

Enterprise Architecture 101



NATIONAL INSTITUTES OF HEALTH
enterpriseARCHITECTURE

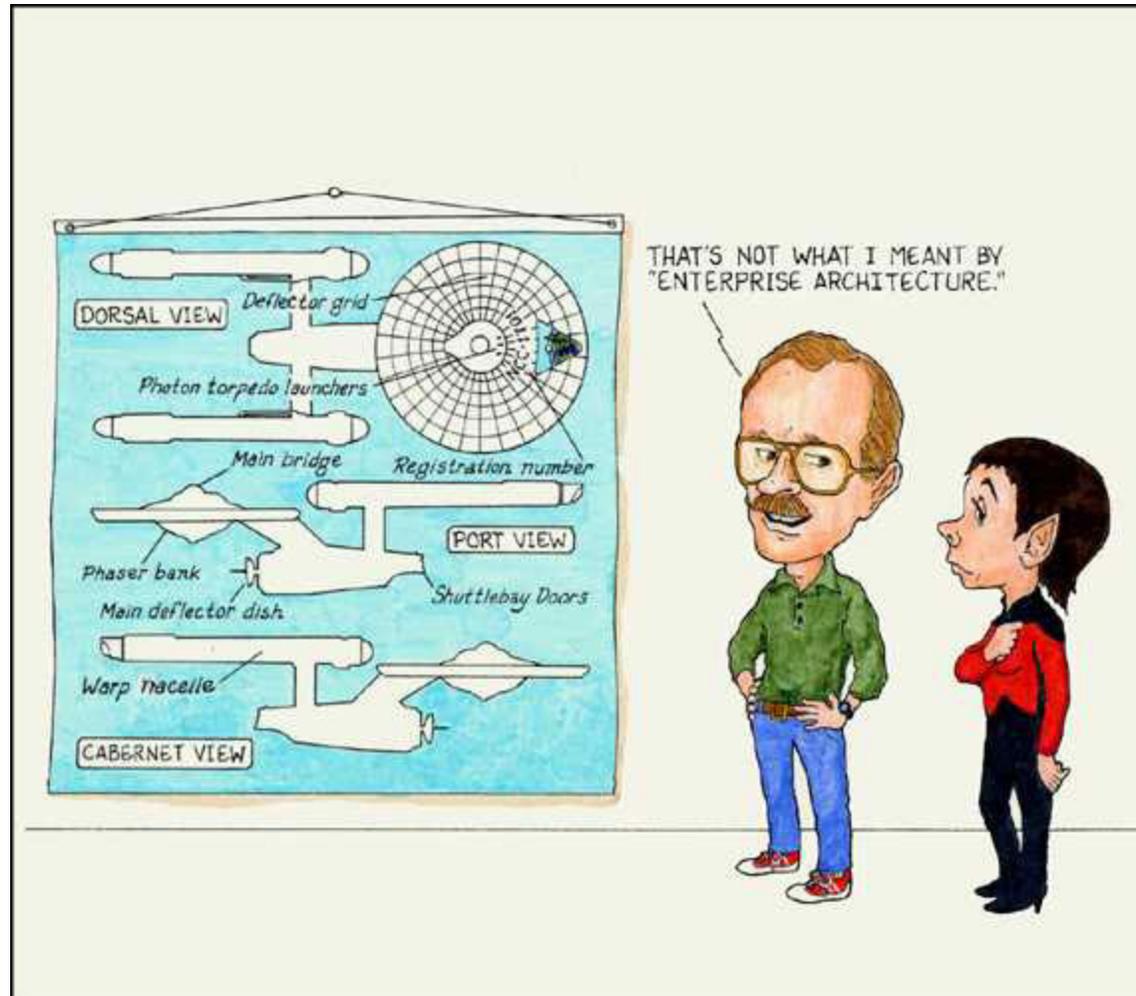
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NIH Enterprise Information Technology Architecture
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Enterprise Architecture 101





Agenda

- What is Enterprise Architecture (EA)
- What are the benefits
- What comprises EA
 - Framework
- Where are we today
- Where are we headed

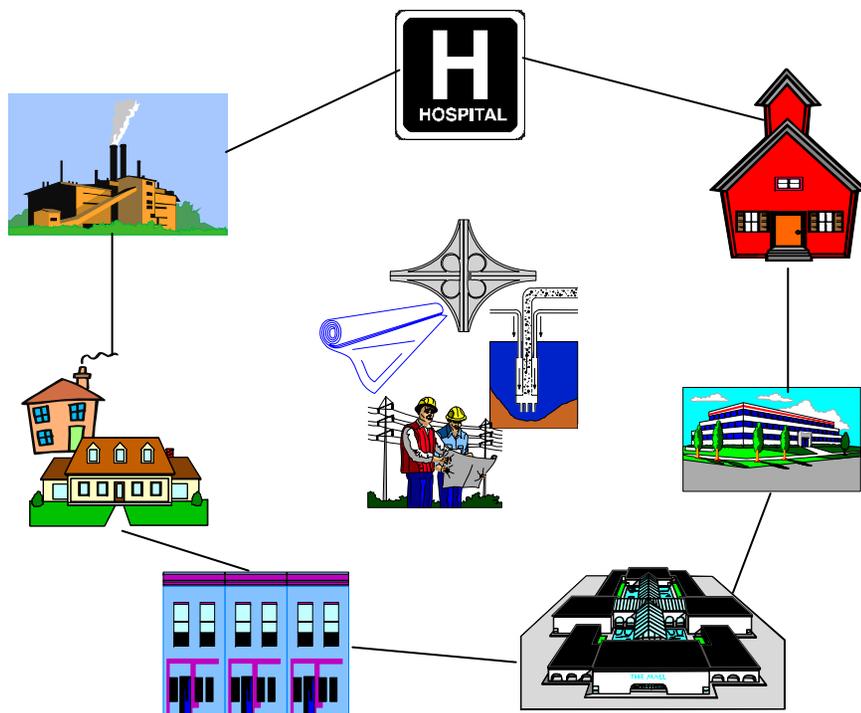


It's All In The Planning

- L'Enfant's Plan of Washington DC – 1791
- City Planning
 - Washington DC or
 - Miami or Houston
- Building
 - on a mountain top vs a planned community
 - in an IT environment



What is Enterprise IT Architecture?



- **Enterprise architecture** defines how information and technology will support the business operations and provide benefit for the business.
- It illustrates the organization's core mission, each component critical to performing that mission, and how each of these components is interrelated. These components include:
 - Guiding principles
 - Organization structure
 - Business processes
 - People or stakeholders
 - Applications, data, and infrastructure
 - Technologies upon which networks, applications and systems are built



Architecture: A Building Analogy

City Planning

Type of city

Zoning

Utilities access

Roads

Enterprise Architecture

Business mission

Support business needs

Standard interfaces

Sufficient infrastructure
(network bandwidth)

How Do We Design the Environment to Support Everyone and Allow for Innovation?

Building Architecture

Type of building

Number and types of rooms

Adherence to building codes

Utility connections

Solution Architecture

Type of application

Functional requirements

Adherence to technology standards

Data access and interfaces

What Do I Design to Meet the Specific Needs of the People Who Will Use This?



What Comprises Enterprise Architecture?

Structure of computing for doing business

- Both Governance Process and Frameworks
- Governance Analogous to City Planning
 - ITWG = City Council
 - Architecture Review Board = Zoning Board
 - Conceptual models = Master plan
 - Common infrastructure = Utilities
 - Application = a building or other structure
 - Standards & interfaces = Building code
 - Exception process = Building permit process
- Frameworks include models and blueprints for building applications





NIH's Mission and EA

- The National Institute of Health is the steward of medical and behavioral research for the Nation. Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability.
- Enterprise Architecture supports the NIH mission by creating a structured and dynamic enterprise-level information technology (IT) design to guide the implementation of applications and infrastructure.





NIH Enterprise Architecture Mission and Policy

Mission

- To develop a comprehensive plan for IT support at the NIH which acknowledges the need for both conforming and diverse business processes.

Policy

- EA applies to all of the NIH, including the Institutes and Centers (ICs), the Office of the Director, and enterprise systems. However, this policy excludes IT systems that directly support Intramural scientific research.





Why *Have* an EA?

- To design a “blueprint” for implementing the NIH information systems to enable the mission:
 - Builds a common understanding of future direction.
 - Identifies systems and information we need to support our processes.
 - Defines the technology infrastructure.
 - Documents processes to align IT to business.
- Why is EA not just another academic process?
 - Tie “to-be” directions to real business objectives
 - Make it practical and instructive
 - Focus on shortening the design process
 - Allow for innovation, evolution, and flexibility
 - Government directives





Drivers for NIH 's EA Requirements

Business Drivers - factors that the EA must address:

- HHS and Congressional Mission Directives
- Mission Initiatives from the NIH Director's Office
- Individual IC Mission Initiatives and Directives

Technology Drivers - opportunities or issues EA must address:

- Technology trends of relevance to NIH
- Significant technology issues within one or more IC's that should be addressed.





Benefits of EA

- Improves interoperability
- Makes accurate information available whenever and wherever needed
- Improves consistency, accuracy, timeliness, integrity, quality, availability, access, and sharing of IT-managed information across the enterprise
- Eliminates the need for multiple, disparate and duplicate systems
- Achieves economies of scale by providing mechanisms for sharing services across the enterprise
- Improves communication among the business organizations and IT organizations within the enterprise





EA Consists of...

Models

- Graphically represent common understandings, i.e., process flow, interaction between applications.
- Show the interactions between applications within NIH's specific business context and the supporting datastores
- Describe future direction for the application portfolio and database topology needed to support NIH.
- Models drive requirements for technology architecture components
- Supported by mappings that cross-reference relationships





EA Consists of...

- Principles

- <http://enterprisearchitecture.nih.gov/ArchLib/Guide/NIHEAPrinciples.htm>

- Patterns

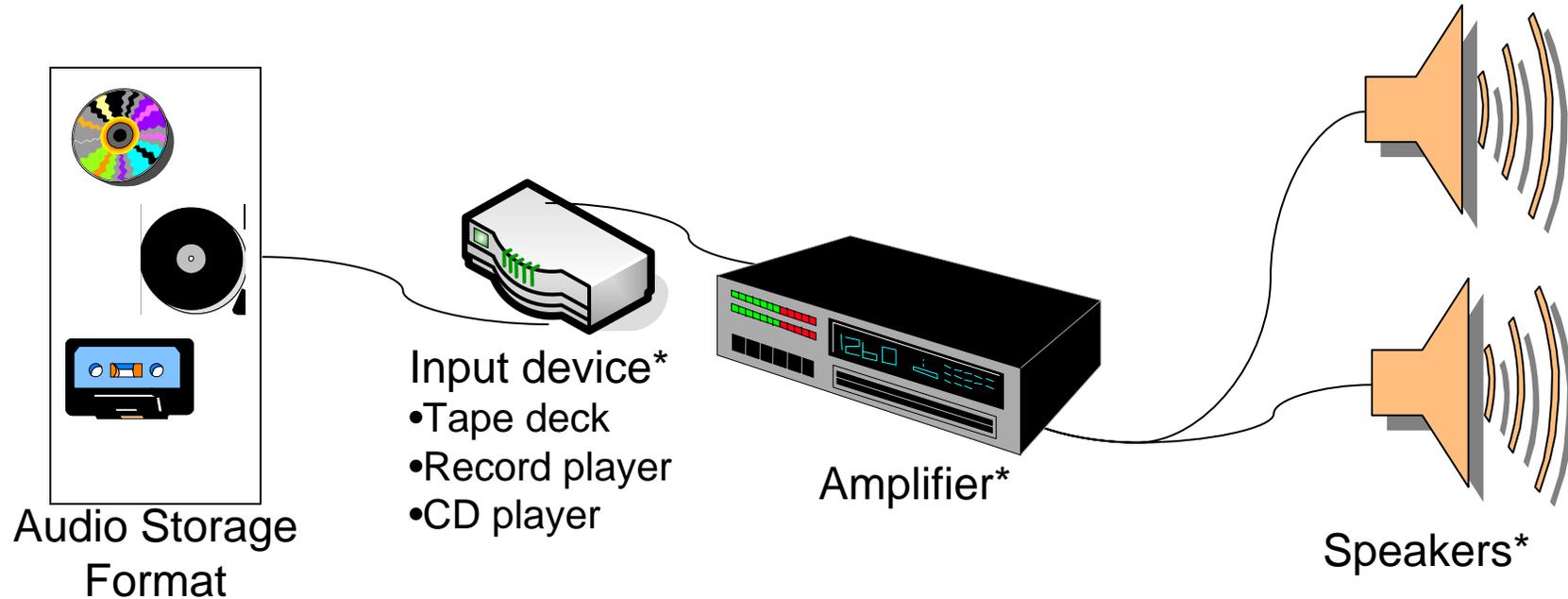
- <http://enterprisearchitecture.nih.gov/ArchLib/Guide/WhatIsPattern.htm>

- Bricks

- <http://enterprisearchitecture.nih.gov/ArchLib/Guide/WhatIsBrick.htm>



Simple Home Sound System Pattern



* Technical bricks would exist for each of these technical elements to ensure system operability when modules are developed and integrated independently.

[View a Pattern](#)





Audio Storage Format Brick

Current

Baseline
<ul style="list-style-type: none"> ■ Cassette ■ CD ■ MP3 ■ Radio ■ Vinyl records (LPs, 45s) ■ 8-track ■ Reel-to-reel

Retirement Targets
<ul style="list-style-type: none"> ■ Reel-to-reel

Two Years

Tactical Deployment
<ul style="list-style-type: none"> ■ CD ■ MP3 ■ Radio ■ Cassette (for books on tape)

Containment Targets
<ul style="list-style-type: none"> ■ Vinyl records (LPs, 45s) ■ Cassette (for music) ■ Reel-to-reel (for recording production) ■ 8-track

Five Years

Strategic Direction
<ul style="list-style-type: none"> ■ MP3

Emerging Technologies
<ul style="list-style-type: none"> ■ Digital rights management ■ Digital asset management

Comments

- Note: eight-track tapes are containment for recording satellite data
- Industry moving from analog to digital media

[View a Brick](#)





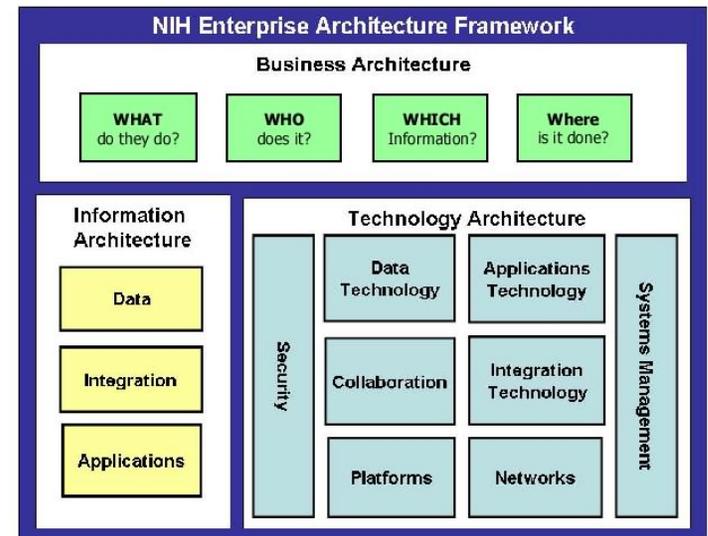
How Do We Use the Framework?

The framework helps organize a complex set of information for a particular group of people at a particular time.

The framework helps structure the EA effort

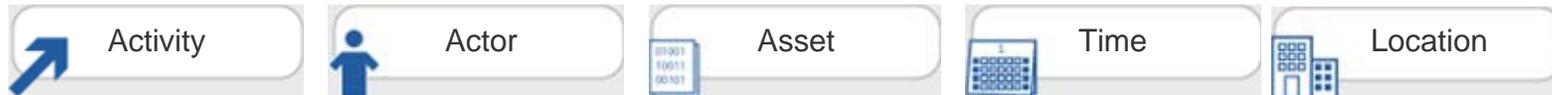
- Business Architecture
- Information Architecture
- Technology Architecture

*Architecture is a process,
not a one-time event*





Business Architecture



Who does what ...

using which resources ...

when and where.

Activities are supported by Application

Assets are generalized and defined as Data Models

Why it matters ...

- » You can understand how important and common activities are completed at NIH.
- » You don't need to redefine or discover the process for the same or similar activities

when ...

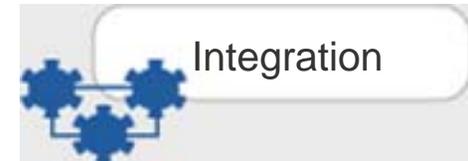
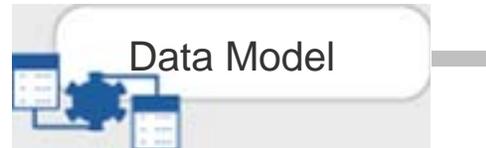
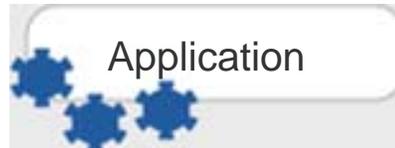
- » You are defining requirements for a new IT project.
- » You are planning revisions to existing application.

and you are ...

- » IT project managers
- » "Business people" working closely with leadership and ground level operations.



Information Architecture



by standardized representation of data ...

and relate to each other.

Why it matters ...

- » You can identify existing design for all or part of your system.
- » You can understand environment around you, and participate in the enterprise plan.
- » You can achieve efficiency at the global level.
- » You can share data more easily because data are represented in standardized way.

when ...

- » You are defining technical design specification.
- » You are working through the detailed design.

and you are ...

- » IT project managers
- » Solution architects

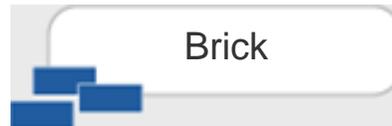




Technology Architecture



Applications relate to each other ...



and are supported by infrastructure.

Community Content

Best Community Practice
Case Studies
Sample Code and Technical Documentation
Vendor Documentation

User contribution enhances the overall content.

Why it matters ...

- » You don't need to spend time figuring out viable technical components and solutions used at NIH now and in the future.
- » You can reduce time and improve quality of proposal.
- » You can reduce variants in solutions, and save money on development and training.

when ...

- » You are selecting a specific technical components to support the design.

and you are ...

- » Solution architects
- » Developers and designers
- » Contractors





Collaboration

Business Philosophy

– NIH Federated IT Governance

- Collegial decision making within the institutes and centers
- Multiple IT organizations are focused on being responsive to individual interests, not the interests of the whole

– Collaborative development of our products

- Domain Teams
- NRFC Process





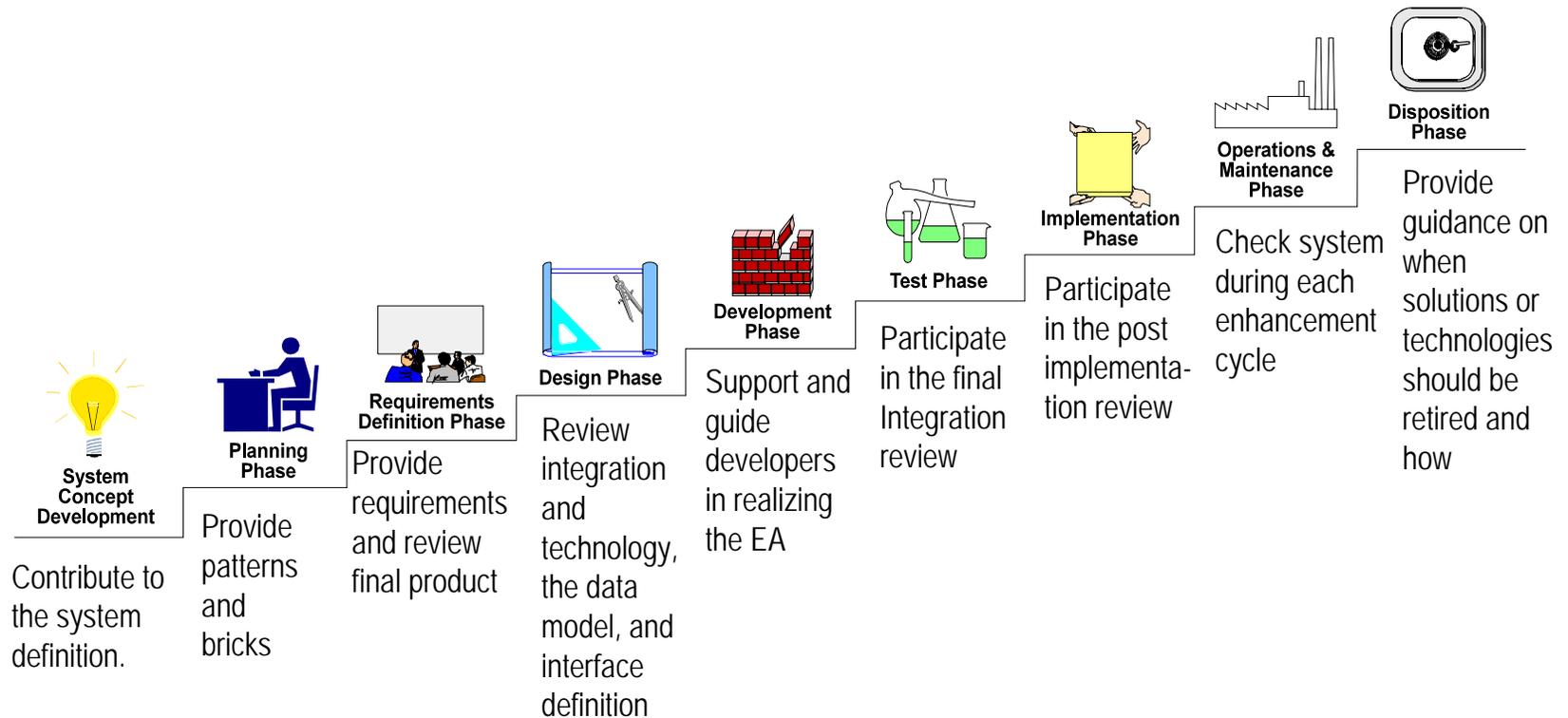
How Standards are Developed

- Domain Teams
- NRFCs
- Exceptions





When to Contact the Architect





Progress To-Date

- Foundation
 - Governance Framework
 - Developing and building the EA Principles and Framework
- Initial Focus on Technology Architecture
 - Security
 - Collaboration
 - Network
- Data, Integration, Business Modeling
- Communications
 - Communicate EA to the NIH Stakeholders
 - Web site (<http://EnterpriseArchitecture.nih.gov>)
 - Intranet presence on the Portal
 - Hands on and on-line training seminars in progress





EA Projects

- Fall Domain Teams (Collaboration, Security)
- Conceptual Data Model
- Grants Information Architecture
- Business Process Modeling
- Identity Management
- Redesigning NED
- Provisioning accounts for email and Active Directory
- Application Integration Pilot
- Shutting Down ph
- Database of 750 applications mapped to business processes
- Marketing





Future Direction

- OCITA
 - Work with ICs to complete population of the EA framework
 - Business Architecture
 - Information Architecture
 - Technology Architecture
 - Publish and maintain EA products
 - Communicate and educate NIH technologists
 - Improve EA processes
 - Focus on Grants and People Information Architecture

- ICs
 - Understand how EA affects what you do
 - Help us structure and improve training
 - Support data collections and domain teams to provide us with cross-IC input
 - Support and advocate for the EA
 - Help to track and record both EA successes and lessons learned





Vision of EA at the NIH

- To make a difference
 - 1 – 3 years
 - Technology Standards used
 - Applications related to business processes
 - 3 – 5 Years
 - Household Name





What Can You Do?

- Learn more from the web site
- Participate in community discussions and surveys
- Participate in domain teams
- Use
- Share information using NRFC series
- Spread the word
- Subscribe to the **LISTSERV**
- Give us your feedback





Contact Information

- **Web site**

<http://EnterpriseArchitecture.nih.gov>

- **The NIH Enterprise Architecture Community in the NIH Portal**

- **Email**

EnterpriseArchitecture@mail.nih.gov

- **Subscribe to the EA LISTSERV:**

http://list.nih.gov/archives/enterprise_architecture.html





Appendix

Supplementary Slides





For the Curious

- These sites provide guidance for EA in the federal government
 - <http://www.feapmo.gov/fea.asp>
 - <http://www.gao.gov/new.items/d03584g.pdf> (EAMMF)
 - <http://www.cio.gov/Enterprise Architecture>
- If you'd like to look at what other agencies are doing with EA, you can take a look at these websites:
 - <http://www.doi.gov/ocio/architecture/index.html>
 - <http://www.blm.gov/ba/>
 - <http://www.cms.hhs.gov/it/enterprisearchitecture/>
 - <http://www.va.gov/oirm/architecture/default.asp>

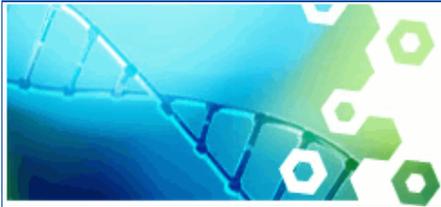




Enterprise Principles

<p><u>Principal Principle</u> The NIH Enterprise Architecture applies to all aspects of NIH information technology (IT).</p>	<p><u>Rationale</u> In the NIH federated environment, a framework for information technology promotes better results.</p> <p><u>Implications</u></p> <ul style="list-style-type: none"> • This applies to all NIH systems and includes systems, data and infrastructure. • EA must be followed by all NIH organizations to strengthen the ability of the NIH IT to provide a consistent and measurable level of quality to customers. • An exception process will be in place to accommodate new technology and specific needs. • Standards must be flexible enough to be responsive to address business needs.
<p><u>Business Priority</u> Information systems exist to support the needs of the business. Therefore, the NIH Enterprise Architecture must support the enterprise vision, business strategies and plans.</p>	<p><u>Rationale</u> The architecture has the most value when closely aligned with the NIH strategic plans and other corporate-level direction, concepts, and objectives.</p> <p><u>Implications</u></p> <ul style="list-style-type: none"> • Technology choices must be linked to business needs. Some technologies will not be appropriate at the NIH. • The NIH Strategic Plan, goals and objectives will be utilized in developing key components of the architecture business vision and architecture components. • The architecture must be generated with a specific purpose and for a specific audience to ensure it meets the expectations and needs of its intended stakeholders. • The NIH must not implement technology simply because it is available.
<p><u>Business Authority</u> The NIH Enterprise Architecture will embody the business authority to create, read and modify data.</p>	<p><u>Rationale</u></p> <ul style="list-style-type: none"> • Those with the most knowledge of the data have the best chance of and most interest in getting it right. • Integrity is improved and maintenance is simplified. <p><u>Implications</u></p> <ul style="list-style-type: none"> • The authoritative source of information and data must be identified. • The authoritative source must provide corporate access to appropriate data. • Data may need to be restructured for easy access and management. • Data integrity and security must be maintained to ensure reliability of information upon which business decisions are made.





Enterprise Principles (cont'd)

<p><u>Optimum Enterprise Benefit</u> Architectural decisions will maximize the overall benefit to the NIH by balancing the following criteria: accessibility, consistency, cost, diversity of business needs, flexibility, functionality, manageability, precision, risk, scalability, security, supportability and value.</p>	<p><u>Rationale</u> Architectures are to provide long term benefits to the enterprise. Therefore decisions must balance multiple criteria based on the business need.</p> <p><u>Implications</u></p> <ul style="list-style-type: none"> • The business owner must prioritize criteria based on funding and governance. • Criteria may receive different emphases in different situations.
<p><u>Reusability of Components</u> The NIH Enterprise Architecture will be built on loosely-coupled, reusable modular components that implement services.</p>	<p><u>Rationale</u></p> <ul style="list-style-type: none"> • Reusable components provide opportunities to reduce IT development costs and development time. Reusable components leverage investments in existing IT systems. • Modular components improve the ability of systems to adapt to changing requirements because the changes will be isolated to affected modules. <p><u>Implications</u></p> <ul style="list-style-type: none"> • The architecture will establish standards and guidelines for developing system components.
<p><u>Technology Components</u> The NIH Enterprise Architecture supports leading edge technologies to meet mission-differentiating needs and requires mature, proven interoperable technologies in support of service environments.</p> <p>Technical diversity that does not tie to business needs is discouraged.</p>	<p><u>Rationale</u></p> <ul style="list-style-type: none"> • Cost and risk are limited unless justified by potential scientific gains. • The NIH does not need to distinguish itself by providing cutting-edge service support technology but desires to distinguish itself by improving support of biomedical science. • Service support must be reliable and easy to use. <p><u>Implications</u></p> <ul style="list-style-type: none"> • Introduction of new technologies will be explicitly evaluated as an exception to standards.

