

# Integrating TOGAF, Zachman and DoDAF Into A Common Process

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*Customer Success Is Our Mission*

# Topics

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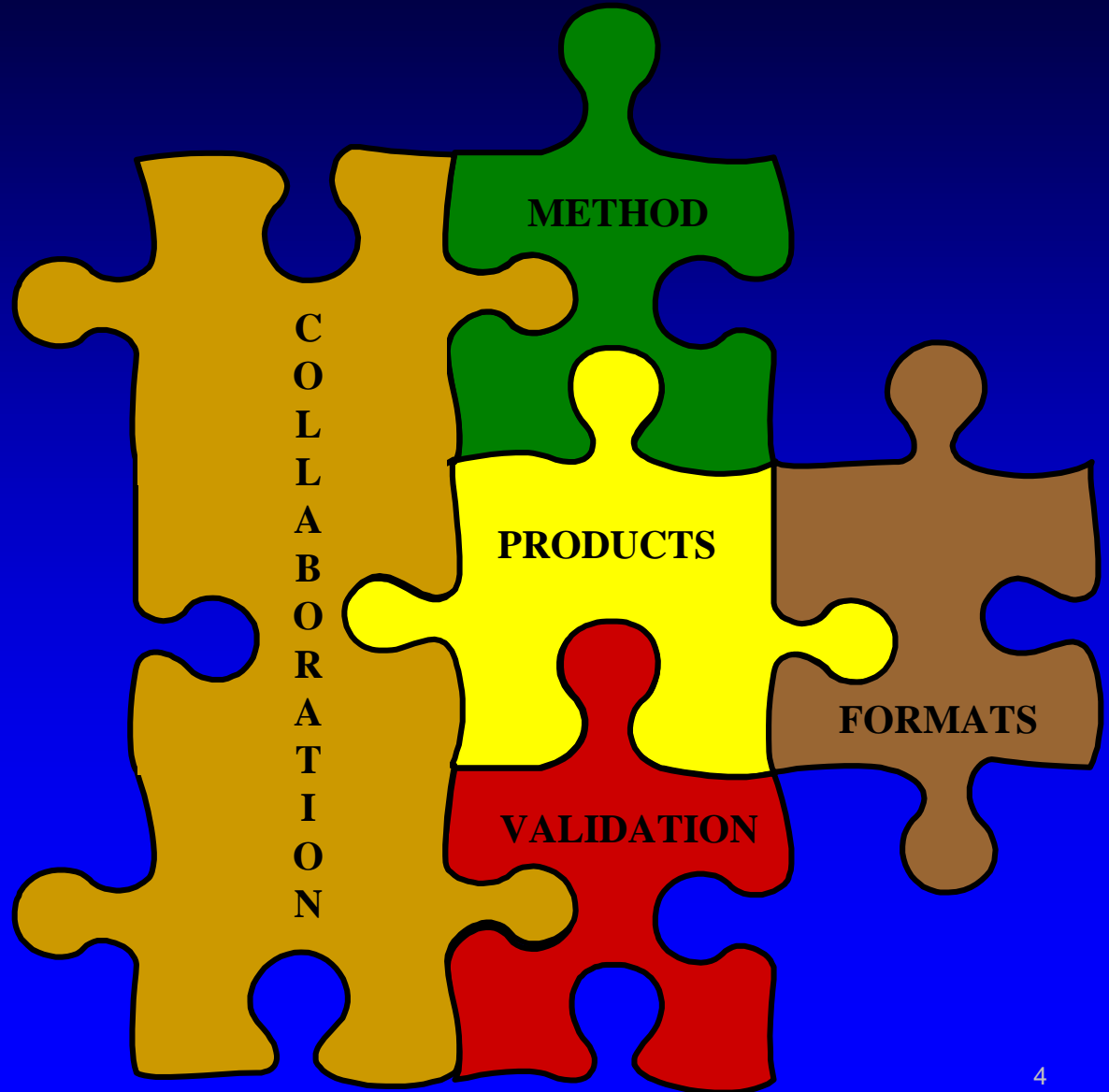
- **Definitions**
- **Building Blocks of an Architecture Process**
- **Unifying the Standards**
- **Summary**

# Definitions

- **Architecture**
  - *“The fundamental organization of a system embodied in its components, their relationships to each other and to the environment, and the principles guiding its design and evolution.” (IEEE 1471-2000)*
- **Architecture Framework**
  - *A resource that guides the development or description of an architecture*
- **Business Architecture**
  - *A perspective of the overall architecture reflecting enterprise mission, strategies, goals, business drivers, business processes, information flows, and the supporting organizational structure*
- **Technical Architecture**
  - *Perspectives of the overall architecture reflecting the enterprise’s data, applications and technical components*
- **Enterprise Architecture**
  - *A blueprint (set of models) that depicts how various business and technical elements work together as a whole*
- **Enterprise**
  - *“e” : the highest level of a system or system of systems*
  - *“E” : a Department or Agency of the government*

# Piecing The Puzzle Together: What's Needed In An "Architecting Process"?

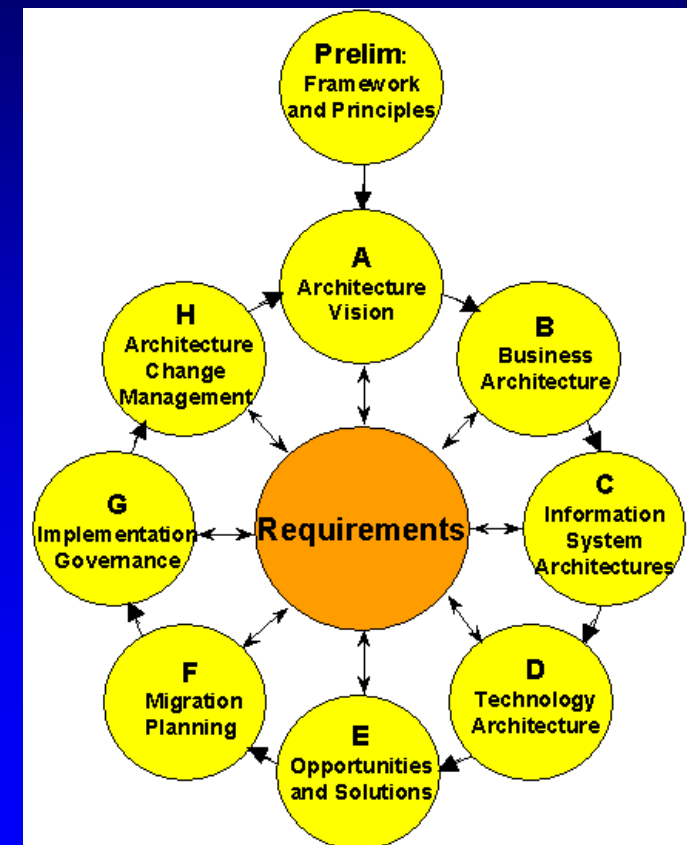
- **Architecting Method**
- **Architectural Products**
- **Product Formats**
- **Architecture Validation**
- **Collaboration**



# Building Blocks

- Architecting Method
- Architectural Products
- Product Formats
- Architecture Validation
- Collaboration

**The Open Group Architecture Framework  
(TOGAF)  
Version 8.0  
Enterprise Edition  
Architecture Development Method (ADM)**



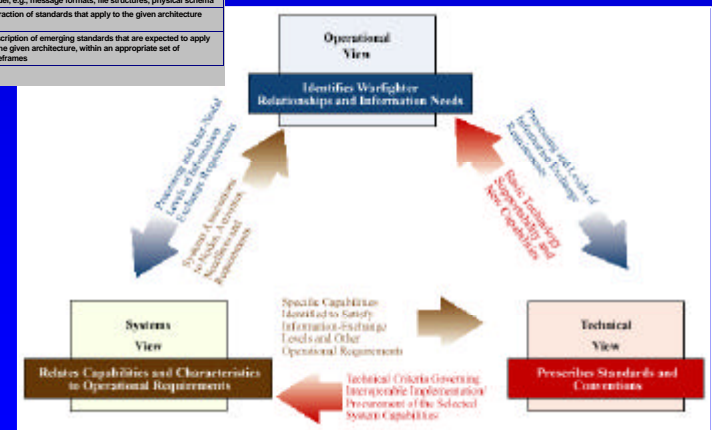
# Building Blocks (cont'd)

- Architecting Method
- Architectural Products
- Product Formats
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Applicable View	Framework Product	Framework Product Name	General Description
All Views	AV-1	Overview and Summary Information	Scope, purpose, intended users, environment depicted, analytical findings.
All Views	AV-2	Integrated Dictionary	Data repository with definitions of all terms used in all products
Operational	OV-1	High-Level Operational Concept Graphic	High-level graphical/textual description of operational concept
Operational	OV-2	Operational Node Connectivity Description	Operational nodes, operational activities performed at each node, connectivity and information exchange needlines between nodes
Operational	OV-3	Operational Information Exchange Matrix	Information exchanged between nodes and the relevant attributes of that exchange
Operational	OV-4	Organizational Relationships Chart	Organizational, role, or other relationships among organizations
Operational	OV-5	Operational Activity Model	Operational Activities, relationships among activities, inputs and outputs. Overlays can show cost, performing nodes, or other pertinent information
Operational	OV-6a	Operational Rules Model	One of three products used to describe operational activity sequence and timing - identifies business rules that constrain operation
Operational	OV-6b	Operational State Transition Description	One of three products used to describe operational activity sequence and timing - traces actions in a scenario or sequence of events and specifies timing of events
Operational	OV-6c	Operational Event-Trace Description	One of three products used to describe operational activity sequence and timing - traces actions in a scenario or sequence of events and specifies timing of events
Operational	OV-7	Logical Data Model	Documentation of the data requirements and structural business process rules of the Operational View.
Systems	SV-1	Systems Interface Description	Identification of systems and system components and their interconnections, within and between nodes
Systems	SV-2	Systems Communications Description	Systems nodes and their related communications lay-downs
Systems	SV-3	Systems-Systems Matrix	Relationships among systems in a given architecture; can be designed to show relationships of interest, e.g., system-type interfaces, planned vs. existing interfaces, etc.
Systems	SV-4	Systems Functionality Description	Functions performed by systems and the information flow among system functions.
Systems	SV-5	Operational Activity to Systems Function Traceability Matrix	Mapping of systems back to operational capabilities or of system functions back to operational activities
Systems	SV-6	Systems Data Exchange Matrix	Provides details of systems data being exchanged between systems
Systems	SV-7	Systems Performance Parameters Matrix	Performance characteristics of each system(s) hardware and software elements, for the appropriate timeframe(s)
Systems	SV-8	Systems Evolution Description	Planned incremental steps toward migrating a suite of systems to a more efficient suite, or toward evolving a current system to a future implementation
Systems	SV-9	Systems Technology Forecast	Emerging technologies and software/hardware products that are expected to be available in a given set of timeframes, and that will affect future development of the architecture
Systems	SV-10a	Systems Rules Model	One of three products used to describe systems activity sequence and timing—Constraints that are imposed on systems functionality due to some aspect of systems design or implementation
Systems	SV-10b	Systems State Transition Description	One of three products used to describe systems activity sequence and timing—Responses of a system to events
Systems	SV-10c	Systems Event-Trace Description	One of three products used to describe systems activity sequence and timing - System-specific refinements of critical sequences of events and the timing of these events
Systems	SV-11	Physical Schema	Physical implementation of the information of the Logical Data Model, e.g., message formats, file structures, physical schema
Technical	TV-1	Technical Standards Profile	Extraction of standards that apply to the given architecture
Technical	TV-2	Technical Standards Forecast	Description of emerging standards that are expected to apply to the given architecture, within an appropriate set of timeframes



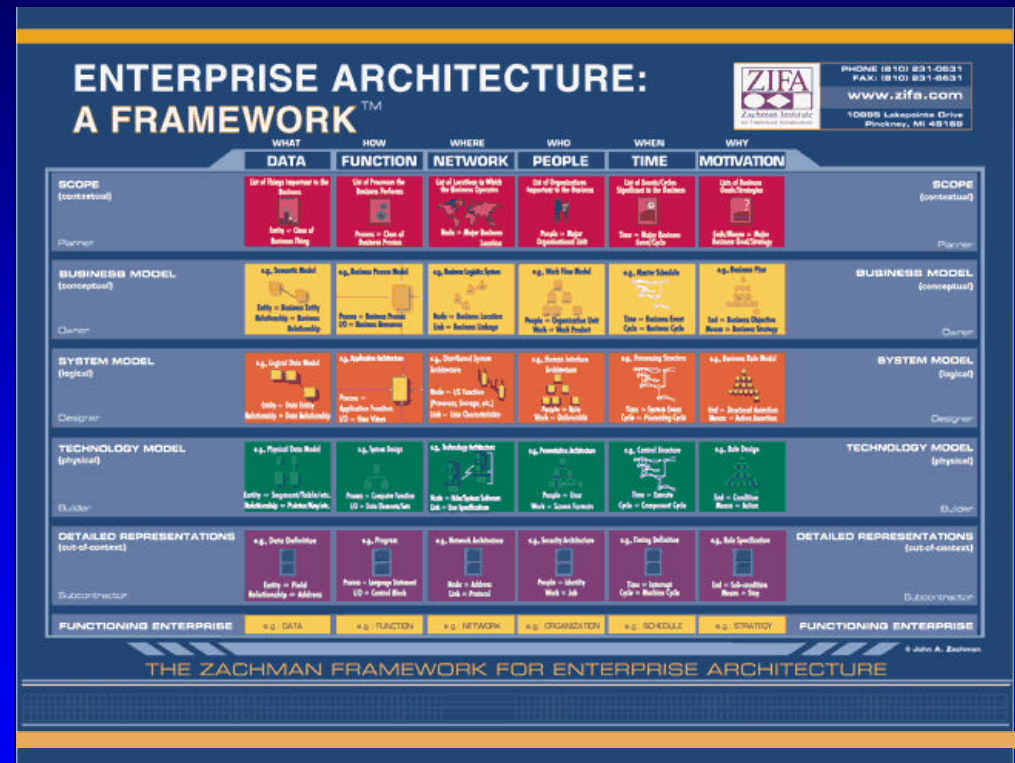
## The Department of Defense Architecture Framework (DoDAF) Final Draft Version 1.0



# Building Blocks (cont'd)

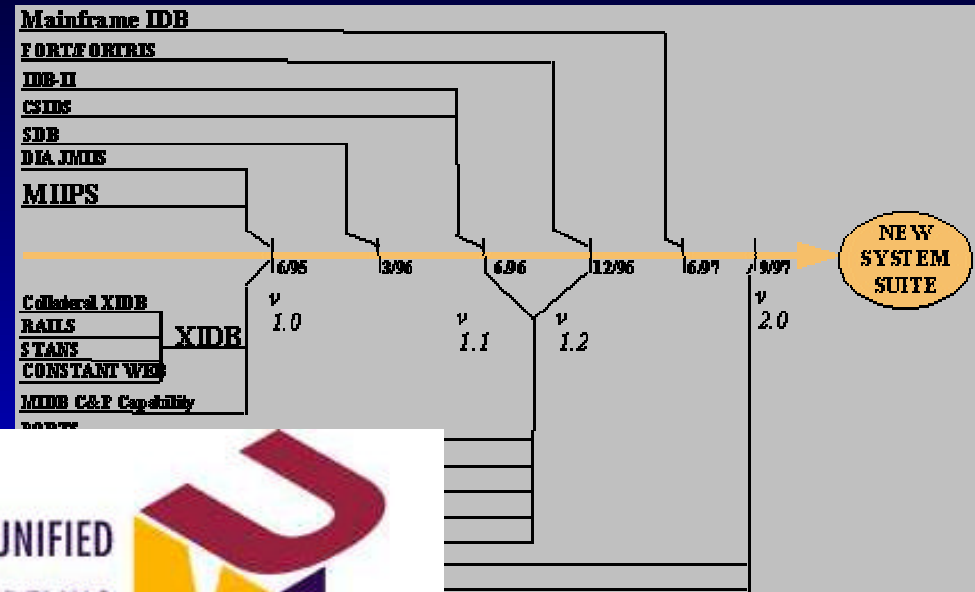
- Architecting Method
- Architectural Products
  - Supplementing the DoDAF
- Product Formats
- Architecture Validation
- Collaboration

## The Zachman Framework For Enterprise Architecture

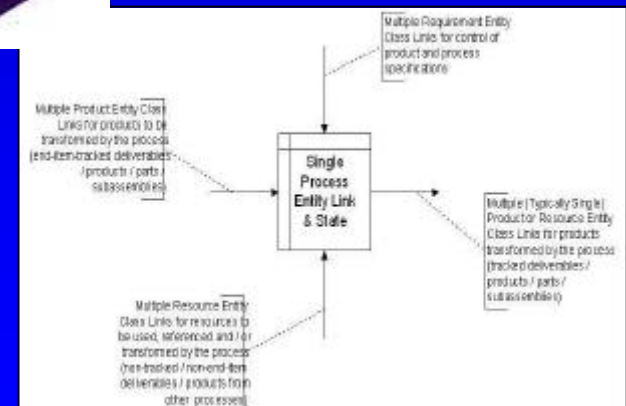


# Building Blocks (cont'd)

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- **Product Formats**
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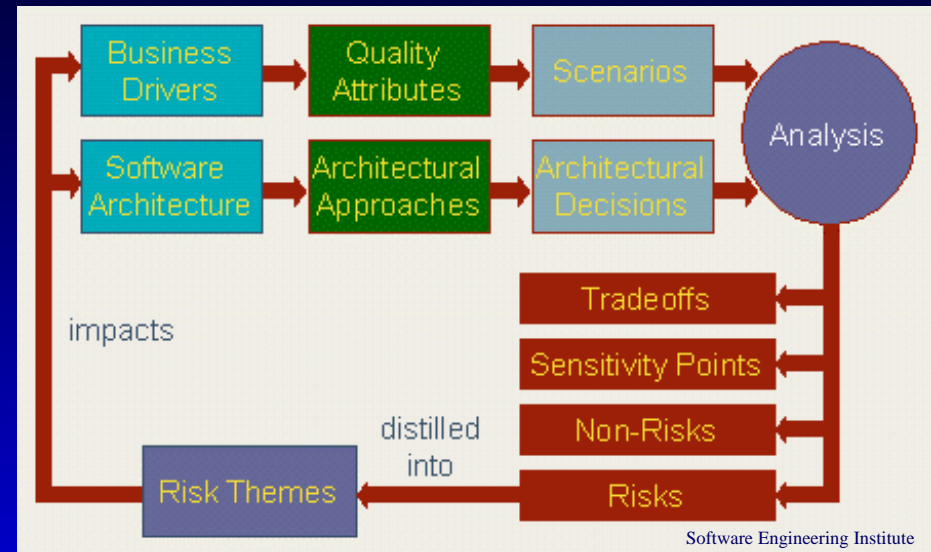
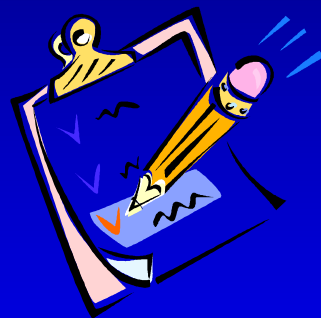
- DoDAF Templates
- Unified Modeling Language (UML)
- Integrated Computer-Aided Manufacturing (ICAM) DEFINITION (IDEF)



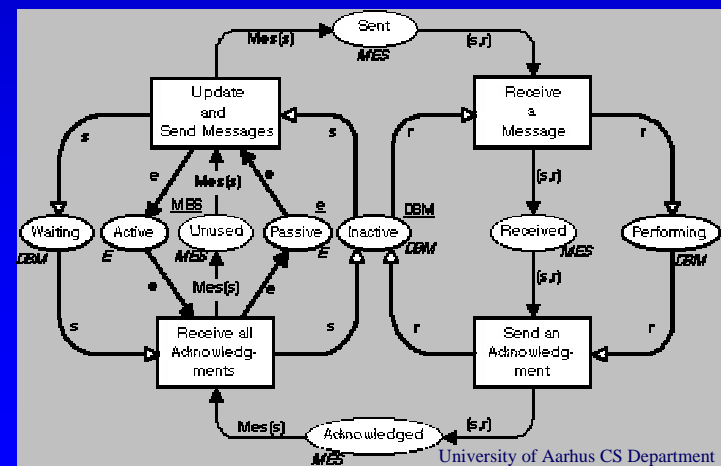


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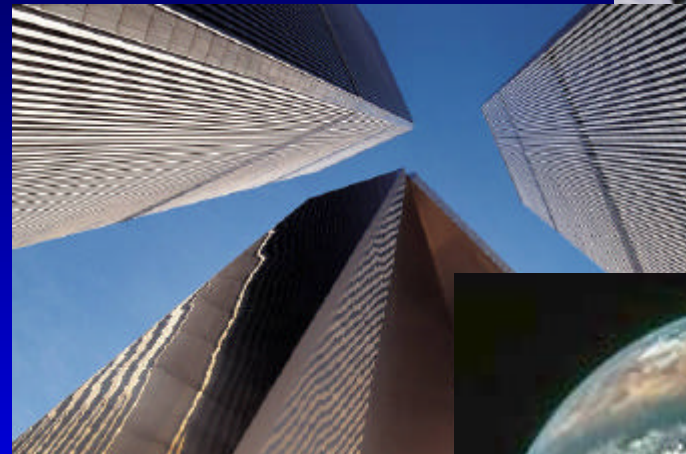


- Software Engineering Institute's Architecture Tradeoff Analysis Method<sup>SM</sup>
- Quality Attribute Assessment Techniques (e.g., Colored Petri Nets)



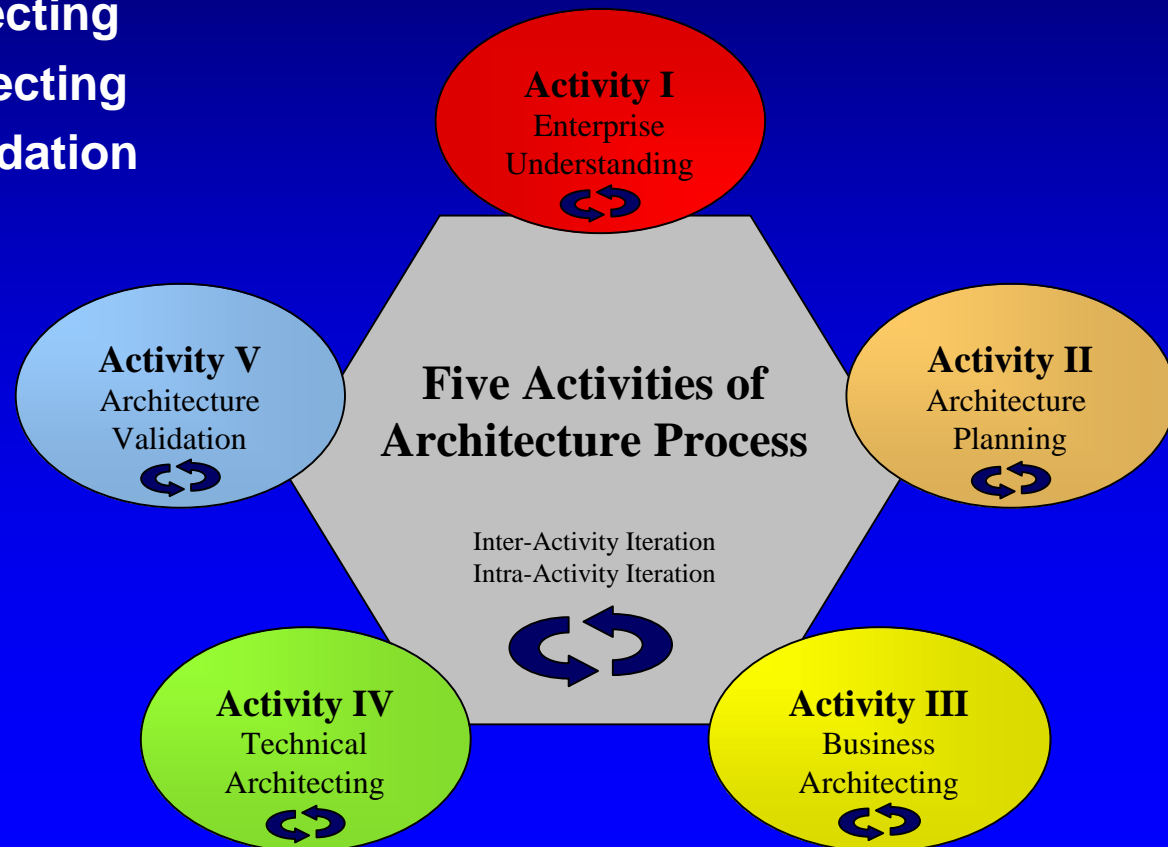
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# REAP: A Unification of Standards

- Raytheon Enterprise Architecture Process (REAP)
  - I Enterprise Understanding
  - II Architecture Planning
  - III Business Architecting
  - IV Technical Architecting
  - V Architecture Validation



# Activity I: Enterprise Understanding

- **Goals**

- Set context for architecture and architecting activities
- Common understanding with customer on the [E/e]nterprise, the architecting initiative, and the problem space

- **TOGAF Relationship**

- ADM: Phase A

- **Subprocesses**

- Customer-focused architecting
- Requirements analysis
- Operational/Business analysis
- Quality attribute analysis

**Activity I**  
Enterprise  
Understanding



- **Inputs**

- Customer vision, needs, & requirements documents
- Domain expertise
- Industry & government standards

- **Outputs**

- DoDAF AV-1, *Overview & Summary Information*
- DoDAF AV-2, *Integrated Data Dictionary*
- DoDAF OV-1, *High Level Operational Concept Graphic*
- DoDAF TV-1, *Technical Standards Profile*

# Activity II: Architecture Planning

- **Goal**

- Establish a plan for the upcoming architecting activities, the goals of the architecture and the architectural outputs

- **TOGAF Relationship**

- ADM: Preliminary Phase

- **Subprocesses**

- Identify stakeholders
- Define architecture principles
- Identify architectural products, formats and the supporting Zachman cells
- Define product relationships / dependencies
- Define schedule
- Select tool(s)
- Plan concordance, configuration & consolidation of architectural products
- Form/train Architecture Team

**Activity II**  
Architecture  
Planning



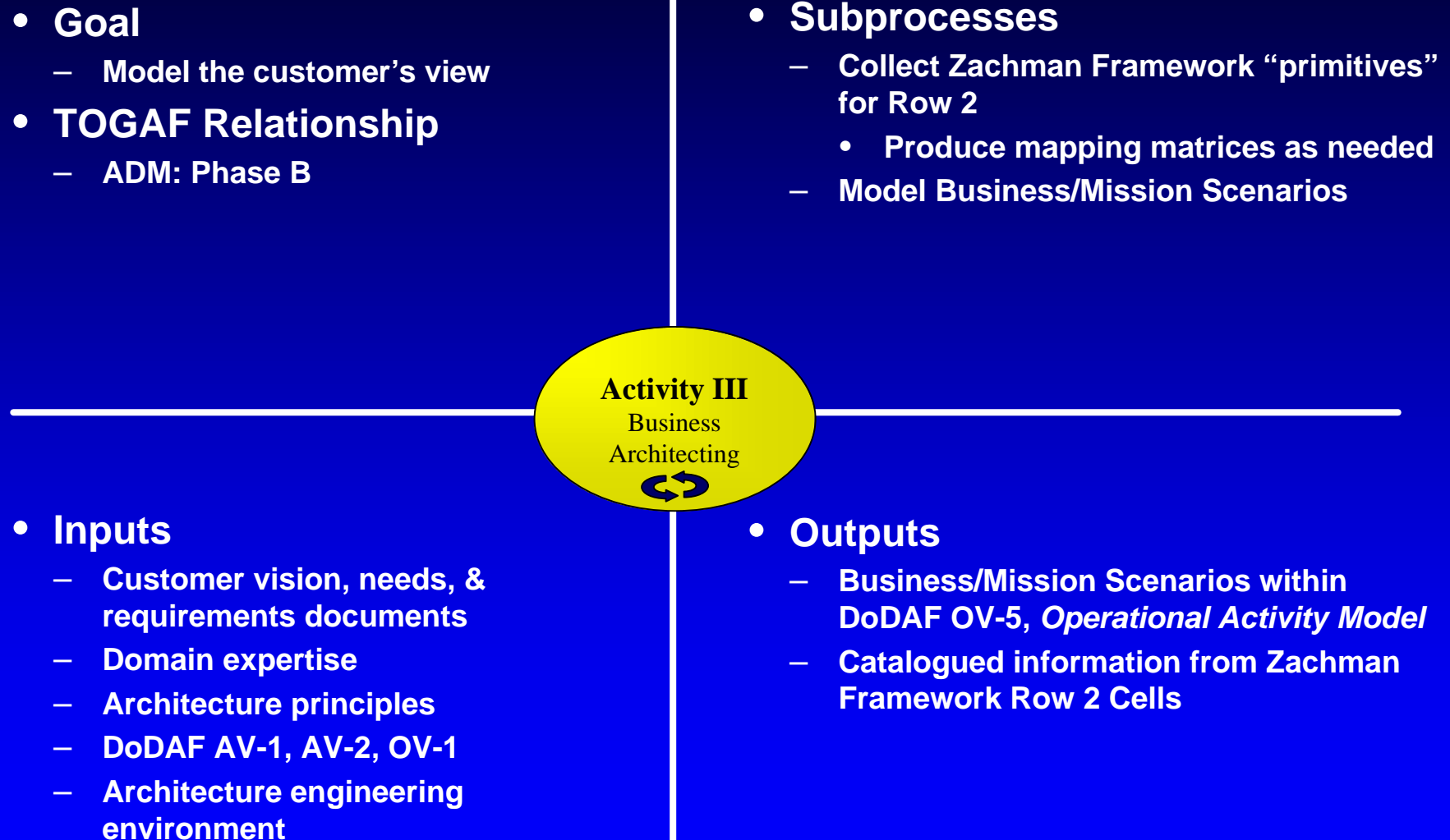
- **Inputs**

- Customer vision, needs, & requirements documents
- DoDAF AV-1, AV-2, OV-1, TV-1
- Quality attribute-based requirements

- **Outputs**

- Architecture principles
- Architecture schedule
- Enhanced DoDAF AV-1, *Overview & Summary Information*
- Architecture engineering environment

# Activity III: Business Architecting



# Activity IV: Technical Architecting

- **Goal**

- Produce the remaining architectural descriptions of the enterprise from a variety of views

- **TOGAF Relationship**

- ADM: Phases C, D

- **Subprocesses**

- Develop/mature the defined DoDAF view products
- Develop the defined additional architectural products
- Ensure concordance between architectural products
- Iteratively evolve an executable model

**Activity IV**  
Technical  
Architecting



- **Inputs**

- Business Architecture
- Customer vision, needs, & requirements documents
- Domain expertise
- Architecture principles
- DoDAF AV-1, AV-2, OV-1, OV-5, TV-1 (and its referenced standards)

- **Outputs**

- Architecture Baseline Package
- Executable model

# Activity V: Architecture Validation

- **Goal**

- Ensure the architecture is ready to be implemented

- **Subprocesses**

- Architecture checklist
- ATAM<sup>SM</sup>
- Quality attribute assessments

Activity V  
Architecture  
Validation



- **Inputs**

- Architecture Baseline Package
- Executable model

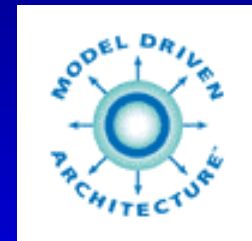
- **Outputs**

- Completed architecture checklist
- Simulation results
- SEI's Architecture Tradeoff Analysis Method<sup>SM</sup> results
- Validated architecture



# Other Analysis Efforts

- Enterprise Architecting Tools
- Object Management Group's Model-Driven Architecture
- UML 2.0 for Systems Engineering
- OMB's Federal Enterprise Architecture Reference Models
- CMMI and IEEE-1471 Mappings
- Standardized supplemental views
- Agile Modeling
- Open Systems Architectures
- Certification Programs



# Summary

- **There are established industry and government standards to help us address enterprise-wide architectural alignment between customer mission, strategic goals, business rules, data, application systems, organization, and technology.**
- **No one standard or framework addresses all the aspects of the architecting process. Unification is necessary to complete the picture.**

# Questions?

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## Reference Links

- The Open Group Architecture Framework, Version 8.0
  - <http://www.opengroup.org/architecture/togaf8/index8.htm>
- C4ISR Architecture Framework, Version 2.0
  - [http://www.defenselink.mil/nii/org/cio/i3/AWG\\_Digital\\_Library/index.htm](http://www.defenselink.mil/nii/org/cio/i3/AWG_Digital_Library/index.htm)
- Department of Defense Architecture Framework, Version 1.0
- Zachman Framework for Enterprise Architecture
  - <http://www.zifa.com>
  - <http://www.zachmaninternational.com>
- Software Engineering Institute's Architecture Evaluations
  - [http://www.sei.cmu.edu/ata/ata\\_eval.html](http://www.sei.cmu.edu/ata/ata_eval.html)