



Information Exchange Policy Automation

Information Exchange Framework (IEF)

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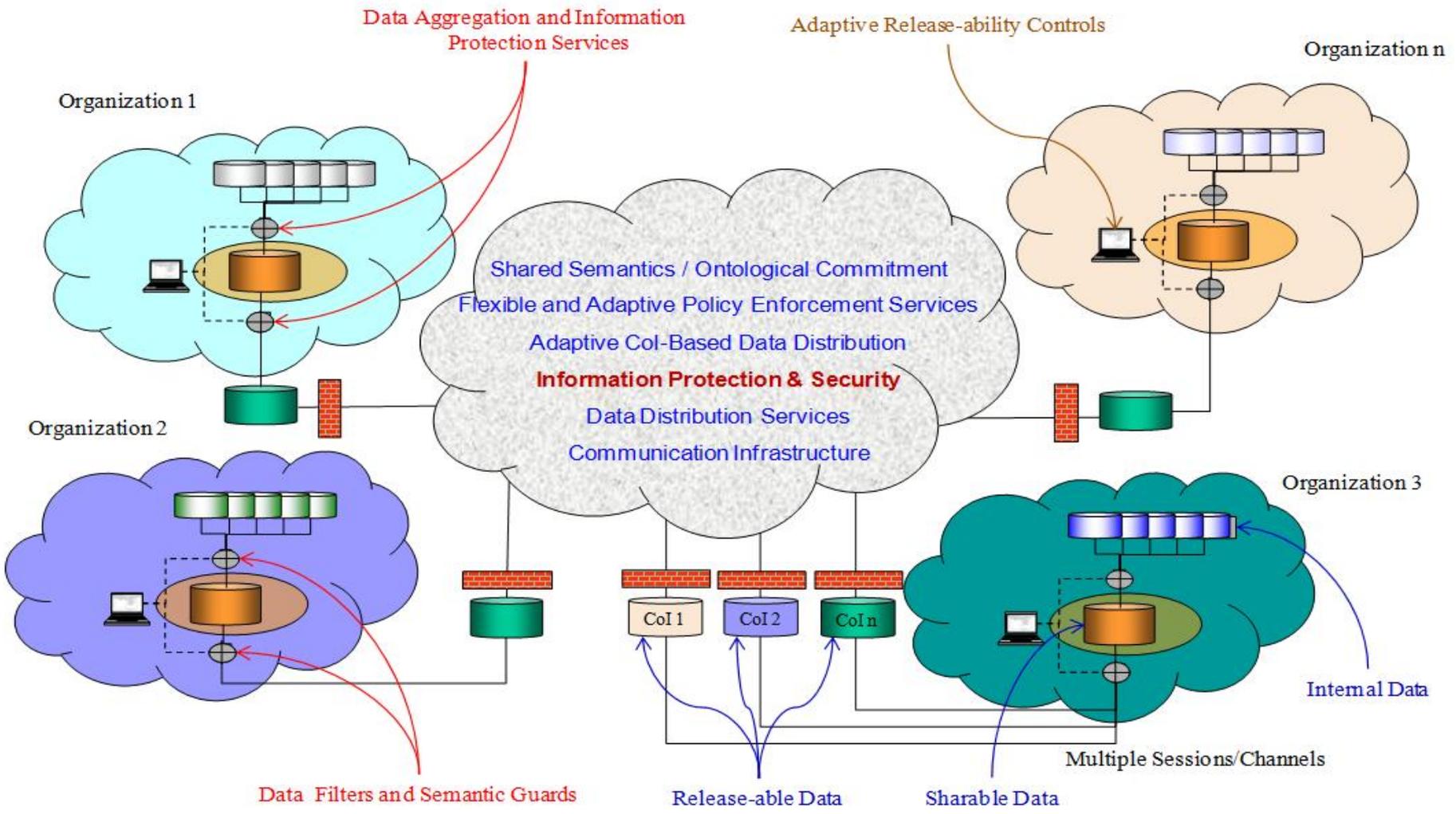
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Presentation

- Operational Challenges To Delivering Broad-based Information Sharing
- IEF Objectives
- Brief IEF Overview
- Questions

Information Sharing and Protection



Interoperability Challenges

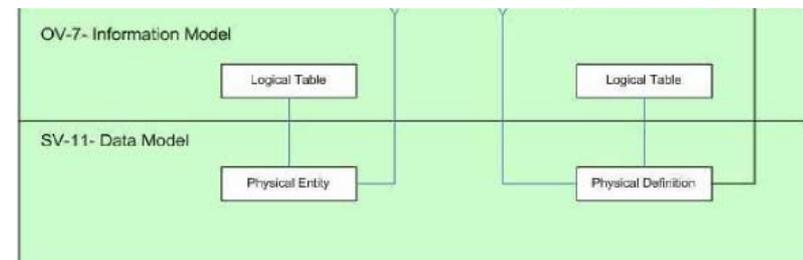
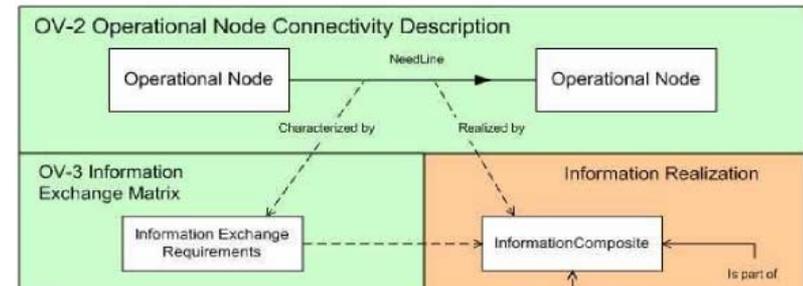
- Enforcing information sharing policies, rules and constraints during dynamic real-world operations
- Adapting to dynamic asymmetric threats
- Adapting to increasing demand for information across multi-agency operations
- Addressing Operational challenges caused by data overload
- Enabling the release of information based on levels of trust and operational context
- Tagging and Labelling of system generated exchanges
- Improving the information quality:
 - **Accuracy:** semantics to accurately convey the perceived situation.
 - **Relevance:** information tailored to specific requirements of the mission, role, task or situation at hand.
 - **Timeliness:** information flow required to support key processes, including decision making.
 - **Usability:** information presented in a common, easily understood format.
 - **Completeness:** information that provides all necessary (or available) information needed to make decisions.
 - **Brevity:** information tailored to the level-of-detail required to make decisions and reduce data overload.
 - **Trustworthiness:** information quality and content can be trusted by stakeholders, decision makers and users.
 - **Protected:** Information is protected from inadvertent or Malicious Release or use.
- Certifying and accrediting Information Sharing Systems and Services
- Managing the underpinning institutional knowledge and memory

Design Challenges

- Translating legislative mandates, policy and Information Sharing Agreements
- Transforming **Information Sharing and Protection policies** into system/software enforceable rules
 - Standardized Vocabulary
 - Modeling Practices and Profiles (Architecture and MDA)
 - Operational Services to Manage and Enforce the Policies
 - Off the Shelf Tools (COTS)
- Development and maintenance cycles keep pace operational needs:
 - New, changing and asymmetric threats
 - Shifting Operational Coalitions and Contexts
 - Continuous evolution of Legislation, Policy, SOPs, Technology
- Certifying Information Sharing Capability for Operations
- Control Life-cycle costs
- Retain, maintain and exploit Institutional knowledge and memory

Support missing from the TLA AFs

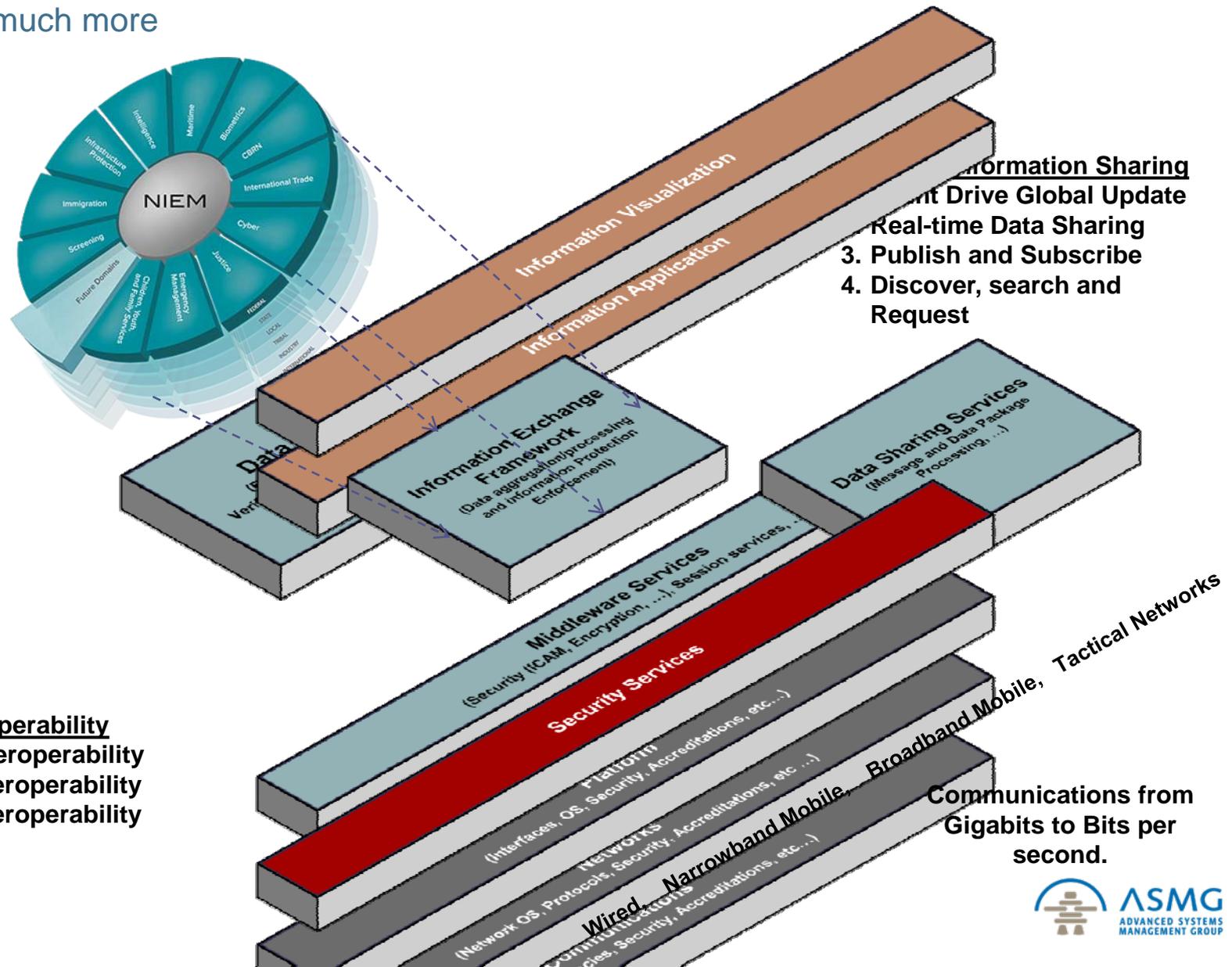
- Linking Information Exchange Requirements to the Data Sources
- Logical Interface Specification that defines the rules governing:
 - The Aggregation, protection & Release of Information
 - The Acceptance, processing and marshalling of data
- MDA for Architecture Driven Interoperability and Model Driven Architecture (MDA)
- Foundation for Information Protection Specifications



TLA AF: Three Letter Acronym Architecture Frameworks

NIEM is a primary Target for IEF Policy Enforcement

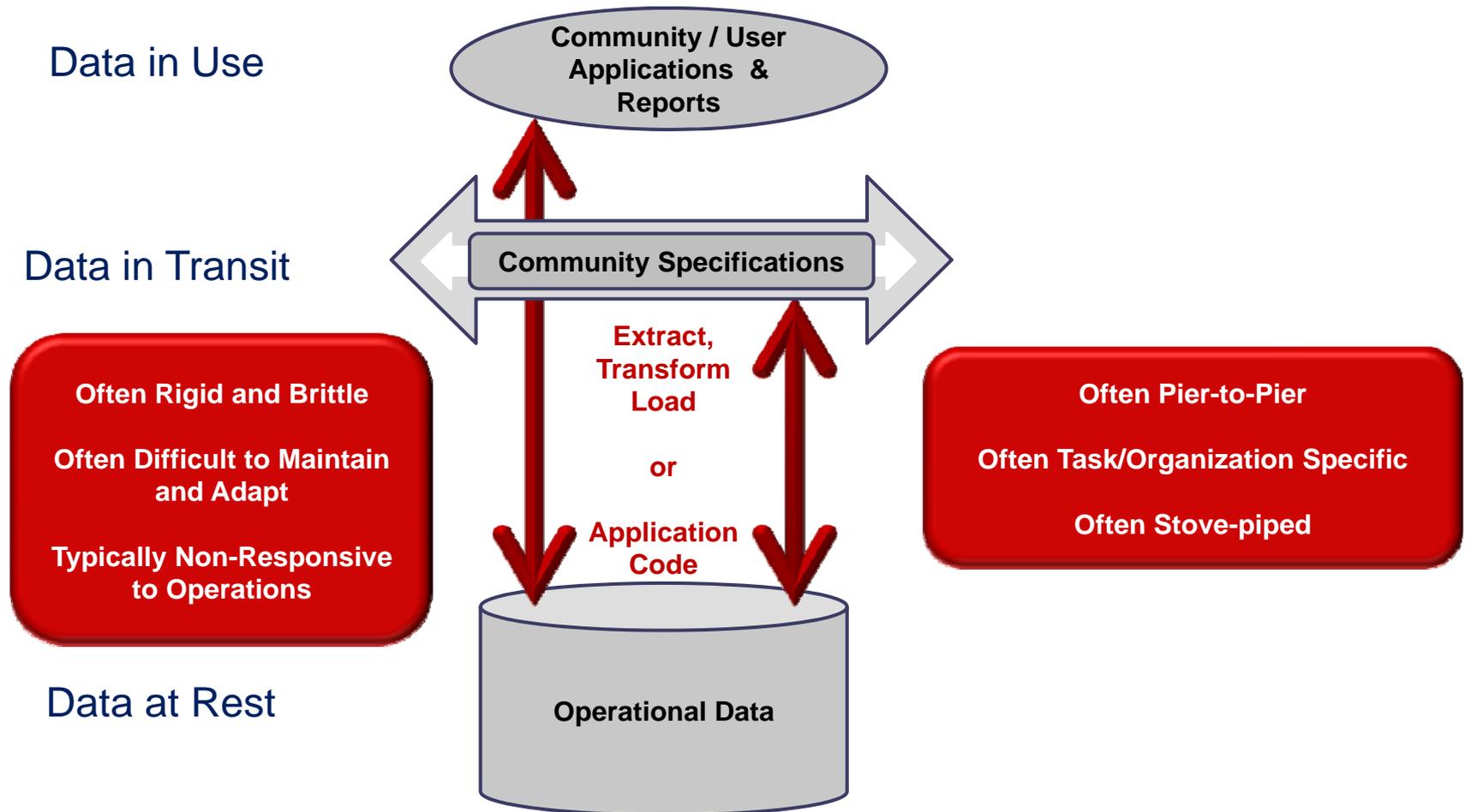
But there is much more



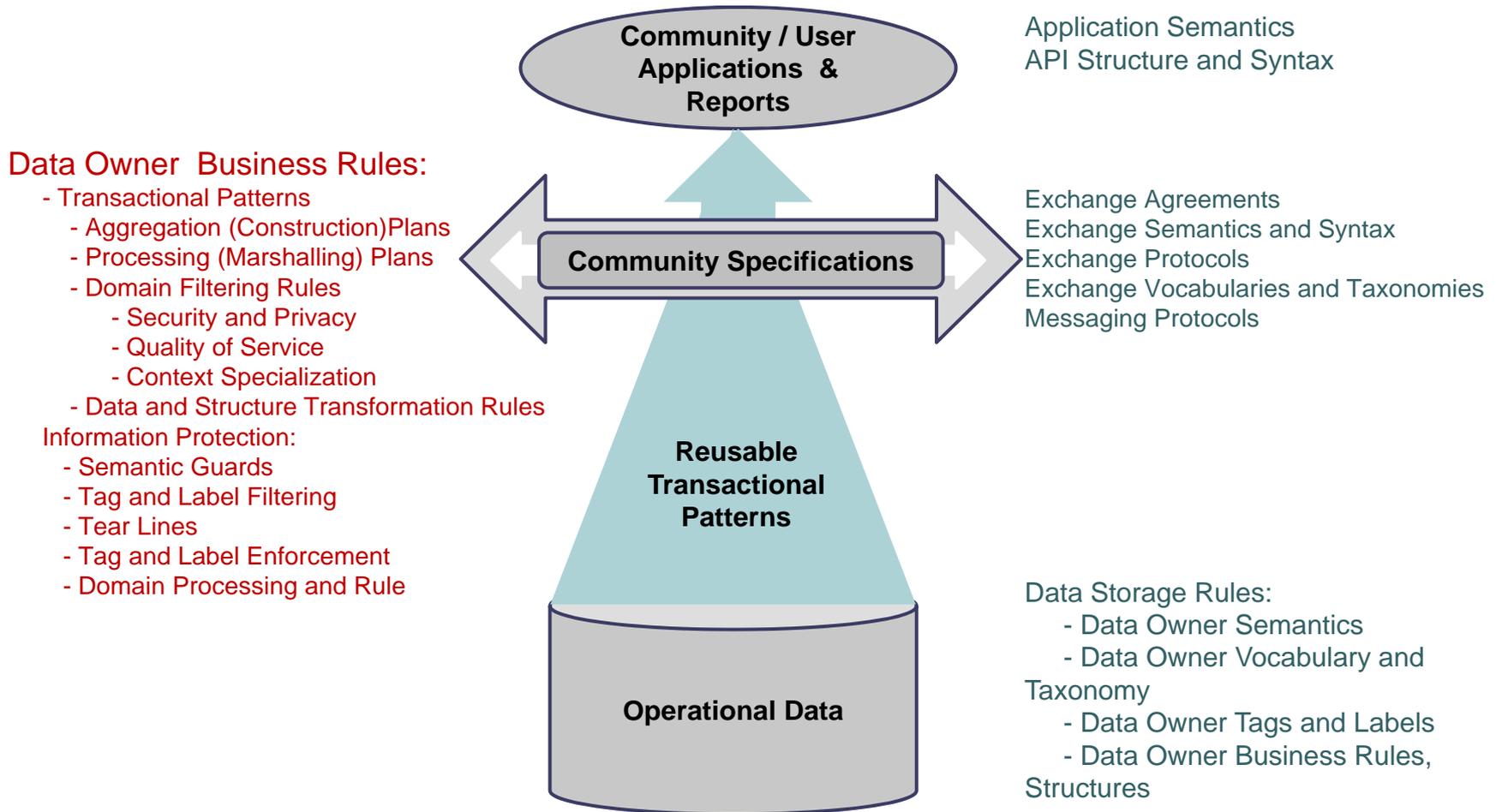
Levels of Interoperability

1. Technical Interoperability
2. Syntactic Interoperability
3. Semantic Interoperability
4. Pragmatic
5. **Dynamic**
6. Conceptual

Understanding Information Sharing Requirements



IEF Targeting the Capture and Enforcement of Data Owner Business Rules



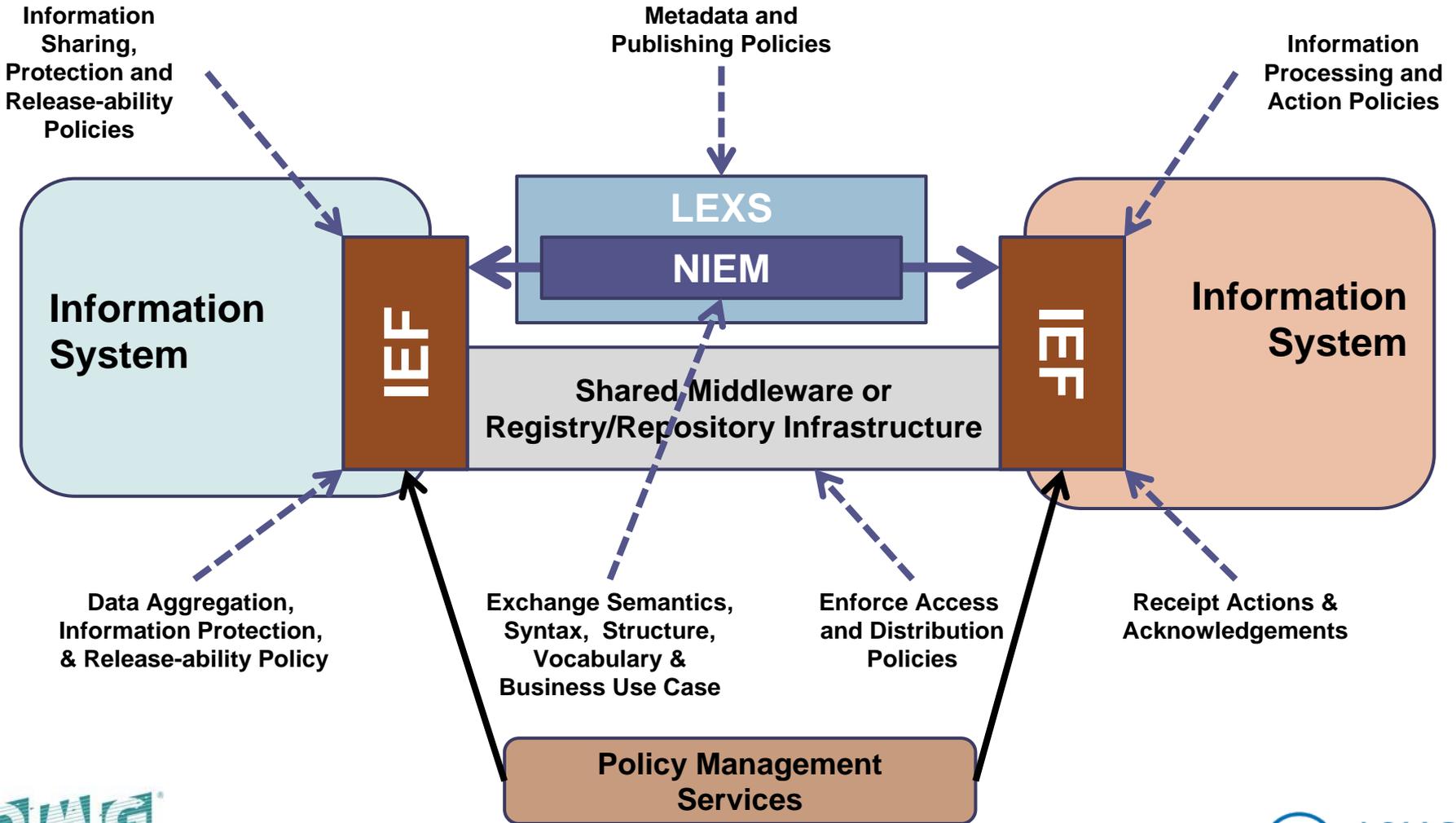
IEF Objectives

- Alignment of standards to support the development and sustainment of semantic interoperability
- Focus on information content rather than mechanisms for distribution
- Separate business rules from the software applications and services that enforce them, providing:
 - increased flexibility, adaptability and agility
 - Increased the retention of institutional knowledge and Memory
 - Increase traceability and audit-ability of information sharing and protection solutions
- IE Policy Enforcement Support for multiple communities (NIEM, CAP, MIP, ...)
- Model Driven Architecture (MDA) services
- Simple approach to modeling messaging, semantic and transactional patterns

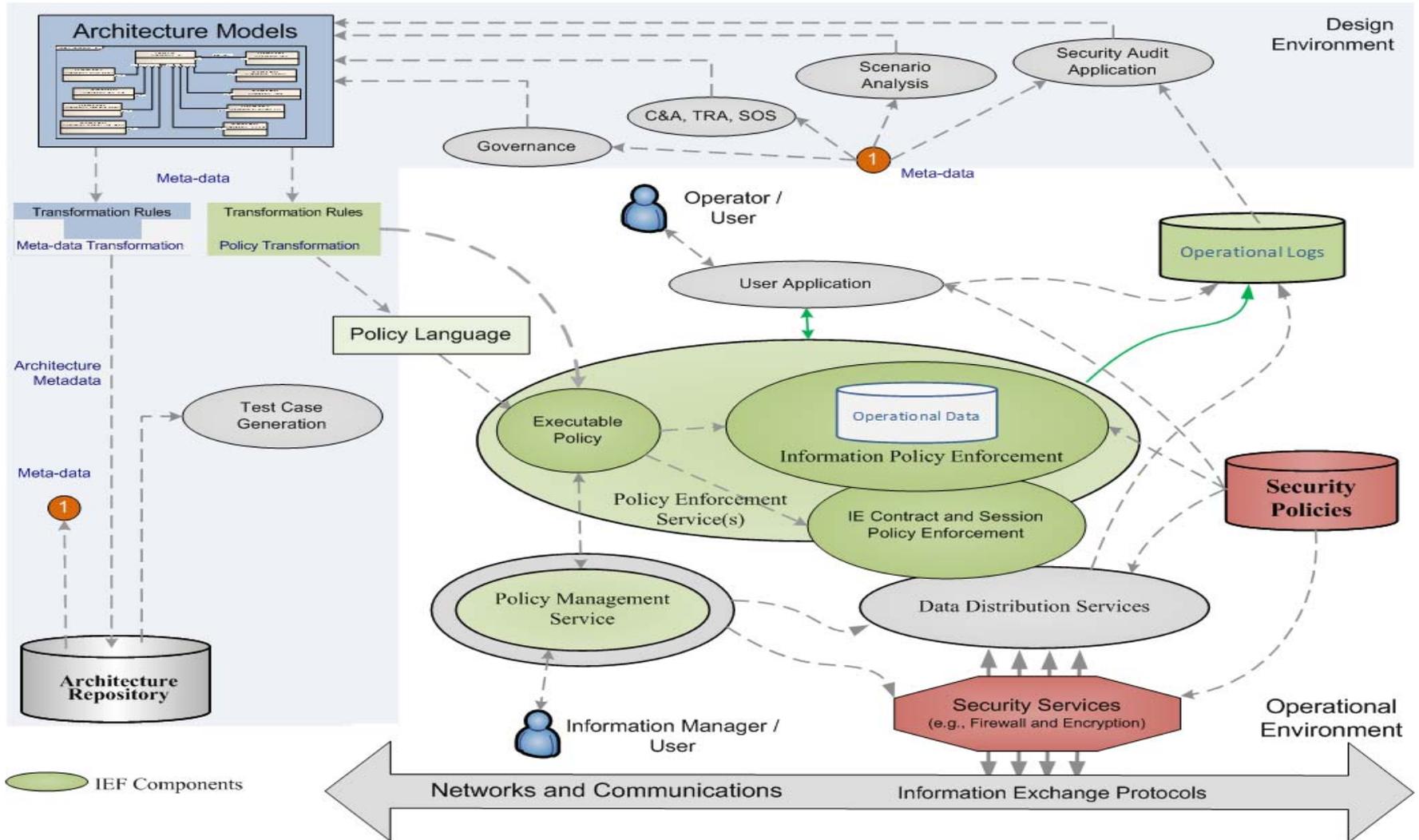
IEF Key Concepts

- Reusable Information Patterns Describing the rules for:
 - Information Sharing Contract
 - Message
 - Semantic
 - Data Transactional Patterns
 - Data Aggregation and Marshalling
 - Data Transformation
 - Domain Filters (Static and Dynamic (alterable at Runtime))
 - Semantic Guards (protected Semantic Patterns)
- Simple Extensible Notations
- Transformable into Executable Rules (MDA Process)
- Direct Alignment to Architecture Frameworks
- Open Standards / Open Architecture / Open Source

Where are the Policies



Life-cycle Concept



MDA for IEF

Architecture and Engineering Domain

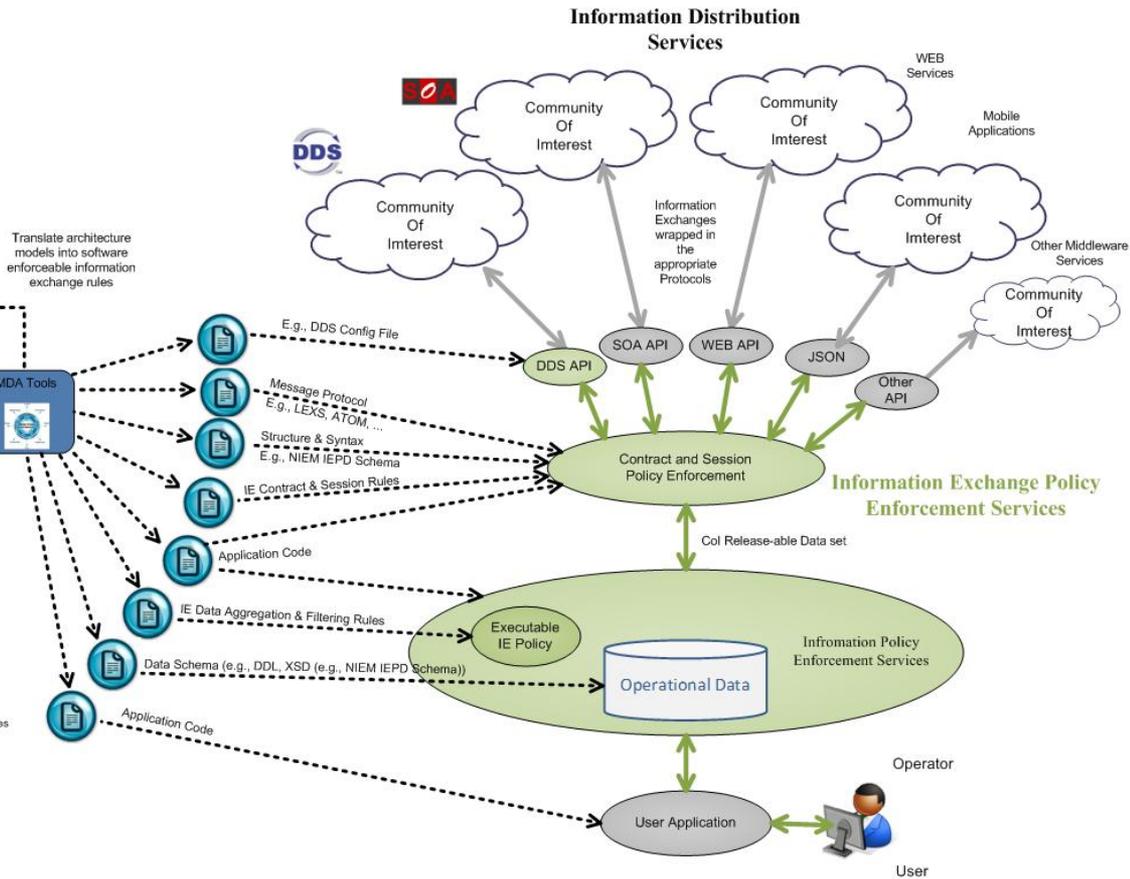
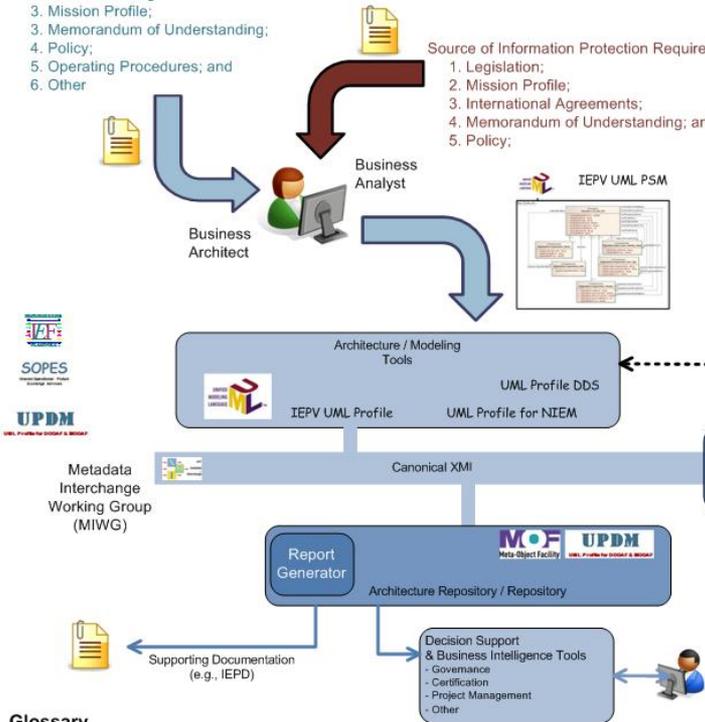
Operational Domain

Source of Information Staring Requirements:

1. Legislation;
2. International Agreements;
3. Mission Profile;
4. Policy;
5. Operating Procedures; and
6. Other

Source of Information Protection Requirements:

1. Legislation;
2. Mission Profile;
3. International Agreements;
4. Memorandum of Understanding; and
5. Policy;



Glossary

- | | |
|---|---|
| API: Application Program Interface | SOA: Service Oriented Architecture |
| BPMN: Business Process Modeling Notation | SOAML: SOA Modeling Language |
| Col: Community of Interest (Operational Group, Security Domain, etc...) | SOPEs: Shared Operational Picture Exchange Services |
| CORBA: Common Object Request Broker Architecture | SysML: System Modeling Language |
| DDS: Real-time Data Distribution Service | UML: Unified Modeling Language |
| IEF: Information Exchange Framework | UPDM: Unified Profile for DODAF and MODAF |
| IEPES: Information Exchange Policy Enforcement Services | XMI: XML Metadata Interchange |
| IEPL: Information Exchange Policy Language (IEPV Platforms Specific Models) | XML: eXtensible Markup Language |
| IEPMS: Information Exchange Policy Management Services | XSD: XML Schema Definition |
| IEPV: Information Exchange Policy Vocabulary | |
| MDA: Model Driven Architecture | |
| MDMI: Model Driven Message Interoperability | |
| MOF: Meta Object Facility | |
| NIEM: National Information Exchange Model | |
- Additional Messaging Protocol Specifications:**
 Common Alerting Protocol (CAP)
 Common Alerting Protocol Canadian Profile (CAP-CP)
 Emergency Data Exchange Language (EDXL)
 Protocol Data Unit (PDU)



Take Away

- Standards are a Community Effort
 - They are only as good and as useful as the input requirements
 - Requirements come from
 - The User Community
 - SMEs, Vendors and Integrators
 - Academia
- Standards Enable Interoperability, Integration and Innovation
- IEF is an Model Driven Approach
 - Providing flexibility, agility and sustainability through MDA
 - Providing Institutional Knowledge Retention
 - Enabling Validation and Verification

Questions and Answers

Standards for Architecture Based Information Interoperability October 2011

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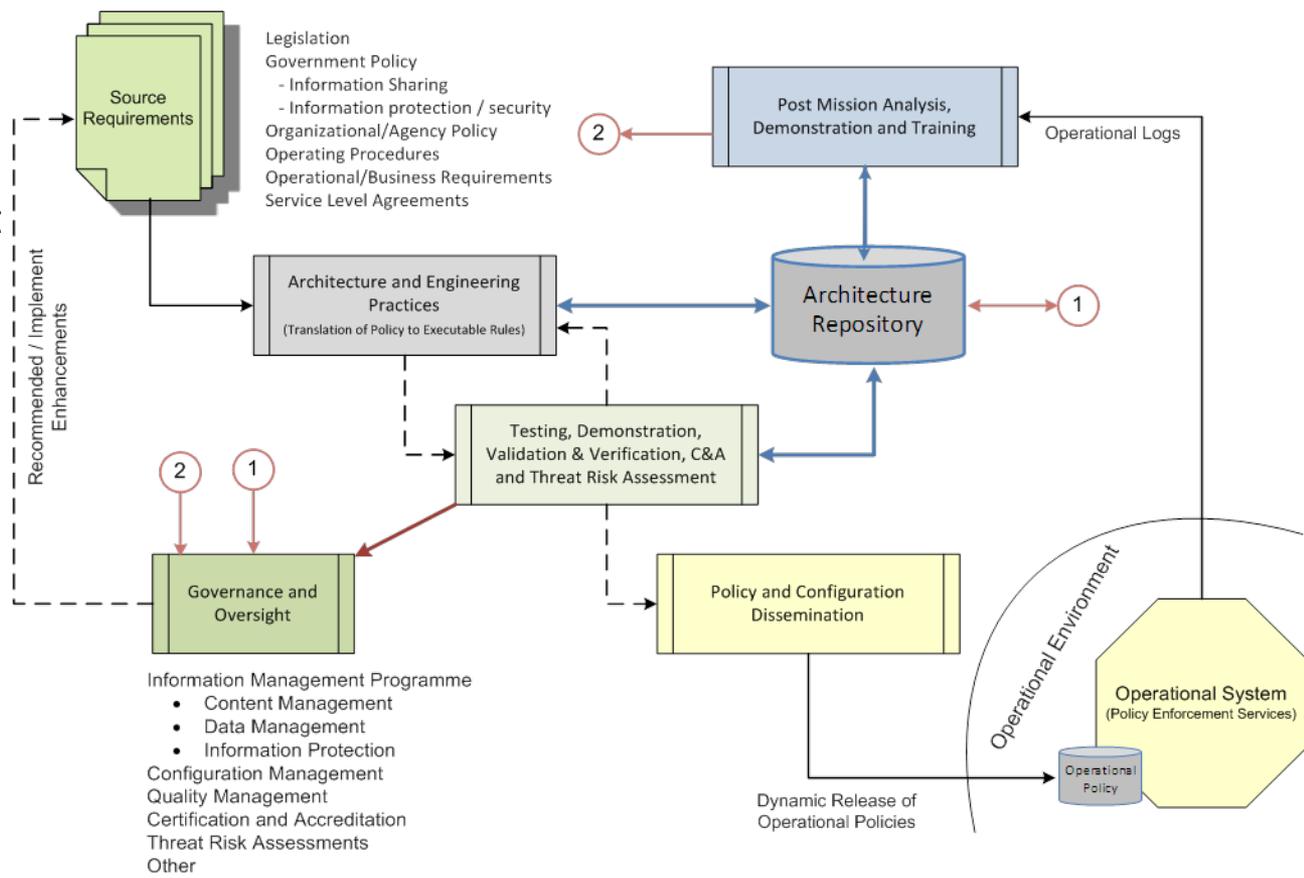
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The IEF Approach

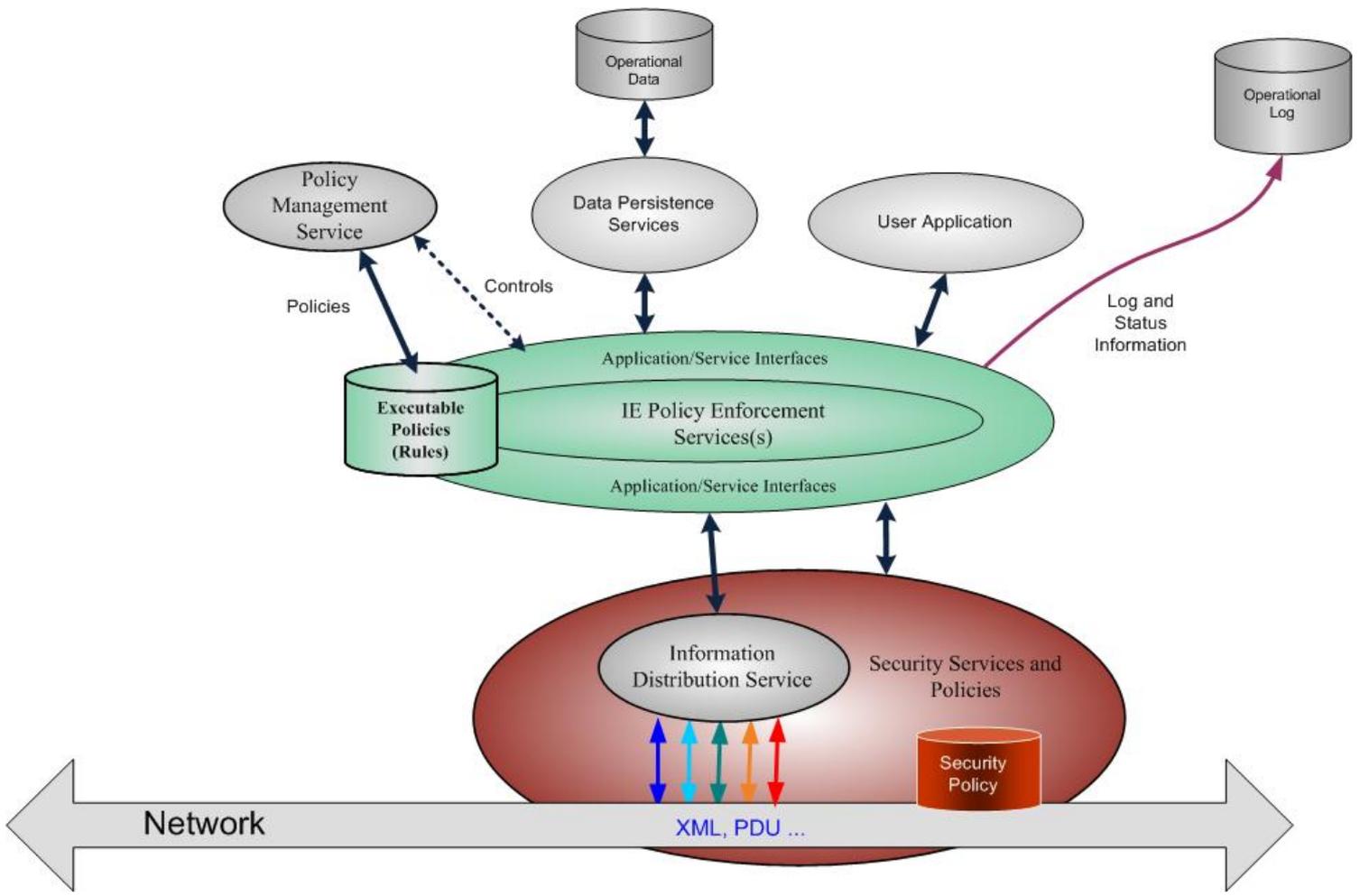
- Requirements → Architecture → Policy (rules) → Interoperability
 - Translate requirements documented as Legislation, Policy, MOUs, SLAs, etc. - Into sets of system enforceable rules - That are traceable and auditable throughout their life-cycle
- Address requirements for strategic, operational and tactical sharing of information based on active & explicit services for:
 - The release of information to authorized recipients; and
 - Protection of information from the unauthorized release based on PRIVACY, CONFIDENTIALITY and SECURITY considerations.
- IEF to issue standards for:
 - A standardized **Information Exchange Policy Vocabulary** that can be used in multiple modelling and policy languages (on-going)
 - A set of standardized **Policy Enforcement Services and Intelligent Agents** that plug into common application and middleware frameworks (RFP Dec 2011)
 - A set of standardized **Policy Management Services** that enable users to the manage of policies throughout their life-cycles (definition, design, operations and maintenance) (RFP Jun 2012)
- And More at http://www.omg.org/public_schedule/

Process for Policy/Rule Life-cycle

- Derived from operational models
- Metadata Driven
- Separation of operational rules from the enforcement applications
- Update / extension of rules from controlled stores
- Automated transformation of models into executable rules
- Aligned to standards architecture, modelling, development, etc ... best practices



IEPES Core Element as per the RFP



UPDM: Aligning AFs and Std Modeling Languages

The Latest:

UML Profile for DODAF & MODAF (UPDM)

- NAF also included

Version 2.0 – Adopted June 2011

Seeking Canadian DND integration of DNDAF in version 2.x (option in V2.0 RFP):

Information Views

Security and Information Protection Views

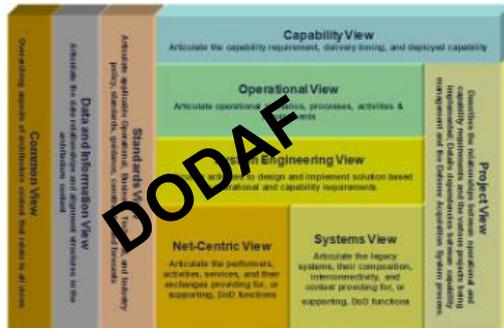
UPDM

UML Profile for DODAF & MODAF

Common Approach to Multi-Agency Architectures

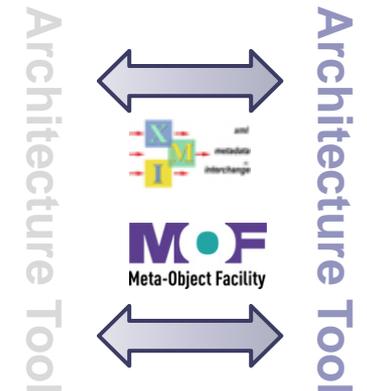


Metadata Interchange Working Group

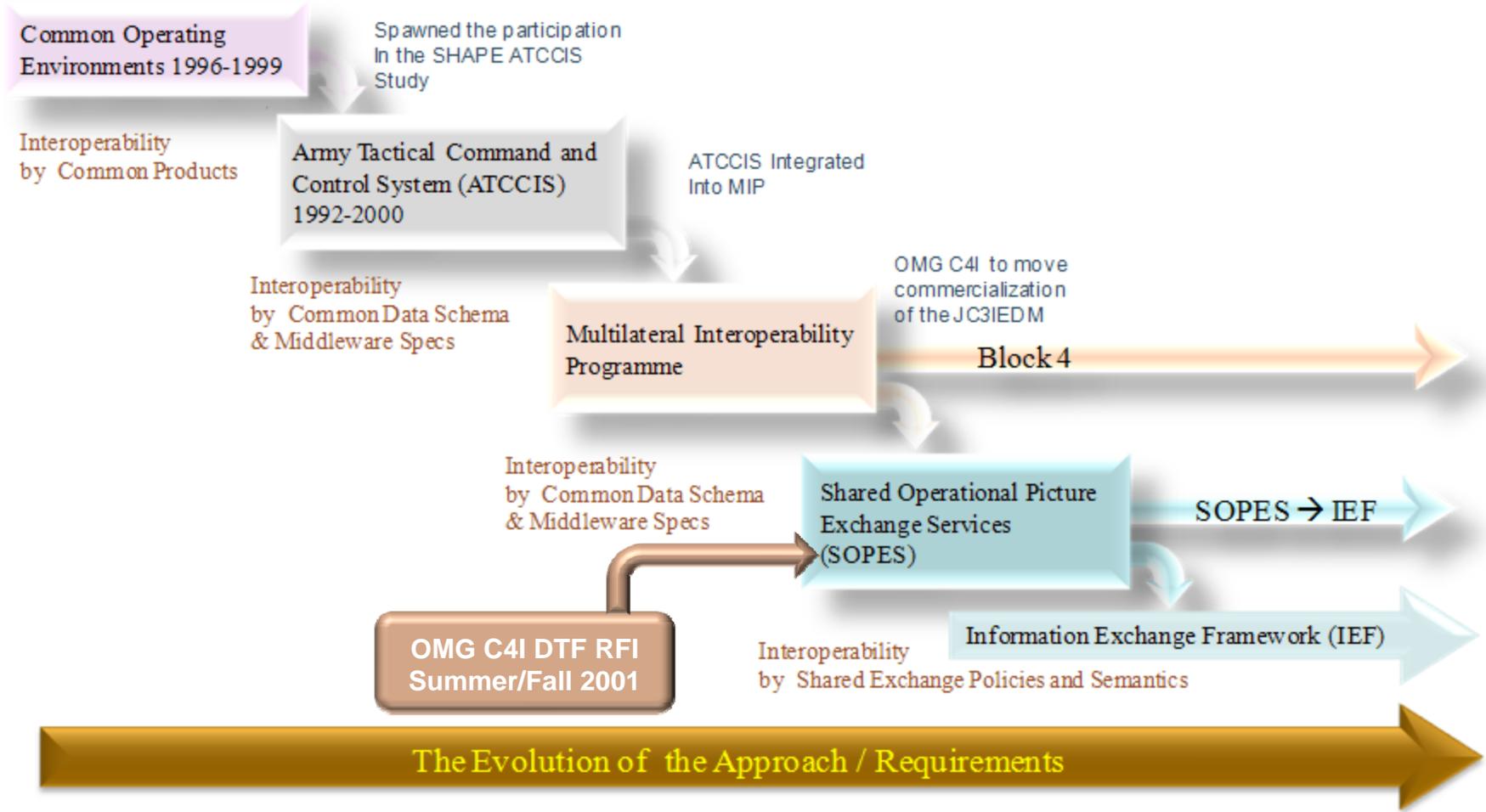


VIEWPOINT	CATEGORY							
	Tabular	Structural	Behavioural	Mapping	Ontology	Pictorial	Timeline	
Strategic	SV-1 Link	SV-4 Link		SV-3 Link	SV-2 Link			
	SV-5 Link			SV-6 Link				
	SV-7 Link							
Operational	OV-1b Link	OV-2 Link	OV-5 Link			OV-1a Link		
	OV-1c Link	OV-4 Link	OV-6a Link					
	OV-3 Link	OV-7 Link	OV-6b Link					
System	SV-6 Link	SV-1 Link	SV-4 Link	SV-3 Link			SV-8 Link	
	SV-7 Link	SV-2 Link	SV-5 Link	SV-12 Link				
	SV-9 Link	SV-8 Link	SV-10c Link					
Technical	TV-1							
	TV-2							
Acquisition		AcV-1 Link					AcV-2 Link	
Service Oriented	SOV-2 Link		SOV-4a Link	SOV-3 Link	SOV-1 Link			
			SOV-4b Link					
			SOV-4c Link					

View Categories
Tabular: Views which are essentially tabular, which includes structured text as a special case.
Structural: This category comprises diagrams describing the structural aspects of an Architecture.
Behavioural: This category comprises diagrams describing the behavioural aspects of an Architecture.
Mapping: These views provide matrix (or similar) mappings between two different types of information.
Ontology: Views which extend the MODAF ontology for a particular Architecture.
Pictorial: This category comprises just one view, namely OV-1a, which is essentially a free-form picture.
Timeline: This category comprises diagrams describing the programmatic aspects of an Architecture.



Pedigree of the IEF Effort



Current Standards Efforts

- IEF – Information Exchange Policy Vocabulary RFP
 - <http://www.omg.org/cgi-bin/doc?mars/2011-3-15>
 - Initial Submission February 2011
 - Proposed Language Models (UML, SAML, XACML)
- IEF – Information Exchange Policy Enforcement Service RFP
 - Expected to be release December 2011 (Draft Available Mars/2011-11-01.
- National Information Exchange Model (NIEM) Profile for UML
 - <http://www.omg.org/cgi-bin/doc?gov/2011-6-4>
- Security Tagging and Labelling RFP
 - <http://www.omg.org/cgi-bin/doc?omg/11-09-04>
- UPDM 2.x
 - Expected to start with the release of DODAF 2.03 March 2012
- Interface Definition Language IDL V3.5 RFC
 - <http://www.omg.org/cgi-bin/doc?mars/2011-09-08>
- And More at http://www.omg.org/public_schedule/
- And More at <http://www.omg.org/spec/>