

# An Introduction to TOGAF™

(The Open Group Architecture Framework)

THE *Open* GROUP

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THE *Open* GROUP

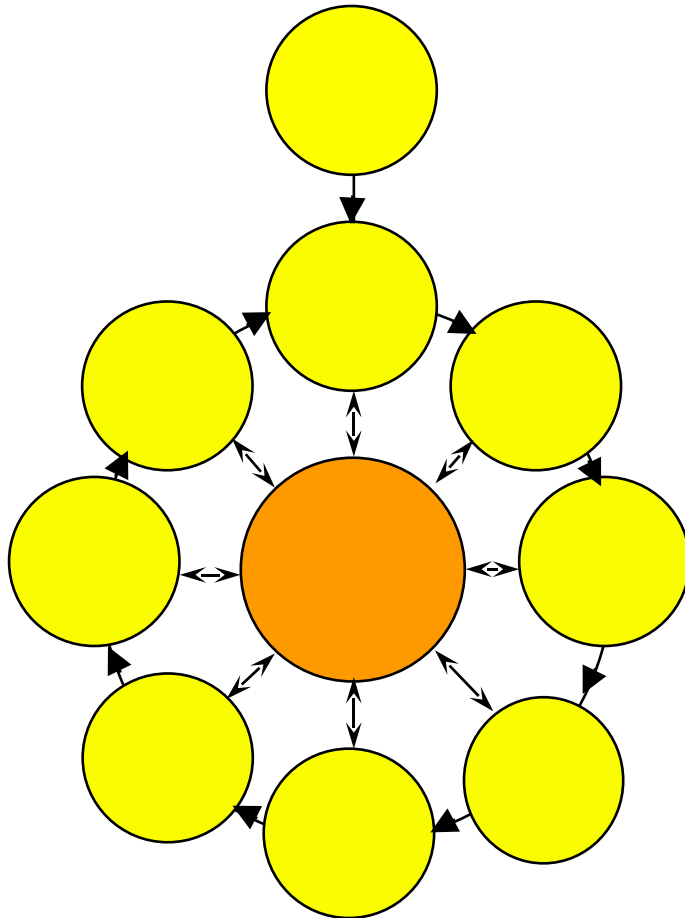
# Self Introduction

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- ❑ Fellow, The Open Group
  - Director, The Open Group Messaging Forum
  
- ❑ Lecturer, University of Reading
  - School of Systems Engineering
  
- ❑ Associate Consultant, Architecting-the-Enterprise
  - Principal, The AtE Institute

# Agenda

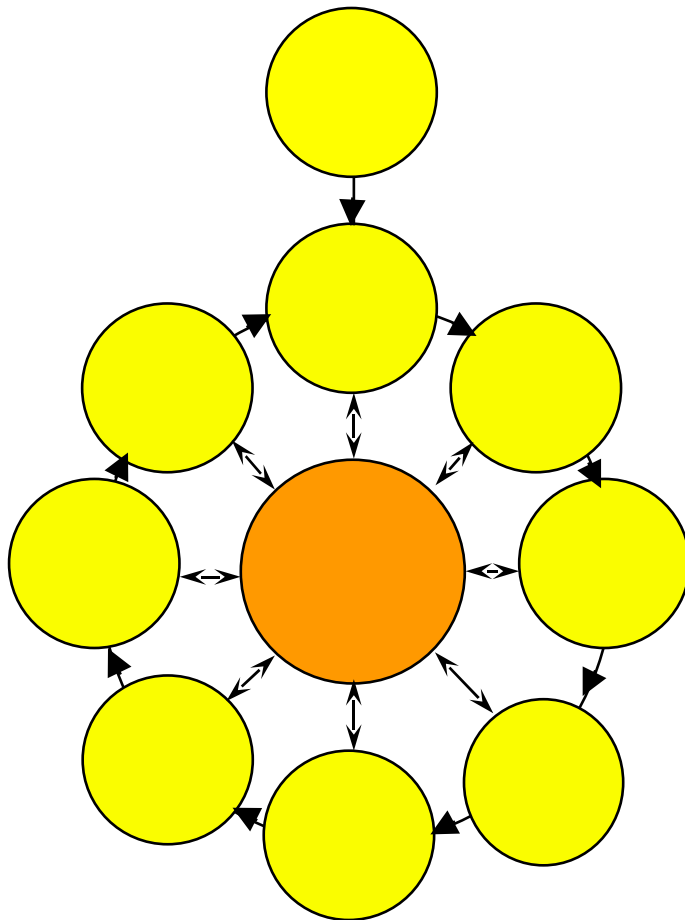
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- ❑ The Open Group
- ❑ The Architecture Forum
- ❑ TOGAF Background
- ❑ TOGAF 8 “Enterprise Edition”
- ❑ Summary

# Agenda

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# About The Open Group

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Global Operation  
Cross-Industry  
Vendor Neutral  
Technology Neutral

San Francisco,  
Boston, UK, Tokyo  
Regional chapters  
50+ staff

Brings the key  
constituencies together  
in an open process

Industry Consortium  
Not-for-profit operations  
Established ~25 years  
~300 member organizations

Operates the industry's  
premier  
certification service

# Mission

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- The mission of The Open Group is to drive the creation of Boundaryless Information Flow achieved by:
  - Working with customers to capture, understand and address current and emerging requirements, establish policies and share best practices;
  - Working with vendors, consortia and standards bodies to develop consensus and facilitate interoperability, to evolve and integrate open specifications and open source technologies;
  - Offering a comprehensive set of services to enhance the operational efficiency of consortia; and
  - Developing and operating the industry's premier certification service and encouraging procurement of certified products.

# Activities

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- Certification Services
  - For specifications of The Open Group and other consortia
- Conferences
  - Quarterly member meetings
  - Architecture Practitioners Conferences
    - San Diego, January 2007
    - Mumbai, February 2007
    - Cape Town, March 2007
    - Paris, April 2007
    - Austin, July 2007
    - Europe, October 2007
- Member Forums and Working Groups

# Forums and Working Groups of The Open Group

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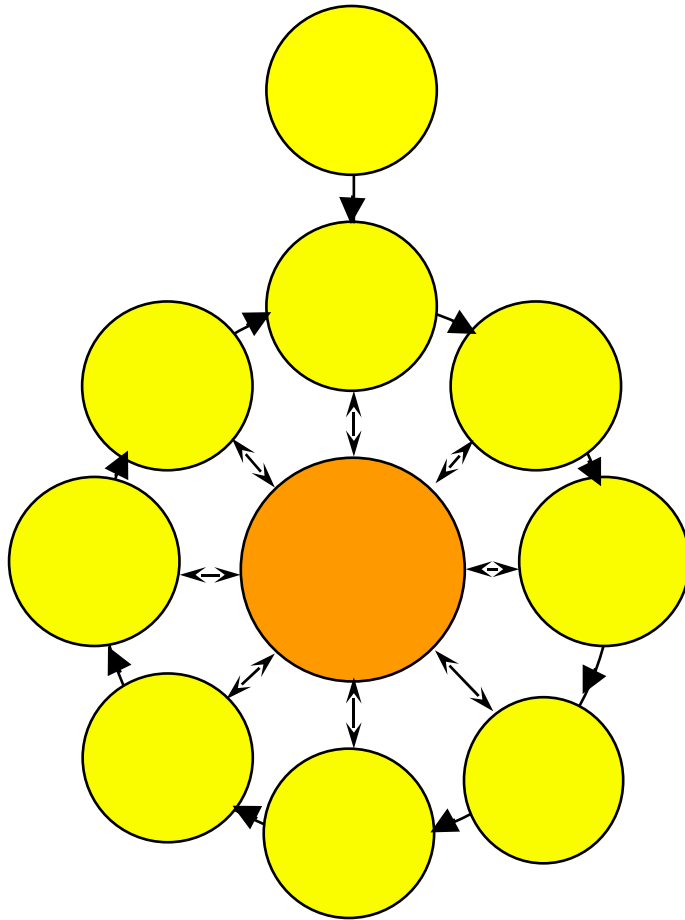
- ❑ Architecture Forum
  - ❑ Enterprise Management Forum
  - ❑ Grid Enterprise Services Forum
  - ❑ Identity Management Forum
  - ❑ Jericho Forum
  - ❑ Messaging Forum
  - ❑ Platform Forum
  - ❑ Real Time & Embedded Systems Forum
  - ❑ Security Forum
  - ❑ Universal Data Element Framework (UDEAF) Forum
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- ❑ Service Oriented Architectures WG
  - ❑ Semantic Interoperability WG
  - ❑ Homeland Security WG





# Agenda

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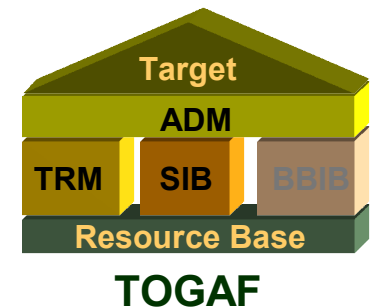
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# Architecture Forum - Focus

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- ❑ Original (and continuing) focus:

- TOGAF



- ❑ Extended focus:

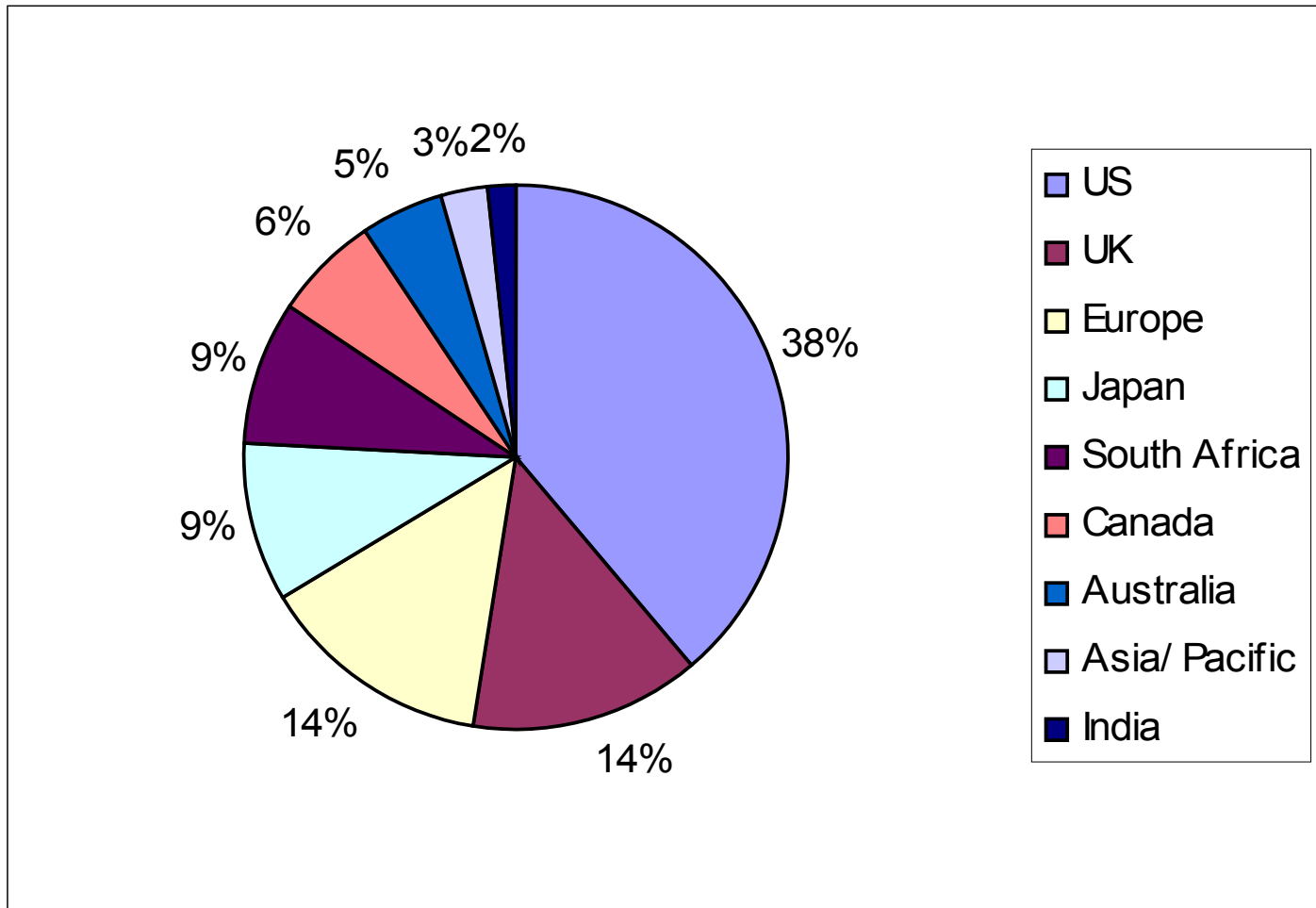
- Architecture as a Professional discipline
- Architecture Tools



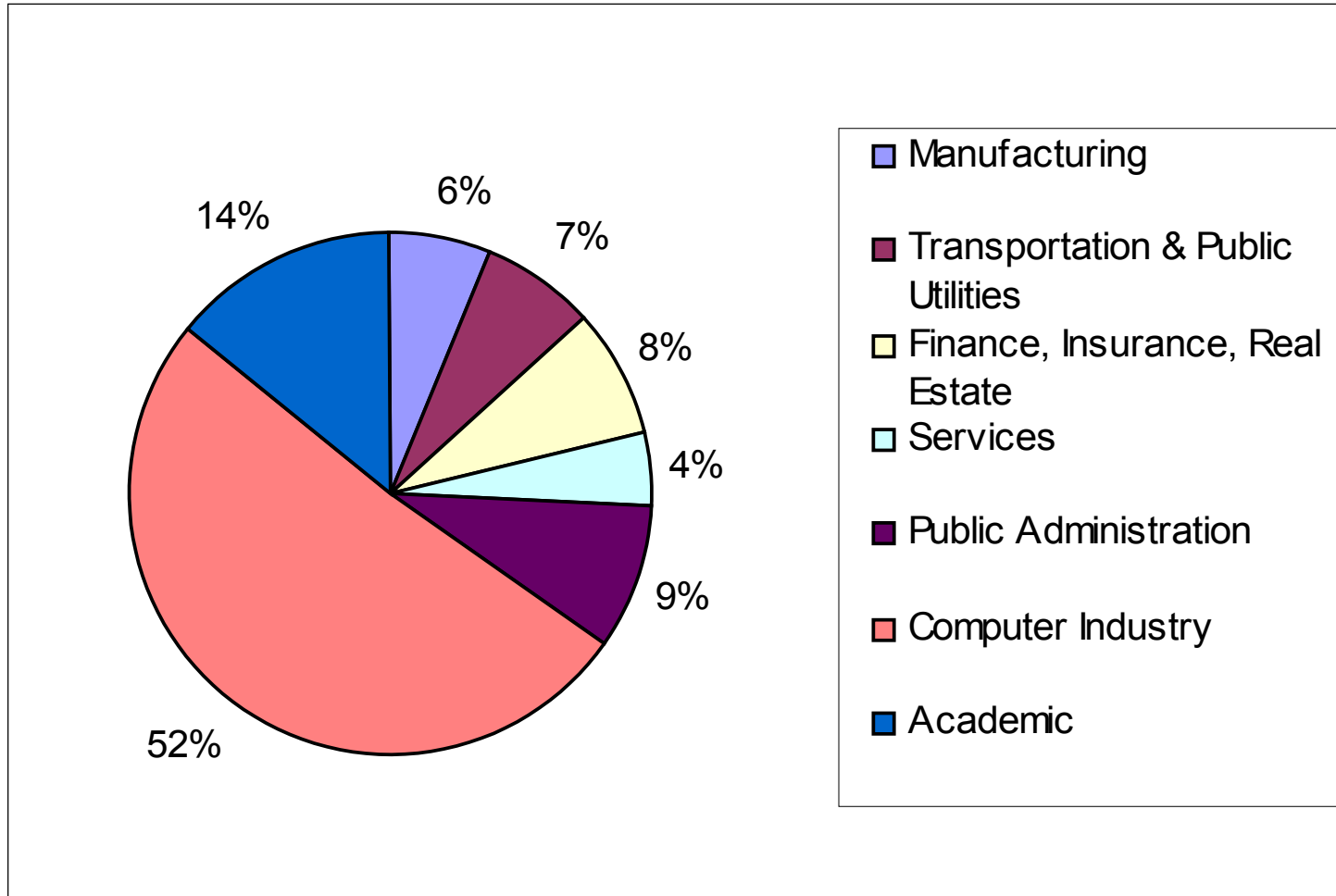
# Architecture Forum Members

- Accenture (US)  
act! Consulting (Germany)  
ADP, Inc. (US)  
American Express (US)  
Allied Irish Bank (Ireland)  
APL, Limited (US)  
Architecting-the Enterprise Ltd (UK)  
Arismore (France)  
Armstrong Process Group, Inc. (US)  
Austin Energy (US)  
Bank of Montreal Financial Group (Canada)  
Boeing Corporation (US)  
C & C Technology (UK)  
CAP Gemini Limited (France)  
Capita IT Services (UK)  
CC and C Solutions (Australia)  
Celestial Consulting Ltd (UK)  
Centre For Open Systems (Aus)  
CGI (Canada)  
ChiSurf (Hong Kong)  
Cisco Systems, Inc. (US)  
Citigroup (US)  
Companhia Vale do Rio Doce (Brazil)  
Computer Associates (US)  
Data Access Technologies (US)  
Dept for Works and Pensions (UK)  
Desktop Management Task Force (US)  
Detecon International GmbH (Germany)  
Enbridge, Inc. (Canada)  
Eskom Holdings (South Africa)
- Fannie Mae (US)  
Frietuna Consultants (UK)  
Fujitsu (Japan)  
Fundani Computer Systems (South Africa)  
Future Tech Systems (US)  
glue: Limited (UK)  
Grant MacEwan College (Canada)  
GTECH Corporation (US)  
Heck Consulting (Germany)  
Hewlett-Packard (US)  
Hitachi (Japan)  
Hornford Associates (Canada)  
IBM (US)  
Identum (UK)  
Infosys (India)  
Infovide (Poland)  
Innenministerium NordRhein-Westfalen (Germany)  
Integration Consortium  
Investec (South Africa)  
Itochu Techno-Science Corporation (Japan)  
Johnson & Johnson (US)  
Kansas State University (US)  
Letsema Consulting (South Africa)  
Lockheed Martin (US)  
Marathon Oil (US)  
Marriott International (US)  
MEGA International (Fra)  
Metaplexity Associates (US)  
Ministry of Science Technology & Innovation (Denmark)  
MIT Lincoln Laboratory (US)  
MITRE Corporation (US)  
Mitsubishi Corporation (Japan)  
Mizuho Information and Research Institute, Inc. (Japan)  
Monash University (Australia)
- NASA Jet Propulsion Labs (US)  
NASA Scientific. & Engineering Workstation Procurement (SEWP) (US)  
National Computerization Agency (Korea)  
National E-health Transition Authority (Australia)  
National University of Singapore  
NEC (Japan)  
Norwegian University of Science and Technology (Norway)  
Object Management Group (US)  
Open GIS Consortium, Inc. (US)  
Penn State University / App. Research Lab (US)  
Portland General Electric (US)  
POSC (US)  
PricewaterhouseCoopers (UK)  
ProForma Corporation (US)  
Qualiware ApS (Denmark)  
Quick Response Systems, Inc. (Canada)  
Raytheon (US)  
Real IRM Solutions (South Africa)  
reGIS (Japan)  
Rococo Company Limited (Japan)  
Rolls Royce (UK)  
Royal Institute of Technology, Stockholm  
SAP (Germany)  
SCC (UK)  
Serono International SA (Switzerland)  
Standard Bank Group (South Africa)  
Swiss Federal Department of Finance (Switzerland)  
Systems Flow, Inc. (US)
- Tanager, Inc (US)  
Teamcall (Bel)  
Telelogic / Popkin Software Inc. (US)  
Telemangement Forum (US)  
Telkom S.A. (South Africa)  
Tonex (US)  
Toyota InfoTechnology Center (Japan)  
Treasury Board of Canada Secretariat (Canada)  
TRON Association (Japan)  
Trox (US)  
Unisys (US)  
University of Chicago (US)  
University of Johannesburg (South Africa)  
University of Kyoto (Japan)  
University of Plymouth (UK)  
University of Pretoria (South Africa)  
University of Reading (UK)  
University of Technology, Sydney (Australia)  
UPCO (UK)  
US Army Weapon Systems Technical Working Group (WSTAWG)  
Veriserve Corporation (US)  
Westpac Banking Corporation (Australia)  
White Knight Management (UK)  
Wipro Technologies (India)

# All Members – by Geography



# All Members – by Industry Sector



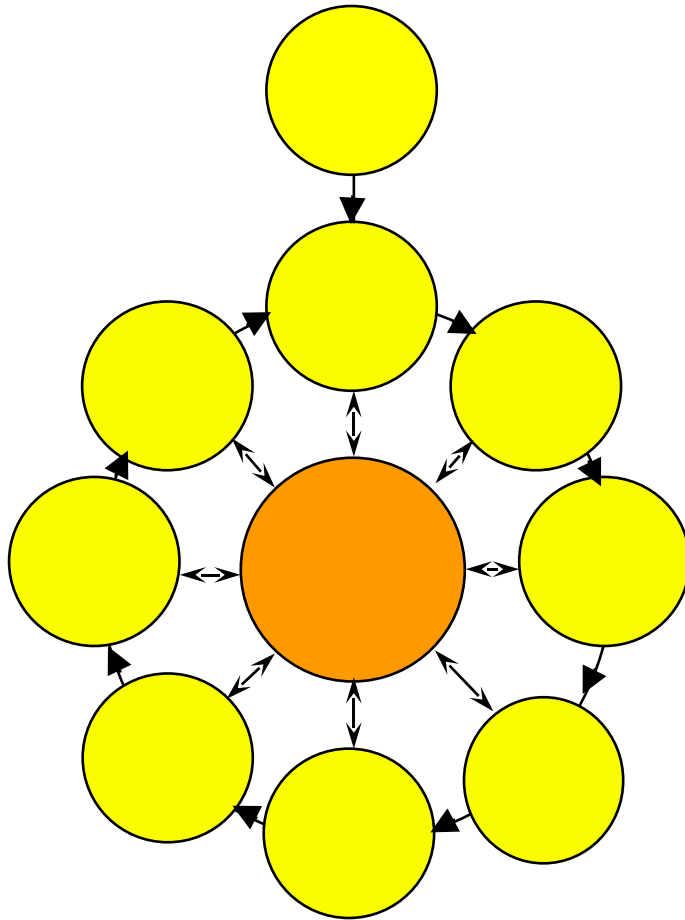
# Stakeholders and Value

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- **Customer Architects: Reduced time, cost, risk**
  - procuring effective IT architecture tools
  - developing an IT architecture
  - procuring products to implement an IT architecture
- **Tools Vendors: Bigger market, bigger market share**
  - supporting open methods for architecture
- **IT Solution Vendors: Greater cost-efficiency**
  - reduced cost of bidding, greater share of procurements
- **Integrators: Greater cost-efficiency, better service**
  - better service delivery to clients
  - more effective use / re-use of own architecture assets
- **Academic / Research Organizations: Funding support**
  - demonstrated relevance to market, route to standardization
  - “technology transfer” important in bids for funding

# Agenda

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# Why Enterprise Architecture?

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- ❑ Effective management and exploitation of information through IT is key to business success
- ❑ Good information management = competitive advantage
- ❑ Current IT systems do not really meet the needs of business
  - Fragmented, duplicated
  - Poorly understood
  - Not responsive to change
- ❑ Investment in Information Technology
  - Focussed on system maintenance
  - Tactical developments rather than a strategic plan



# Enterprise Architecture Drivers

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- ❑ Laws and regulations
  - Clinger-Cohen Act (US Information Technology Management Reform Act 1996)
  - EU Directives on the Award of Public Contracts
  - Sarbanes-Oxley
- ❑ More extended enterprises
- ❑ More co-operative IT operations
- ❑ Greater publicity to failures
- ❑ Increase in litigation
- ❑ Audit requirements

# What is an Enterprise?

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- ❑ Collection of organizations that share a common set of goals
  - Government agency
  - Part of a corporation
  - Corporation
- ❑ Large corporations may comprise multiple enterprises
- ❑ May be an “extended enterprise” including partners, suppliers and customers

# What is an Architecture?

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- An Architecture is the fundamental organization of something, embodied in
  - its components,
  - their relationships to each other and the environment,
  - and the principles governing its design and evolution.

Adapted from ANSI/IEEE Standard 1471-2000

# What is an Architecture Framework?

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- ❑ An **architecture framework** is a toolkit which can be used for developing a broad range of different architectures.
- ❑ It should describe a method for designing an information system in terms of a set of building blocks, and for showing how the building blocks fit together.
- ❑ It should contain a set of tools and provide a common vocabulary.
- ❑ It should also include a list of recommended standards and compliant products that can be used to implement the building blocks.

# The Value of a Framework

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- Provides a practical starting point for an Architecture Project
  - Avoids the initial panic when the scale of the task becomes apparent
  - Systematic – “Codified common sense”
  - Captures what others have found to work in real life
  - Baseline set of resources
  - Foundation architecture in the Enterprise Continuum

# TOGAF Origins

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- ❑ A customer initiative
- ❑ A framework, not an architecture
  - A generic framework for developing architectures to meet different business needs
  - Not a “one-size-fits-all” architecture
- ❑ Originally based on TAFIM (U.S. DoD)

# TOGAF Development

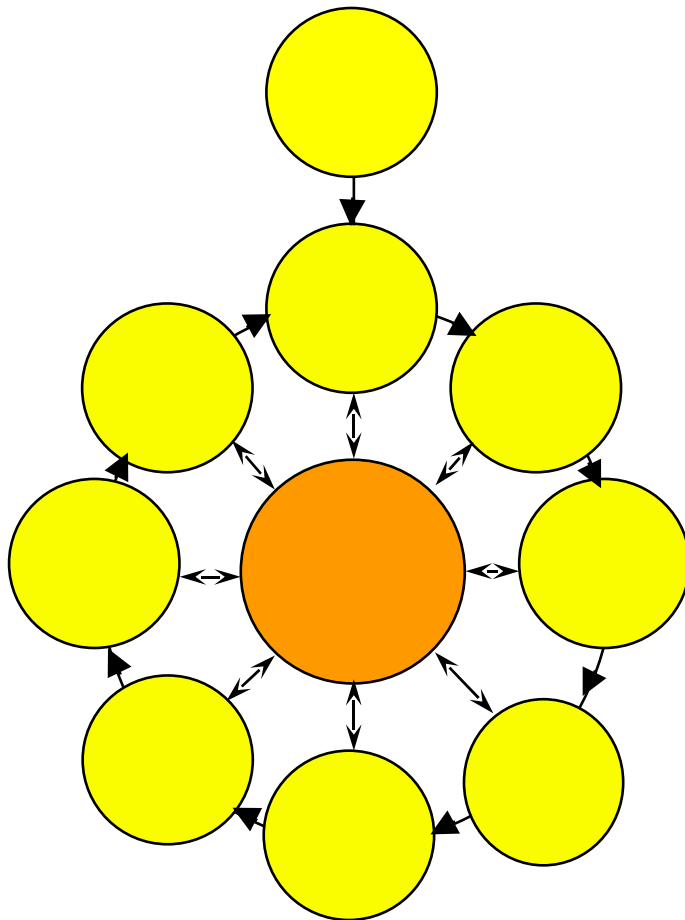
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- ❑ TOGAF's evolution has been driven by the members of The Open Group's Architecture Forum over a period of more than 14 years

- |   |                           |
|---|---------------------------|
| ❑ 1994: TOGAF – Version 1   | <b>Technical Edition</b>  |
| ❑ 2001: TOGAF – Version 7   |                           |
| ❑ 2002: TOGAF – Version 8   | <b>Enterprise Edition</b> |
| ▪ New Enterprise Architecture Framework                                   |                           |
| ▪ New Business Scenarios section  |                           |
| ▪ Architecture Contracts  |                           |
| ▪ Extensive Resource facilities including initial Requirements Management |                           |
| ❑ 2003: TOGAF – Version 8.1   |                           |
| ▪ New Requirements Management Phase                                       |                           |
| ▪ New Governance Section  |                           |
| ▪ Basis of TOGAF 8 Certification  |                           |
| ❑ 2006: TOGAF – Version 8.1.1   |                           |
| ▪ No substantive changes  |                           |

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# TOGAF 8 Scope

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- TOGAF 8 covers the development of four related types of architecture:

- Business architecture
- Data or information architecture
- Application architecture
- Technology architecture

TOGAF 8  
“Enterprise Edition”

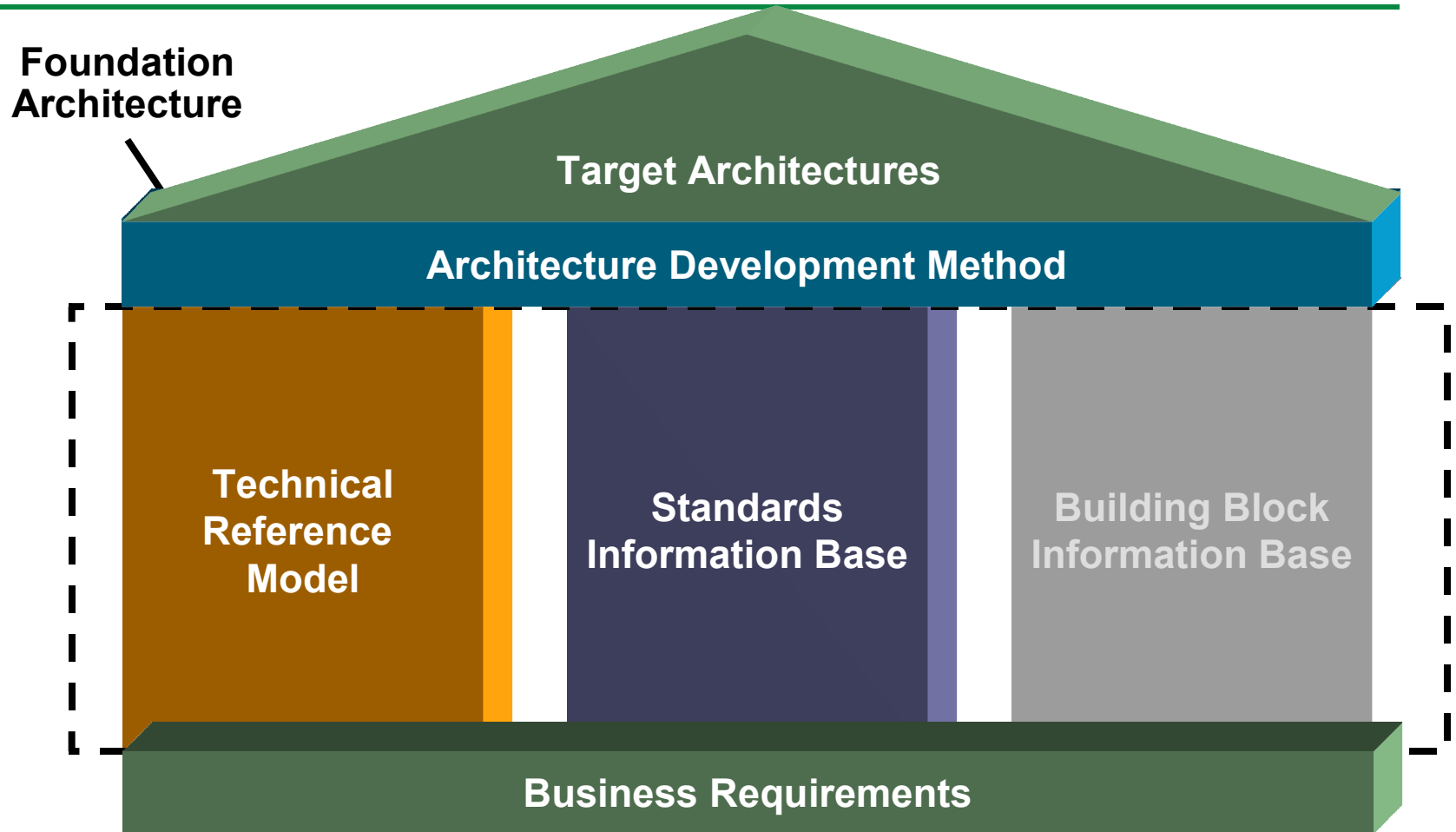
TOGAF 7 “Technical Edition”

# TOGAF 8 Goals

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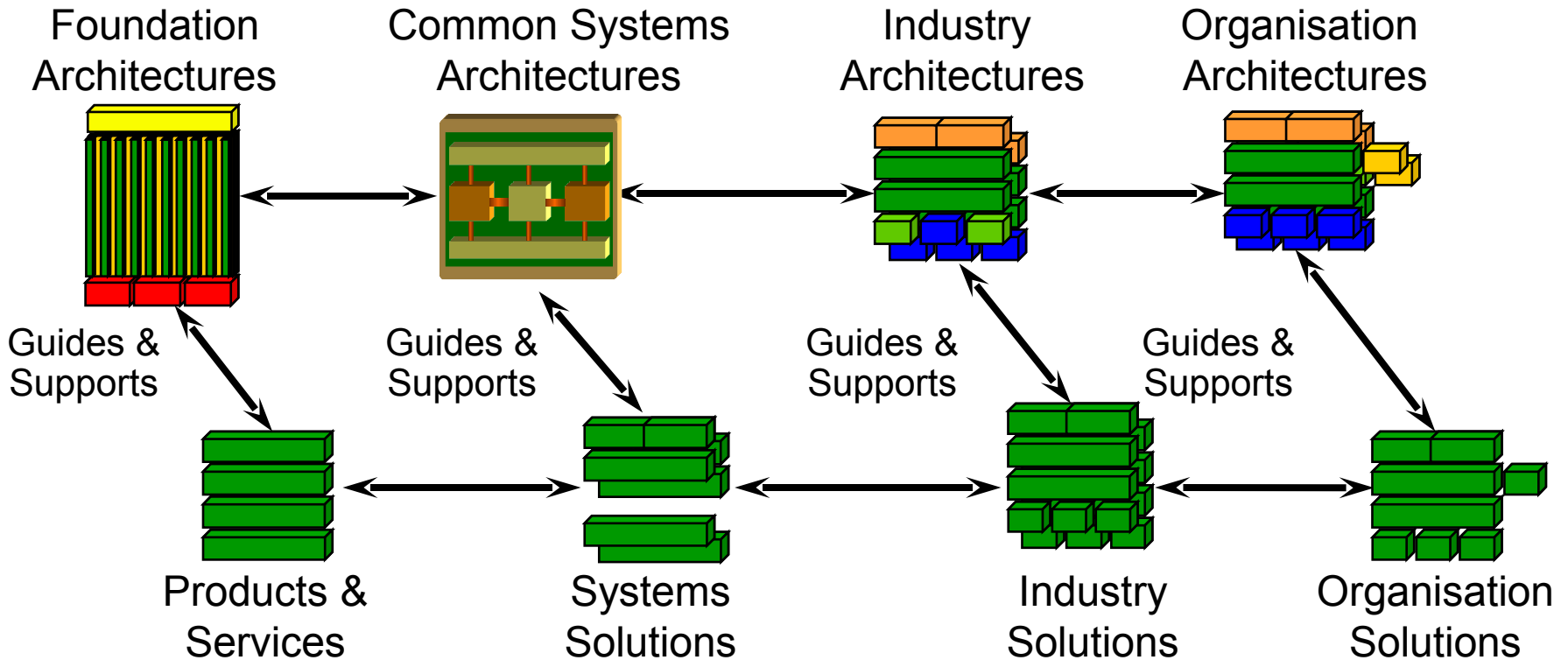
- Long-term:
  - An industry standard, generic enterprise architecture method....
  - ....usable in conjunction with frameworks having products relevant / specific to particular sectors.
    - Several frameworks have mindshare:
      - Zachman, Spewak, DoD Framework, FEAF, TEAF, ...
    - Almost all focus on products, not method
    - TOGAF and.... (not TOGAF or....)
  
- Version 8:
  - An overall structure and core method for enterprise architecture that can be filled out in future years.

# The Components of TOGAF



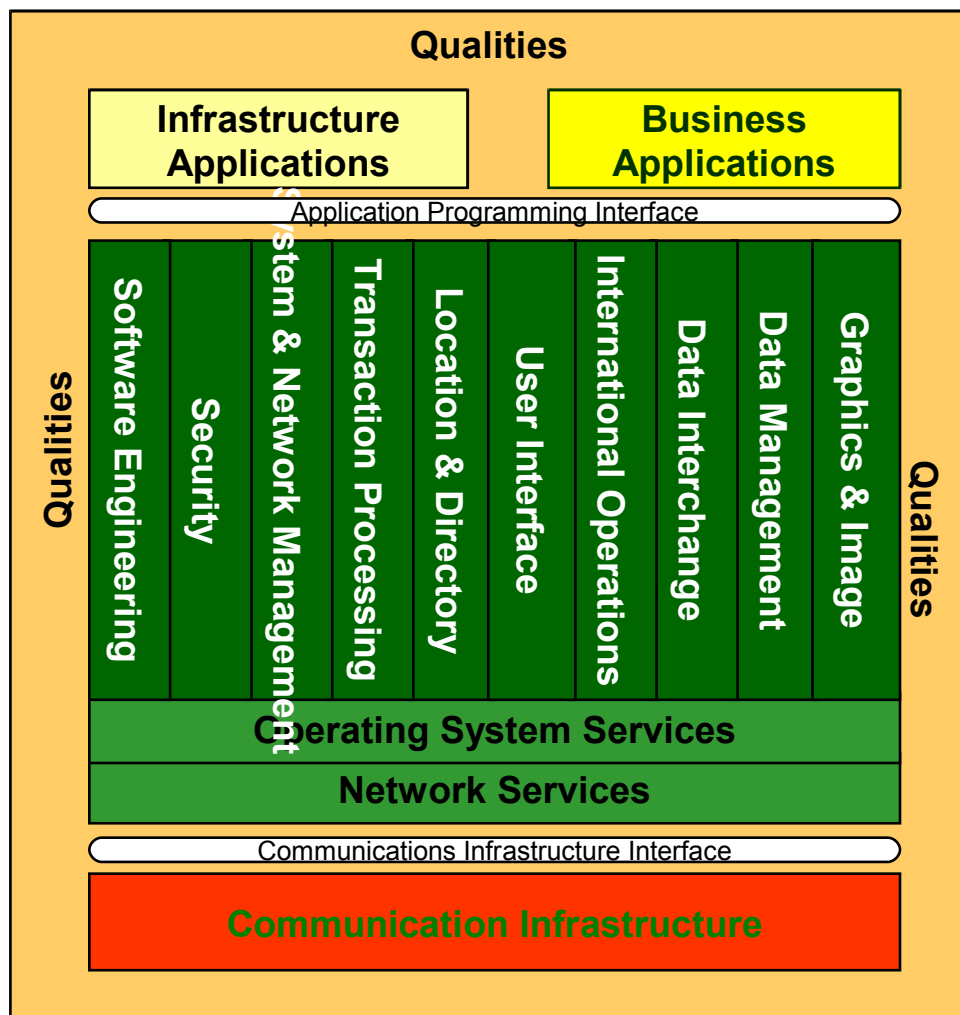
# The “Enterprise Continuum”

## Architecture Continuum



## Solutions Continuum

# Foundation Architecture: Technical Reference Model (TRM)



- ❑ Associated with detailed taxonomy of **services**
  - defines scope of each service category
- ❑ Identifies system-wide capabilities or **“qualities”**; e.g.:
  - Internationalization
  - Security
  - Management

# Foundation Architecture: Standards Information Base (SIB)

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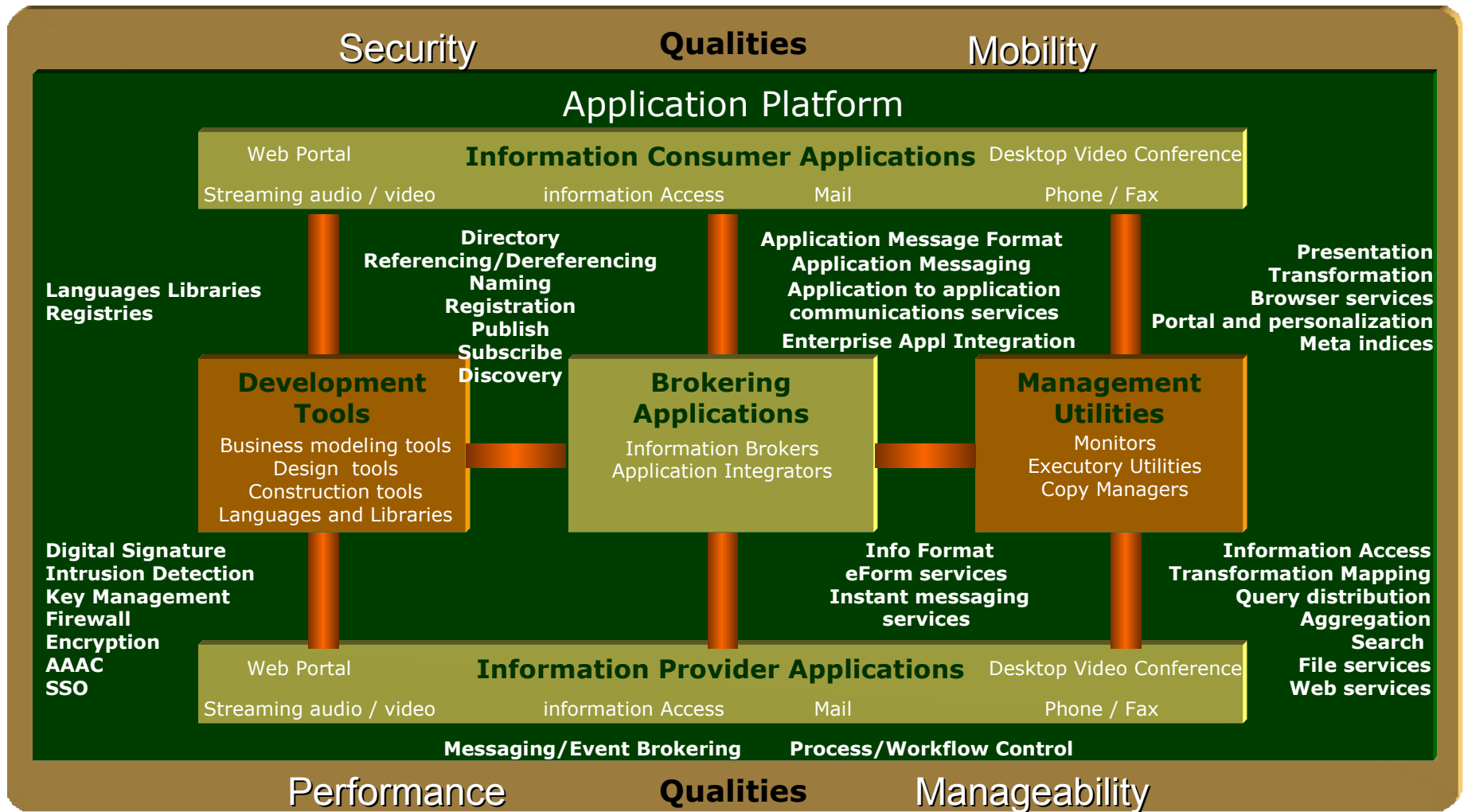
- ❑ A database of open industry standards
- ❑ Content determined by Open Group consensus process
- ❑ Structured according to TOGAF Technical Reference Model taxonomy
- ❑ Available for public web access
  - <http://www.db.opengroup.org/sib.htm>
- ❑ Gateway to many linked resources

# Integrated Information Infrastructure Reference Model

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- ❑ A model of the key components for developing, managing, and operating an integrated information infrastructure.
  - Supporting “Boundaryless Information Flow”
- ❑ A model of a set of applications that sit on top of an application platform.
- ❑ An expanded subset of the TOGAF Technical Reference Model, using different orientation.

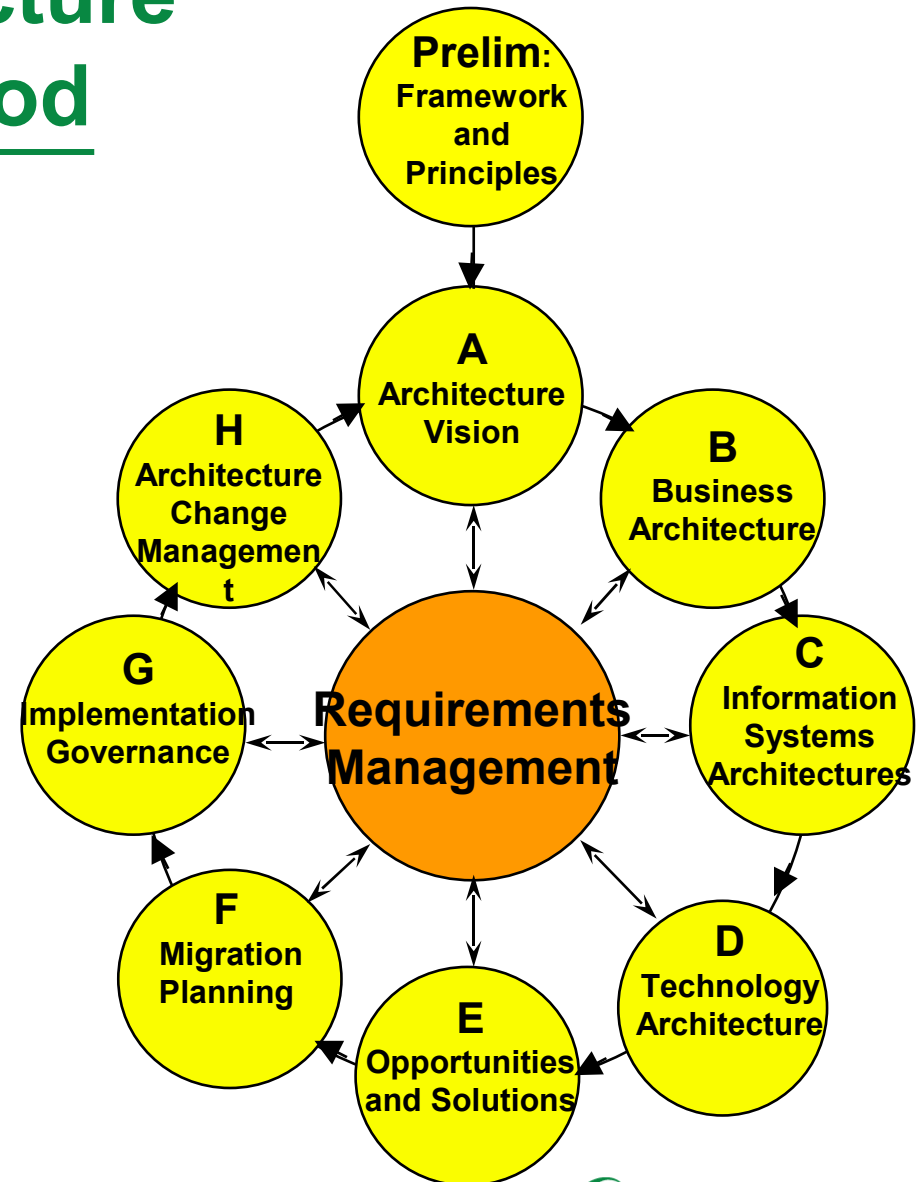
# Integrated Information Infrastructure Reference Model – Detailed Model





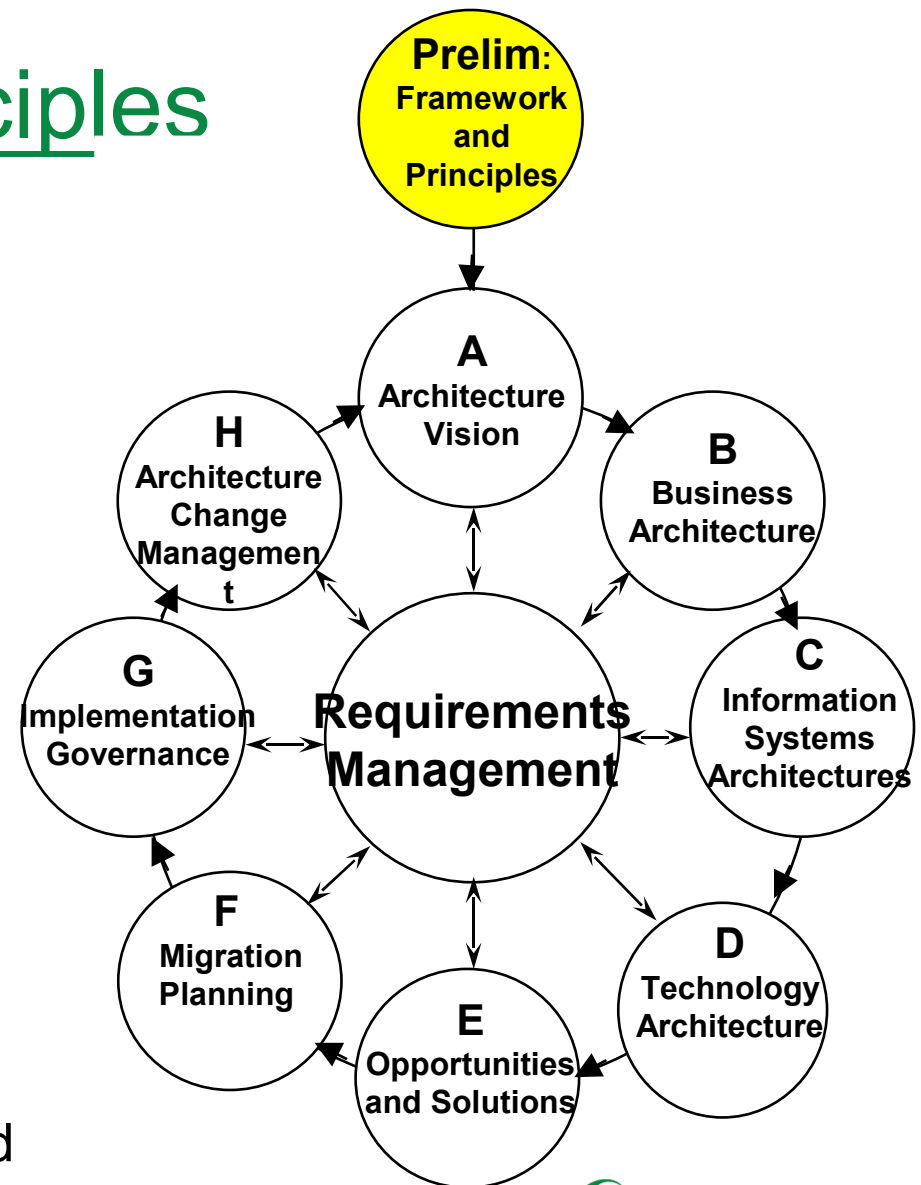
# Enterprise Architecture Development Method

- An iterative method
- Each iteration = new decisions:
  - Enterprise coverage
  - Level of detail
  - Time horizon
  - Architecture asset re-use:
    - previous ADM iterations
    - other frameworks, system models, industry models, ...)
- Decisions based on:
  - Competence / resource availability
  - Value accruing to the enterprise.



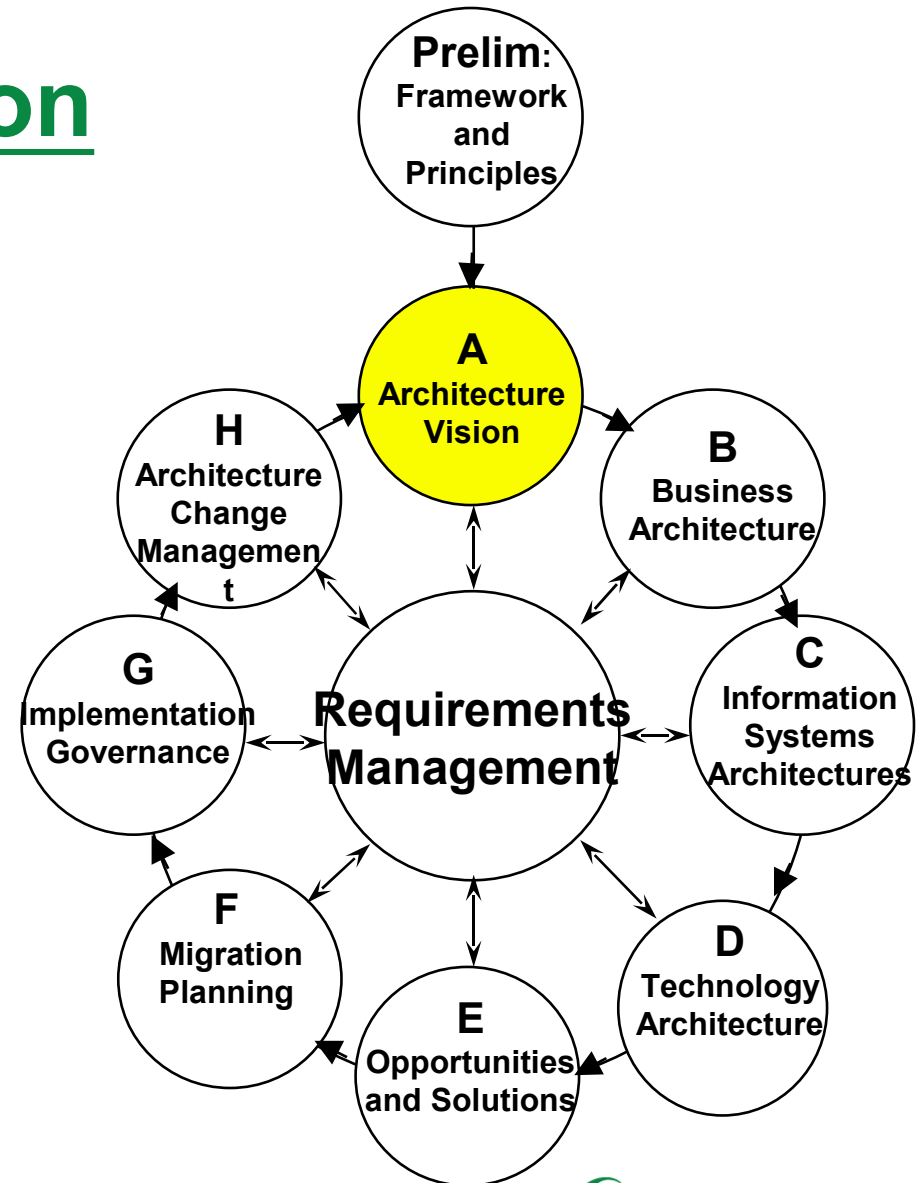
# Preliminary: Framework & Principles

- This phase prepares the organisation for a successful Enterprise Architecture project
  - Understand business environment
  - High level management commitment
  - Agreement on scope of architecture activities
  - Establish principles
  - Establish governance structure
  - Agree method to be adopted



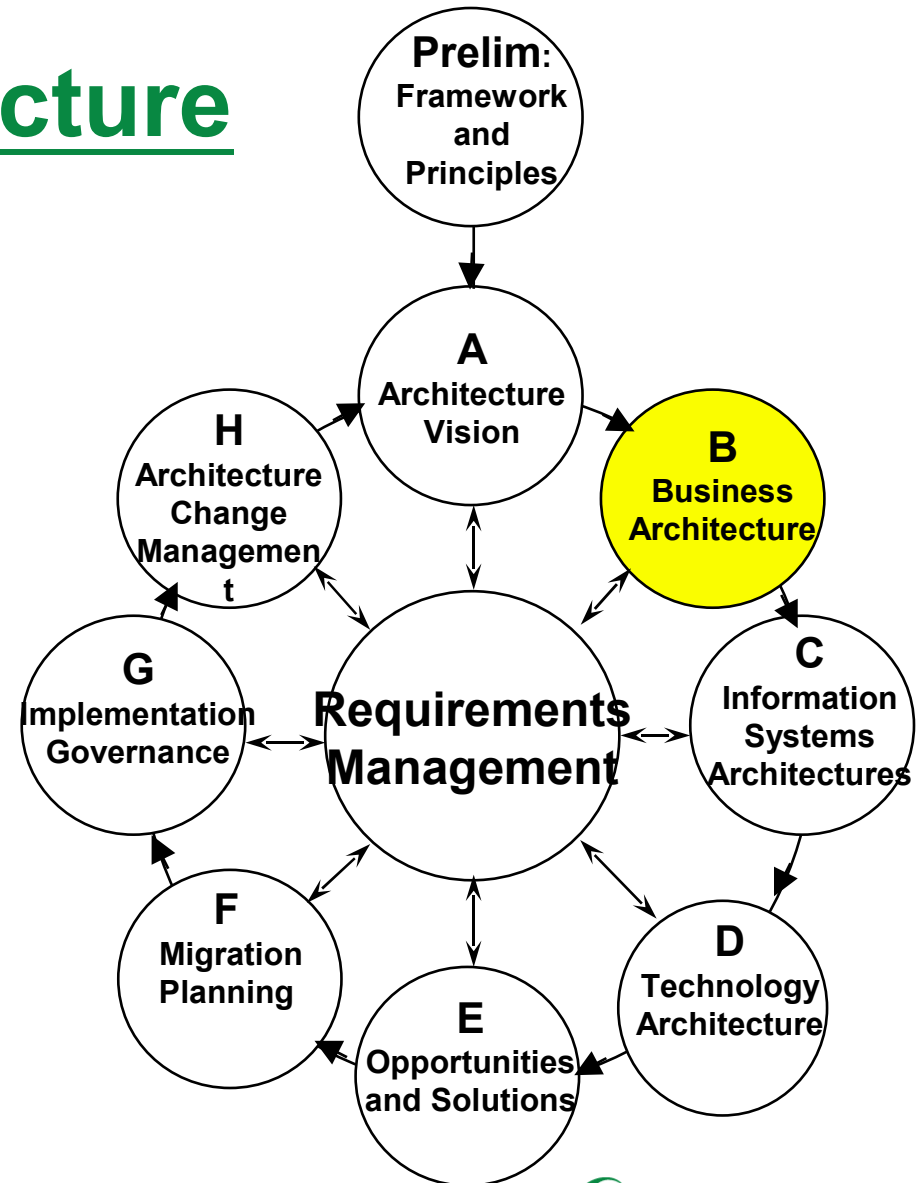
# Phase A: Architecture Vision

- Initiates one iteration of the architecture process
  - Sets scope, constraints, expectations for this project
  - Required at the start of every architecture cycle
- Validates business context
- Creates Statement of Architecture work



# Phase B: Business Architecture

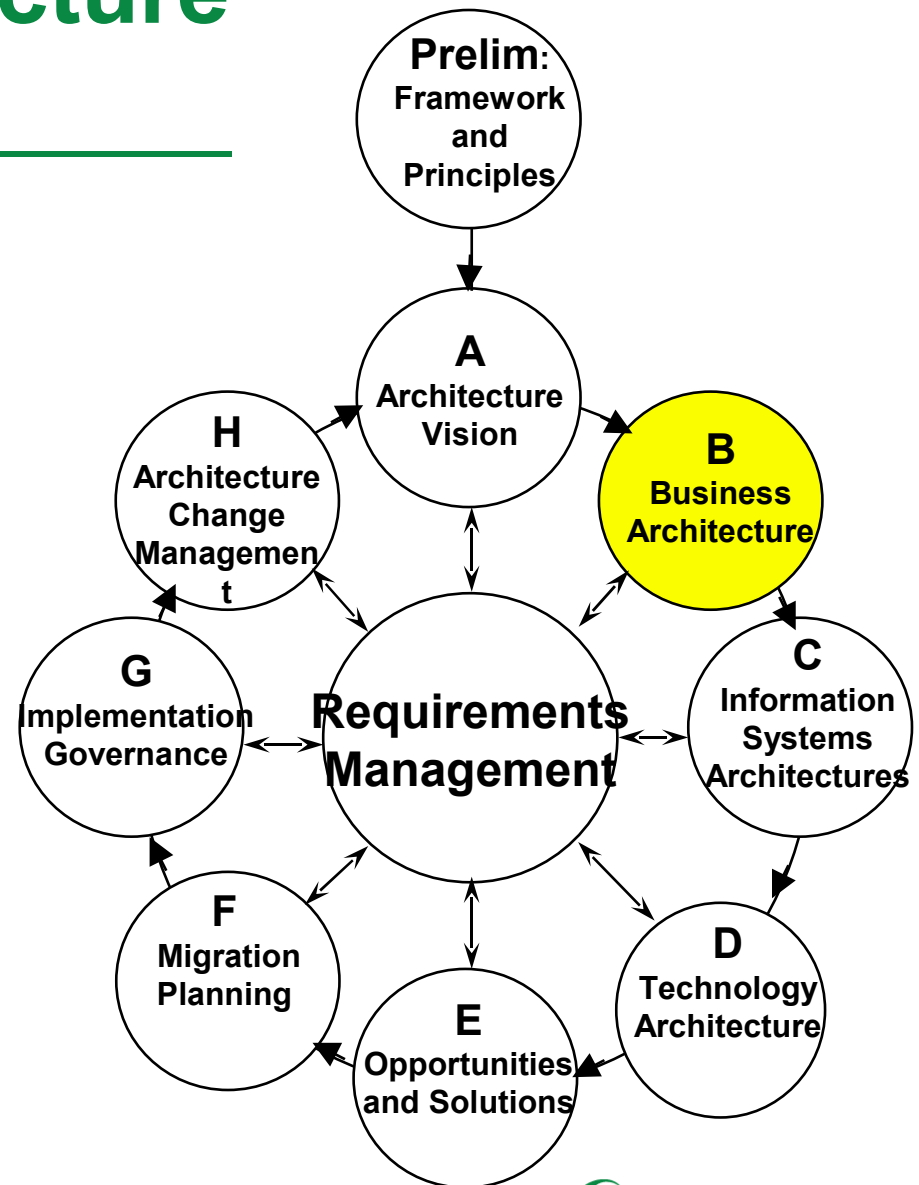
- The fundamental organization of a business, embodied in
  - its business processes and people,
  - their relationships
    - to each other and the environment,
  - and the principles governing its design and evolution
- Shows how the organization meets its business goals



# Business Architecture Contents

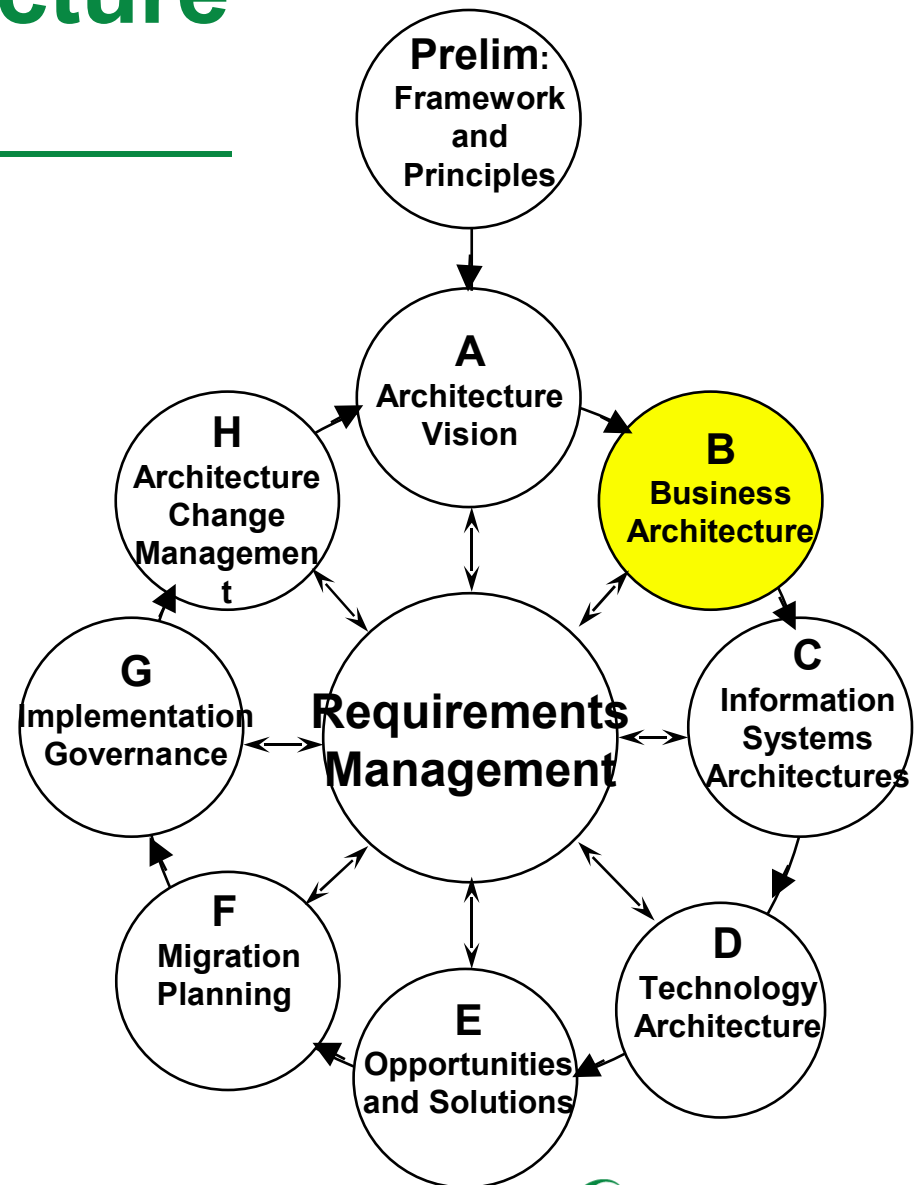
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- ❑ Organization structure
- ❑ Business goals and objectives
- ❑ Business functions
- ❑ Business Services
- ❑ Business processes
- ❑ Business roles
- ❑ Correlation of organization and functions.



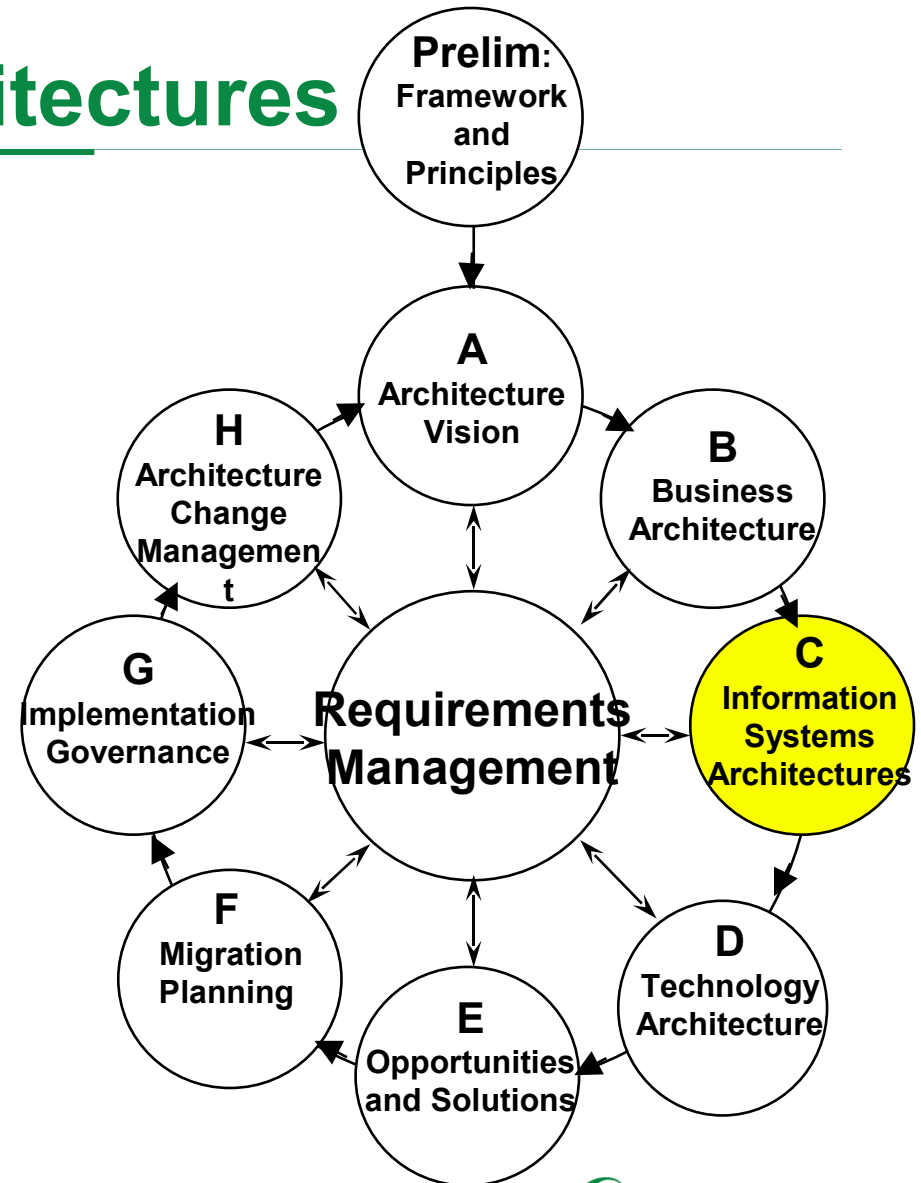
# Business Architecture Steps

- ❑ Confirm context
- ❑ Define baseline
- ❑ Define target
  - Views are important
- ❑ Validate
  - Requirements
  - Concerns
- ❑ Gap analysis
- ❑ Produce report



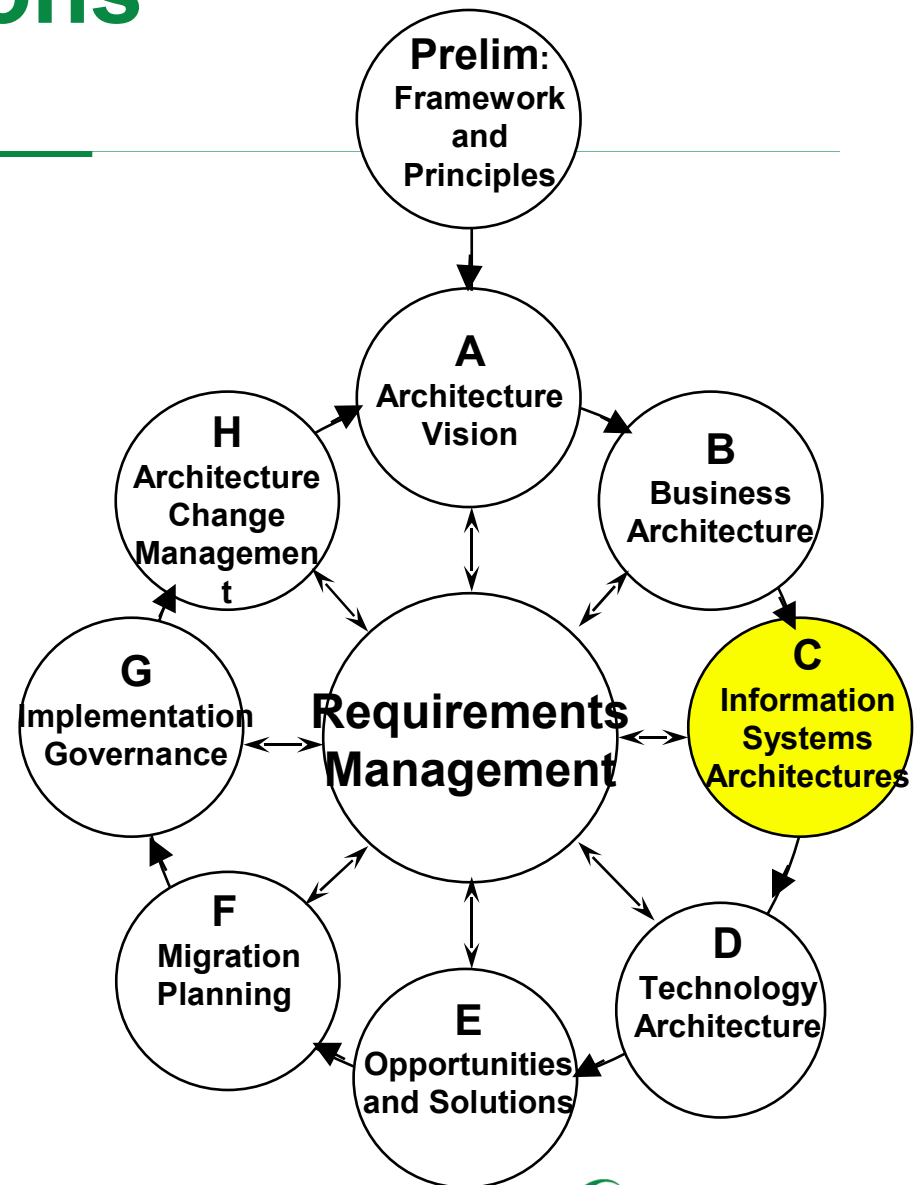
# Phase C: Info. Systems Architectures

- The fundamental organization of an IT system, embodied in
  - the major types of information and the application systems that process them
  - their relationships
    - to each other and the environment,
  - and the principles governing its design and evolution
- Shows how the IT systems meets the business goals of the enterprise



# Data or Applications first?

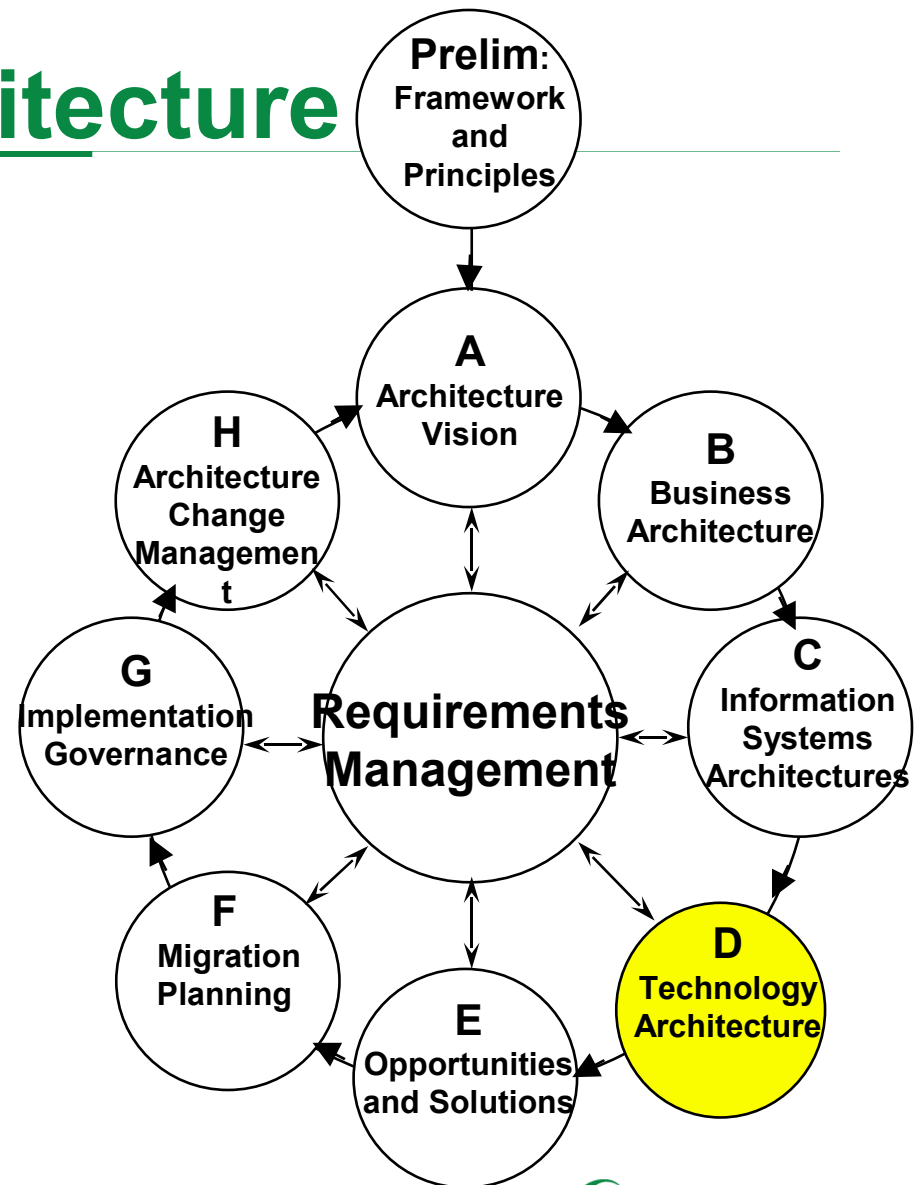
- It is usually necessary to address both
  - Not always the case, depending on project scope and constraints
- May be developed in either order, or in parallel
  - Theory suggests Data Architecture comes first
  - Practical considerations may mean that starting with Application Systems may be more efficient
- There will need to be some iteration to ensure consistency





# Phase D: Technology Architecture

- The fundamental organization of an IT System, embodied in
  - its hardware, software and communications technology
  - their relationships
    - to each other and the environment,
  - and the principles governing its design and evolution



# Technology Architecture Steps

Analyse the existing system in consistent terms, using a Technical Reference Model

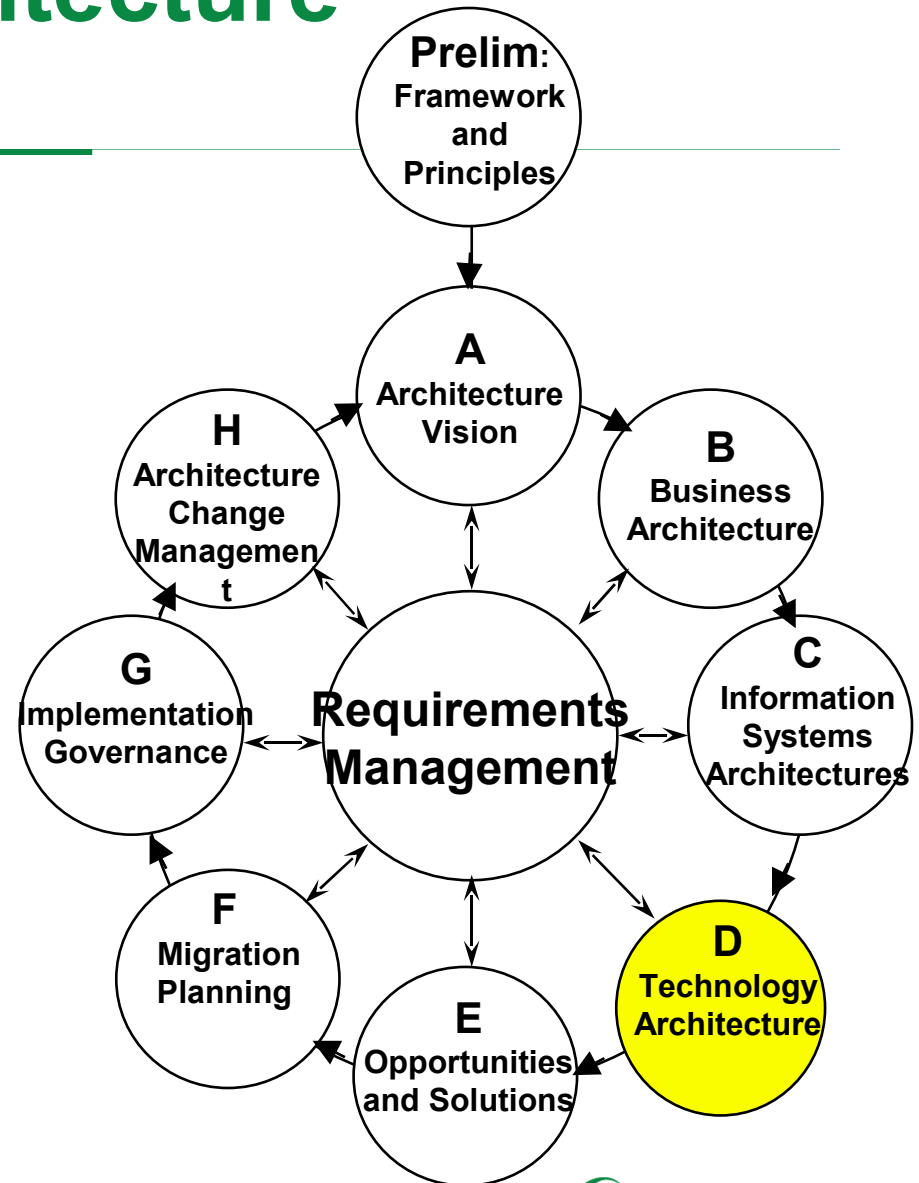
Explicit requirements  
Implicit concerns from views

Define models in terms of functionality

Validate against requirements

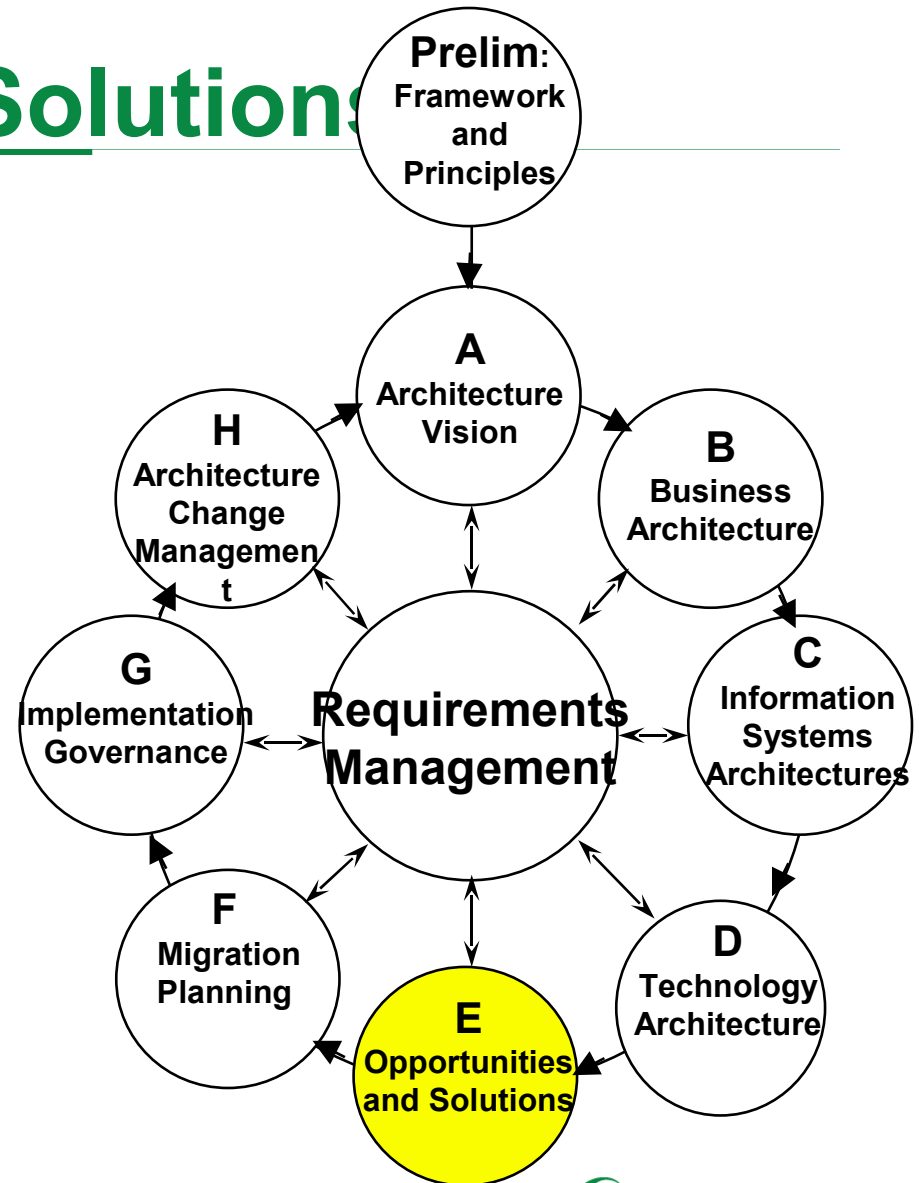
Define interface standards

Build list of possible projects



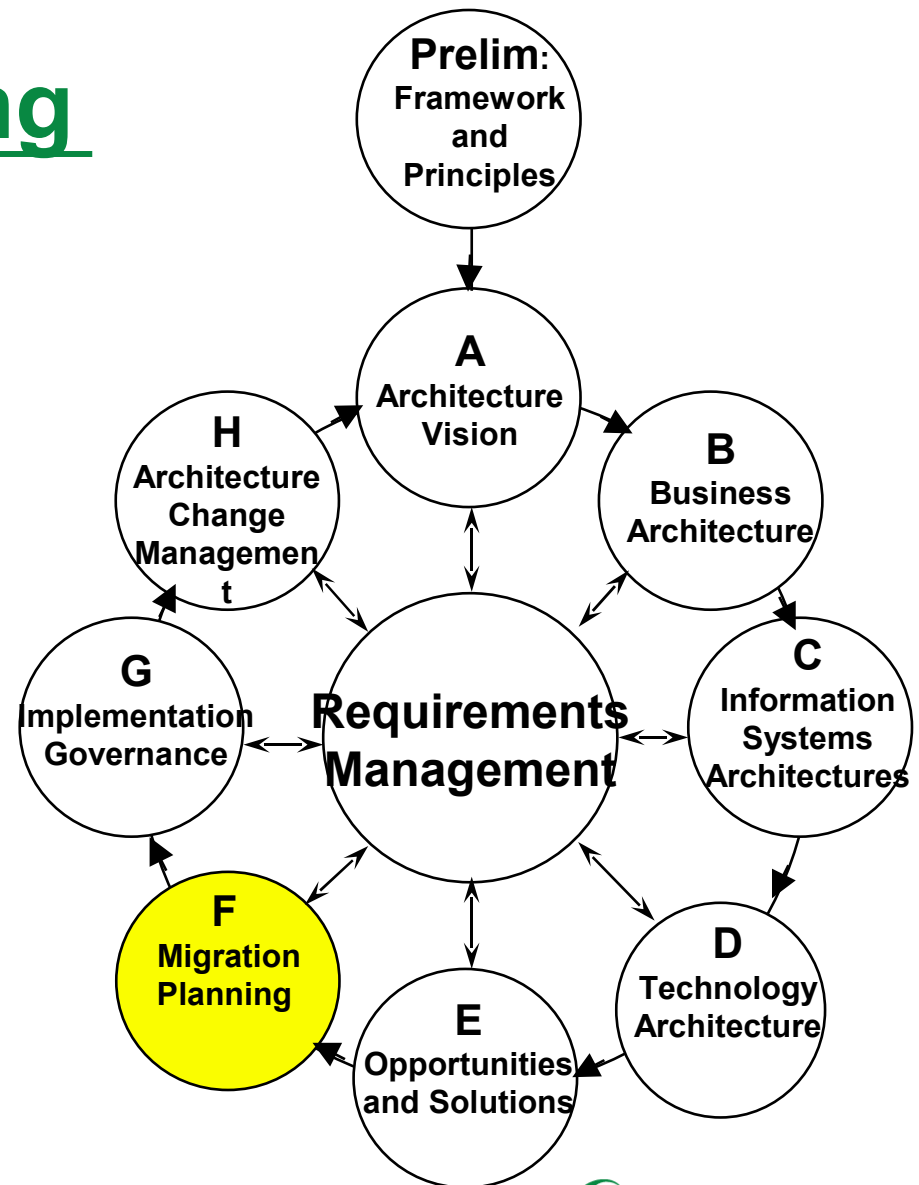
# Phase E: Opportunities & Solutions

- ❑ Decide on approach
  - Make v Buy v Re-Use
  - Outsource
  - COTS
  - Open Source
- ❑ Assess priorities
- ❑ Identify dependencies



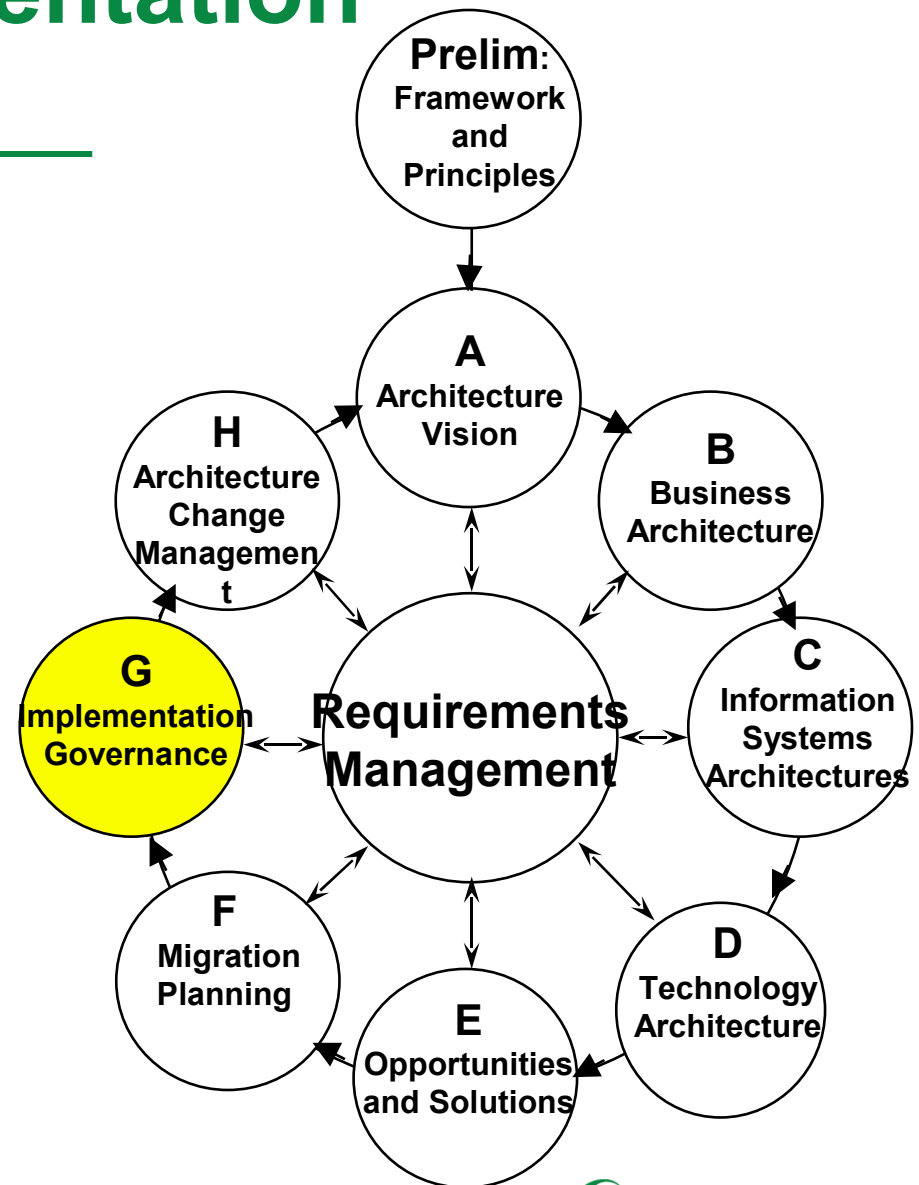
# Phase F: Migration Planning

- ❑ Cost/benefit analysis
- ❑ Risk assessment
- ❑ Technology road-map



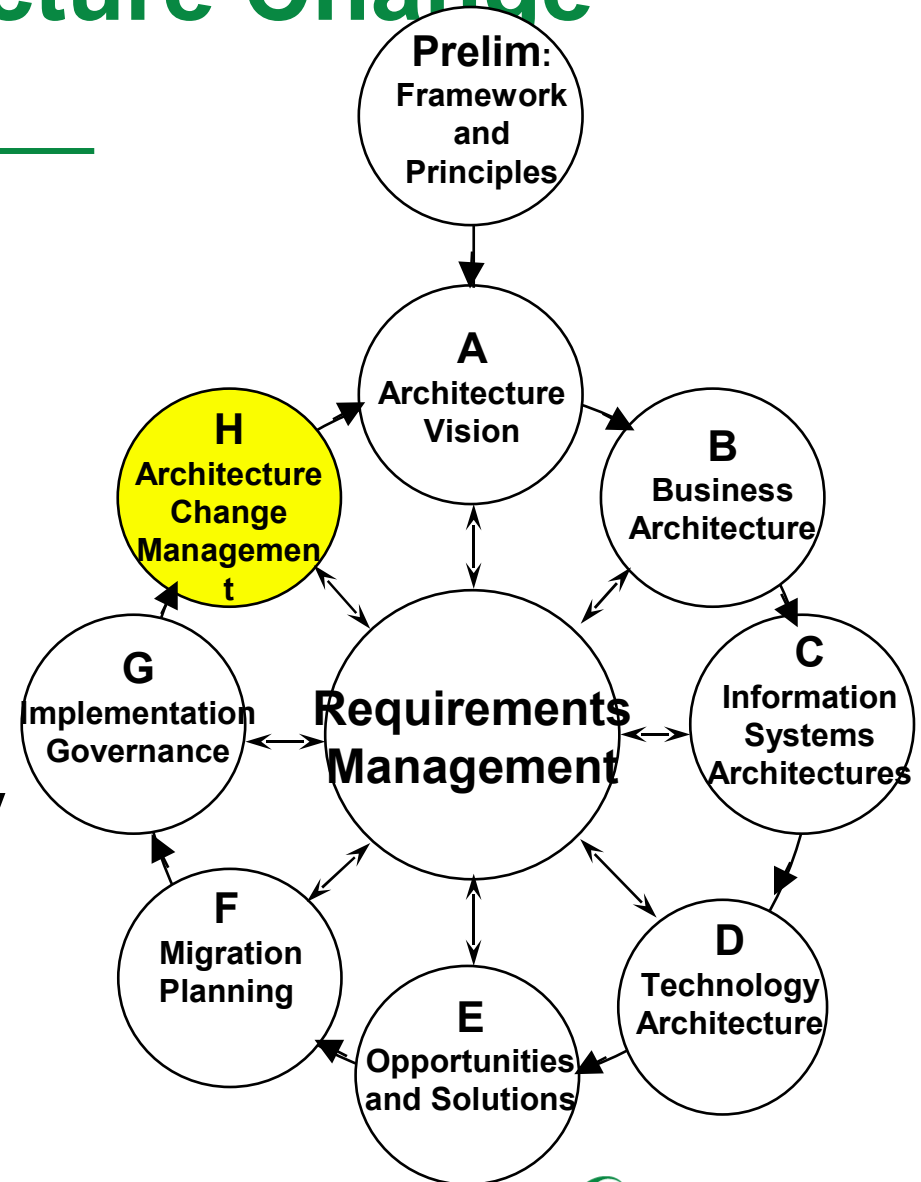
# Phase G: Implementation Governance

- Defines architecture constraints on implementation projects
  - Architecture contract
- Monitors implementation work for conformance



# Phase H: Architecture Change Management

- Ensures that changes to the architecture are managed in a cohesive and architected way
- Establishes and supports the Enterprise Architecture to provide flexibility to evolve rapidly in response to changes in the technology or business environment



# Resource Base

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- ❑ **Architecture Board:** Guidelines for establishing and operating an Enterprise Architecture Board
- ❑ **Architecture Compliance:** Guidelines and checklists for ensuring project compliance to architecture
- ❑ **Architecture Contracts:** Guidelines for architecture contracts
- ❑ **Architecture Governance:** Arrangements for effective control of IT Architecture by enterprise management
- ❑ **Architecture Patterns:** Guidelines on architecture patterns
- ❑ **Architecture Principles:** Guidelines on developing Architecture Principles; and a generic set of Architecture Principles
- ❑ **Architecture Views:** Guidelines for developing viewpoints and views in architecture models
- ❑ **Building Blocks Example:** Example illustrating use of building blocks in architecture

# Resource Base (continued)

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- ❑ **Business Process Domain Views:** A set of function views aligned with the business process structure of the enterprise
- ❑ **Business Scenarios:** A method for deriving business requirements for architecture and the implied technical requirements
- ❑ **Case Studies:** Real-life examples of TOGAF in use
- ❑ **Glossary:** Definitions of key terms
- ❑ **Other Architectures / Frameworks:** and relationship to TOGAF
- ❑ **Tools for Architecture Development:** Generic evaluation criteria for architecture tools
- ❑ **Zachman Framework mapping:** Mapping the TOGAF ADM to the Zachman Framework



# TOGAF 8 - Recent Developments

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- ❑ Hewlett-Packard's internal IT used TOGAF8 in successful merger with Compaq
- ❑ Raytheon integrating TOGAF8 into its REAP methodology
- ❑ Sun Microsystems incorporating TOGAF8 into a composite best-of-breed of EA frameworks
- ❑ TOGAF8 supported in 4 architecture tools
  - Trous (Metis),
  - ProVision,
  - Telelogic (Popkin),
  - ITatlas (Flashmap Systems)
- ❑ TOGAF8 Certification Program launched February 2004
  - 2,163 TOGAF certified individuals to 25<sup>th</sup> Feb 2007

# TOGAF 8 Certification

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- A vendor-neutral, global basis of certification to impose standards for TOGAF 8 within the industry



*TOGAF 8  
Certified*

Architects trained in the use of TOGAF 8



*TOGAF 8  
Training*

Training courses which instruct in TOGAF 8



*TOGAF 8  
Tool Support*

Architecture tools which support TOGAF 8



*TOGAF 8  
Professional  
Services*

Professional services offered to support TOGAF 8

# TOGAF 8 global, online testing

## □ Thomson Prometric now live.....

The screenshot shows the Thomson Prometric website homepage. At the top, there is a navigation bar with the Thomson Prometric logo on the left and the text "Thomson.com > Learning Solutions > Thomson Prometric" in the center. On the right side of the navigation bar, there are links for "日本" (Japan) and "中国" (China). Below the navigation bar is a red banner with the word "LEARNING" in white, followed by a list of links: "Press Room", "About Us", "Contact Us", "Schedule A Test", and "Locate A Test Site".

Below the banner, there is a section titled "Find solutions for:" with a list of categories: "TEST SPONSORS", "TEST TAKERS", "TEST SITES", and "CORPORATE & GOVERNMENT SOLUTIONS".

The main content area features a large image of a woman in a business suit sitting at a desk. To the right of the image is a welcome message: "Welcome to Thomson Prometric, a part of The Thomson Corporation. The leading worldwide provider of comprehensive, technology-based testing and assessment services." Below this message is a paragraph of text: "Only Thomson Prometric can provide total assessment solutions on a global scale. We offer clients a fully integrated testing system ranging from legally defensible test development through secure test delivery to robust data management." Another paragraph follows: "With clients in IT, Government, Academic and Professional Association sectors, and with a growing customer base among corporations looking to measure the effectiveness of their training programs, Thomson Prometric has the proven experience to develop and deliver your assessment program." A final paragraph states: "For programs seeking to validate knowledge, create a certified community or ensure compliance with legal requirements, Thomson Prometric is the partner to provide the answers." A link ">> Learn more" is provided at the bottom of this section.

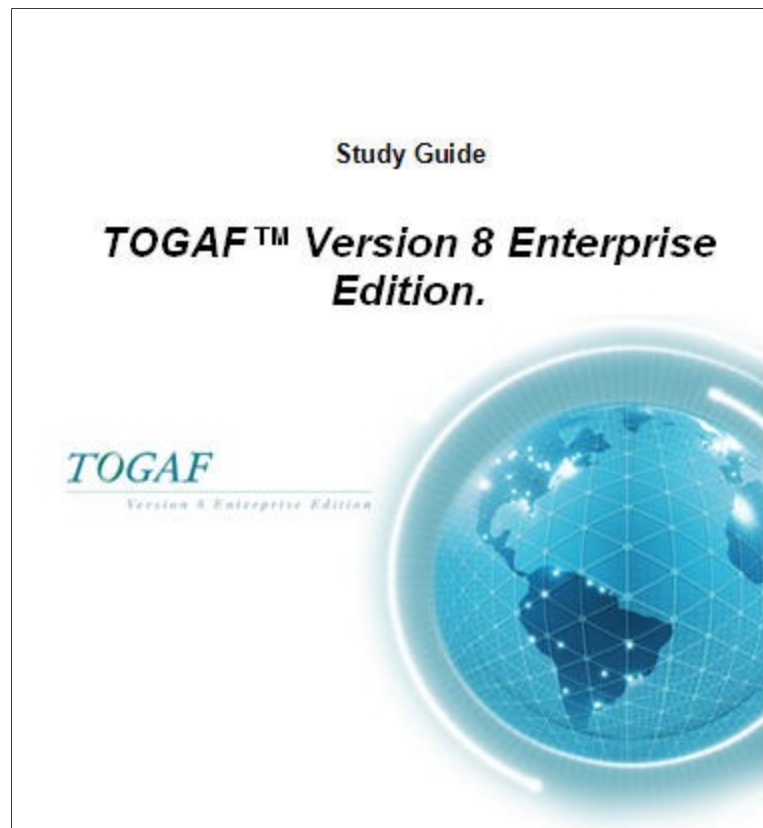
Below the main content area is a section titled "Thomson Prometric News" with a "View All >>" link. It lists two news items: "July 13, 2006 Thomson Prometric Selected Among List of Top Specialized Learning Process Providers by TrainingOutsourcing.com" and "June 21, 2006".

On the right side of the page, there is a "Solutions" section with a list of services: "Test Development", "Test Delivery", "Data Management", and "Registration Services". Each service has a brief description. Below the "Registration Services" section is a "Locate a Test Site" section with a "Schedule a Test" section and a "Reschedule or Cancel a Test" section.

# TOGAF 8 Study Guide

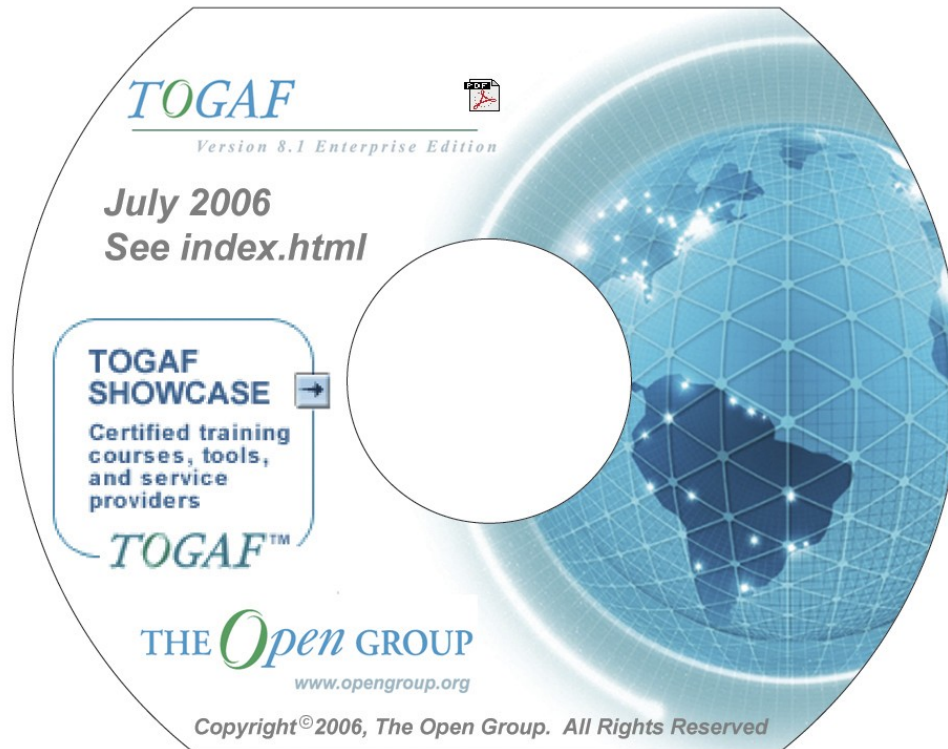
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Available from Certified Trainers & Franchises



# TOGAF 8 Product & Service Showcase

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# TOGAF 8 Core Training Materials

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- ❑ Licensed from The Open Group
- ❑ 4-day & 1-day versions

*TOGAF*

*Version 8 Enterprise Edition*

*Personal Certification Course*

A four-day taught course for:

- IT Architecture students and practitioners

A single-day course for:

- Senior managers (needing an overview)

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# TOGAF and Other Frameworks / Bodies of Knowledge

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- ❑ TOGAF8 already contains mapping to Zachman Framework
- ❑ Recent White Paper maps TOGAF to OMG's MDA modeling standards:
  - <http://www.opengroup.org/architecture/wp/>
- ❑ Near completion: White Paper mapping TOGAF8 and DODAF (collaboration including Raytheon and MITRE Corporation)
- ❑ Near completion: White Paper mapping TOGAF8 and COBIT4 (Real IRM)
- ❑ Agreement in principle to map TOGAF and ITIL



# TOGAF 8 “The Book”

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- ❑ Published September 2005
- ❑ Professional graphics
- ❑ New “Look & Feel”
- ❑ 8.1.1 Corrigendum September 2006
  - No technical changes
  - Look & Feel of on-line document now aligned with “The Book”

2006 Edition (incorporating TOGAF 8.1.1)

*TOGAF*

*Version 8.1 Enterprise Edition*

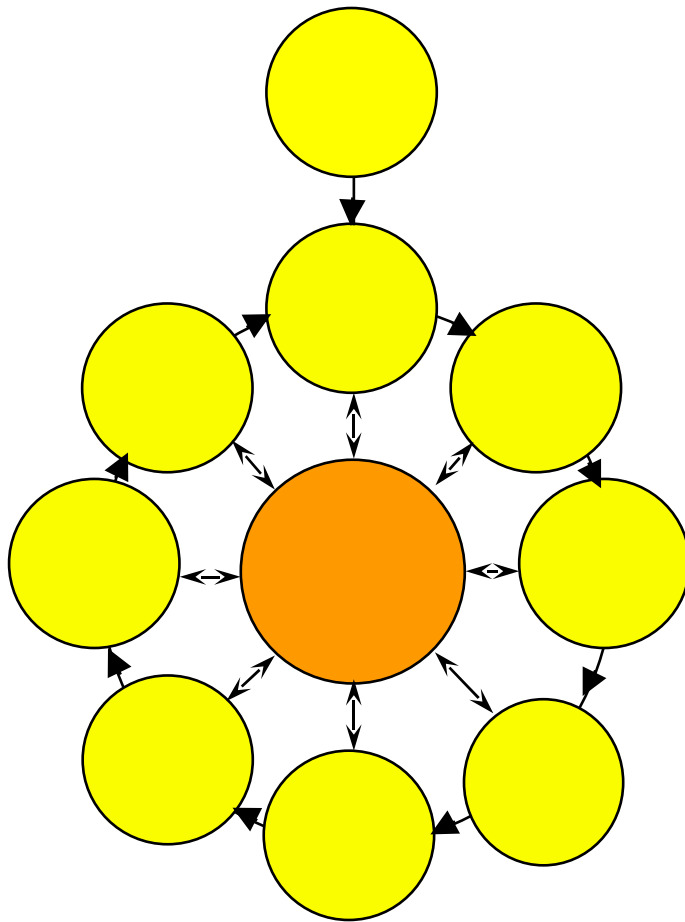


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[www.opengroup.org](http://www.opengroup.org)



# Agenda

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- ❑ The Open Group
- ❑ The Architecture Forum
- ❑ TOGAF Background
- ❑ TOGAF 8 “Enterprise Edition”
- ❑ Summary

# TOGAF 8 Summary

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- ❑ An effective, industry standard framework and method for enterprise architecture.
- ❑ Complementary to, not competing with, other enterprise frameworks
- ❑ A repository of best practice
  - “Demystifies” architecture development
- ❑ A framework and method for achieving the “Boundaryless Information Flow” vision

# Conclusions

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- Adopt and use TOGAF
  - An effective, industry standard framework and method for enterprise architecture.
  - Vendor, tool, and technology neutral
  - Complementary to, not competing with, other frameworks
  
- Join and participate in the Architecture Forum
  - Worldwide forum for Architecture practitioners
  - Network with peers and industry experts
  - Contribute to / leverage work in progress
  - Help further development of Enterprise Architecture as a discipline and a profession

# For More Information . . .

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- The Architecture Forum:
  - <http://www.opengroup.org/architecture/>
  
- Viewing TOGAF Version 8 on-line:
  - <http://www.opengroup.org/architecture/togaf8-doc/arch/>
  
- TOGAF Version 8 licensing and downloads:
  - <http://www.opengroup.org/togaf/>

