

Technology Architecture

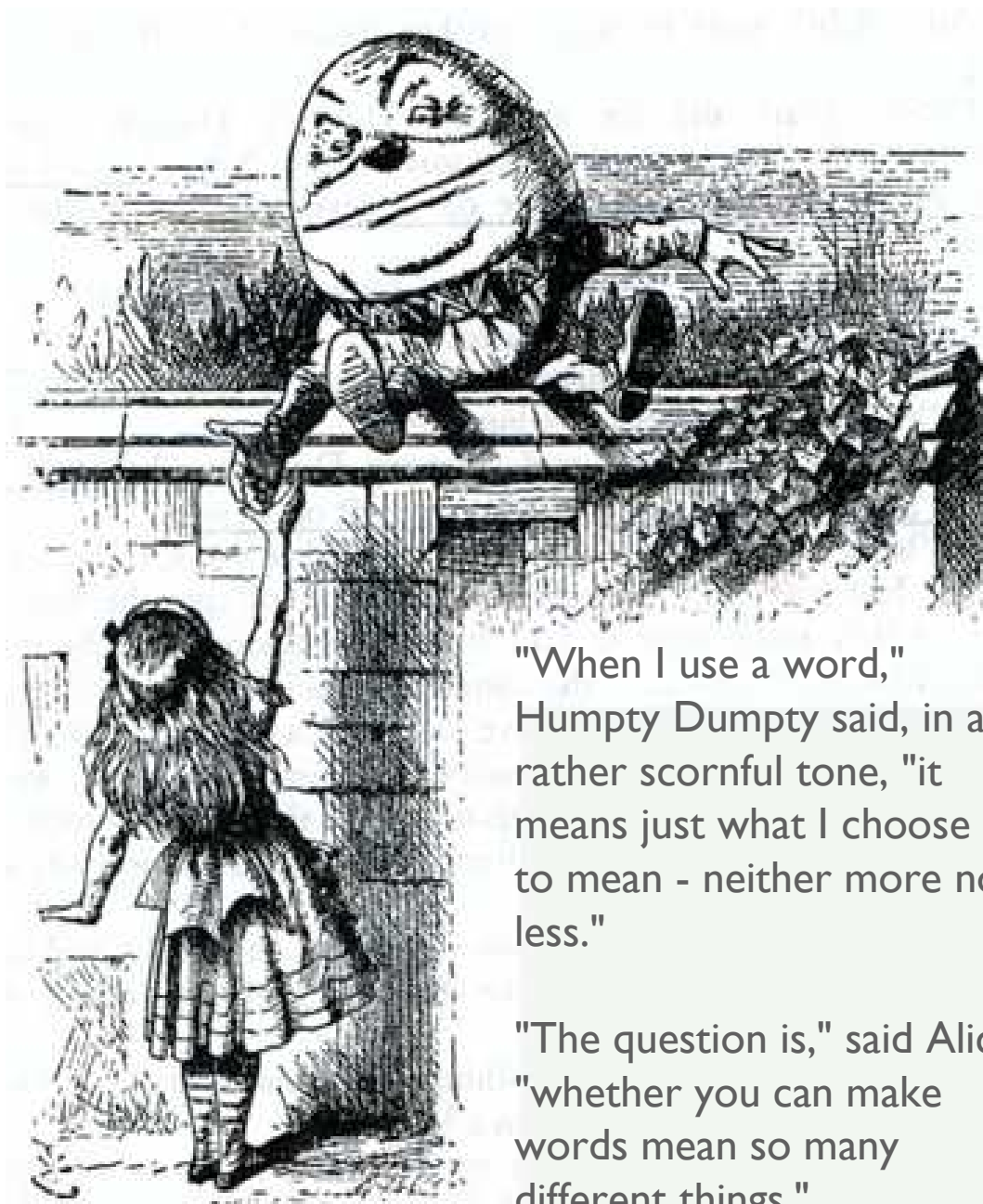
versus

Business Architecture



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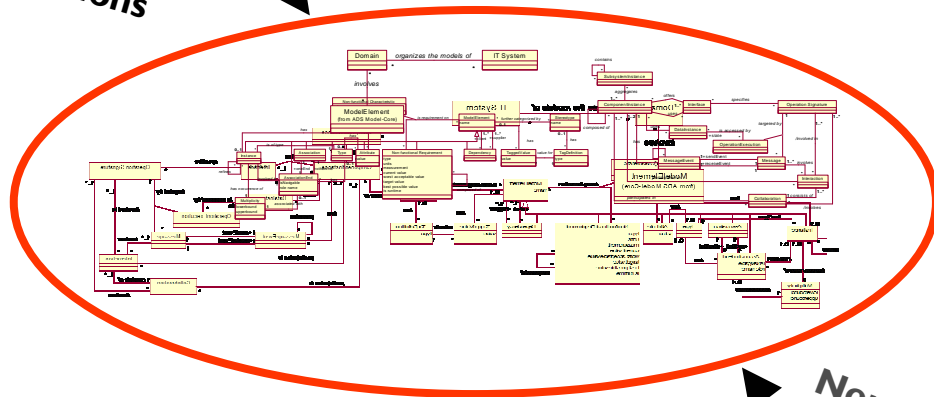
“Technology organizations can solve almost any technical challenge that comes their way. Yet for most organizations, technical architecture must be informed by, and usually driven by, the business architecture. This means that users must be involved and the end goal of the organization must be paramount in the planning process. How do you achieve a balance between business **goals** and technology goals – transparency versus security for example? This session will **explore the differences** between business and technology **architectures** and provide you with **tips** on how to build a business architecture without losing sight of the technical realities of the organization.”



"When I use a word,"
Humpty Dumpty said, in a
rather scornful tone, "it
means just what I choose it
to mean - neither more nor
less."

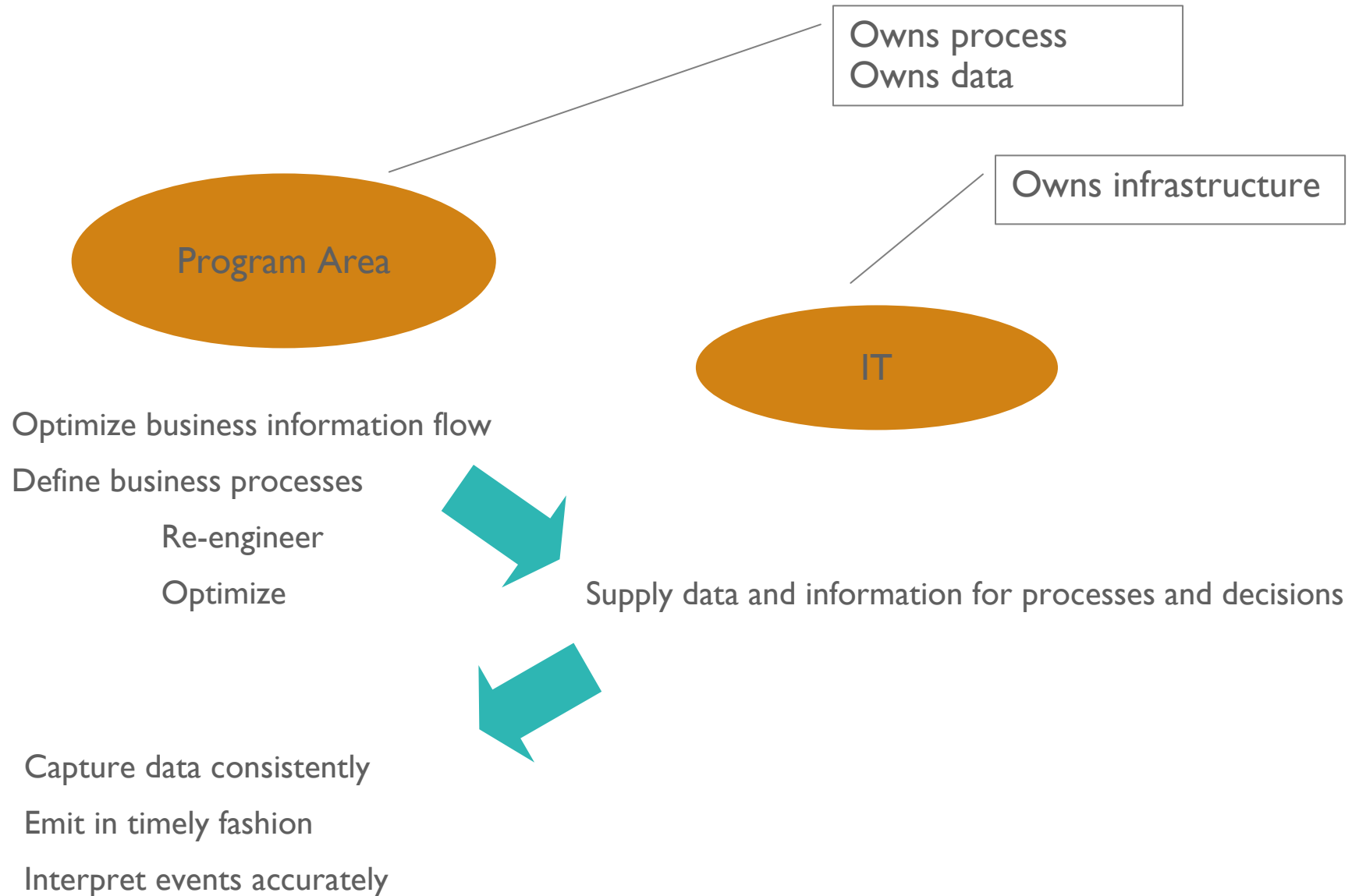
"The question is," said Alice,
"whether you can make
words mean so many
different things."

Purpose
 Legislation
 Roles
 Situations
 Resources
 Policy
 Procedures
 Decisions
 Processes
 Locations
 Communications
 Commitments
 Experiences
 Organizations
 Value
 Attitudes
 Beliefs
 Objectives
 Culture
 Goals
 Services
 Products
 Events
 Work practices

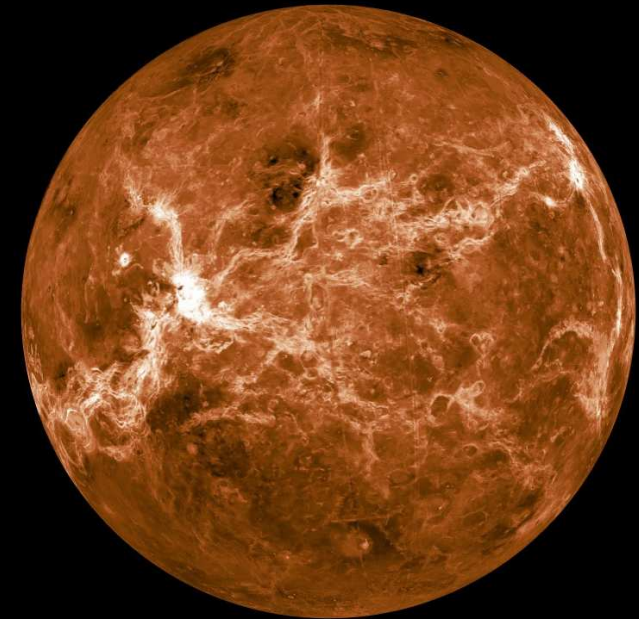
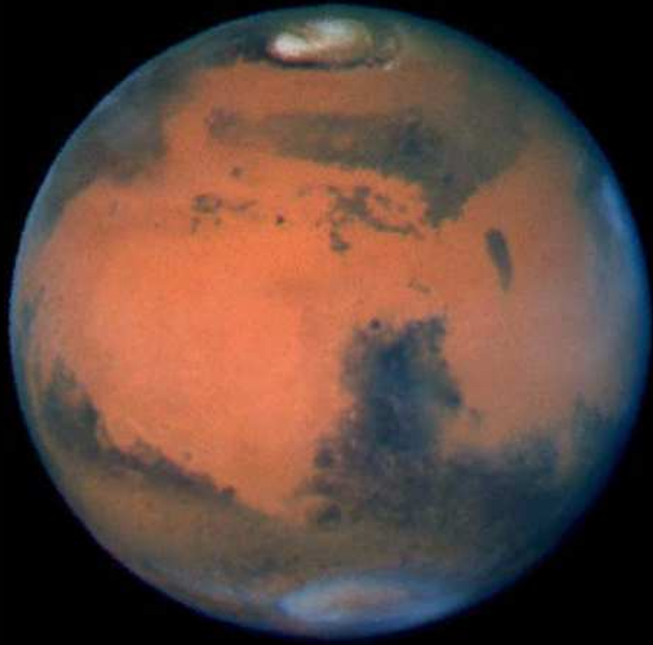


Servers
 Hardware
 Applications
 Security
 Functional components
 Non-functional requirements
 Databases
 Functional interfaces
 Networks
 Objects
 Middleware
 Data
 Operating systems

Interplay



Business is from **Mars**



IT is from **Venus**

2% improvement in revenue by focusing on IT optimization

8% improvement by focusing on business optimization

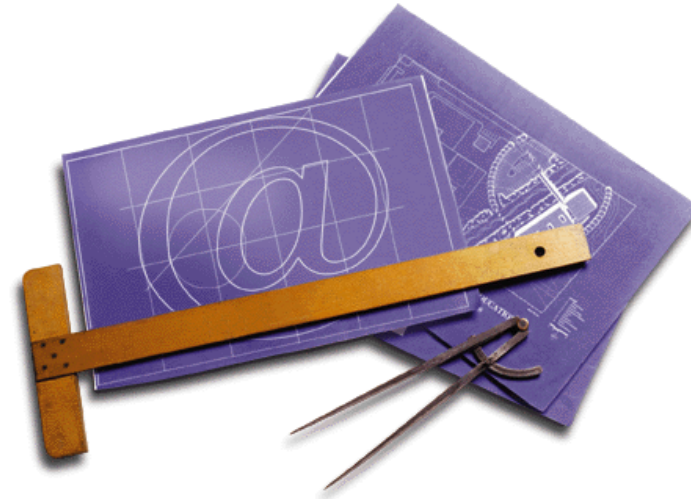
20% improvement when IT and business are aligned

— IBM 2008 CEO Survey



Architecture

- **Description or plan for a system**
 - Fundamental organization
 - Components
 - Connection
 - Relationship to environment



- *“The fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution.” [ANSI/IEEE Std 1471-2000]*

Enterprise Architecture (EA)

- **Views organization as the “enterprise”**
- **Top-to-bottom**
 - Business down to IT
- **Creates documents**
 - Strategy, plans, business processes, standards, and more
- **Is a process**

Who we are.

What we do.

How we are organized.

How technology supports us.

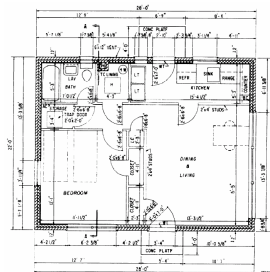
Where we want to go.

EA - Uses

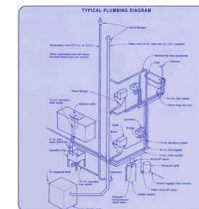
Who	How Used
Governor's Office Cabinet Legislature	Strategy, plans, performance
Agency Management	Functions, processes, tasks, performance
Agency IT	Align IT to business
CIO	Manage statewide IT
Everyone	Document, understand, analyze, transform



*City Plan
Zoning*

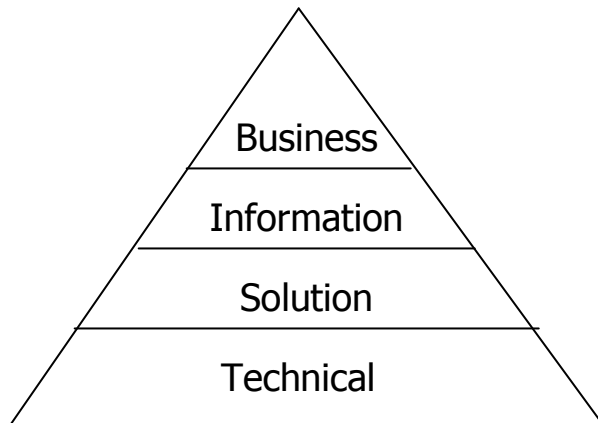


Building Plan



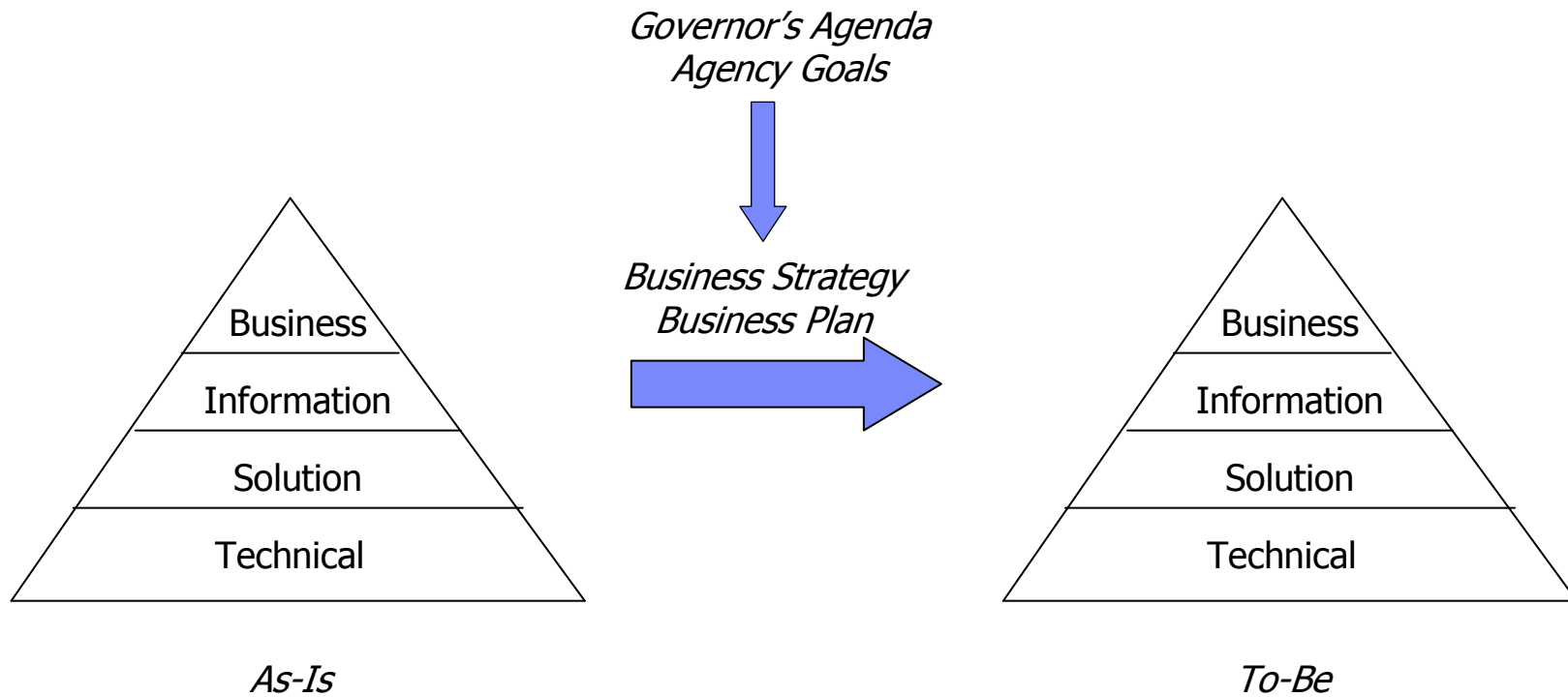
Building Code

EA Layers



- **Business architecture:** business strategy, governance, organization, and key business processes.
- **Information architecture:** structure of an organization's data assets and data management resources.
- **Solution architecture:** blueprint for the individual application systems to be deployed, their interactions, and their relationships to the core business processes of the organization.
- **Technical architecture:** infrastructure intended to support the deployment of core, mission-critical applications.

EA – The **BIG** picture

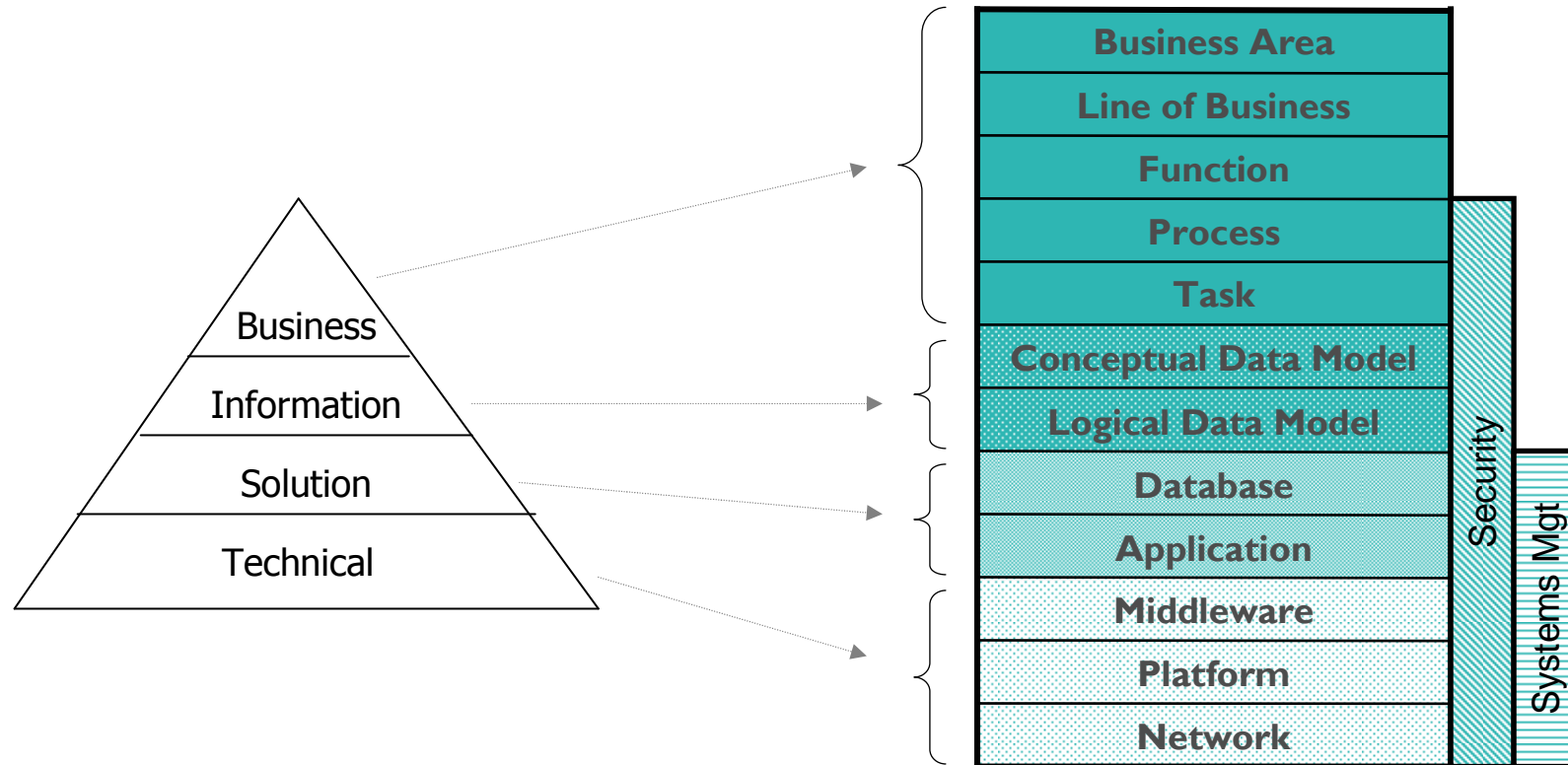


EA is like an Ogre



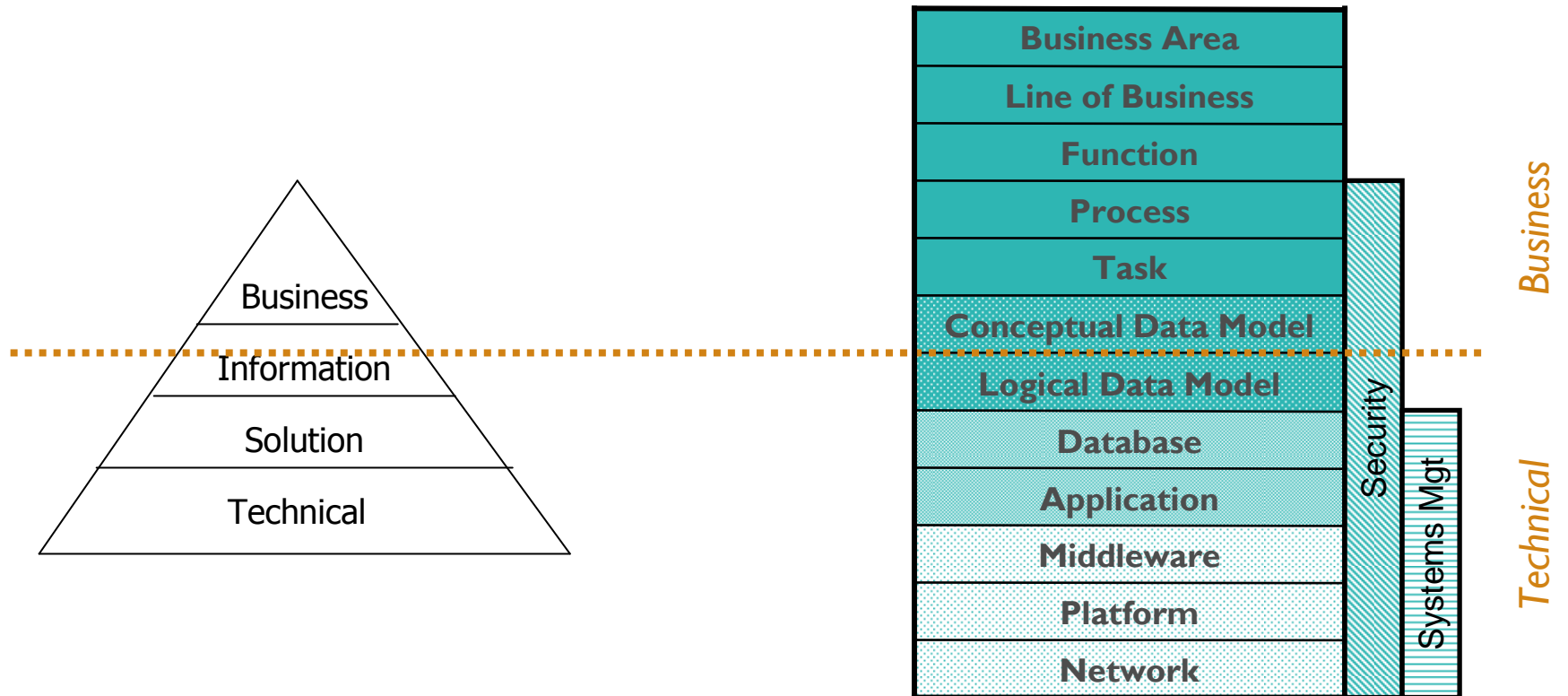
“Onions have layers. Ogres have layers”
— *Shrek*

EA – layers of layers

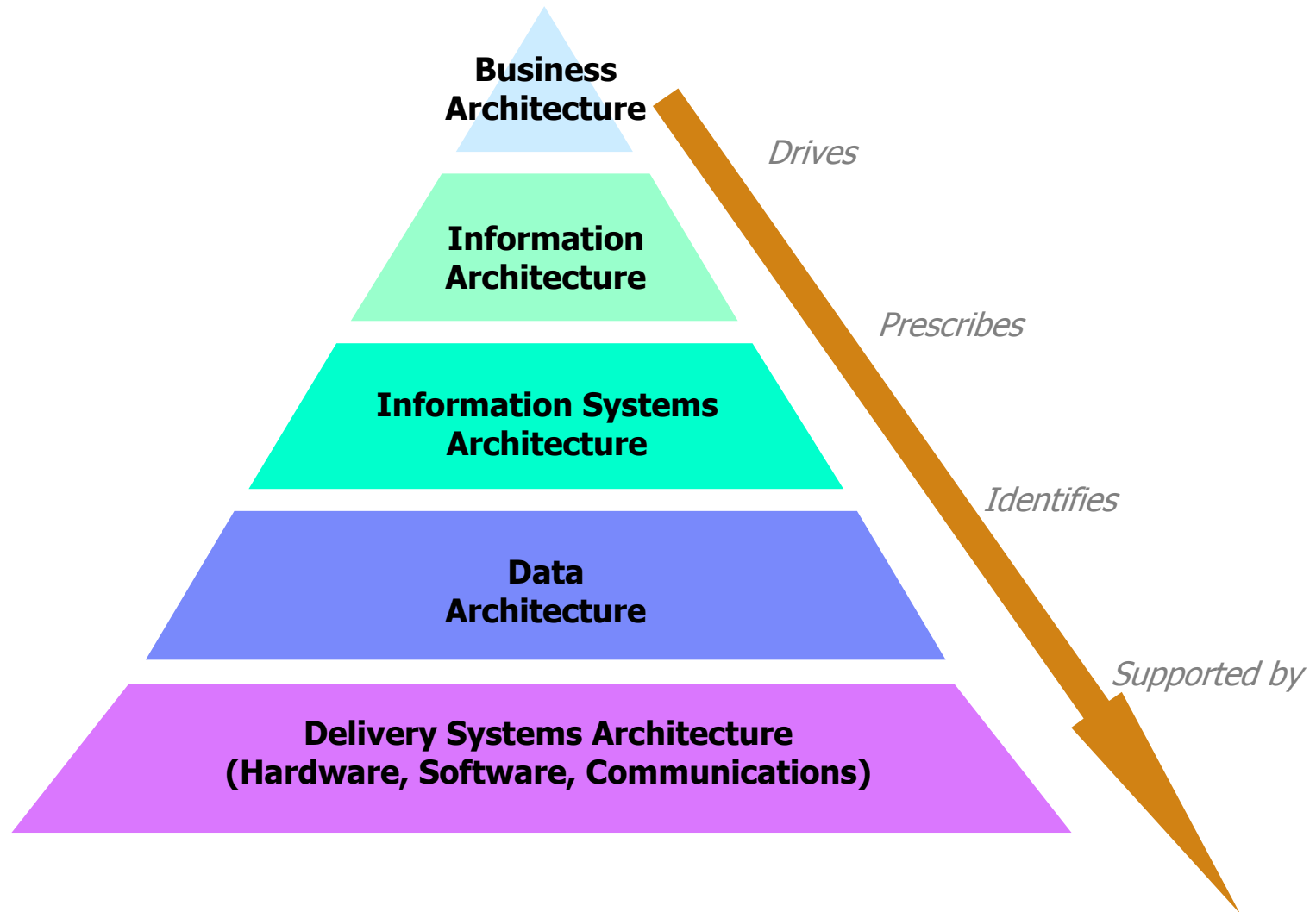


Other layers and terms can also be used.
Pick the words and slices that work best for you.

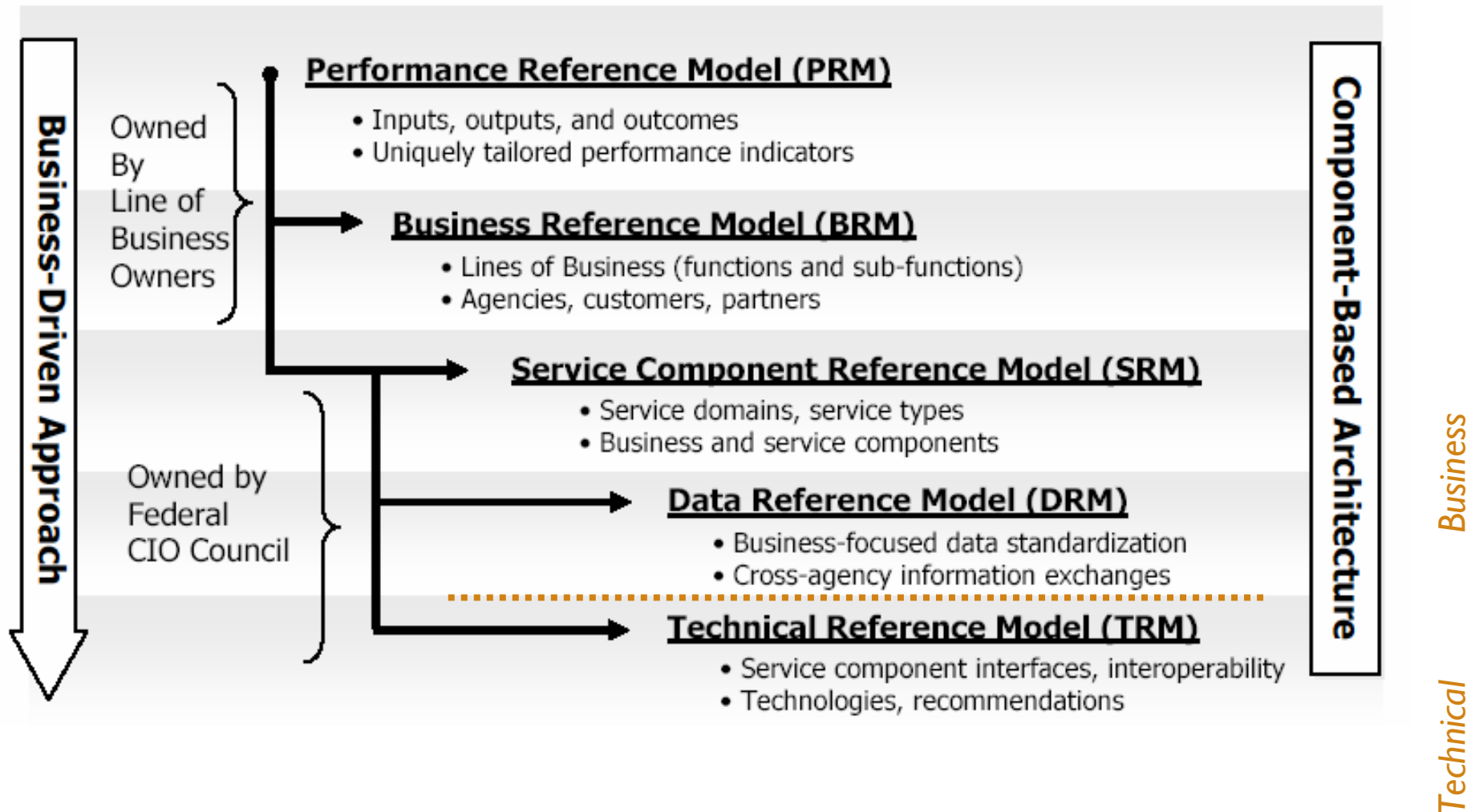
Business | Technical split



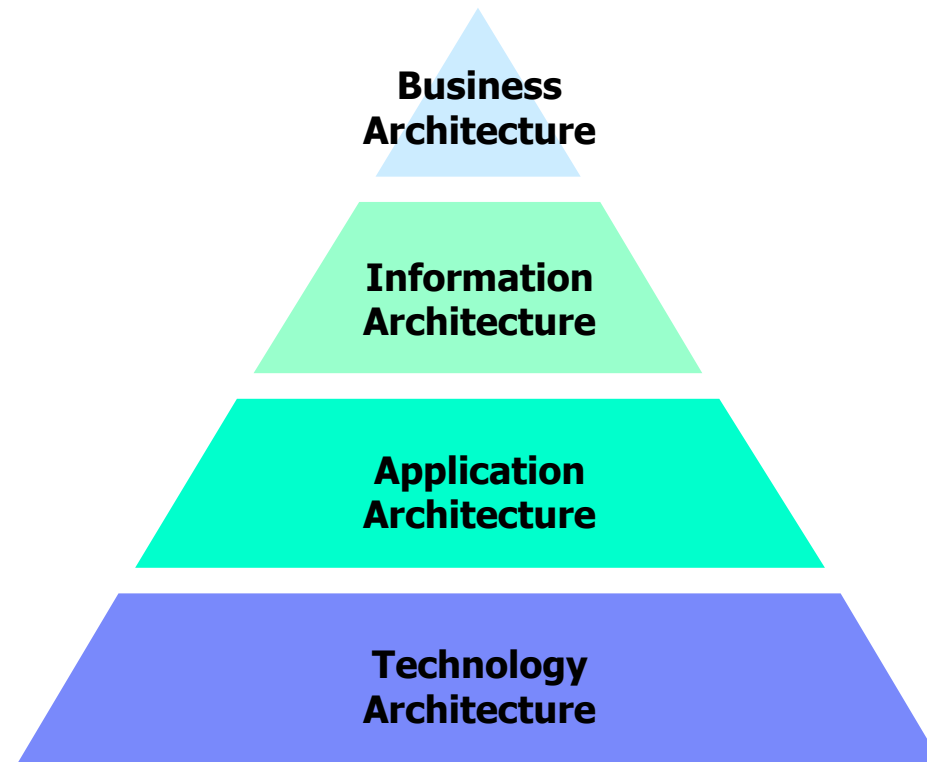
Federal Enterprise Architecture Framework (FEAF)



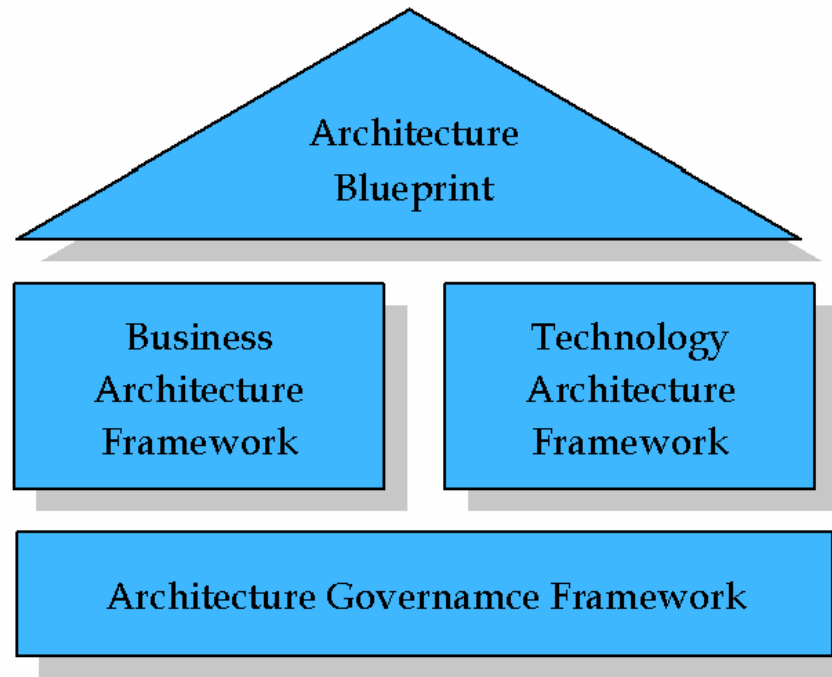
Federal Enterprise Architecture Framework



The Open Group (TOGAF)



NASCIO Toolkit





Zachman Framework

	<i>What</i> Data	<i>How</i> Function	<i>Where</i> Network	<i>Who</i> People	<i>When</i> Time	<i>Why</i> Motivation
Scope (contextual) <i>Planner</i>	List of things important to the business	List of processes the business performs	List of locations in which the business operates	List of organizations important to the business	List of events/cycles important to the business	List of business goals and strategies
Business Model (conceptual) <i>Owner</i>	Semantic model	Business process model	Business logistics systems	Work flow model	Master schedule	Business plan
System Model (logical) <i>Designer</i>	Logical data model	Application architecture	Distributed system architecture	Human interface architecture	Processing structure	Business rule model
Technology Model (physical) <i>Builder</i>	Physical data model	System design	Technology architecture	Presentation architecture	Control structure	Rule design
Detailed Representations (out-of-context) <i>Subcontractor</i>	Data definition	Program	Network architecture	Security architecture	Timing definition	Rule specification
Functioning Enterprise	DATA	FUNCTION	NETWORK	ORGANIZATION	SCHEDULE	STRATEGY

Function is sometimes called, "Application"
 Network is sometimes called, "Technology"

Business | Technical split

	<i>What</i> Data	<i>How</i> Function	<i>Where</i> Network	<i>Who</i> People	<i>When</i> Time	<i>Why</i> Motivation
Scope						
Business Model						
System Model						
Technology Model						
Detailed Representations						
Functioning Enterprise						

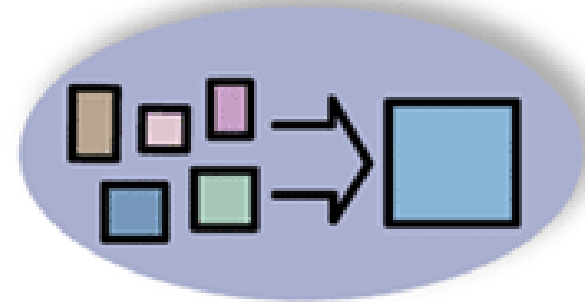
Business

Technical

Business architecture (BA)

- **Create and maintain a set of information assets for:**

- Strategic alignment
- Operational planning
- Execution



- **Documents**

- Business structure
- Capabilities
- Services
- Processes

- **Artifacts can include:**

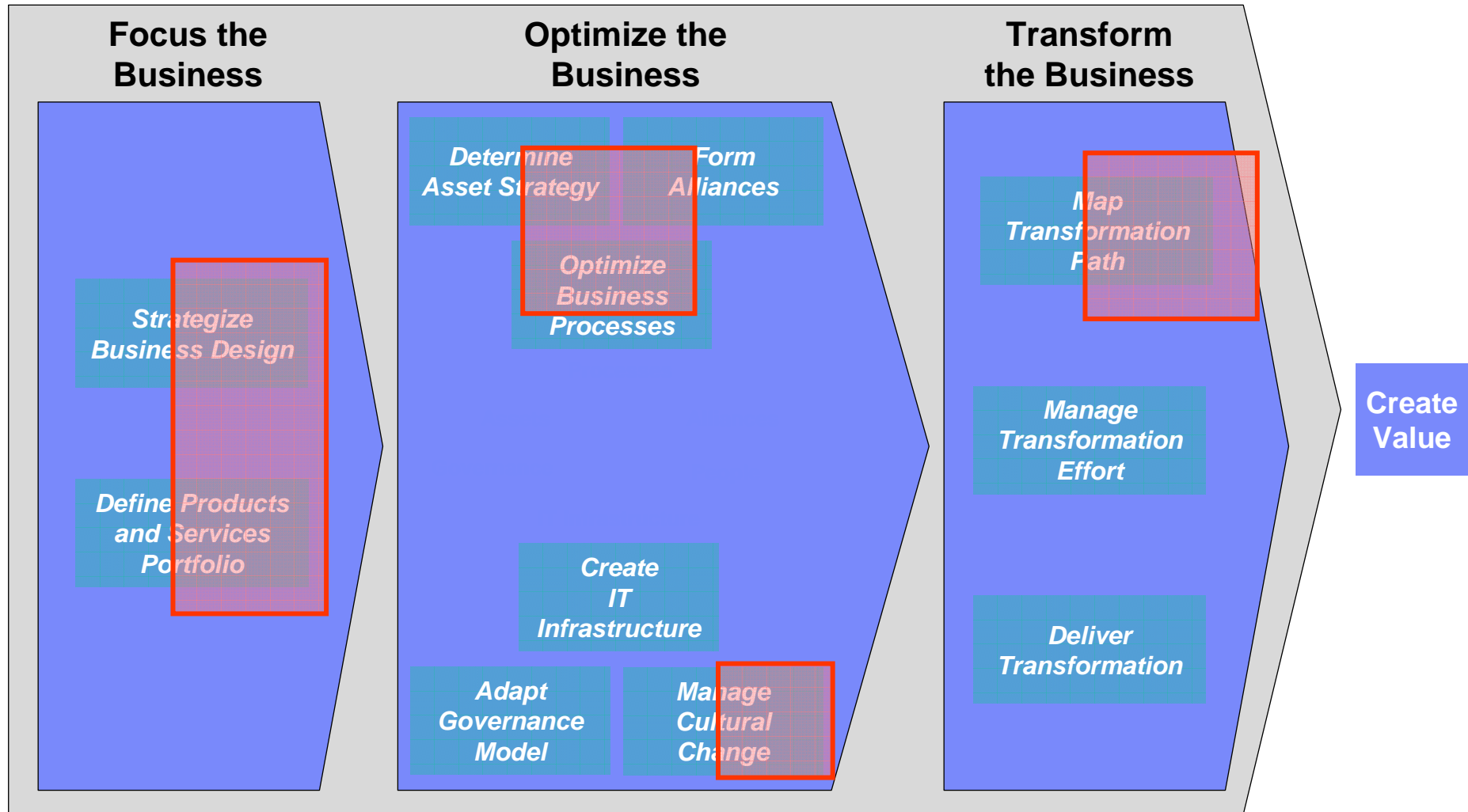
- Process maps
- Requirements
- Business rules
- Data elements
- Context diagrams

Business architect

- Participate in business **strategy** discussions
- Identify business **services**
- Identify and model business **processes**
- Translate business needs into **IT solutions** / projects
- Review and **map** IT application portfolio to business processes
- Identify **gaps** and propose alternatives to business
- **Prioritize** IT projects across the enterprise with business
- Develop **frameworks** such as:
 - Business process outsourcing
 - Solution support
 - Business feedback
 - Solutions procurement process
- Define business **policies** such as:
 - Application and data access
 - Regulatory compliance

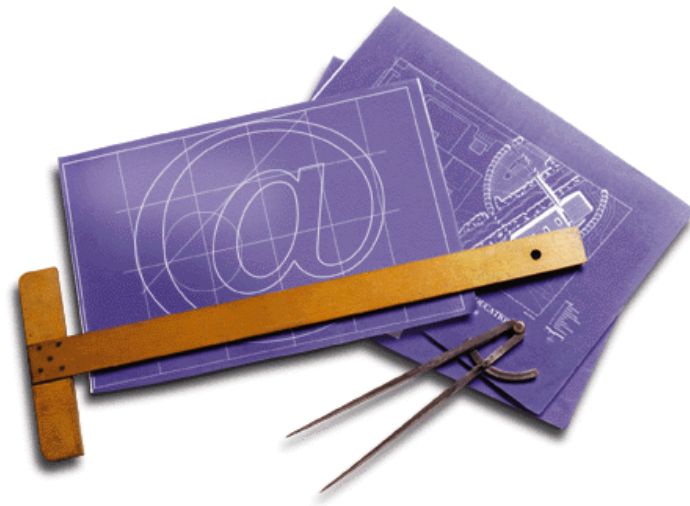


Applying business architecture



Technology architecture (TA)

- Ensure **business needs** are met
- Ensure **consistent** technology architecture across the enterprise
- Develop technology **reference** architecture
- Provide **guidance** to project teams
- Develop technology **frameworks** such as:
 - Solution procurement
 - Development
 - IT operations policies

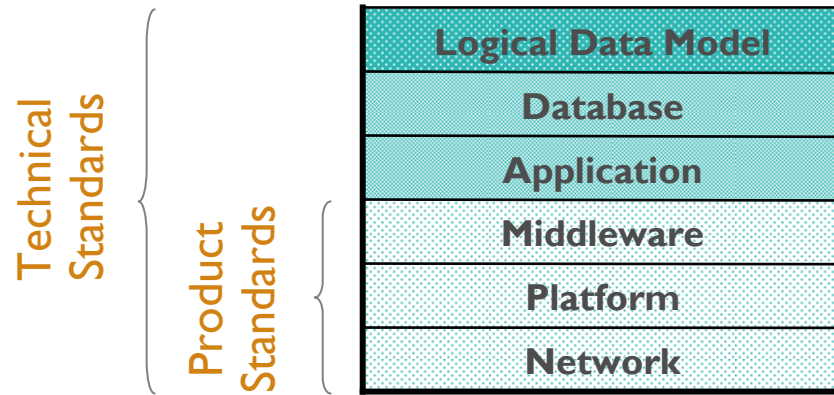


Technology architect

- **Inventory** existing systems
- Develop technology **principles**
- Develop models of **existing** technical architecture
 - Systems
 - Network
 - Processing
 - Cost
 - Standards
- Identify **gaps** between business needs and architecture
- Identify **gaps** between principles and architecture
- Develop models of **target** architecture
- Develop **roadmap** to close gaps and move to target:
 - Projects
 - Priority / sequence



TA



Entity-relationship diagrams

Data dictionary

DB definition

Program specs

Program code

Object model

Logical system diagrams

Physical system diagrams

Network diagram

Reference architectures

Top-down

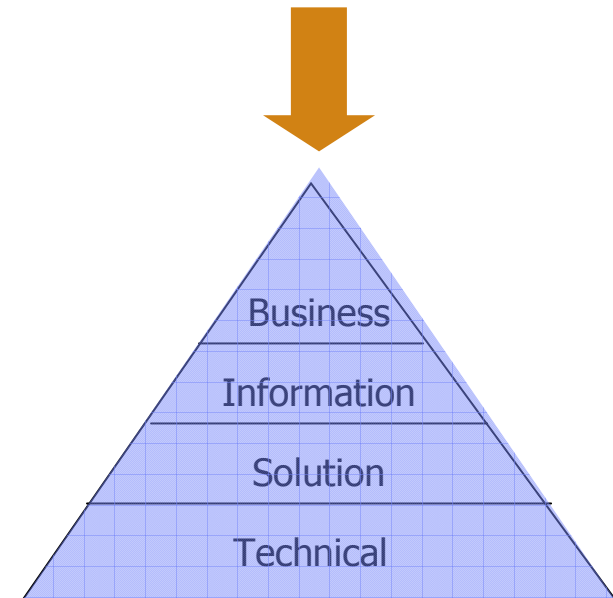
- Typically driven by strategic business objectives such as:
 - Alignment
 - Reducing costs
 - Revised strategy
- Results in a high level view of the business

Benefits

- Enterprise scope
- Can address strategic issues
- Change management is easier
- Governance is easier to put in place

Challenges

- Hard and lengthy
- Does not address tactical issues quickly
- Long time to develop all tools and approach



Bottom-up

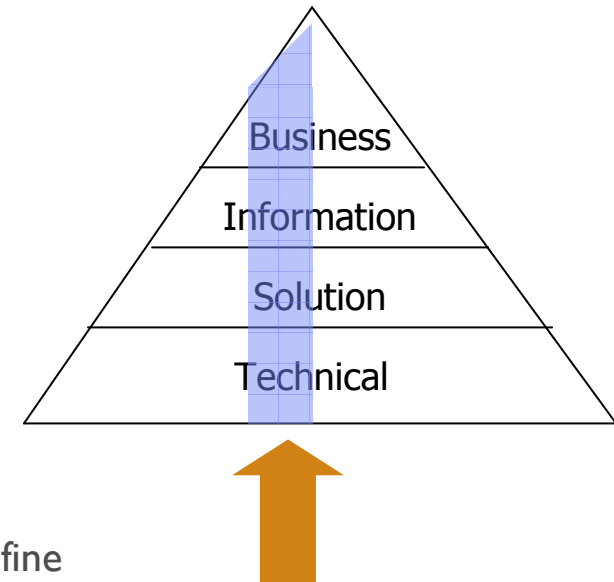
- Driven by tactical business objectives such as:
 - Revamping a business area
 - Rationalizing / simplifying
 - RFP
- Results in a more tactical view of the business

Benefits

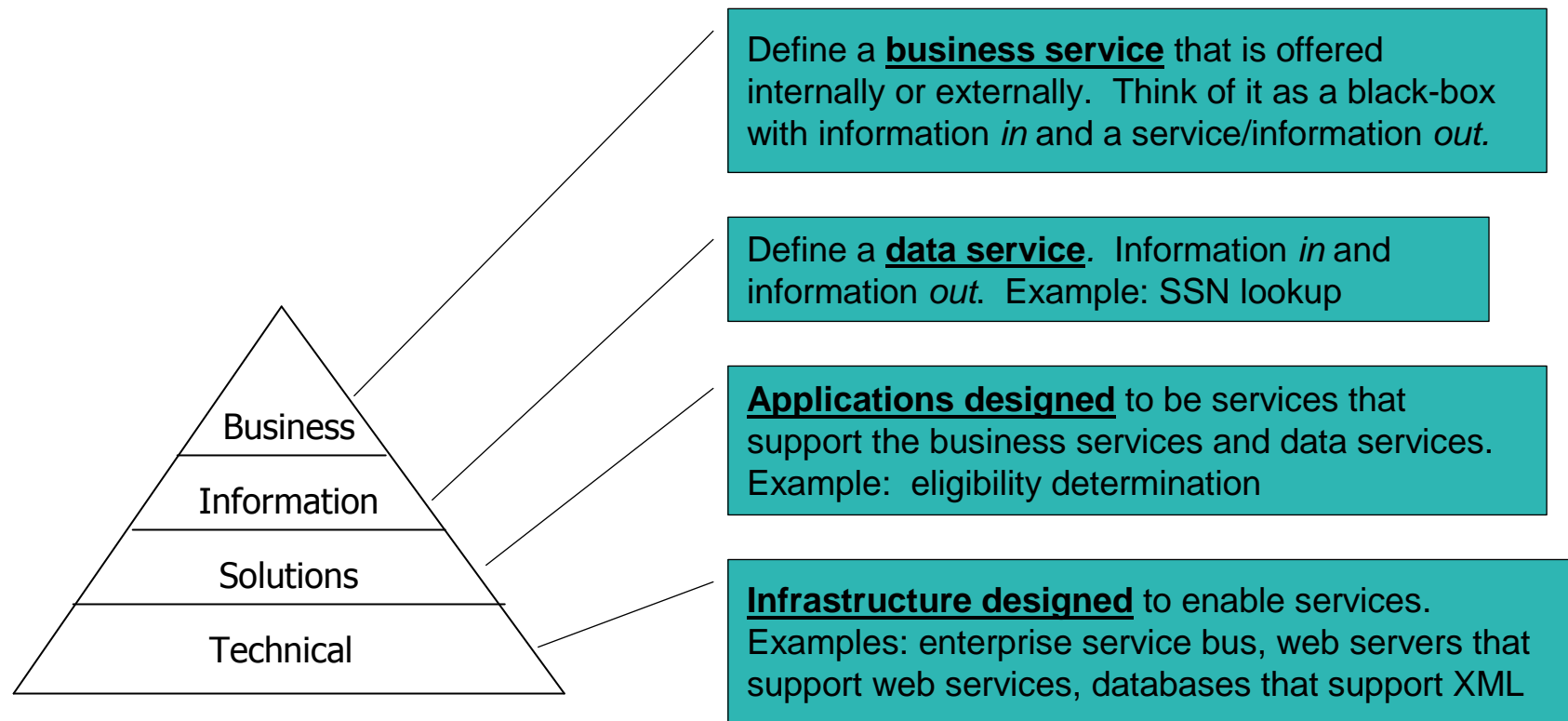
- Tactical issues are addressed quickly
- Vertical slice – develop bottom-to-top skills and approach and refine
- Minimal buy-in

Challenges

- Maybe difficult to institutionalize
- Entire value proposition is difficult to realize
- Is not fully utilized by entire organization
- Difficult to put governance in place for techniques and content
- Lacks a strong tie to strategy



EA and SOA



SOA is a style of design that falls into all layers.

Key success factors

- Understand the initial organizational **driver**
- Understand the **end** game
- Start **small**, but **plan** for the future
- People with **experience** at senior level and business architecture
- **Centralize** the initial architect group
- Focus on the **positive**
- Strong leadership **support** and buy-in
- Organization's capability to accept **change**
- Setup **governance** – keep it alive
- Establish continuity. **Institutionalize.**
- **Communicate**, communicate, communicate
- Adequate **resources** to implement architecture



Benefits

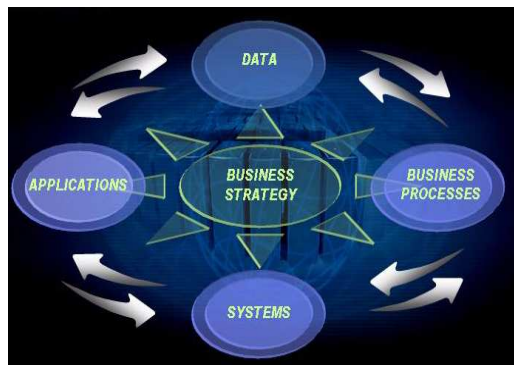
- Speed **time-to-implementation**
- Reduce **costs**
- Speed **decision-making**
- **Improve** communication, prioritization, governance of initiatives
- Reduce **integration** problems
- Better budgeting and **planning**



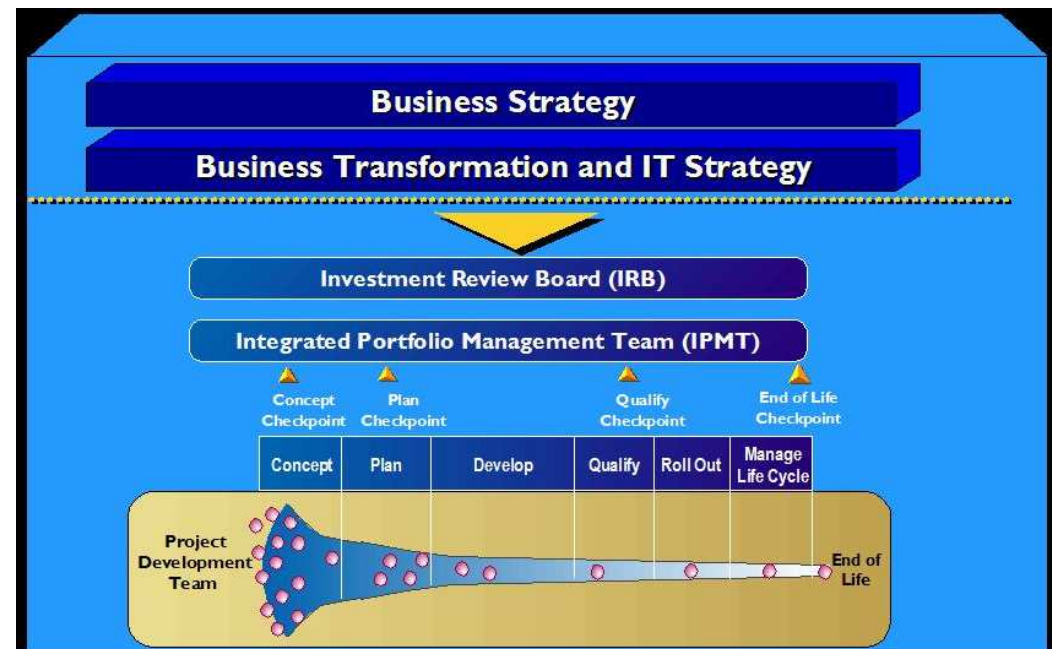
IBM example

	Before	After
CIOs	128	1
Host Data Centers	155	11
Web Hosting Centers	80	7
Networks	31	1
Applications	16,000	5,000

Simplification



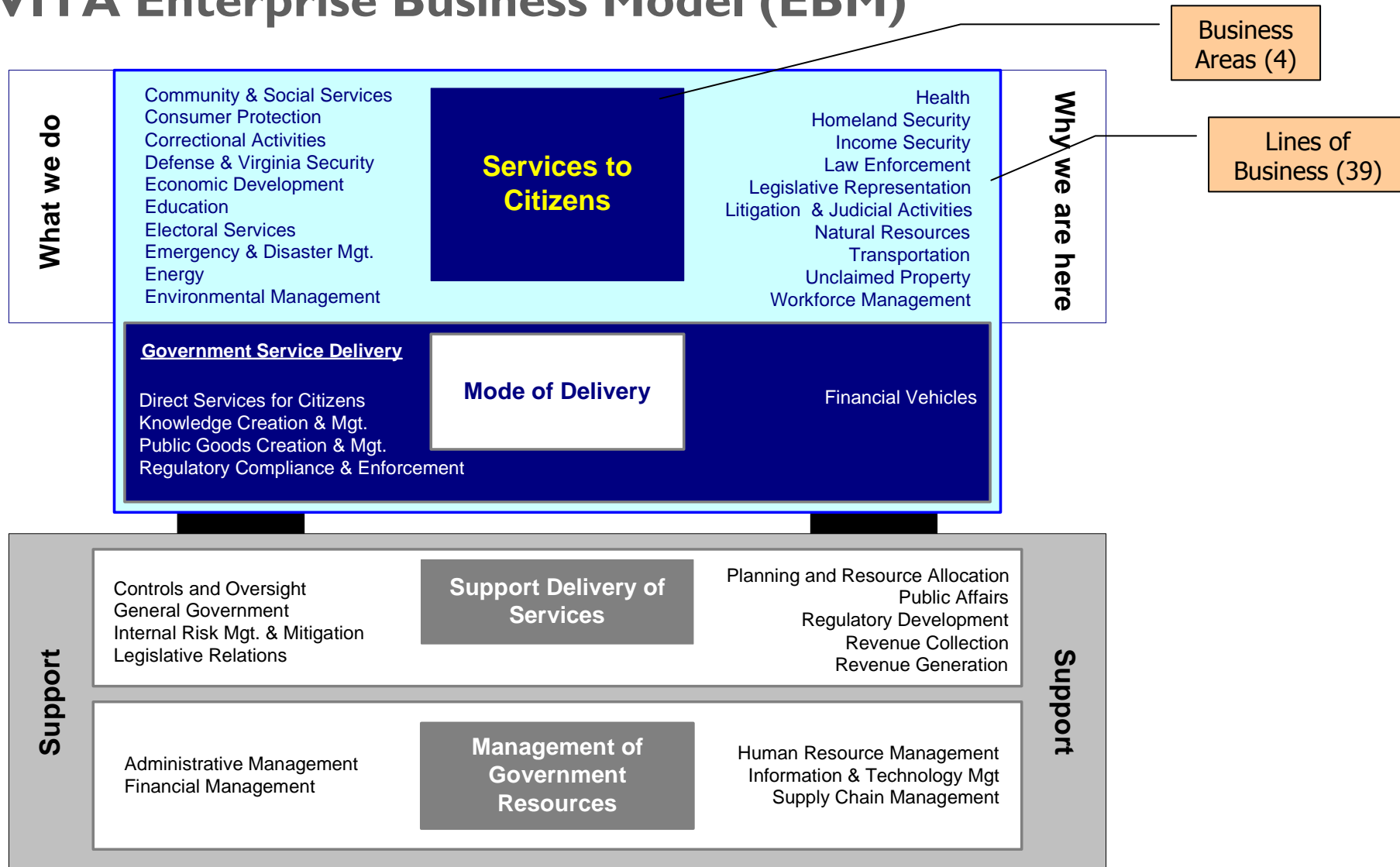
Living Architecture



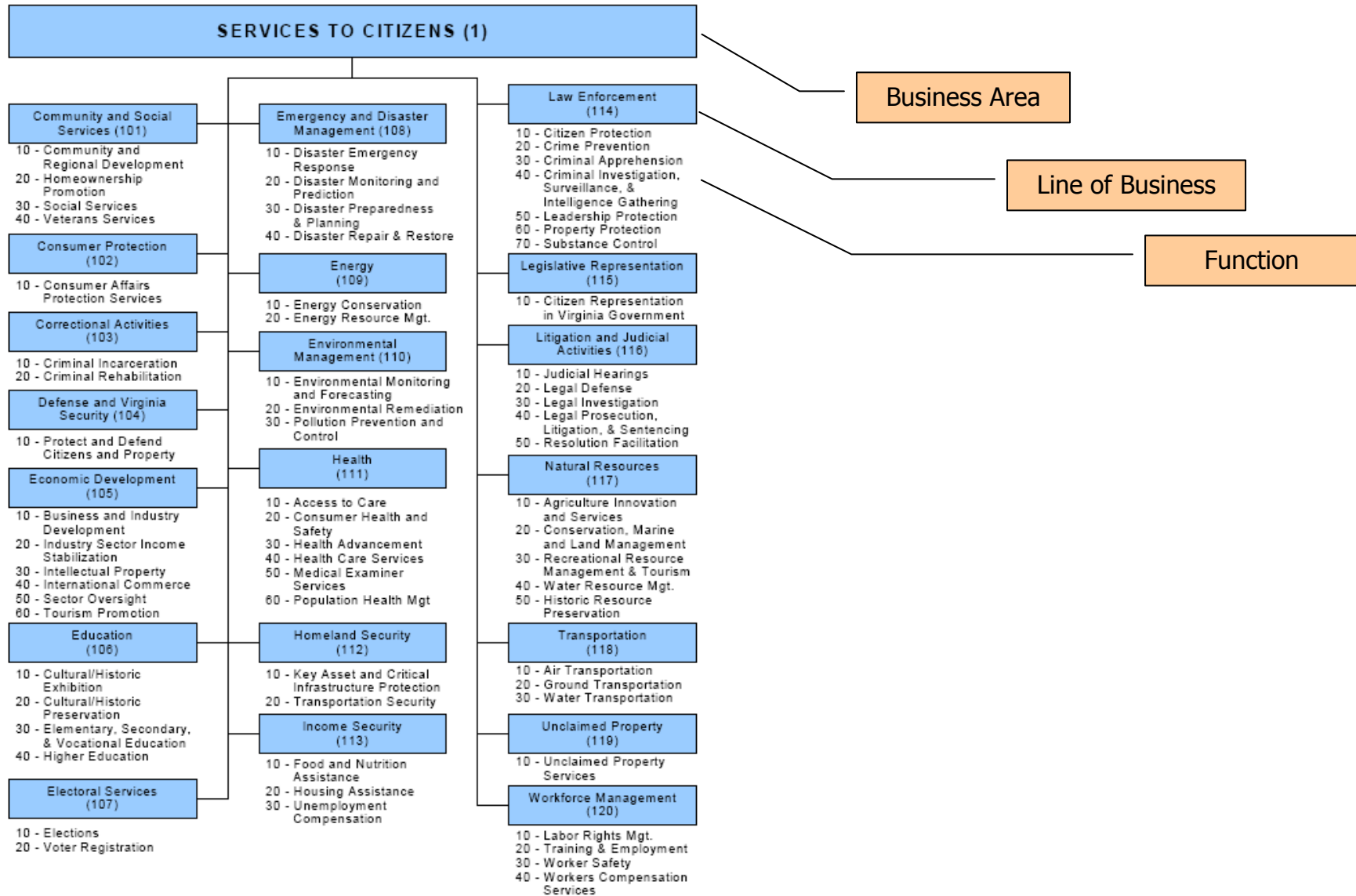
Business Transformation

BA – example

VITA Enterprise Business Model (EBM)



EBM – business area / line of business / function



EBM – summary of agencies performing a function

Services to Citizens		# Agencies Mapped
101 Community and Social Services		
10	Community and Regional Development	5
20	Homeownership Promotion	2
30	Social Services	10
40	Veterans Services	1
102 Consumer Protection		
10	Consumer Affairs Protection Services	8
103 Correctional Activities		
10	Criminal Incarceration	3
20	Criminal Rehabilitation	3
104 Defense and Virginia Security		
10	Protect and Defend Citizens and Property	2
105 Economic Development		
10	Business and Industry Development	13
20	Industry Sector Income Stabilization	5
30	Intellectual Property	3
40	International Commerce	2
50	Sector Oversight	7
60	Tourism Promotion	9

EBM – details of agencies performing a function

Line of Business 102 Consumer Protection

Involves state activities that address consumer complaints and assure consumer goods are properly labeled, weighted and/or measured.

Function 10 Consumer Affairs Protection Services

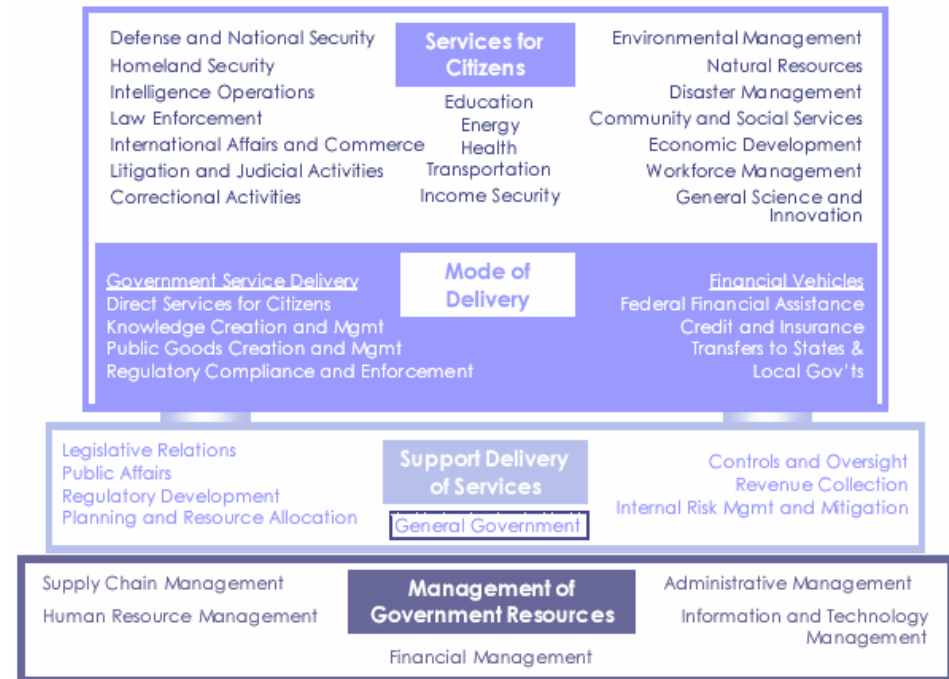
Includes activities that address consumer complaints related to fraudulent, deceptive, or illegal practices. Also includes activities related to ensuring accurate and valid weights and measures are being used in dispensing consumer products.

Agency	Cross Agency	External Provider	Notes	Verified
226 Accountancy, Board of	<input type="checkbox"/>		Board receives complaints on individual CPAs and CPA firms and on unlicensed CPAs and CPA firms.	1/18/2005
163 Aging, Department for the	<input type="checkbox"/>			12/6/2004
301 Agriculture & Consumer Services, Department of	<input type="checkbox"/>		Weights and measures; charitable solicitations; consumer affairs; and pesticide services.	1/12/2005
173 Charitable Gaming, Department of	<input type="checkbox"/>			1/19/2005
601 Health, Department of	<input type="checkbox"/>		The Bedding and Upholstery Division certifies new bedding and upholstery so it can be sold interstate. The Center for Quality Healthcare protects patients in hospitals and nursing homes.	1/30/2005
720 Mental Health, Mental Ret. & Sub. Abuse Svcs., Dept. of	<input type="checkbox"/>		Human Rights Program.	12/13/2004
506 Motor Vehicle Dealer Board	<input type="checkbox"/>		Protect and assist consumers in matters related to the purchase of an automobile.	1/19/2005
222 Professional & Occupational Regulation, Dept. of	<input checked="" type="checkbox"/>		Citizen complaints on regulated businesses and professions. Works with localities to investigate and prosecute unlicensed contracting. DPOR also handles fair housing complaints (for a fee) for the U.S. Department of Housing and Urban Development.	1/18/2005

EBM - align state to federal



VA Enterprise Business Model



FEA Business Reference Model

MITA - business hierarchy

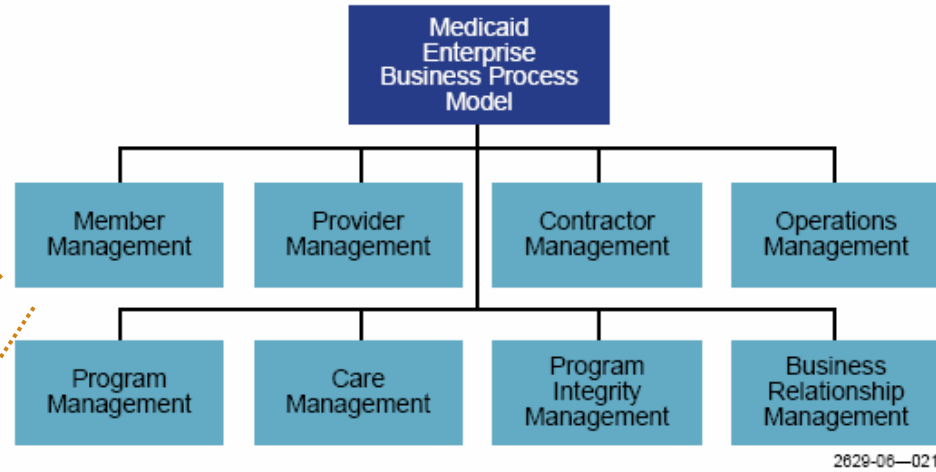


Figure 4-1. MITA Business Process Model Business Areas

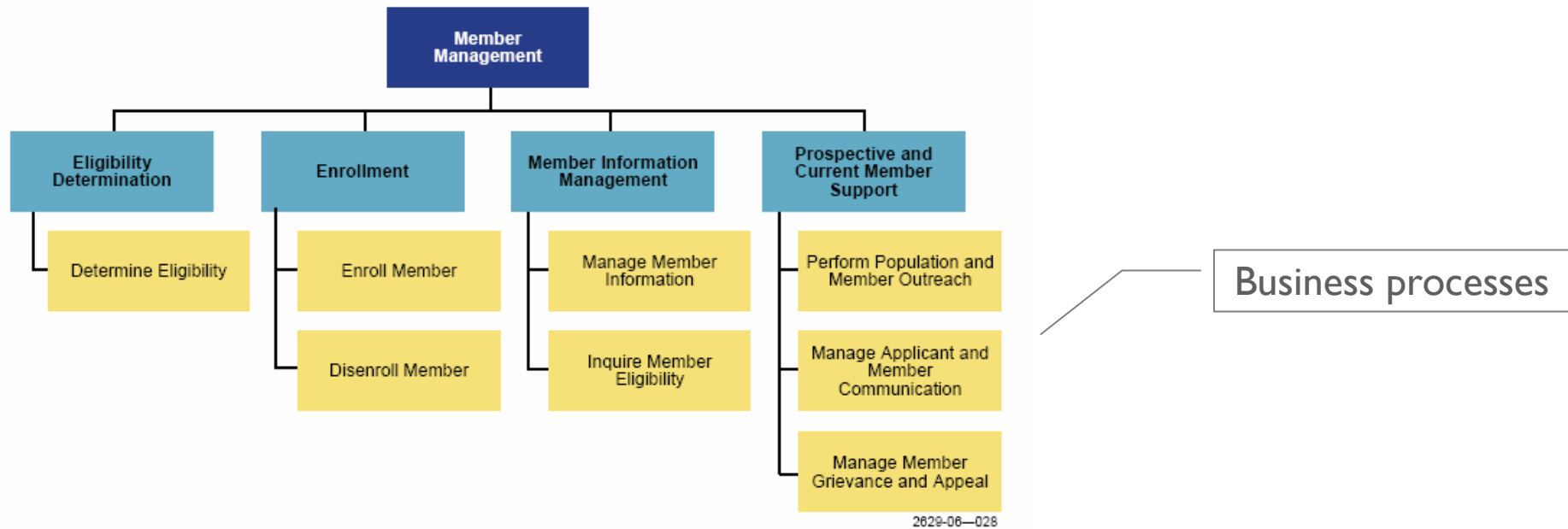


Figure 4-3. Member Management Business Area

BA example Medicaid IT Architecture (MITA)

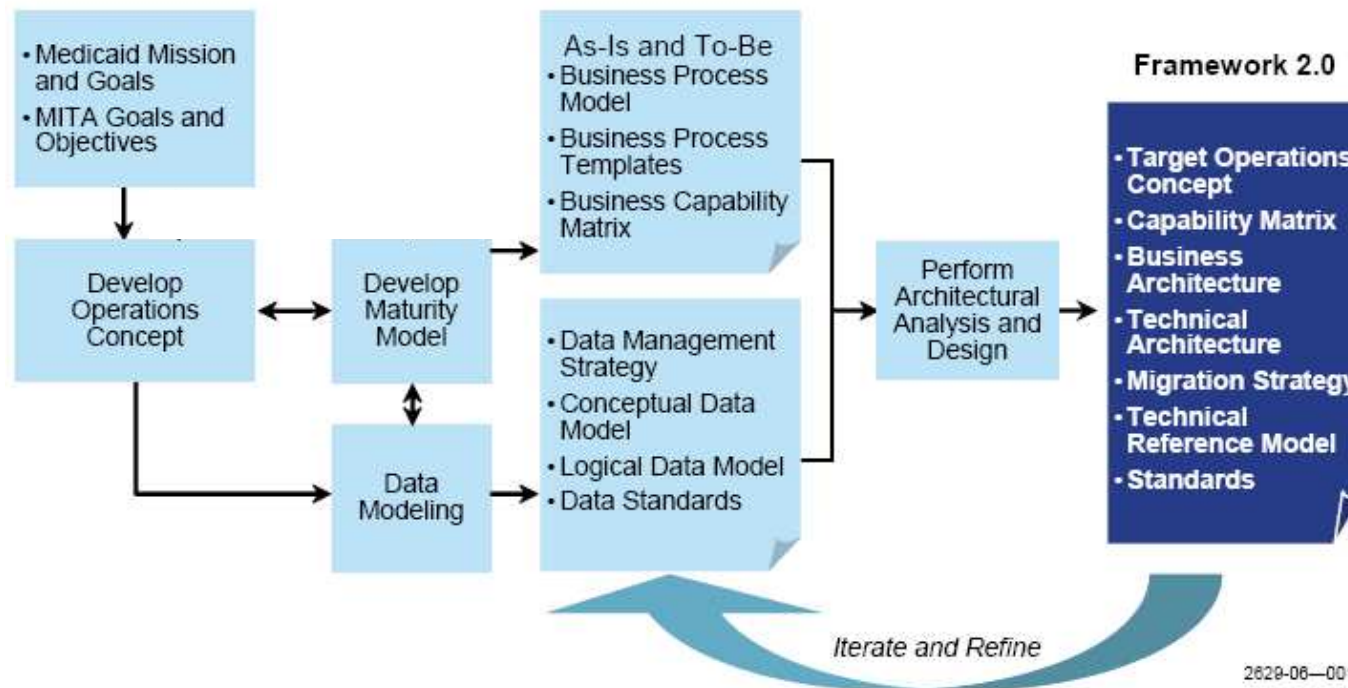


Figure I-1. MITA Framework Development Approach

2828-06-001

MITA - BA and TA

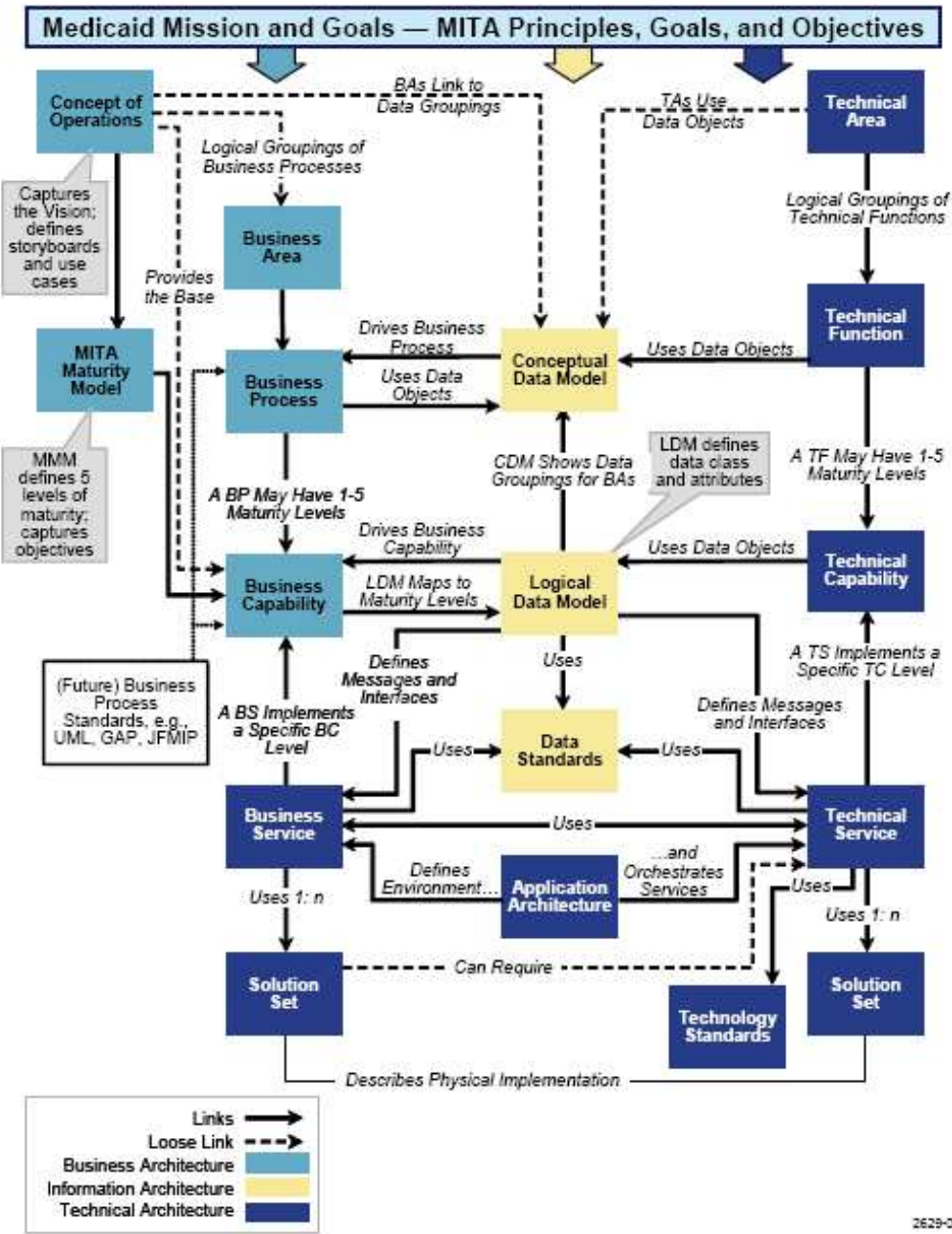


Figure I-7. Relationships Among the Components of the BA, IA, and TA

BA example – IBM Component Business Model

Version 1 July 12, 2004 © IBM Corp. 2004	Social Marketplace	Social Program Development	Outreach	Relationship Management	Case Management	Collections	Compliance and Integrity	Business Service	
Policy and Strategic Planning	Policy Analysis	Legislation Support and Management	Campaign Planning	Service Delivery Strategy		Collections Strategy	Risk Management Framework	Financial Strategy	
	Customer Segmentation	Policy Interpretation	Discovery			Loans & Debt Strategy	Privacy Strategy	HR Strategy	
	Community Engagement Strategy	Program Planning				Audit Strategy	IT Strategy		
Oversight and Accountability	Outcome Evaluation	Product Design	Campaign Administration	Account Management	Case Supervision	Funds Management	Risk Trend Analysis	Financial Management	
	Performance Management	Product Administration		Service Provider Management	Case Account Management		Outcome Management	Privacy Management	HR Management
	Reporting			Activity Management	Appeals Monitoring		Records Management	Audit Control	IT Management
Service Delivery	Market Research	Product Implementation	Prospect Identification	Provider/Client/ Employer Registration	Assessment	Liability Calculations	Quality Assurance	Financial Delivery	
	Community Building	Capacity Building	Marketing and Advertising	Intake	Validation	Collections	Risk Assessment	HR Delivery	
			External Campaign Execution	Screening	Service Plan / Corrective Action Plan		Disaster Response		
			Change of Circumstance	Benefit Eligibility Determination	Accruals	Risk Prevention			
Notifications	Referral	Allocation	Risk Detection	Rehabilitation	Audit Delivery	IT Delivery			

TA – example Classification Scheme

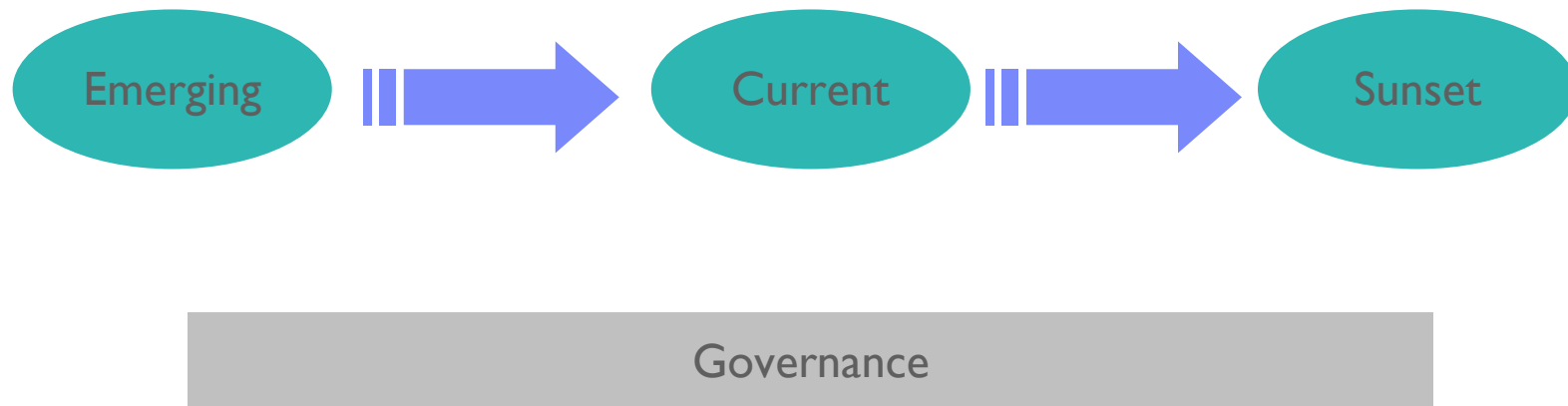
Domain ID	Domain	Component ID	Component
0001	Governance and Administration		
0002	IT Architecture Overview and Framework		
0003	Measuring Progress		
0004	Standards Advisories and Updates		
1000	Hardware Platform	1100	Laptop
		1200	Palmtop
		1300	Desktop
		1400	Kiosk
		1500	Cellphone
		1600	Printer – portable
		1610	Printer – personal
		1620	Printer - LAN
2000	Software		
3000	Network		
4000	Data		
5000	Security		
6000	Privacy		
7000	Systems Management		
8000	Access/Telecommunications		
9000	Application Development		
10000	Application Integration		
11000	Groupware		
12000	Application Components		
13000	Project Management		

TA – example

Component Description

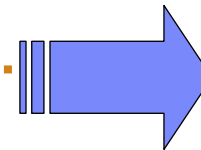
2330 ELECTRONIC DOCUMENTS: <i>Non-alterable</i>	
Definition	Document creation and exchange software for the conversion of documents to a read and print format for dissemination via the Internet, intranet, electronic mail or other transport. The creation of electronic documents such as reports, bids, forms, graphs and others formats that are not meant to be altered by the user.
Rationale	The file format standard for non-editable documents must offer a freely available and easy-to-use client software for viewing documents distributed electronically. The file format must be cross-platform and work with most operating systems on the client side. The format must be capable of easy viewing and download from state government websites. The file creation software must provide for the creation of a read-only format that may be secured and rendered non-alterable by end users.
Approved Standard(s)	Portable Document Format (PDF)
Approved Product(s)	Adobe Acrobat Exchange for creation of non-alterable and non-editable file formats Adobe Acrobat Reader 4.0 or 5.0 (for PDF files)
Justification	Certain electronic documents need to be created and distributed in a read-only format for protection of the content. Acrobat Exchange lets you view, print, annotate and collate electronic documents. It includes the PDF Writer driver for creating PDF files from most applications and also lets users add bookmarks and hypertext links to their documents. Acrobat Distiller is used to convert PostScript files into the PDF Format and allows for the creation of thumbnails. Acrobat Reader is the free client software for reading PDF files. It may operate as a plug-in for the web browser and is easily available and installed.
Technical Implementation Considerations	The Adobe Acrobat reader software is a free download from the vendor and must be installed on the client computer. Agencies should keep the reader software upgraded to the latest version because of new features found in the Adobe PDF Writer file conversion software. Users should review best practices for file conversion and be aware of the size of PDF files, use of fonts, graphics size and orientation. PDF documents are not truly read-only and secure unless the security features of PDF Writer are invoked during file creation. The use of PDF files represent universal accessibility concerns for citizens of e-government services. Please review the technical considerations in Category 4020, Web Design and Publishing.
Emerging Trends and Architectural Directions	When released, Adobe Acrobat Reader, version 5 is expected to include advanced features in accessibility.
Review Cycle	Annually
Timeline	Revision date: November 1, 2001 Effective date: March 5, 1999

TA – standards lifecycle



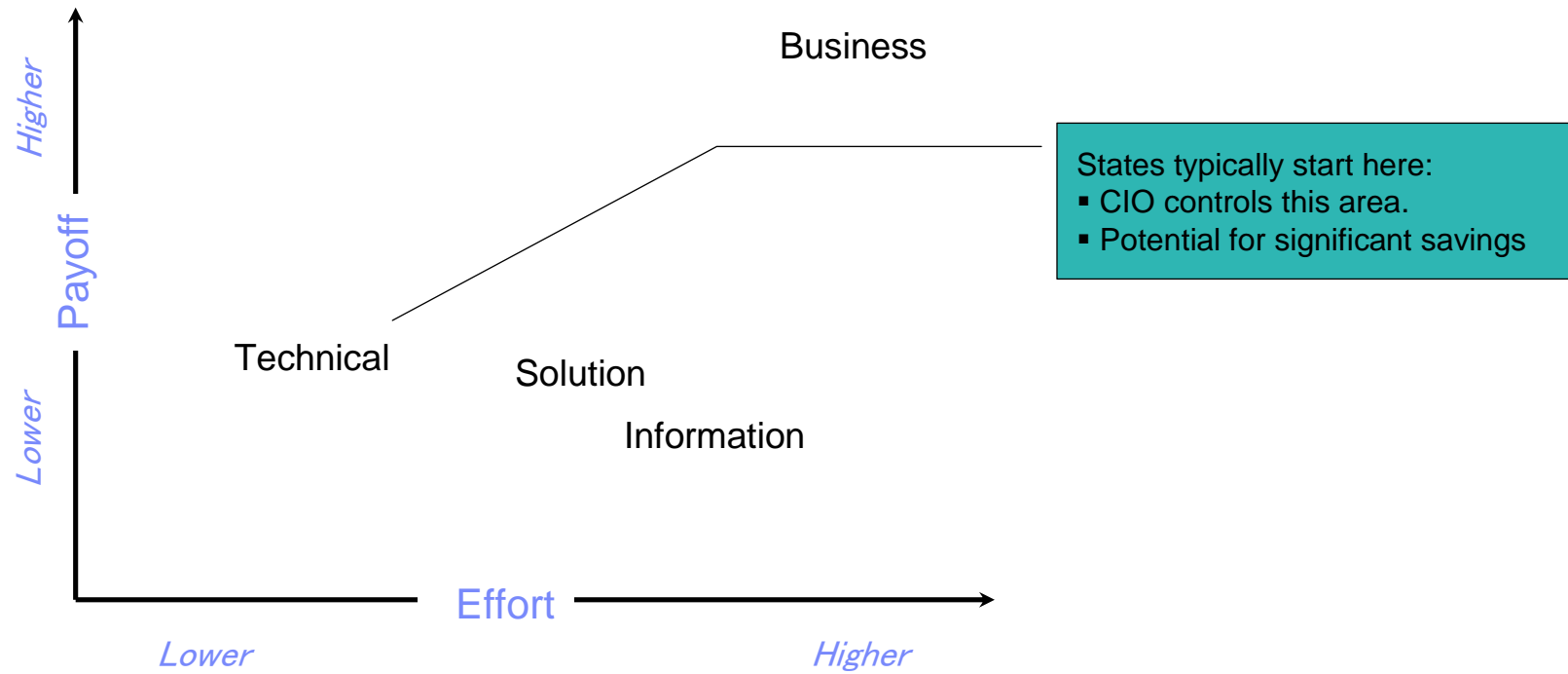
Where to start

Layer	Tackle this layer in order to
Business	Improve service to citizens Streamline business operations Reduce redundancy Share services Reorganize
Information	Improve privacy Improve business data quality Improve business intelligence Improve data security Increase data sharing between agencies
Solution	Lower application support costs Standardize applications Reuse code and designs Increase use of commercial off-the-shelf applications
Technical	Standardize components Reduce IT cost Consolidate IT Streamline IT operations Virtualize IT



- Reduce costs
- Reduce risk
- Improve focus
- Improve service
- Improve flexibility
- Improve sharing
- Position for outsourcing

Where to start



None of this is easy. This is a relative comparison.
Your mileage will vary.

More info

- **TOGAF** - <http://www.opengroup.org/togaf/>
- **FEAF** - <http://www.whitehouse.gov/omb/egov/a-1-fea.html>
- **NASCIO** - <http://www.nascio.org/publications/>
- **Zachman** - <http://www.zifa.com/>
- **MITA** - <http://www.cms.hhs.gov/MedicaidInfoTechArch/>
- **CBM** - <http://www.research.ibm.com/journal/sj/444/cherbakov.html>
- **DoDAF** - <http://en.wikipedia.org/wiki/DoDAF>



