

# USGS Information Architecture Tiger Team

# charge to lead the bureau toward an architectural vision/framework

- what an information architecture means for USGS
- what value an architecture will have for the USGS science programs,
- what systems, processes, and services are included in the architecture,
- The relationship of the USGS architecture to the DOI architecture, and
- what strategic approach the Bureau should take for developing and implementing an architecture per OMB mandates

# Members of the IA tiger team

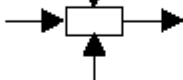
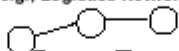
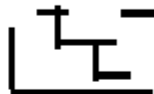
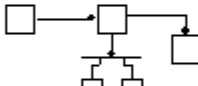
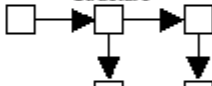
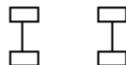
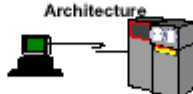
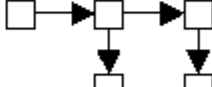
- Donna Scholz - chair
- Jessica Alvarez - systems administrator expertise and Water regional
- Paul Celluzzi - enterprise web and enterprise collaborative communications
- Stu Doescher - USGS architecture representative on DOI Architecture Working Group and Geography infrastructure
- Karen Kaye - architecture expertise and Biology infrastructure
- Mike McGreer - architecture expertise and capital investment concepts
- Ray Obuch - database expertise and Geology infrastructure
- Sandy Williamson - publications expertise and Water ITAC

# Defining an Enterprise Architecture

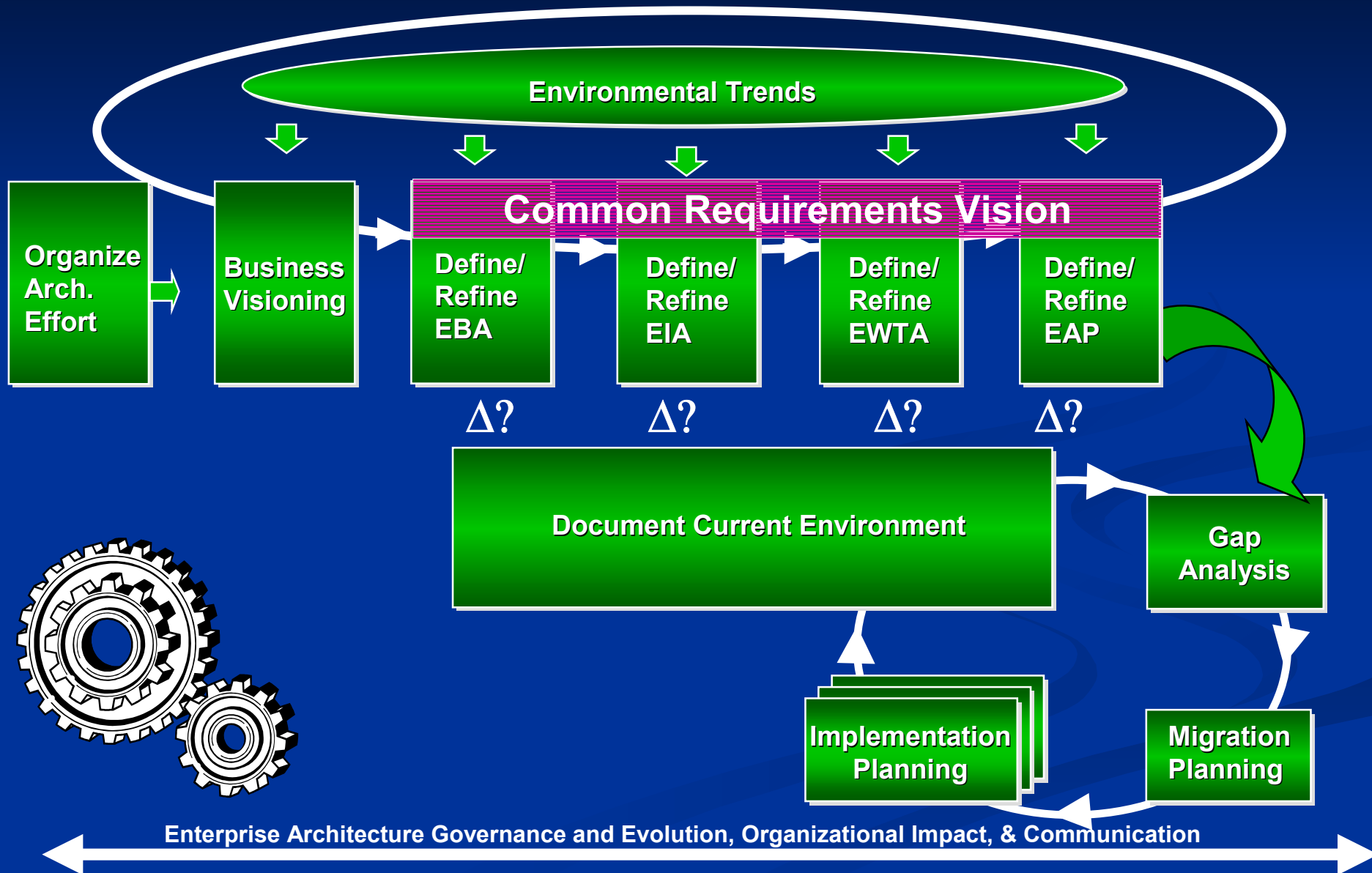
An Enterprise architecture (EA) is a logically consistent set of written down principles that:

- Are derived from business requirements
- Guide the engineering of an organization's information systems and technology infrastructure across the various component architectures
- Are understood and supported by the senior staff and developers
- Set targets for future developments (drive change)
- Enable parallel efforts to be aligned, converged and integrated with complete interoperability.

# Zachman's Framework for Information Systems Architecture

|                    | What                                                                                                                                              | How                                                                                                                          | Where                                                                                                                         | Who                                                                                                                                | When                                                                                                                          | Why                                                                                                                      |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
|                    | Data                                                                                                                                              | Function                                                                                                                     | Network                                                                                                                       | People                                                                                                                             | Time                                                                                                                          | Motivation                                                                                                               |
| DEFINITION         | <b>Scope</b><br>List of Things Important to Business<br>         | List of Processes the Business Performs<br> | List of Locations Important to Business<br> | List of Organizations Important to Business<br> | List of Events Significant to Business<br> | List of Business Goals/Strategies<br> |
|                    | <b>Investor</b><br>Entity=Class of Business Thing<br>                                                                                             | Function=Class of Business Process<br>                                                                                       | Node=Major Business Location<br>                                                                                              | Agent=Major Org Unit<br>                                                                                                           | Time=Major Business Event<br>                                                                                                 | End/Mean=Major Business Goal/CSF<br>                                                                                     |
| DESIGN             | <b>Enterprise Model</b><br>e.g., Entity Relationship Diagram<br> | e.g., Function Flow Diagram<br>             | e.g., Logistics Network<br>                 | e.g., Organization Chart<br>                    | e.g., Master Schedule<br>                  | e.g., Business Plan<br>               |
|                    | <b>Owner</b><br>Ent=Business Entity<br>Rel=Business Rule<br>                                                                                      | Function=Business Process<br>                                                                                                | Node=Business Location<br>Link=Business Linkage<br>                                                                           | Agent=Org Unit<br>Work=Work Product<br>                                                                                            | Time= Business Event<br>Cycle=Business Cycle<br>                                                                              | End=Business Objectives<br>Means=Business Strategy<br>                                                                   |
| DEVELOPMENT        | <b>Information System Model</b><br>e.g., Data Model<br>          | e.g., Data Flow Diagram<br>                 | e.g., Distributed System Architecture<br>   | e.g., Human Interface Architecture<br>          | e.g., Processing Structure<br>             | e.g., Knowledge Architecture<br>      |
|                    | <b>Designer</b><br>Entity=Data Entity<br>Relationship= Data Relationship<br>                                                                      | Funct=Appl Function<br>Arg=User Views<br>                                                                                    | Node=Info Sys Funct<br>Link=Line Char<br>                                                                                     | Agent=Role<br>Work=Deliverable<br>                                                                                                 | Time=System Event<br>Cycle=Processing Cycle<br>                                                                               | End=Criterion<br>Means=Option<br>                                                                                        |
|                    | <b>Technology Model</b><br>e.g., Data Design<br>                 | e.g., Structure Chart<br>                   | e.g., System Architecture<br>              | e.g., Human/ Technology Interface<br>          | e.g., Control Structure<br>               | e.g., Knowledge Design<br>           |
|                    | <b>Builder</b><br>Entity=Segment/Row<br>Relationship=Pointer/Key<br>                                                                              | Funct=Computer Funct<br>Arg=Screen/Device Formats<br>                                                                        | Node=Hardware/ System Software<br>Link=Line Specification<br>                                                                 | Agent=User<br>Work=Job<br>                                                                                                         | Time=Execute<br>Cycle=Component Cycle<br>                                                                                     | End=Condition<br>Means=Action<br>                                                                                        |
| FUNCTIONING SYSTEM | <b>Components</b><br>e.g., Data Definition Description<br>     | e.g., Program<br>                         | e.g., Network Architecture<br>            | e.g., Security Architecture<br>               | e.g., Timing Definition<br>              | e.g., Knowledge Definition<br>      |
|                    | <b>Subcontractor</b><br>Ent=Fields<br>Rel=Addresses<br>                                                                                           | Funct=Language Stmts<br>Arg=Control Blocks<br>                                                                               | Node=Addresses<br>Link=Protocols<br>                                                                                          | Agent=Identity<br>Work=Transaction<br>                                                                                             | Time=Interrupt<br>Cycle=Machine Cycle<br>                                                                                     | End=Subcondition<br>Means=Step<br>                                                                                       |
|                    | e.g., Information                                                                                                                                 | e.g., Application                                                                                                            | e.g., Technology                                                                                                              | e.g., Organization                                                                                                                 | e.g., Schedule                                                                                                                | e.g., Strategy                                                                                                           |

# EA Process Model



# Architecture Challenges

## CHALLENGE #1

**Creating an enterprise architecture deliverable that is 'actionable' across the IT organization.**

- What are IT staff expected to do differently the day after you have delivered your Information Infrastructure Architecture (ITA)?
- 'Actionable' means prescriptive
- Successful architecture efforts are able to communicate role of ITA across IT



# Interior Information Conceptual Architecture Principles

1. Information is valued as an Interior asset to accelerate decision-making, improve management, and increase accountability.
2. Data and information must be managed and maintained as a stewardship responsibility to support the mission of the department.
3. Systems must be designed, acquired, developed, or enhanced such that data and processes can be effectively shared across Interior and with our partners.
4. In considering system requirements (e.g., new functionality), we should look to reuse existing components before we buy. If no components exist, purchased solutions (e.g., COTS or GOTS) should be explored before we build.
5. IT systems should be implemented in adherence with security, confidentiality and privacy policies to assure proper information availability.
6. An assessment of business continuation and recovery requirements is mandatory when acquiring, developing, enhancing or outsourcing systems. Based on that assessment, appropriate disaster recovery and business continuity planning, design, testing and maintenance will take place.
7. A basic set of information services will be provided to all employees.



# Interior Information Conceptual Architecture

- **Principle 8:** We must implement an Interior-wide “interoperable network” performing as if it were a virtual, Interior-wide Local Area Network.
- **Principle 9:** Easy and timely access to data and information is the rule rather than the exception, without security and privacy being compromised.
- **Principle 10:** Business processes will be analyzed, simplified or otherwise redesigned in preparation for and during information systems enhancements, development, and implementation.
- **Principle 11:** Interior will adopt a total cost of ownership model for IT systems that includes life-cycle considerations like the costs of development, implementation/transition, support, disaster recovery, and retirement as well as the impacts of flexibility, scalability, ease of use and reduction of integration complexity.
- **Principle 12:** IT solutions will use industry-proven and “state-of-the-art” mainstream technologies.
- **Principle 13:** Priority will be given to products adhering to industry standards and open architecture.
- **Principle 14:** The planning and management of the Interior Information Architecture will follow a unified “federated” model. It will include sufficient support and review structures to ensure that the integrity of the architecture is maintained as systems are acquired, developed and enhanced.