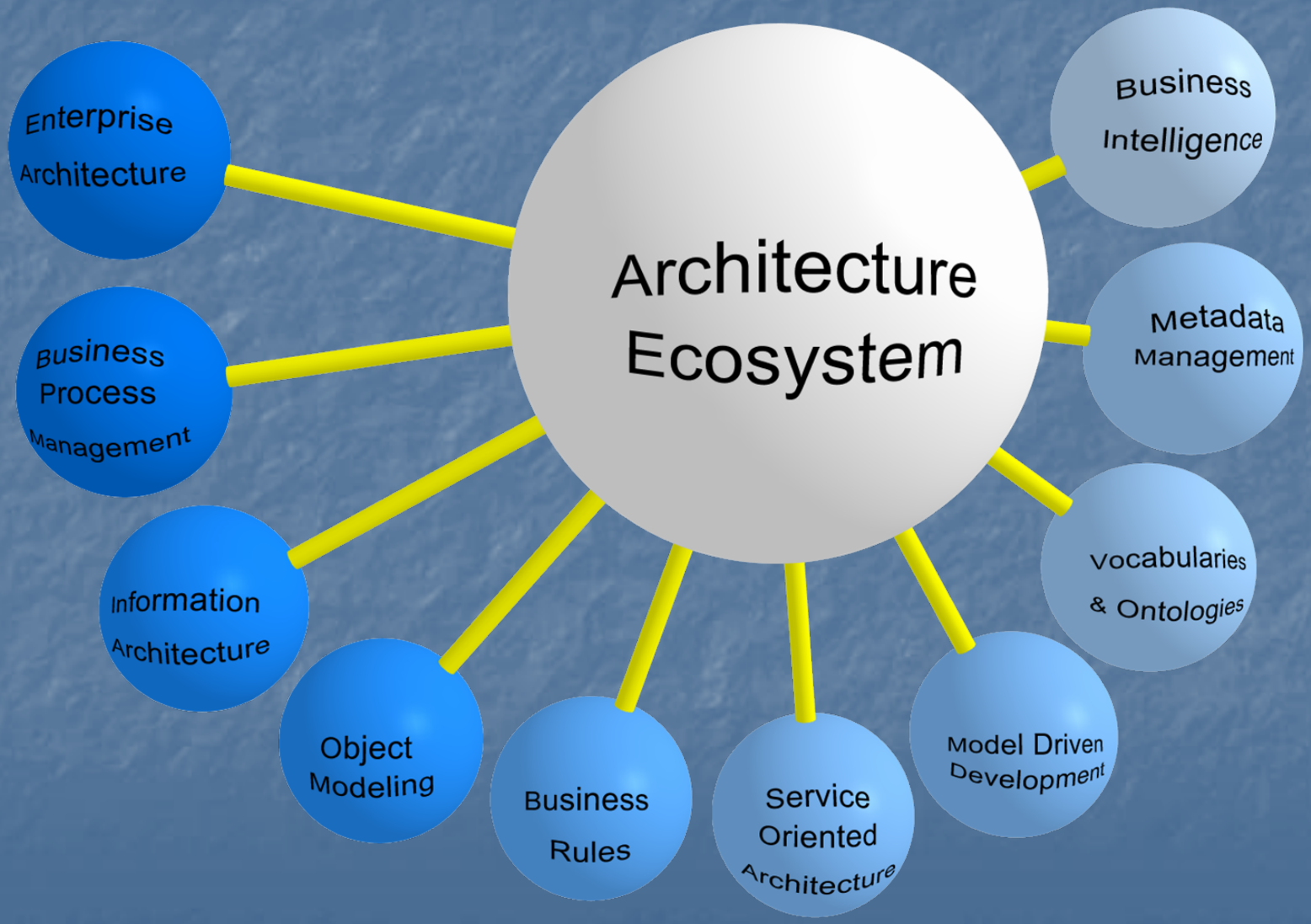
OBJECT MANAGEMENT GROUP

- The OMG is the leading consensus standards organization for modeling, model driven architecture and distributed computing with over 500 members
- Standards include
  - UML (Unified Modeling Language)
  - UPDM (DODAF/MODAF in UML)
  - BPMN (Business Process Modeling Notation)
  - SoaML (Service Oriented Architecture Modeling Language)
  - Corba (Common Object Request Broker)
  - MOF (Meta Object Facility)
  - FSAM (Federal Segment Architecture Methodology)

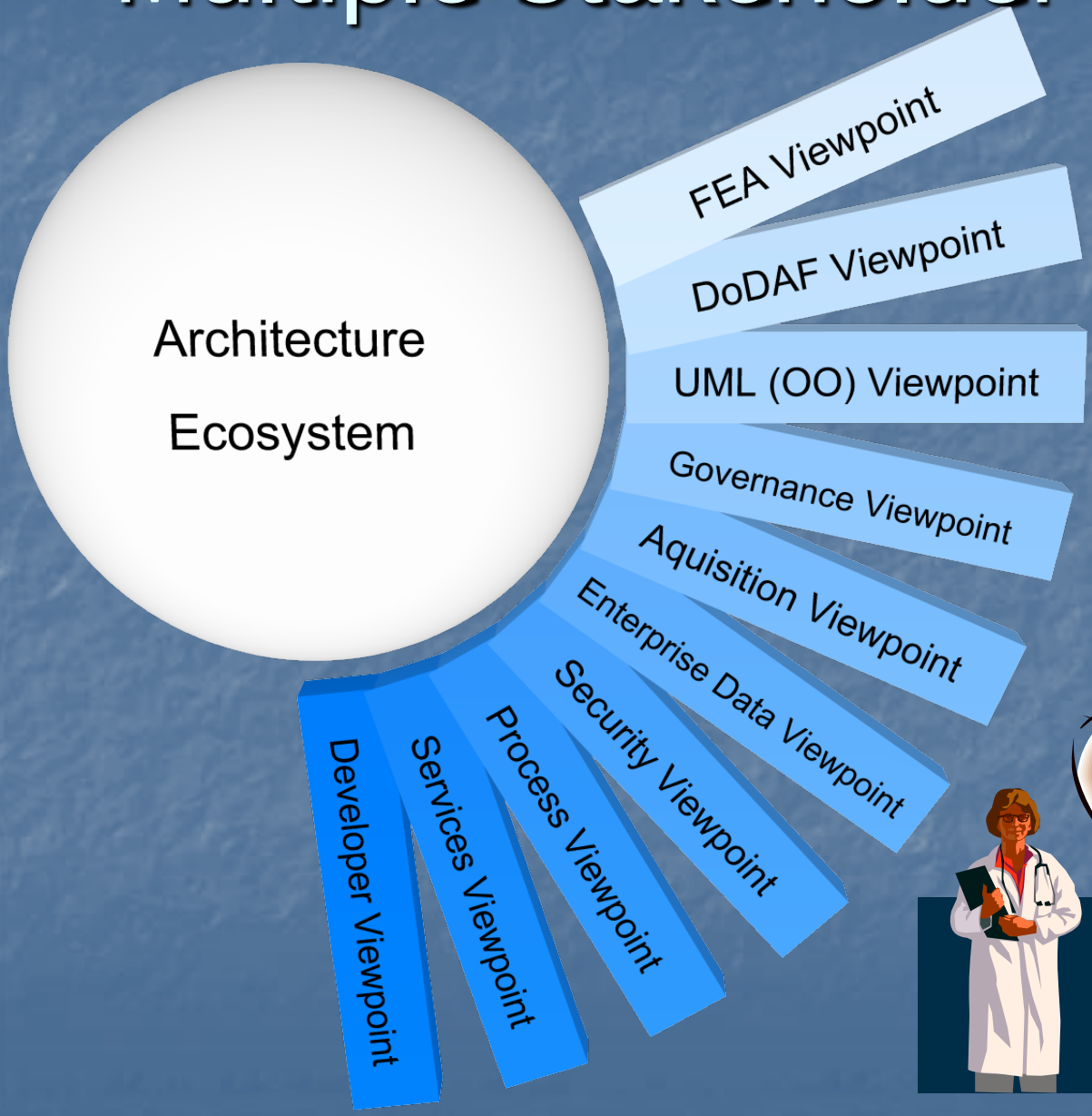
Problem: Fragmented Architecture Domains



Proposal: Unified Architectures

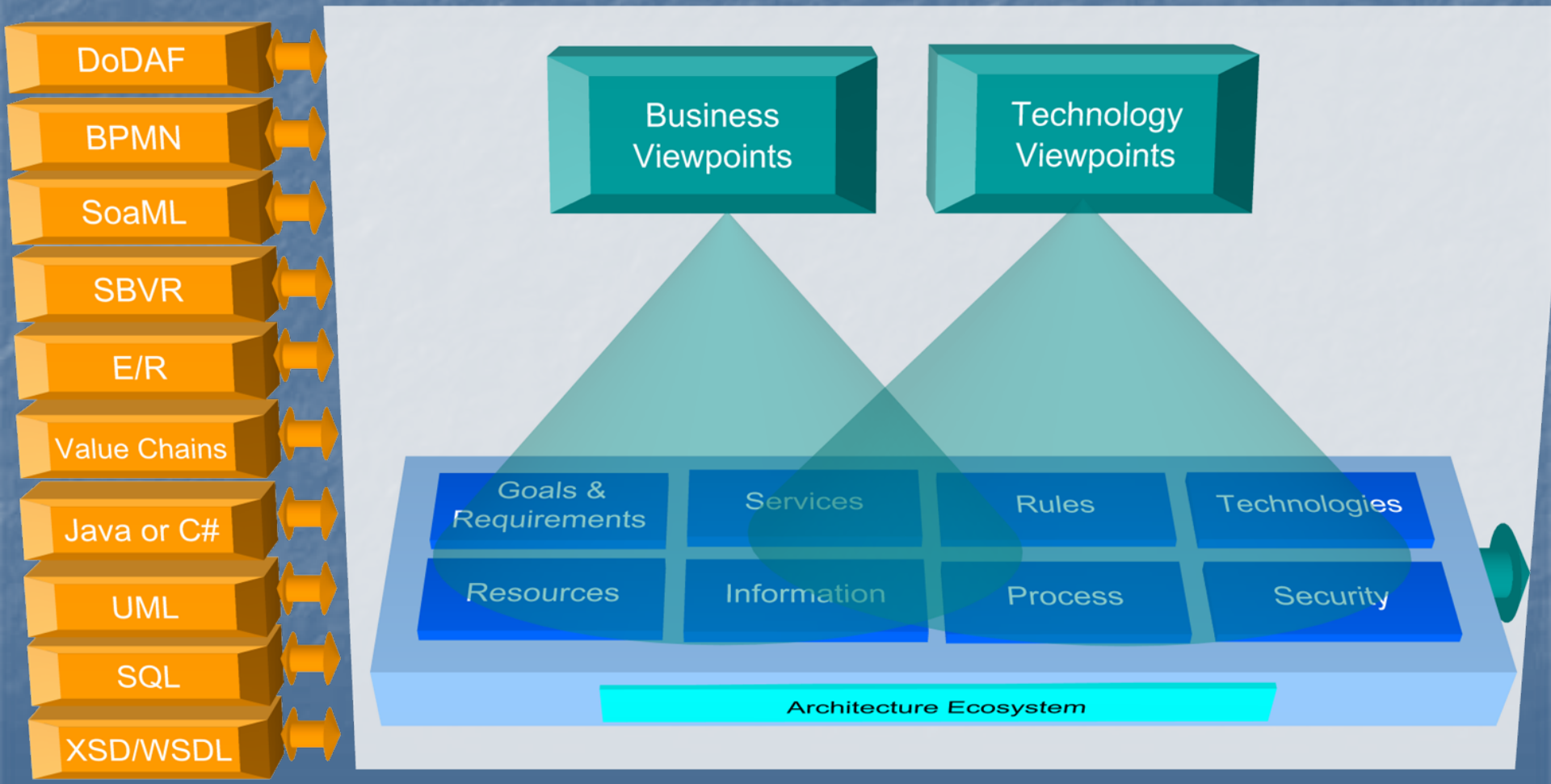


Multiple Stakeholder Viewpoints



Different stakeholders need different views of the <u>same information</u>

Semantically Federating Multiple Viewpoints and Standards



AESIG Objectives

- The full value of modeling and architecture is achieved by understanding and defining systems from many perspectives (viewpoints)
  - “Systems” are inclusive of the enterprise, business architectures, information systems architectures, software, processes, rules, services and information.
  - Systems include “systems of systems” at the macro level
- Systems are not insular, they are composed of and interact with other systems
- Today's models typically represent one perspective of one system and are difficult to combine with other perspectives so the whole system of systems can be understood
- These different perspectives come from different stakeholders using different tools and different languages – but they all talk about the same systems and express overlapping information

- Our objective is to enable model and language integration and expression using multiple viewpoints
- This must be done in an open environment that can leverage a broad community

Where We Are Today

- MOF (Meta Object Facility)
  - Modeling languages in OMG are defined in the MOF, this provides a model driven platform for defining the structure of modeling languages and interchanging models in those languages
  - Both new and existing languages have been defined in the MOF, including UML, DoDAF, XSD, SQL, Etc.
  - The exchange format is called “XMI”
  - This allows models in multiple languages to co-exist in the same repository and be exchanged between tools

But: The Meta-Muddle

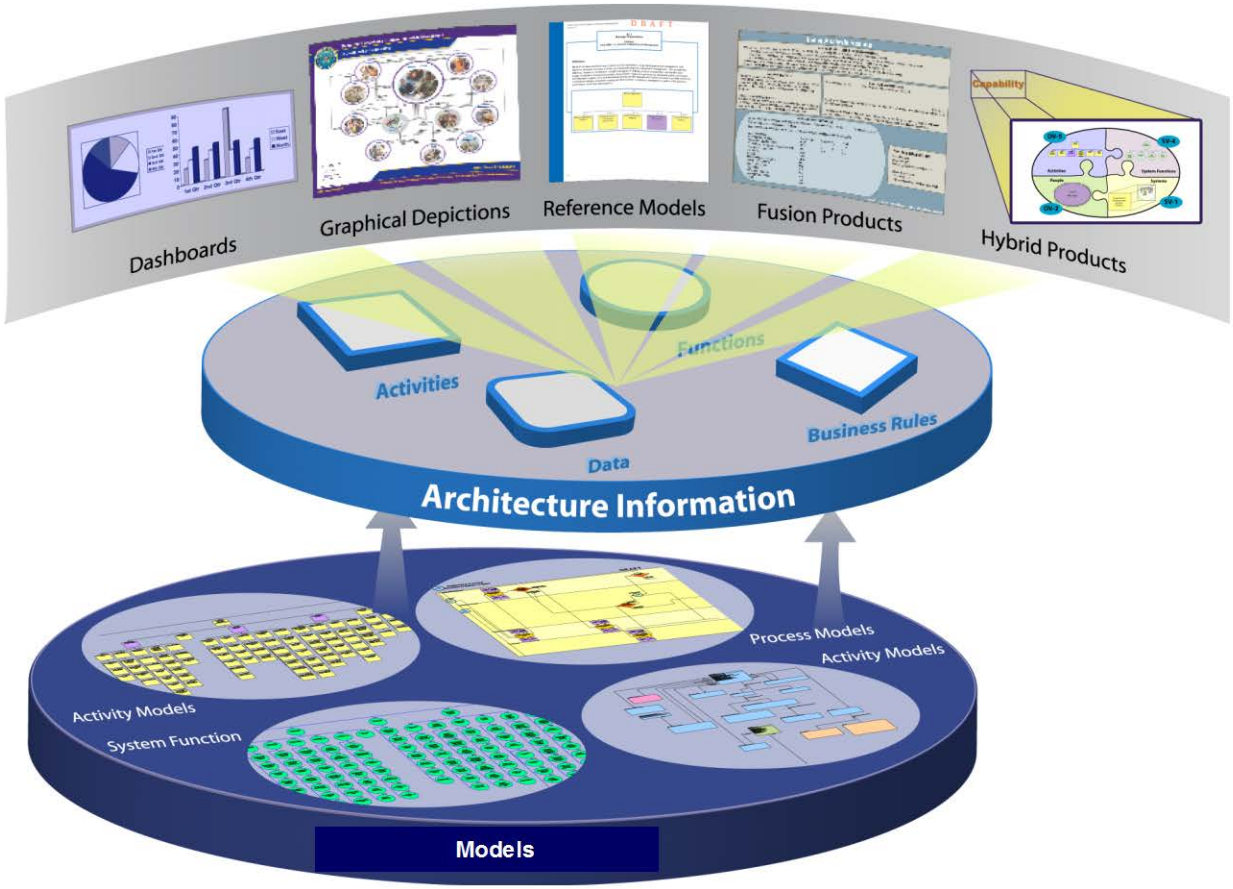
- The MOF is structural and does not provide for multiple languages, profiles & viewpoints to be easily integrated.
- OMG defines “languages” as both MOF and UML profiles, these don’t play well together
- The OMG and other organizations have created stovepipes, hard to integrate and understand
- Since each stovepipe has to solve world hunger, each becomes big and complex or dies
- Consider using these together today:
  - UML-2, BPMN-2, IMM, ODM, SBVR, SoaML, SysML, UPDM
  - Profiles do not mix well with other profiles or with other meta models at all
  - Mapping the stovepipes does not make an effective integrated environment!
- This meta-muddle is compromising the value of each standard and making OMG & modeling less relevant
- We need to FIX the Meta-Muddle Madness!

Related Current OMG Processes

- fUML (Completed) – Formal, Executable subset of UML
- Semantic MOF (In finalization) – Adds a few of the “semantic web” capabilites to MOF
- Diagram Definition – Formal specification of the relationship between models and views of that model
- MOF 2 RDF – Ability to represent MOF models in the semantic web

Example - DoDAF-2 Vision

"Fit for Purpose" Architecture Descriptions



Based on models and authoritative information (data), the architectural description can support desired presentations for multiple purposes.

DEPARTMENT OF DEFENSE
CHIEF INFORMATION OFFICER
Creating an Information Advantage

The Architectural Ecosystem
Open Markets, Open World

- The technologies and standards that have been successful are those that provide a foundation for the marketplace to build on
  - Visual Basic, Java, Eclipse, TCP/IP, Etc
- Why are people still building their modeling foundations on PowerPoint, Visio and Excel?
  - Because the foundation we have provided is not open – it is a "closed world" except for the restrictive capabilities of UML profiles.
- An Open Market / Open World approach to modeling has an inherently unlimited market and the potential to excite and embrace new users and new markets

This is being done now

- Current Integrated Modeling Efforts
  - DoDAF DM2
  - FEA/FSAM
  - Proprietary tool models
  - BPDM & IMM
  - Nasa NExIOM
  - (Proposed) OMG Business Modeling Framework
  - Unified Process Model (NIST)
  - Model Driven Solutions “EKB”
  - Others….

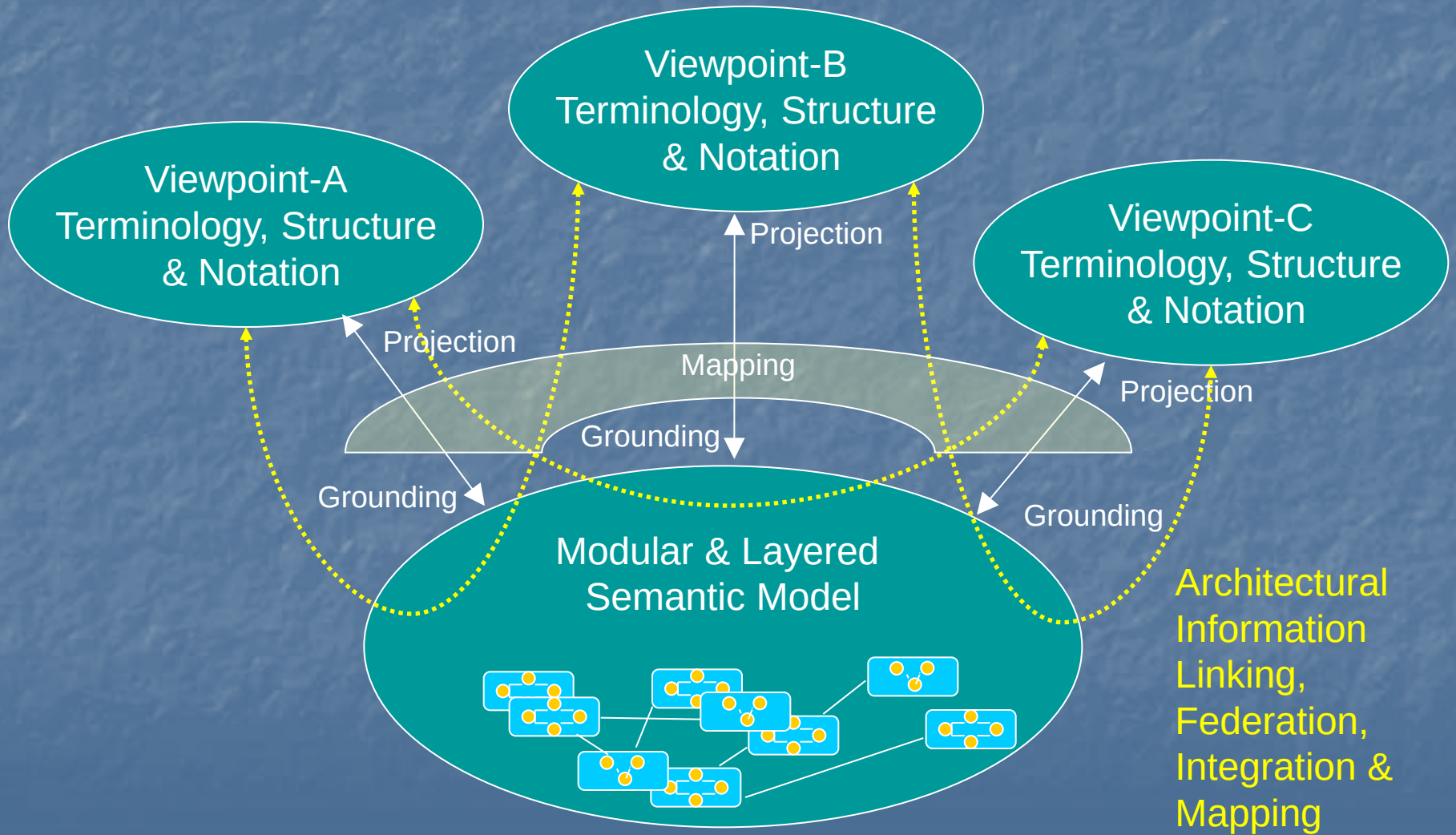
A major problem and multiple non integrated solutions – sounds like standards time!

Where We Are

- AESIG is trying to solve a “big problem”, this is not an easy transition. We are potentially stepping on some big toes!
- The SIG has been active for less than one year
- There are some open questions
  - What is the best foundation for our needs? Is it an evolution of MOF, Semantic Web, Common Logic, UML, Other?
  - Is the core problem model integration or modeling language integration
  - How “semantic” do we need to be, or is structure and mapping sufficient?
  - Are the solutions to this ready for standards or are they research?

!

Notional Architecture



Architectural Information Linking, Federation, Integration & Mapping

Recent Progress

- Last OMG meeting a strawman RFP was considered
  - This RFP is very “open” and asks for solutions to the high level problem
  - It could be satisfies by multiple technology foundations (MOF, RDF, Common Logic, Etc)
  - The consensus was that this was to open and we should try and make more choices and approach the problem in more steps

Current Activity

- Potential roadmaps are being prepared and discussed
  - UML centric
  - Semantic Web Centric

Example Ecosystem Foundation

- Enterprise Knowledge Base
  - Integrates architectures using semantic web
  - Initial funding from GSA
  - Provides that this is doable
  - Open source on www.modeldriven.org
  - Evolving slowly, not currently funded

Getting Involved

- OMG Membership is advantages but not required
- Created wiki and mailing list
  - http://www.omgwiki.org/architecture-ecosystem
- Contact Cory Casanave (cory-c at modeldriven dot com) for mailing list access
- OMG Meetings
  - Dec 6-10, Santa Clara CA
  - March 21-25th, Washington DC

DRILLDOWN SLIDES

Mission Statement Introduction

The mission of the Architecture Ecosystem SIG (AE SIG) is to work with OMG domain and platform task forces, other relevant OMG SIGs, external entities and related industry groups to facilitate the creation of a common architectural ecosystem. This ecosystem will support the creation, analysis, integration and exchange of information between modeling languages across different domains, viewpoints and from differing authorities. In particular the need for business and enterprise level architectural viewpoints must be better integrated with the technical viewpoints that define systems to address enterprise needs. The AE SIG will focus on the capability to define and integrate languages and models in various viewpoints and support other groups that will focus on the specific viewpoints required for their specific domains. The set of viewpoints, supporting models and supporting technologies will comprise the ecosystem.

Problem Statement

OMG languages can be defined using the MOF meta model and models based on OMG standards can be exchanged and serialized using the MOF standards. In this way the MOF provides a common platform for exchanging and, in some cases managing, model information. Despite the MOF capabilities, languages and UML profiles are excessively stove piped and not easily integrated. Information in models is not easily accessible over the internet which makes it difficult to query, federate and links across models from different authorities and those in different languages. The semantics of language elements is not well grounded or formalized. Real and perceived issues with the MOF as well as OMG process have contributed to these problems.

Desired Result

The resulting capability envisioned by the AE-SIG is that architectural viewpoints (also known as domain specific languages or DSLs) will be better integrated and consistent, enable more flexible extension and integration with other information, and therefore provide greater value. In addition these architectural viewpoints will be available as web-accessible data such that architectures can be used and federated across organizational and domain boundaries. This will enable architectures and architectural efforts to more directly address modern enterprise needs for data sharing, service use and reuse, business process integration, openness and collaboration on multiple levels.

The Model Integration Problem

- The enterprise typically has many models for different parts of the enterprise expressing different areas of concern
- While the concerns may be different, the concepts being modeled are cross-cutting
- Stakeholders need to be able share model information with others, who may have different concerns and perspectives, to make better business and technical decisions
- We need to be able to connect and reason about independently conceived models so that elements and relations can cross those models regardless of source, perspective or language
- To do this we need to “connect the dots” between models
- Example: A process in BPMN may satisfy a requirement in BMM

The Language Integration Problem

- Languages are a means of expressing and communicating views
- Languages are inclusive of textual and diagrammatic representations of information
- Different languages express overlapping concepts and concerns in different ways that are difficult to connect
- By better understanding the common semantics of languages we can better understand the common elements of models
- We need better capabilities to express the semantic relationships between languages and the common semantics of languages
- Information about a system should be able to be projected onto multiple languages (textual or graphical), as is suited for a particular purpose
- This will simplify our set of languages as well as support the definition of whole systems perspectives that utilize multiple languages
- Example: A service defined in SoaML may be implemented by a BPMN process and transfer data defined in OWL. These elements should be able to be <u>used</u> as if they were defined in the "local" language

The Need for Viewpoints

- While we want to understand the whole system, we need to enable stakeholders to see it in their terms
- Viewpoints provide a lens into the whole system tuned to the needs of particular stakeholders
- Viewpoints combine particular parts of the system model and using particular languages to create views of the system suitable for a stakeholder
- Viewpoints may subset the information in the whole system, may specialize vocabulary and use specific notations and syntaxes
- Viewpoint separation: Separating different aspects of a system
- Viewpoint integration: Integrating consistent aspects of a system
- Note: viewpoints and the need for them need to be clarified.
- Example: A security viewpoint deals with roles, processes, data and rights using particular diagrams and tables

The Need for Semantics

- In current meta-models semantics is mixed with syntax and often poorly defined, yet over specified
- The same and related concepts are re-invented without any connection between them
- Semantics grounds the languages in what they mean
- We have a need for a better semantics foundation to represent the concepts we are modeling (in use models and in languages)
- Semantic models need to be able to be layered and modular, not requiring a “universal model”
- While we want to enable a semantic foundation, not all language concepts should have to be semantically grounded
- Example: The concept of classification by types is almost universal, yet UML classifier has no relation to the well defined concept outside of UML that may be similar but different