An Introduction to Enterprise Architecture and related domains

The Open Group
4th October 2006

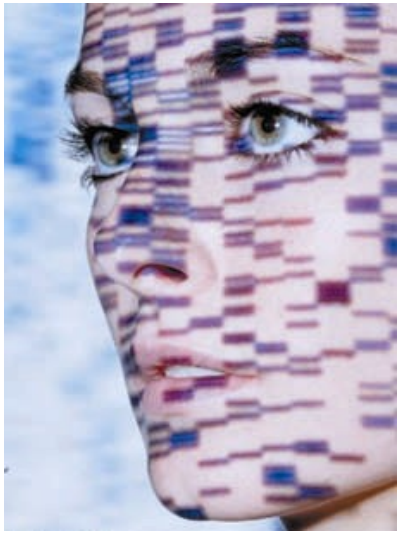
Serge Thorn – IT Research and Innovation

Agenda

- Serono…the company
- Context
- Enterprise Architecture definition
- Portfolio Management
- Business Architecture
- Business Process Modelling
- SOA
- Information Architecture
- Application Architecture
- Methodologies, Frameworks and Tools
- Questions

Serono Profile

- Fully integrated global biotech company (R&D, Mfg, M&S) with almost 100 years of history in biologic therapies
  - ✓ operate in 44 countries
  - ✓ sales in over 90 countries
  - ✓ 4,750 employees worldwide
  - ✓ 6 recombinant products on the world market
  - ✓ revenues of $2,5 billion in 2005
- Largest biotech company in Europe
- Third largest biotech company worldwide
- Solid and sustained financial performance

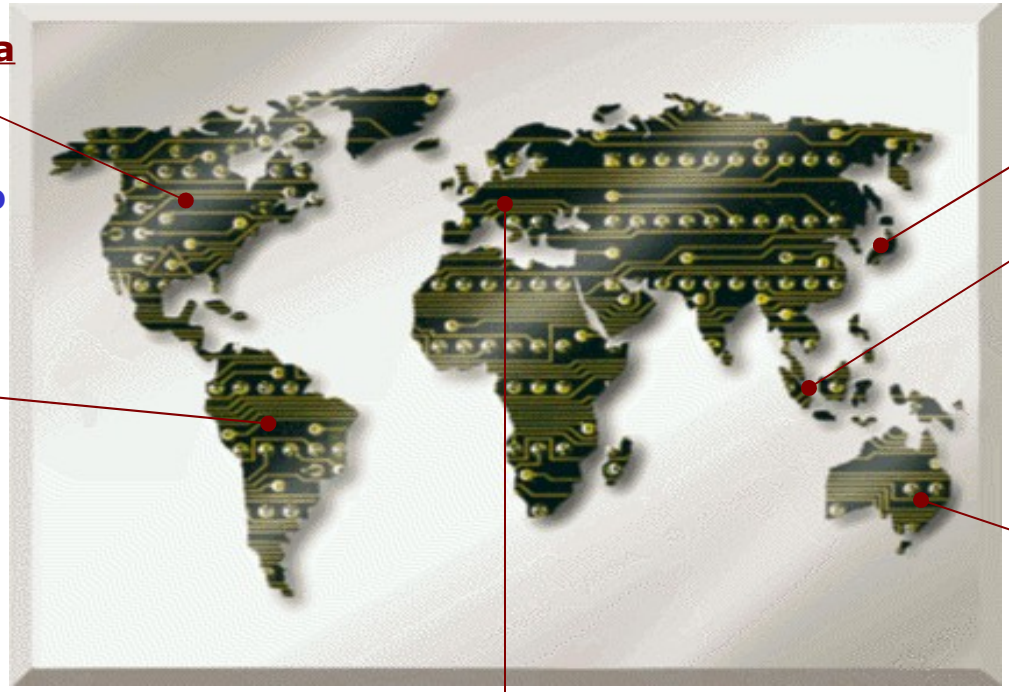


A Global Biotech Leader

3rd Biotech worldwide, 1st biotech outside USA

Global Presence

We are a global organization of 140 employees supporting 4'750 users in more than 60 locations and from 30 different countries in the world.



North America
- Canada
- USA
- Puerto Rico

Latin America
- Argentina
- Brazil
- Uruguay
- Venezuela
- Colombia
- Mexico

Japan

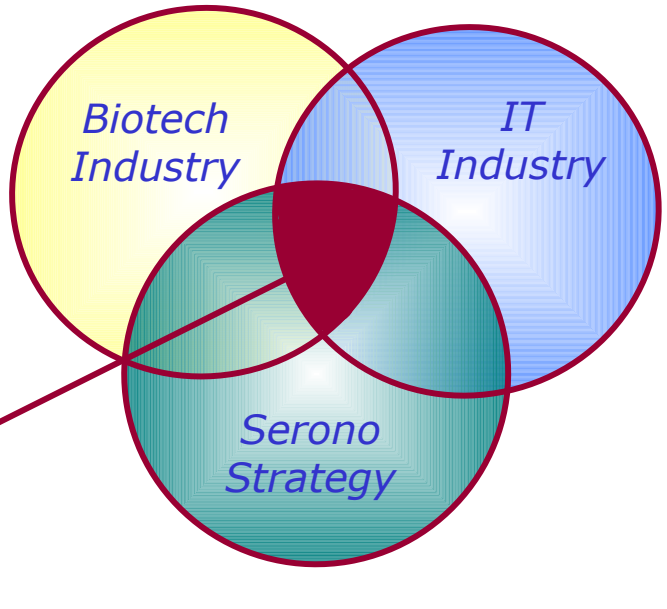
Asia-Pacific
- Singapore
- Korea
- Hong-Kong
- Taiwan
- Thailand
- China

Oceania
- Australia
- New-Zealand

Europe, Middle-East, Africa

- Switzerland
- France
- UK
- Germany
- Austria
- Netherlands
- Sweden
- Danemark
- Finland
- Norway
- Czech Rep.
- Slovakia
- Poland
- Lithuania
- Russia
- Croatia
- Italy
- Spain
- Portugal
- Greece
- Israel
- South Africa
- Egypt
- Tunisia
- Algeria
- Morocco
- Turkey
- Jordan
- Saudi Arabia
- United Arab Em.

Serono IT



At the crossroad of the Biotech Industry trends, the technology opportunities & the company goals to deliver new business capabilities

We sell 4 basic Services

Business case studies & Projects Implementation

Business Applications Secured Hosting & Management

Desktop, MSOffice, e-Mail, VPN & Support Services

Bsnss Applications & Common Desktop Training Programs

We concentrate our forces on three main regions

USA Services

HQ Services

Affiliates Services

Some Statistics

3'000 Desktops
1'500 Laptops

350 Servers

40 Terabytes of Data

120 Telecom Lines

We optimise the running business

100 New projects per year

We invent the future business

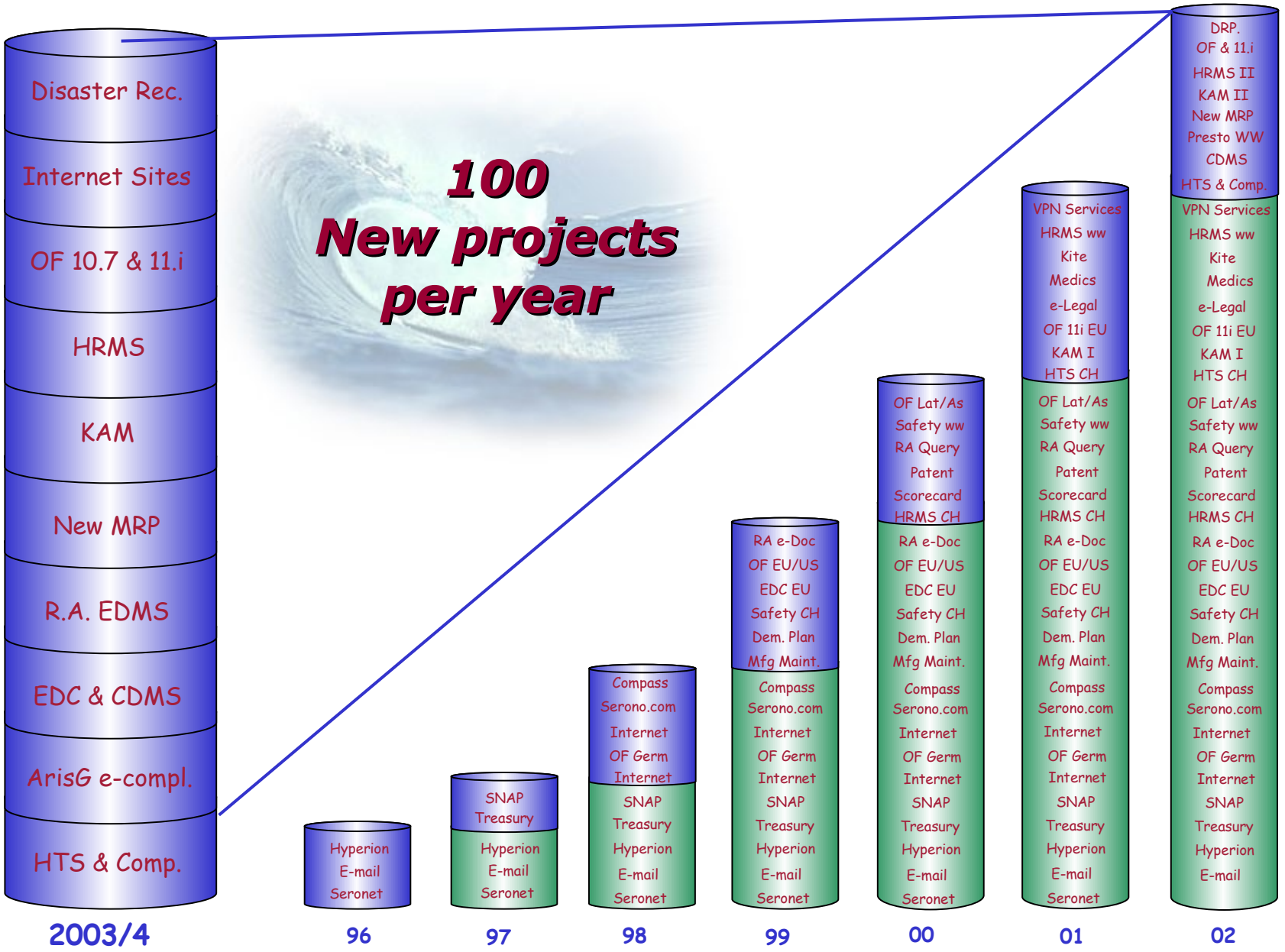
35'000 calls/year

1'500 cyber-attacks/year

500 Applications

20M e-mails/year

Speed Complexity



Business Complexity

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Discovery Compounds Inventory and High Throughput Screening

Clinical Dev. Electronic Data Capture, Clinical Trials & Safety Data Management, Medical Call Centers

Regulatory Registration files management

Sarbanes-Oxley
Public Company Accounting Reform and Investor Protection Act

Manuf. Manufacturing Resource Planning suite

FDA

Supply Suply Chain Planning suite

Marketing Patient Registry Databases

Sales Customer Relationship Management

Strategic Plan. Projects and Strategic Documentation Approval Process, Balanced Scorecard Measurement

Business Complexity

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Communication Intranet and Internet websites management

Finance Order to cash, Purchase to pay, Reporting and Treasury

Bsnss Dev. M&As approval process

HR Human Resource database management

Legal Contracts management

IP Patents management

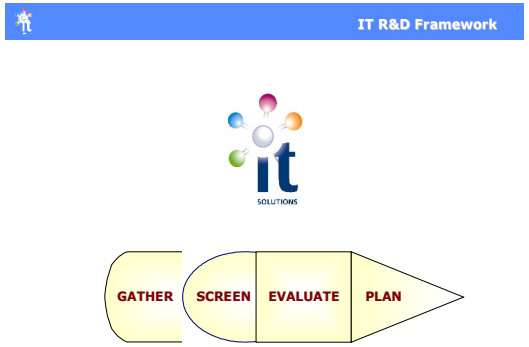
Cross-Funct. Datawarehouse and Dashboards

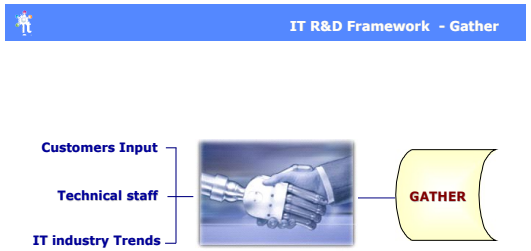
IT A robust and secured platform

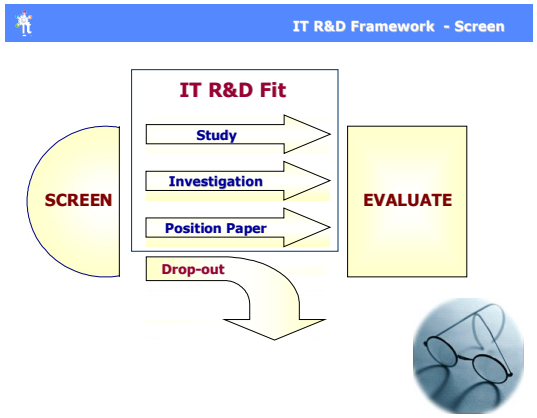
We connect the company value chain

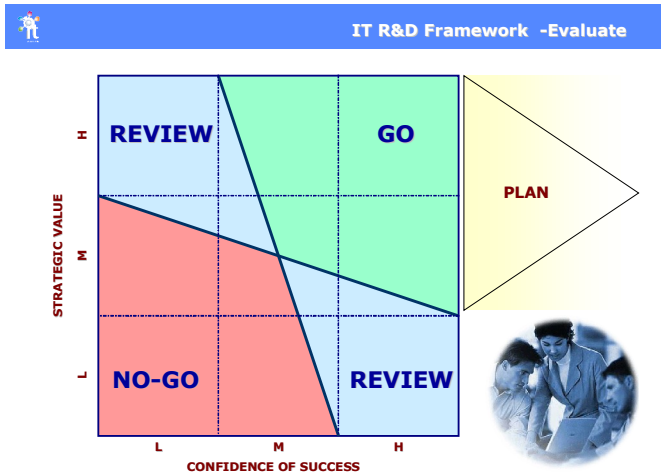
Context: IT Research & Innovation

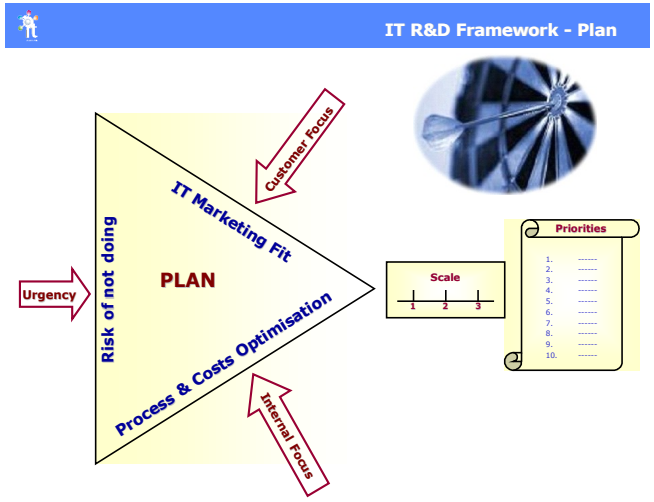
- October 2003: New « R & D » initiative











- One of the key study is linked to Enterprise Architecture
  - Serono wished to evaluate the development process of an Enterprise Architecture in order to re-structure its IT department and improve its relation with the various LOB
  - For these reasons, several workshops were scheduled to:
    - Identify what would be the added value
    - Select and validate an Enterprise Architecture methodology
    - Explore tools and technologies related to Enterprise Architecture, Business Process Management and SOA architecture
    - Define the project scope
    - Define an initial plan

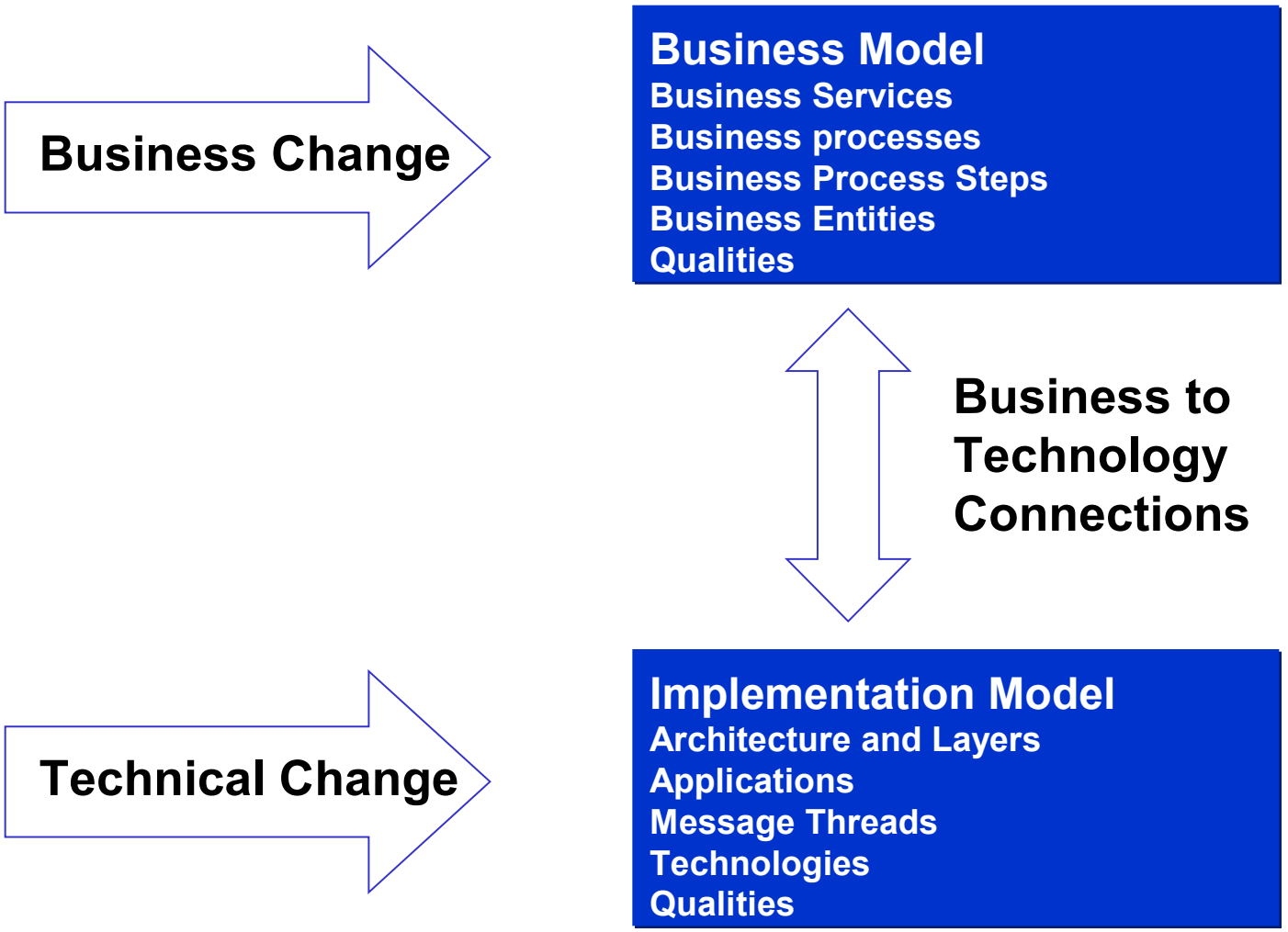
Enterprise Architecture

- Situation
  - Enterprise Architecture did not exist within Serono
- Key Benefits and Value proposition
  - Alignment with the company's Business Model and Strategy
  - Enable business changes, technologically based business opportunities
  - Make easier the introduction of new technologies
  - Allow standardization
  - Information (or data) consolidation
  - Reduce enterprise/application integration complexity
  - Facilitate outsourcing if required
  - Better assets utilization
  - Better assess the impact of changes
  - Reduced time to market

Business and IT Alignement

- The objectives of alignment are:
  - Better understand the company business model (current and future)
  - Understand the relationship between the business model and the current and future IT architectures
  - Reposition IT such that it is aligned with business strategy, and be able to communicate that alignment to the business community
  - Build roadmaps showing how IT can create credible solutions that align with the business strategy

Business and IT Alignement

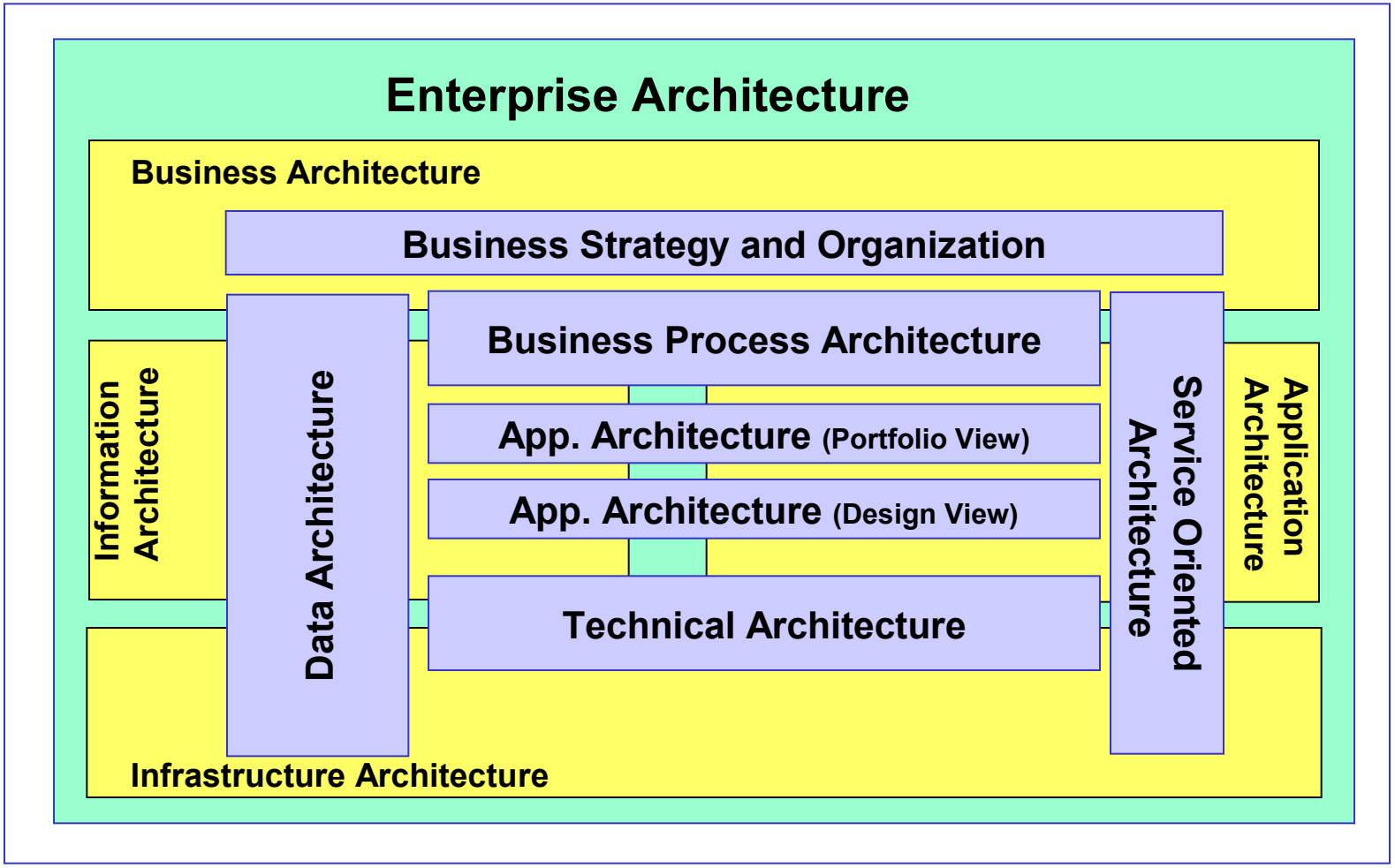


Enterprise Architecture

Enterprise Architecture - Definition

- An Enterprise Architecture (EA) consists of the vision, principles, standards and processes that guide the purchase, design and deployment of technology within an enterprise. EA describes the interrelationships between business processes, information, applications and underlying infrastructure for that enterprise, and provides best practices for technology purchase, design and deployment. EA structures and processes govern adherence to an organization's technology strategy and provide a managed environment for the introduction of new technology.

Enterprise Architecture and Business Design Activity



Enterprise Architecture

- Cost justification
  - It is an on-going strategic process
  - Improve financial efficiency
  - Enhance business effectiveness

⇒ EA is an asset, an investment, not an expense!

⇒ We do Architecture in order to do something we otherwise are unable to do!

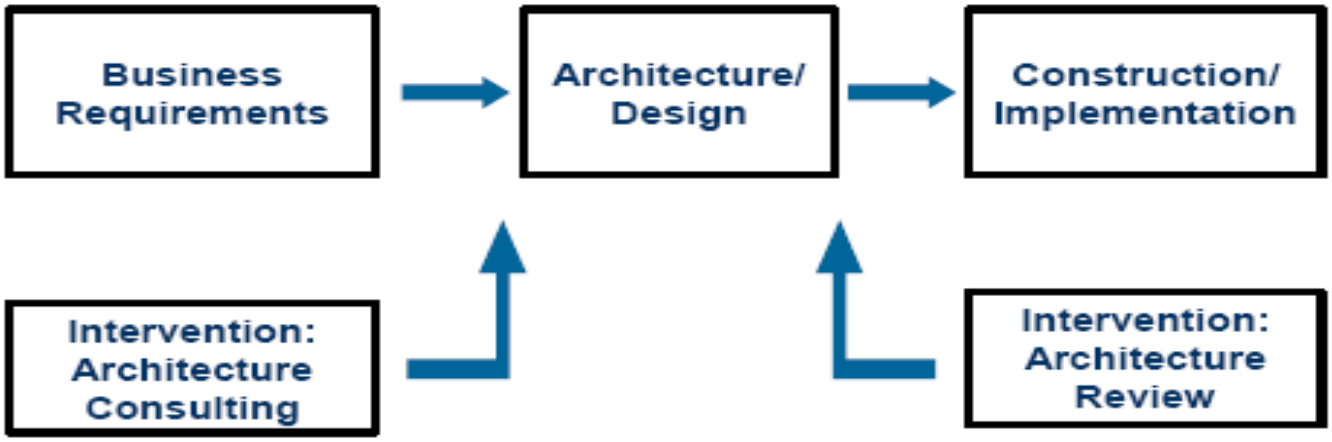
- Scope
  - Should be accurate and agreed
  - Architecture program should describe the span (Enterprise and beyond), the depth (Business, information, solution, technical) and the details (Contextual, conceptual, logical, physical)

- Who is doing what?
  - GlaxoSmithKline, Hoffman La Roche, Genentech (EA, SOA, EAI), Pfizer (Zachman), Johnson & Johnson (Zachman-TOGAF 8)

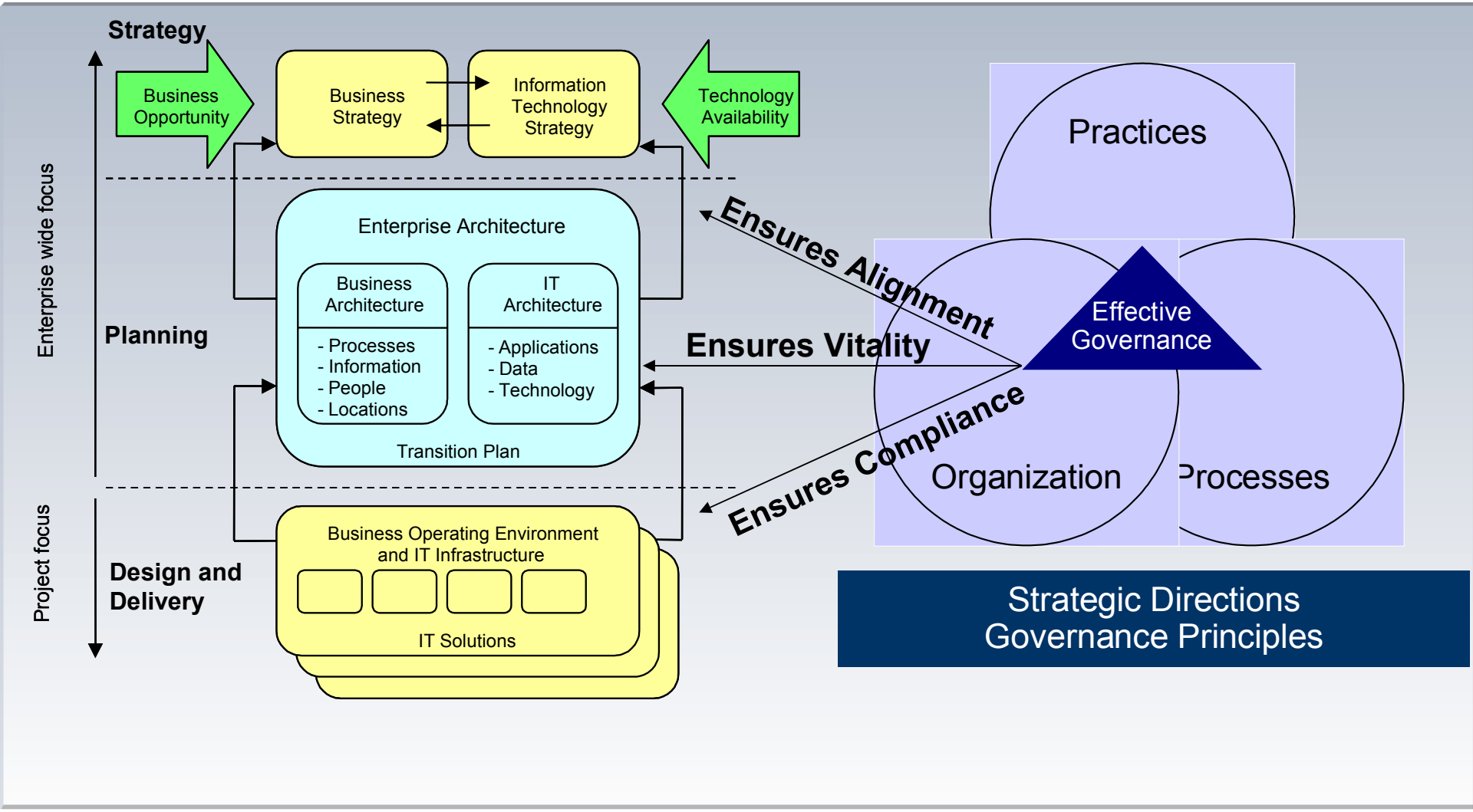
Enterprise Architecture and IT Governance

- Elements of good governance
  - Oversight committees
    - IT/Business planning bodies (“Funnel”)
    - Enterprise Architecture Steering Committee
    - Architecture Review Board
      - Project construction should begin only upon approval by the board!
      - Occurs at the beginning of design
      - Implement a consultative process
        - Review of requirements
        - Design provided
        - Technology selection recommendations
        - Steer the organization toward reuse and best practices.

Governance is essential in the development process!



Enterprise Architecture Governance Ensures IT Aligns with Business



Enterprise Architecture and IT Governance

- Elements of good governance
  - Good documentation
    - Well communicated standards
    - Principles
    - Solution patterns
    - Hardware and software diagrams
  - Strong allies and champions
    - Program and project offices
    - Policy decision makers
    - Purchasing department
    - Legal department
    - Architecture Domain Owners!
  - Solid Processes
    - Ownership
    - Accountability
    - Carrots and sticks

What is Portfolio management

- A categorization model
- A common language for business and IT to …
  - Support Business strategy
  - Organize investments
  - Evaluate and prioritize IT projects
  - Govern and manage applications portfolio
  - Decide when and how to make changes (opportunities)
  - Understand what can and can not be changed
  - Provide real-time visibility into resources, budgets, costs, programs, projects, and overall IT demand
- A hedge
  - “What if” scenarios enable us to analyze our portfolio and assess the business contribution of each proposal, project, or application to the entire portfolio
  - Triggers, Thresholds

Enterprise Architecture

Portfolio management Process

- The portfolio governance process starts when a business user requests or suggests a new capability.
- The request is automatically routed to a gatekeeper, then to a business analyst or team for an initial business case before being routed to the operations council and the architecture standards committee for review and scoring.
- The business team then evaluates the prioritized, ranked projects to determine the proper portfolio mix and whether to accept the recent request.
- Portfolio management has to be linked to Enterprise Architecture

Business Architecture and Business Process Management (BPM)

Business Architecture

- When the Enterprise Architecture Committee receives suggestions for strategic changes, they should immediately translate those changes into changes in specific business processes. If the architecture is well-defined, changes in processes will immediately suggest changes in specific applications and databases. It's important to stress that there is no one-to-one relationship between business processes and applications, or between applications and databases

Business Architecture

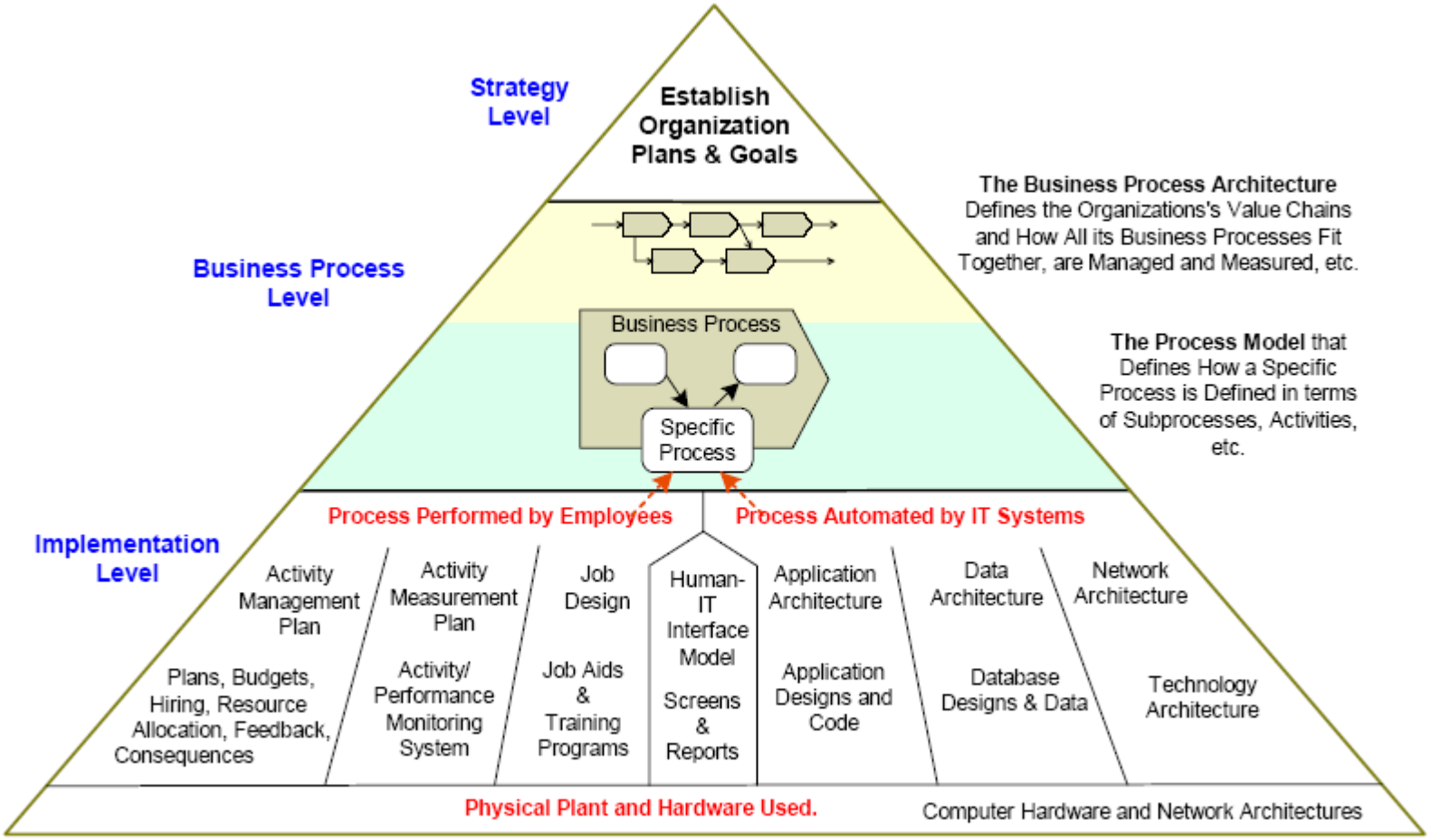
Objectives

- Describe the current Baseline Architecture
- Develop a target Business Architecture describing the product and/or service strategy, and the organizational, functional, process, event, information, and geographic aspects of the business environment
- Analyze the gaps between the Baseline and target Business Architecture

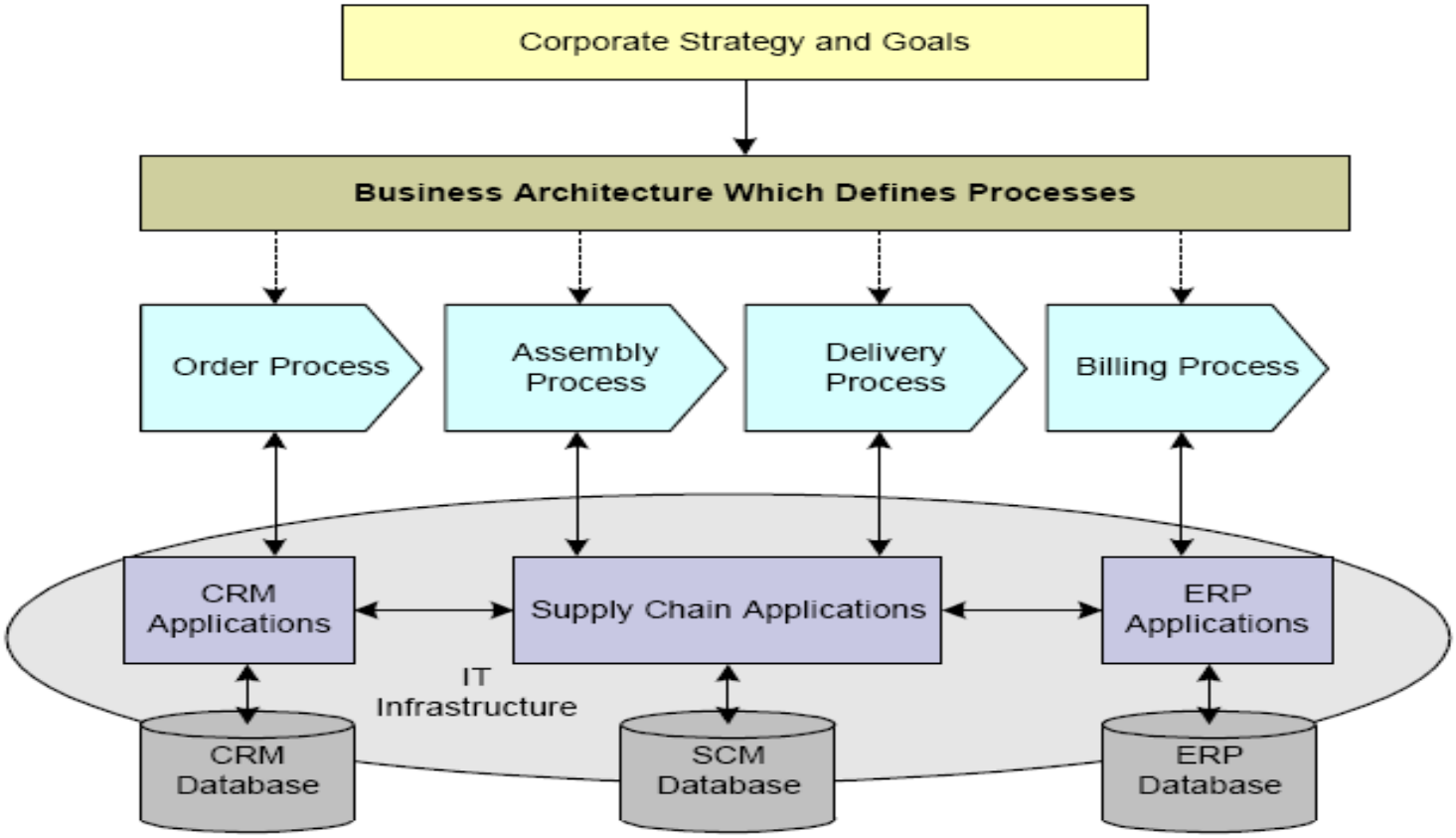
Business Architecture

- *Business Architecture* programs and are typically driven from the top-down, with corporate planning and strategy, or Change Management as the sponsor of the program
- The Enterprise Architecture team is typically comprised of business process experts, and has a close relationship to their specific Line of Business (LoB)
- The business process experts in companies that are “process organizations” typically have the mandate to define business processes that span the company
- Business Process Modeling is becoming an important part of Enterprise Architecture, and has a notation standard
- The Business Process Models is the way to communicate between business analysts and developers, thereby minimizing misunderstandings between these two groups

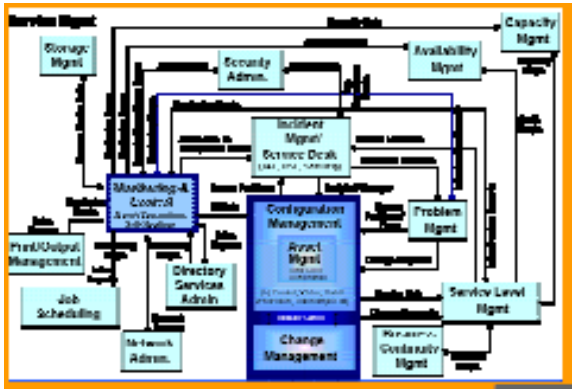
Business Architecture



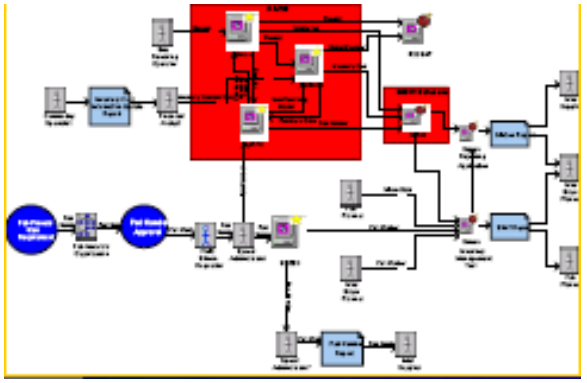
Business Architecture



Enterprise Model consolidates the "4 views"



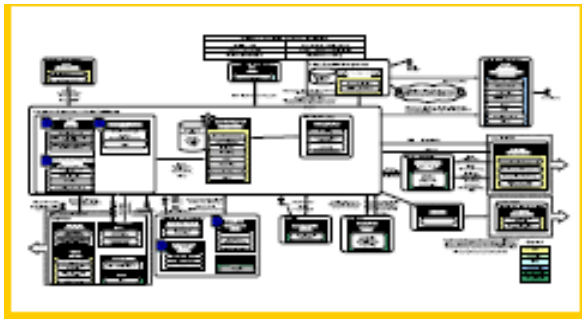
Business Architecture



Information Architecture

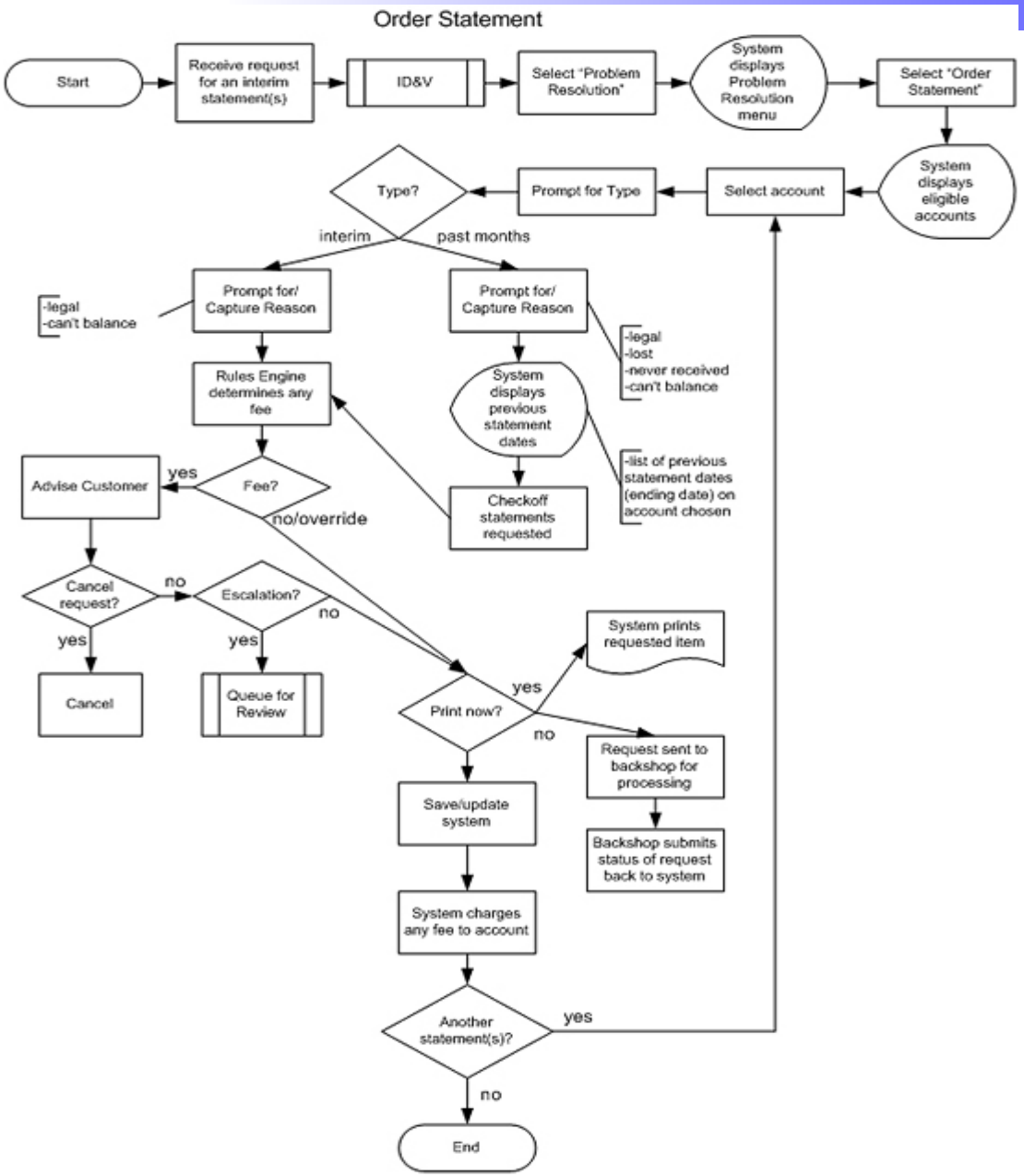
Enterprise Model

Application Architecture



Technical Architecture

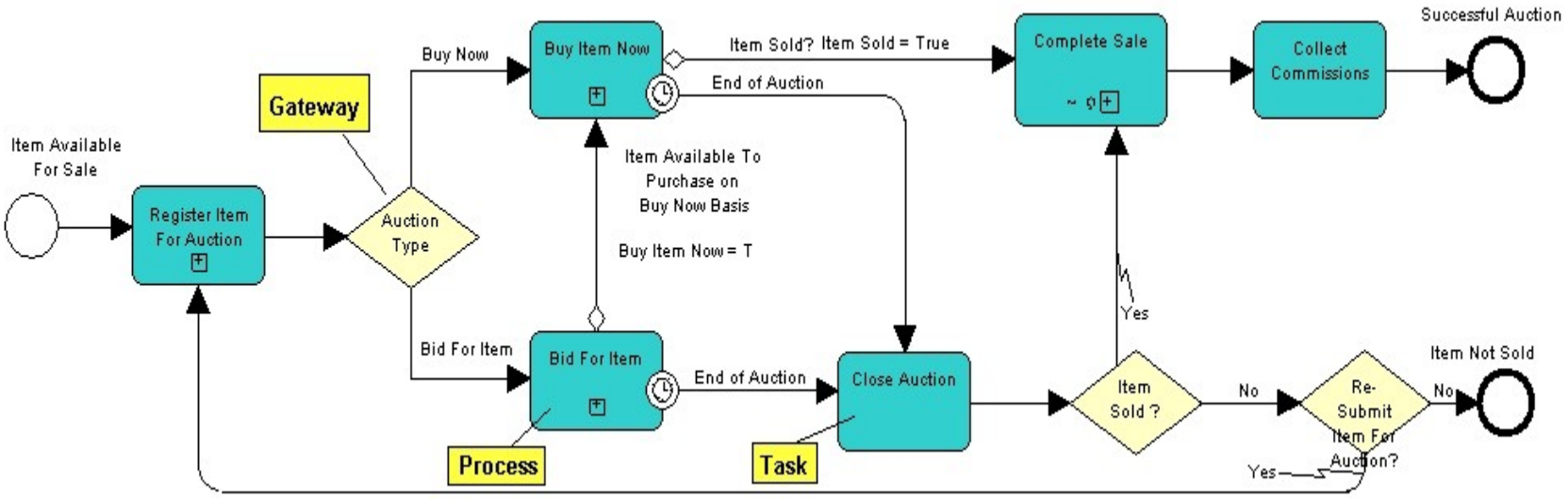
Statement Inquiry Business Process Diagram (example)

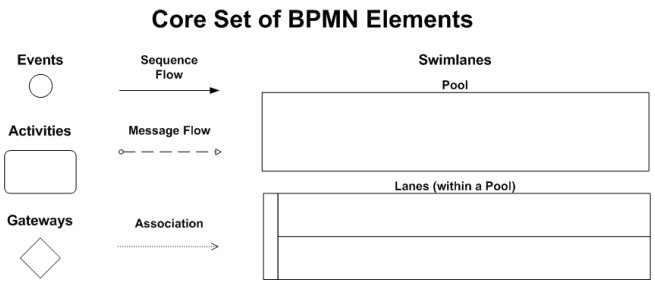


Business Process Modeling with BPMN

- The Business Process Modeling Notation (BPMN 1.0) provides a readily understandable, royalty-free notation designed for both business process design and business process implementation
- This process modeling specification is helping bridge the gap between business analysts and technical developers responsible for Business Process Management within the enterprise by offering standardized means of communicating process information to other business users behind the firewall

Business Process Modeling with BPMN





http://www.bpmn.org

Business Process Management with BPEL

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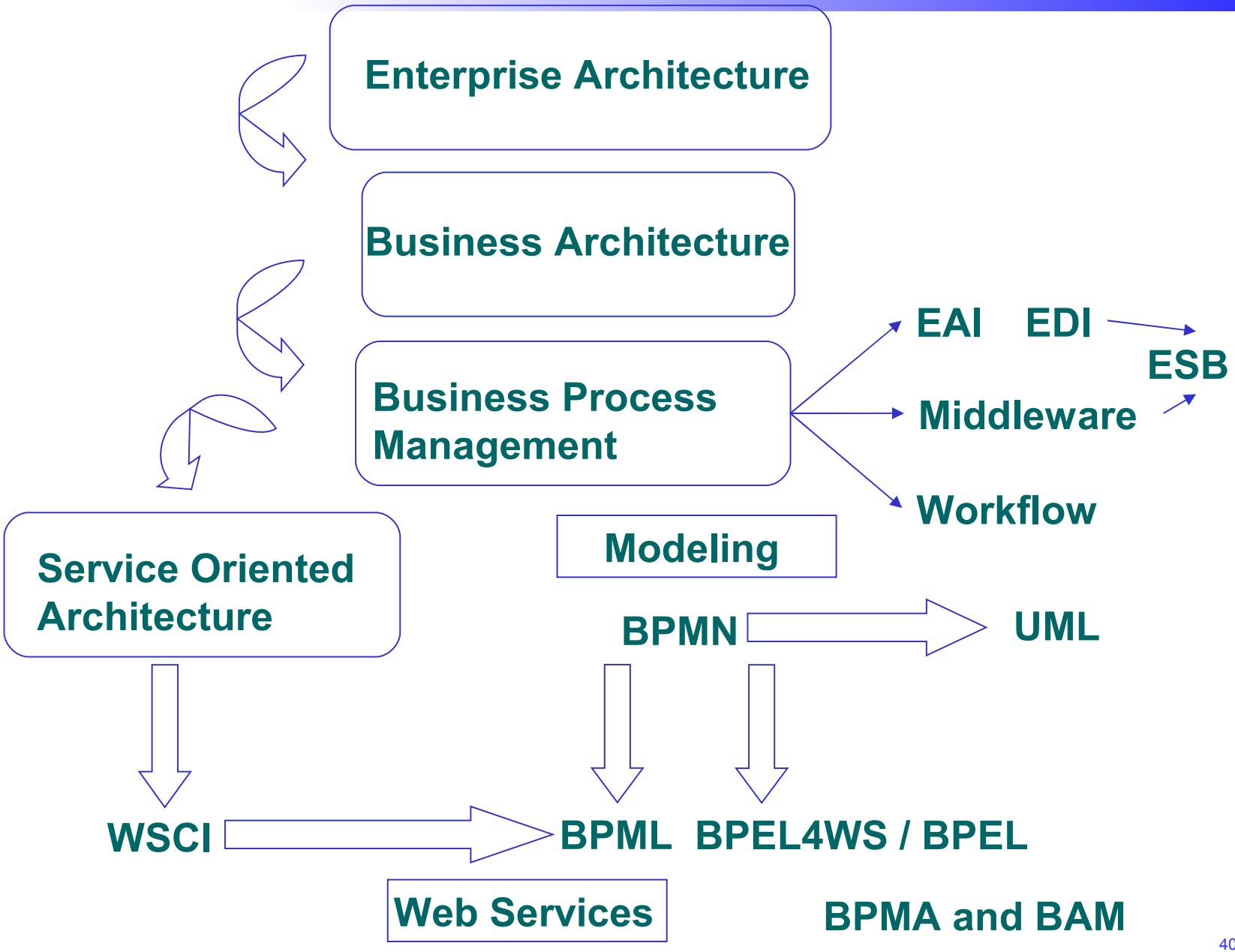
- BPEL (Business Process Execution Language) for Web services is an XML-based language designed to enable task-sharing for a distributed computing or grid computing environment , even across multiple organizations, using a combination of Web Services

Comments on Business Architecture

- The Business Architecture is tightly linked to Business Process Management (BPM)
- BPM is relying on Service Oriented Architecture (SOA)
- BPM is an evolution of Enterprise Application Integration (EAI) and middleware products
- Model the business processes of our organization using the Business Process Modeling Notation (BPMN)
- BPM Models are converted into Business Process Modeling Language (BPML) or Business Process Execution Language for Web Services (BPEL4WS or BPEL)
- We could link our BPMN business process diagrams with UML methods for systems and application development
- Business Process Modeling is tightly linked with the deployment of Application Servers

Graphically...



The Inevitability of BPM

- Business Process Management (BPM) delivers the crucial business glue that synchronizes the planning, designing, building, operating, maintaining, monitoring and improvement of the capabilities of the enterprise. BPM is unique in its ability to tame the relentless competitive, service and cost pressures in all organizations. It enables enterprises to continue to adapt faster and faster while enhancing quality
- Gartner says implementing Service Oriented Architecture and Business Process Management are crucial steps towards becoming a real-time enterprise, creating the foundation to respond faster to changing business requirements and to react to events in real-time

Business Architecture Conclusion

- Business analysts must be involved in Enterprise Architecture because business process modeling (BPM) is a core EA activity.

Service Oriented Architecture

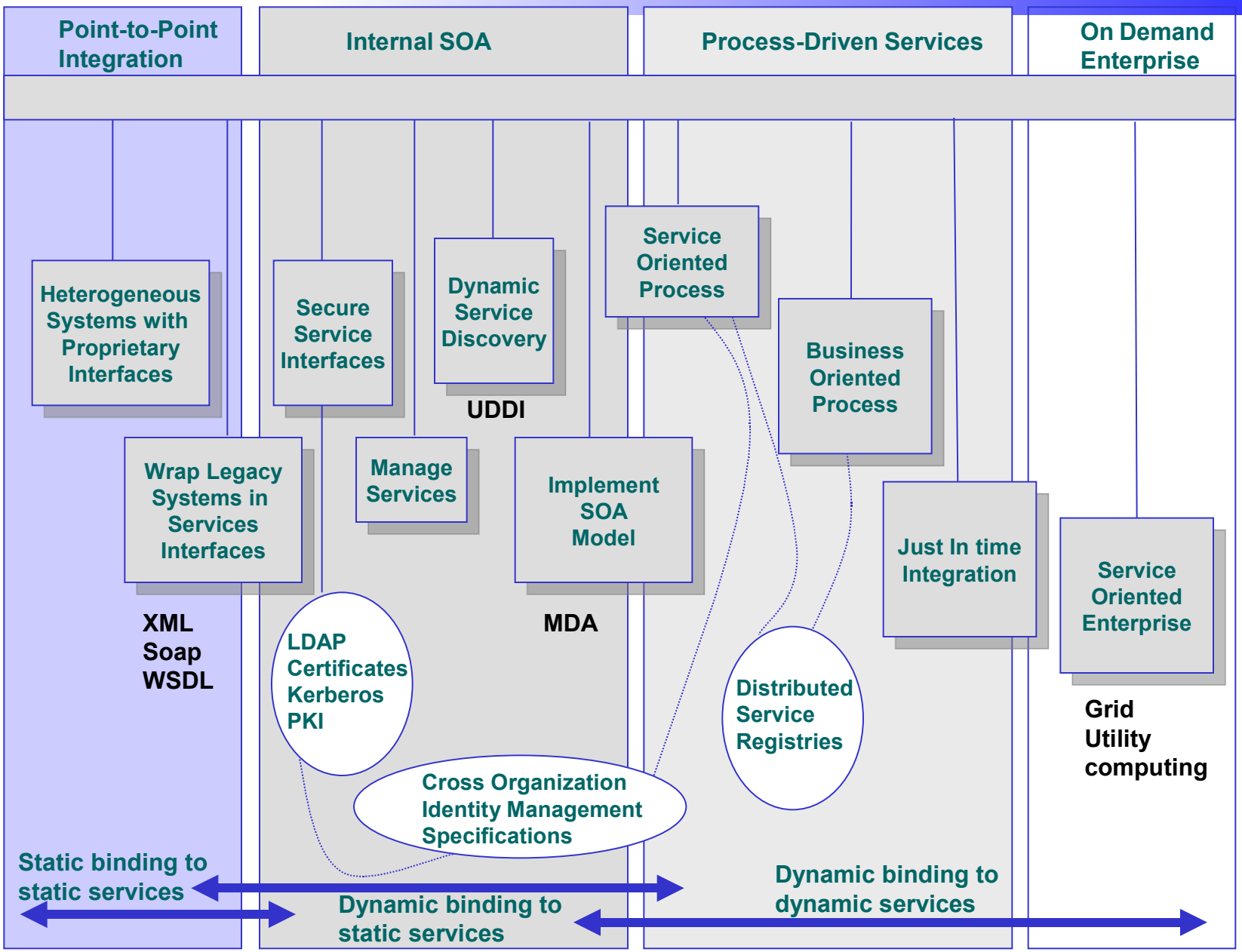
Service Oriented Architecture

- Service Oriented Architecture, a philosophy of interoperability and reuse, is heavily reliant on Enterprise Architecture to assist not just with identification of standards around formats, identifiers, and protocols, but also in assisting with the determination of what will become services and how these services can be combined into composite applications
- SOA should be based on BPM as SOA start with services, which are groups of software components that carry out Business Processes
- SOA is an evolution from traditional tightly coupled application connections, including common object request broker architecture, or CORBA, to loosely coupled ones, such as Web services based on XML/SOAP/HTTP/WSDL and other “WS standards”

Service Oriented Architecture

- SOA is a collection of services on a network that communicate with one another
- And large chunks of SOA code are reusable, reducing development costs. An SOA takes legacy investments, such as Siebel, Oracle E-business suite and the like and makes them all play nicely (and more cheaply) together

Phases to move from today's brittle infrastructure to loosely-coupled, coarse-grained, asynchronous SOA



SOA Organization

- Building an SOA requires significant human capital
  - including business analysts to lay out the Business Processes
  - Systems architects to turn processes into specifications
  - Software engineers to develop the new code
  - Project managers to track it all

Service Oriented Architecture Benefits

- Better dialogue between the IT and line-of-business execs by forcing IT workers to think in terms of business not *Technical Architectures*
- Easier integration
- Services are designed to be generic enough that they can work with an array of front-facing systems, reducing development time and freeing developers to spend more time on business solutions
- Risk and expense reducing while speeding development of new applications
- Improvement of ability to adapt to changing business requirements and shifting market conditions

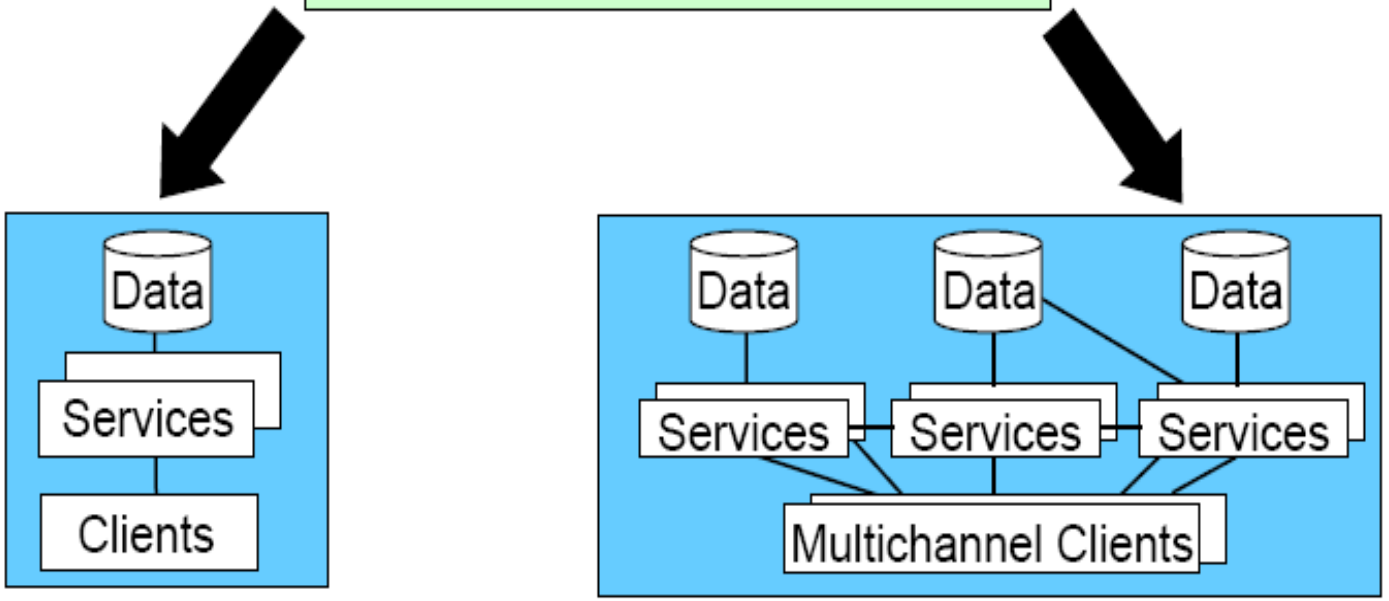
Information Architecture

Information Architecture

- Information Architecture programs are typically driven from the corporate or group level, and are often inspired by the need to consolidate information (e.g. customer, product, and employee) across the company.
- Information Architecture is the art and science of organizing information and interfaces to help information seekers solve their information needs efficiently and effectively, primarily within networked and web-based environments

Enterprise Information Architecture

- Common design patterns
- Common process models
- Common data models
- Common object models
- Shared database
- Component software reuse



The Inevitable Diversity of Information Architecture

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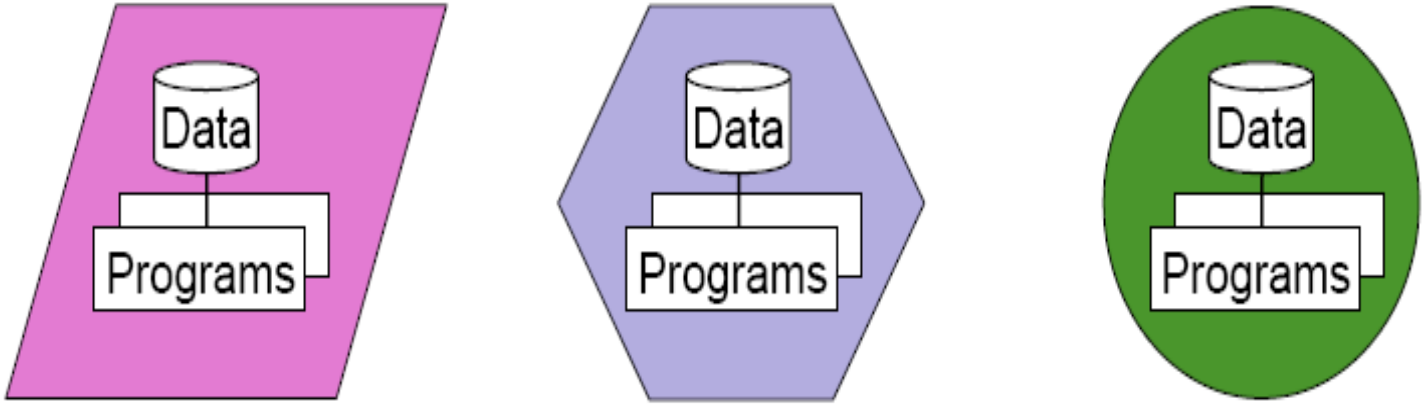
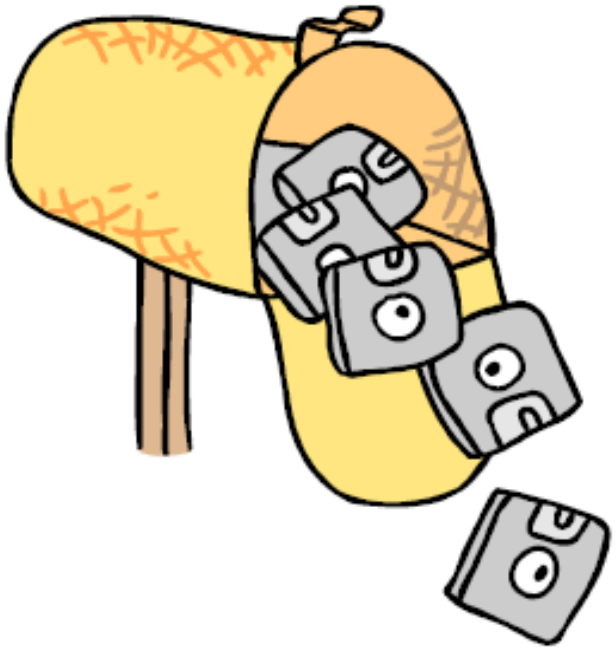
Information Architecture I	Information Architecture II	Information Architecture III
Order Entry	Call Center	Inventory



New	Purchased	Legacy

Information Architecture



Objectives

Define the major types and sources of data necessary to support the business in a way that is understandable by the stakeholders

Define the data relevant to the enterprise so that they are complete, consistent and stable

Application Architecture

Application Architecture

- Also called Solution Architecture, focuses on three separate dimensions, Data, Processes and Technology and five sequential levels of detail or views; the corporate view (or Ballpark), the process owner's view, the designer's view, the builder's view and the programmer's view

- An Application Architecture, at the conceptual level, gives us a set of well-defined and modularized applications, integrated through a set of common databases with no redundancies that fully supports the future business challenges of the integrated enterprise

Application Architecture

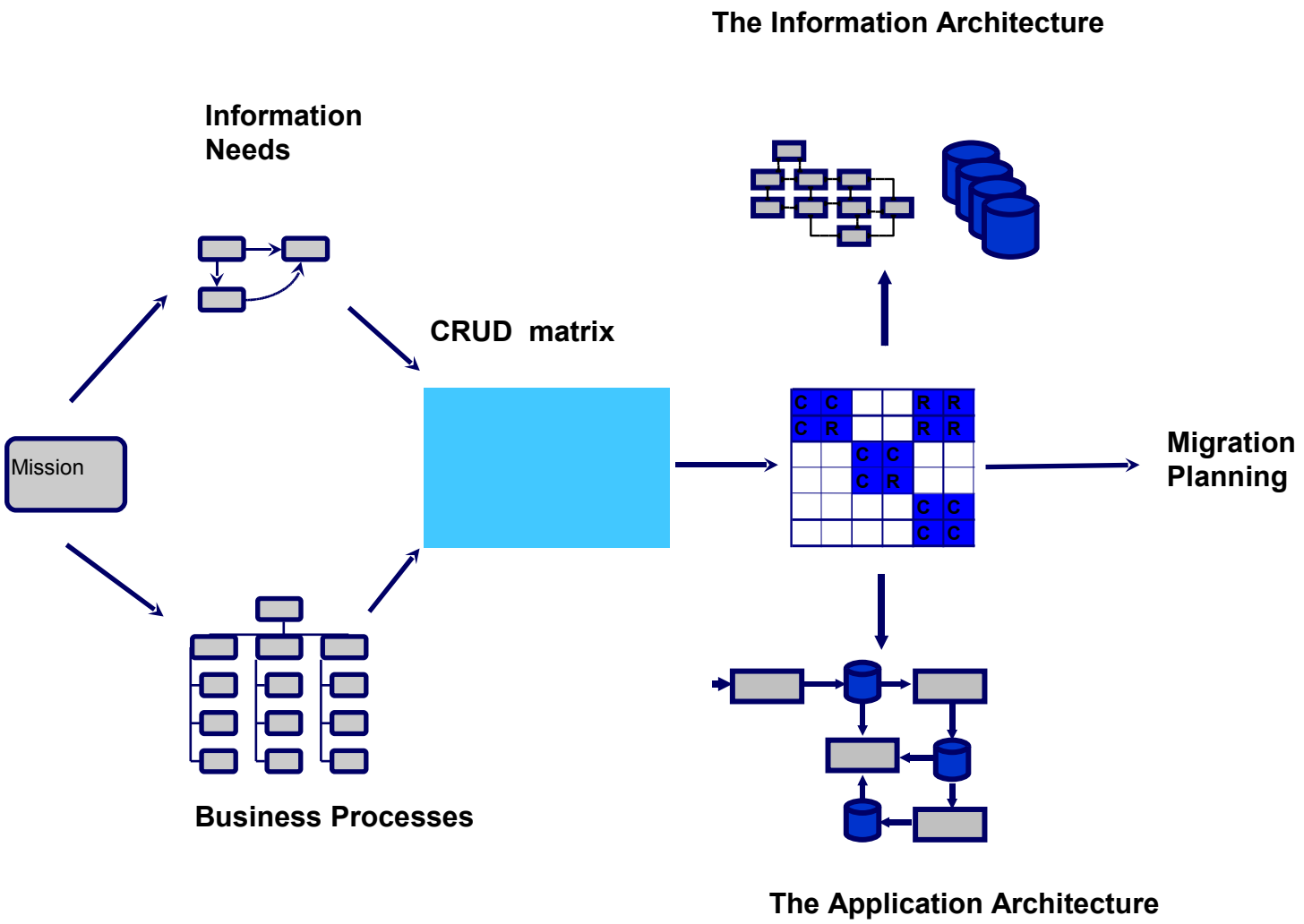
- The Application Architecture must be used as a communication tool between Business Process owners and IT every time an application or database is being discussed and/or planned. The AA gives us the scope and boundaries of each application and database
- A Application Architecture, at the conceptual level, gives us a set of well-defined and modularized applications, integrated through a set of common databases with no redundancies that fully supports the future business challenges of the integrated enterprise

Application Architecture

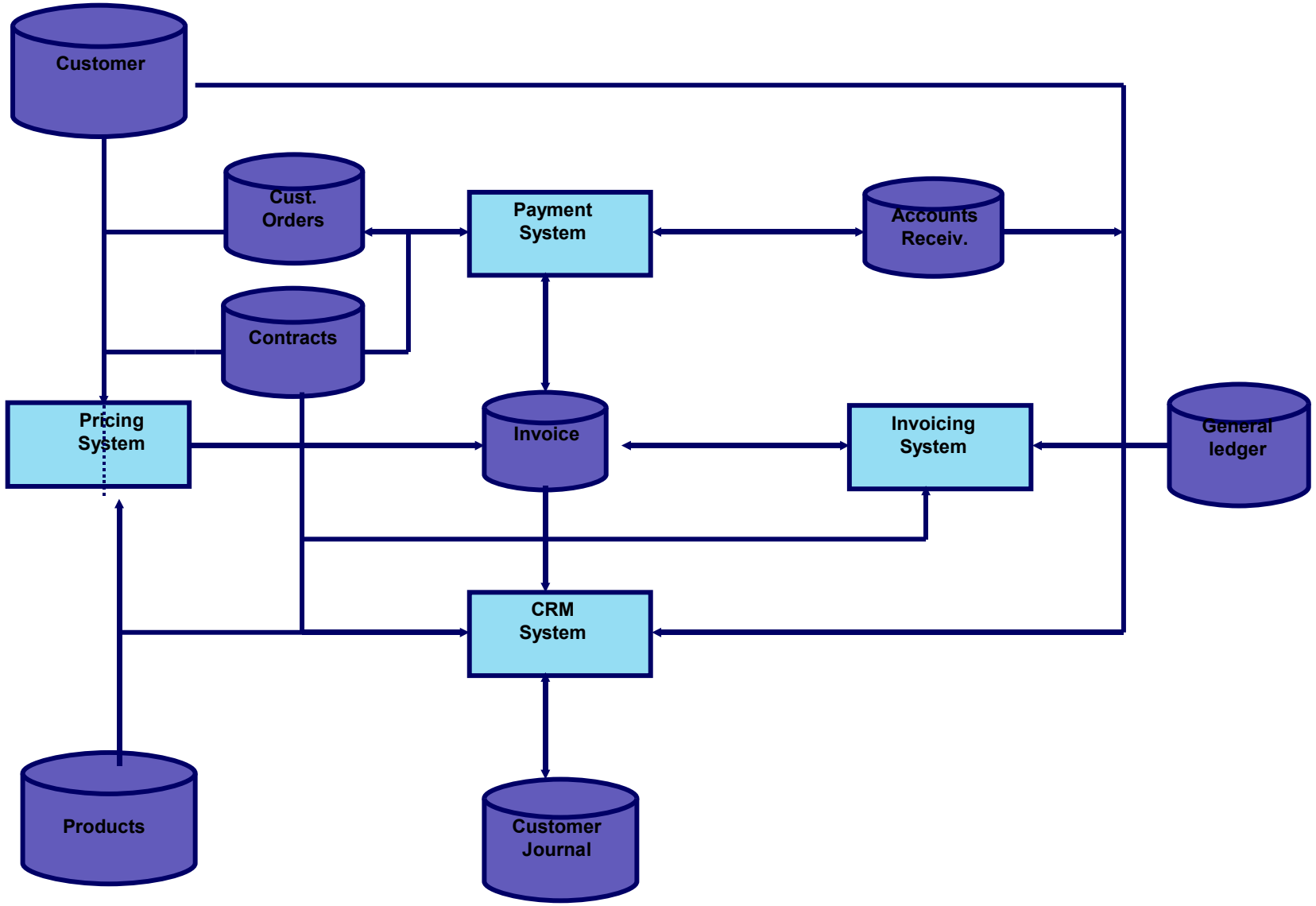
Objectives

- Define what kinds of application systems are relevant to Serono, and what those applications need to do in order to manage data and present information to the system users
- Describe the applications as logical groups of capabilities that manage data in the Information Architecture and support the business functions in the Business Architecture

Methodology



Application Architecture



Technical Architecture

Application Architecture

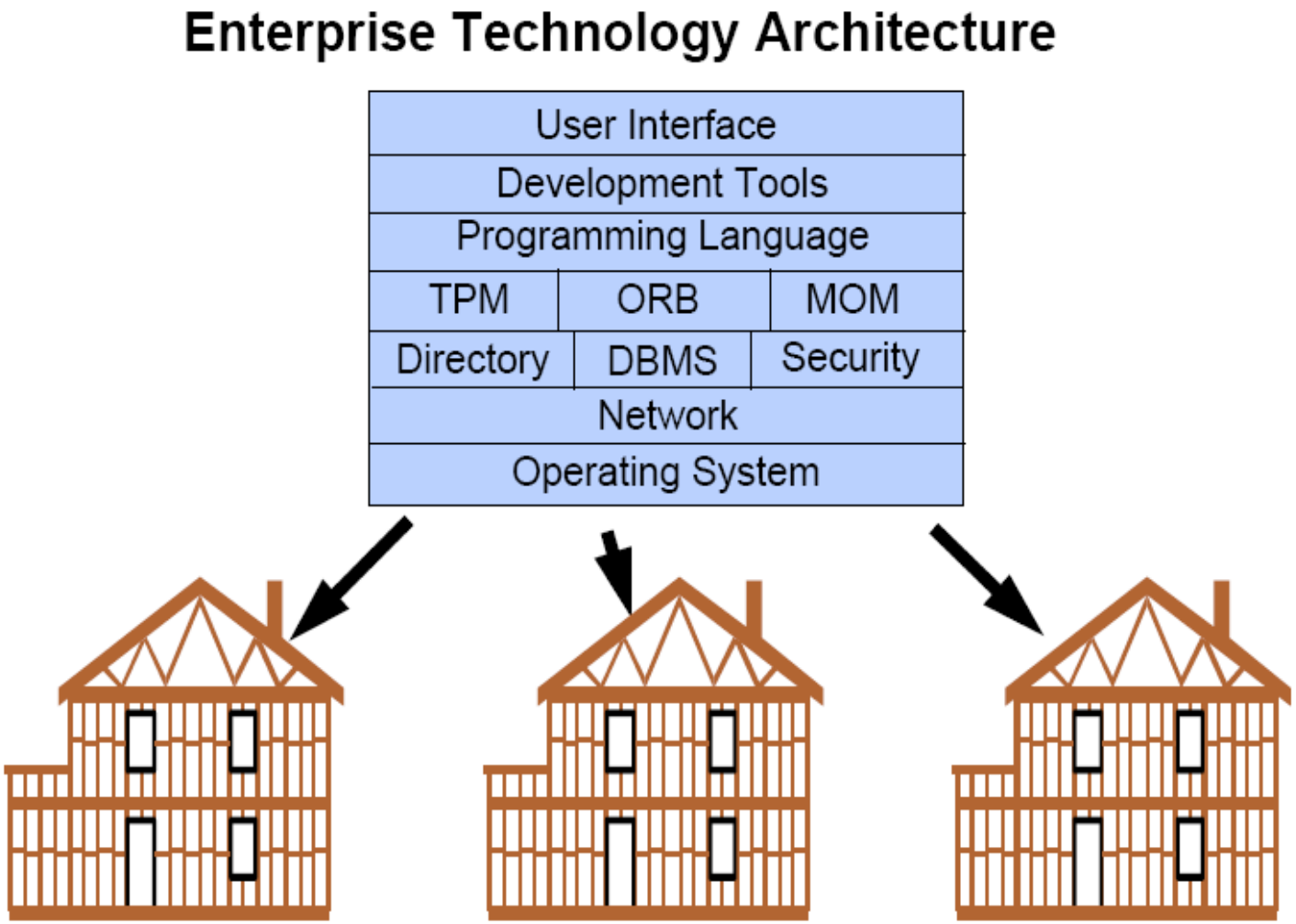
- The Technical Architecture establishes the evolving blueprint that guides all aspects of the enterprise's technology life cycle
- The TA influences the activities for definition, purchase, creation, modification, integration, deployment, operation, and retirement of the infrastructure and supported applications. It affects both technical management and engineering practices in use within the enterprise
- The TA is primarily concerned with enterprise-wide integration issues, describing in a vendor- independent manner the technology-related entities and relationships that need to be managed across the enterprise. (Technology-related entities may include platforms, information appliances, software applications or parts, information access and storage, networking, and the external and internal users of the Information Systems)

Application Architecture

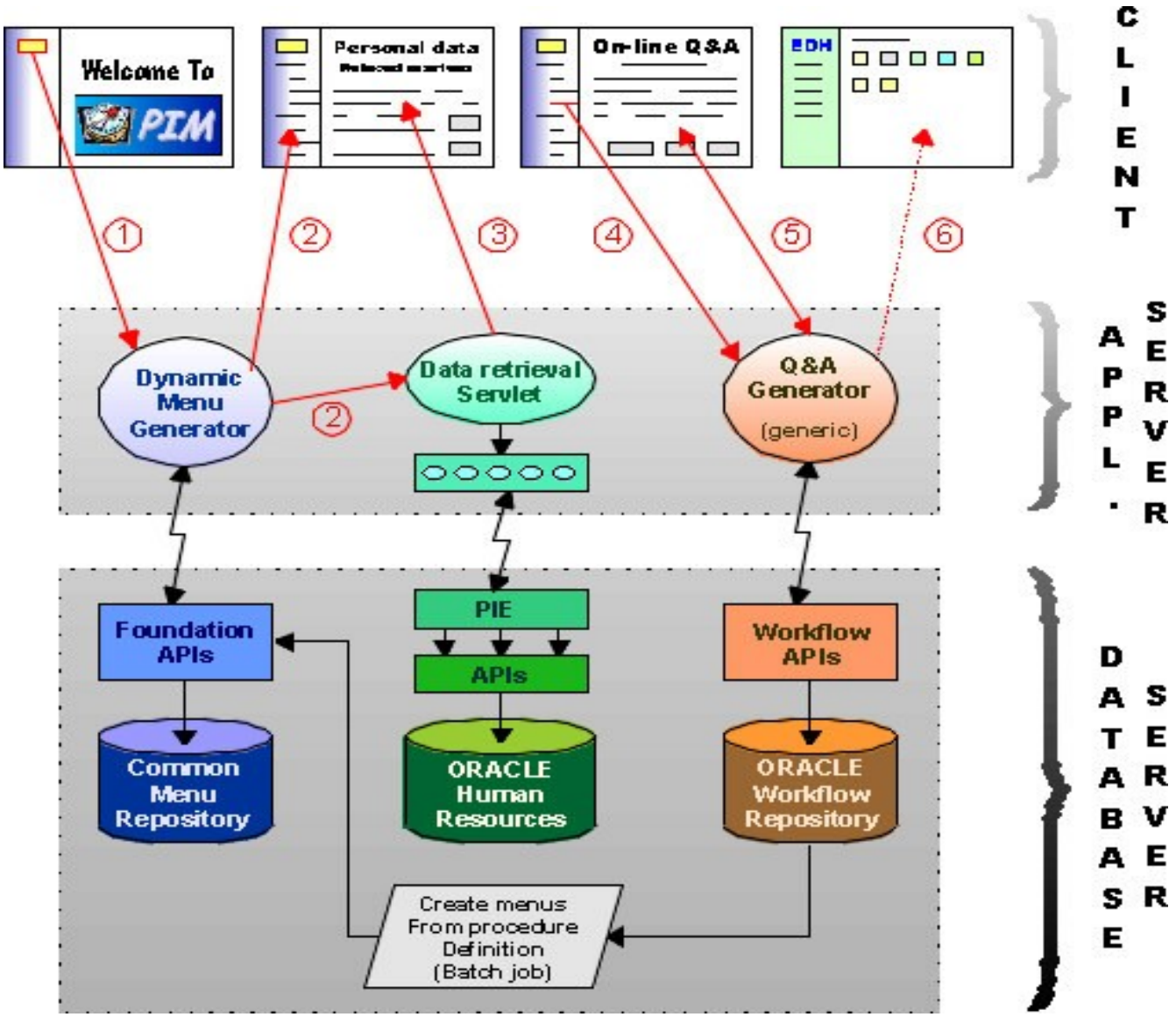
Objectives

- Define the major kind of technologies needed to provide an environment for the system architecture
- Identify technology principles and platforms
- Define the technology platforms and the distribution of data and applications
- Establish a justification for the technology platforms by relating them to the Business functions that will utilize them
- Support future growth

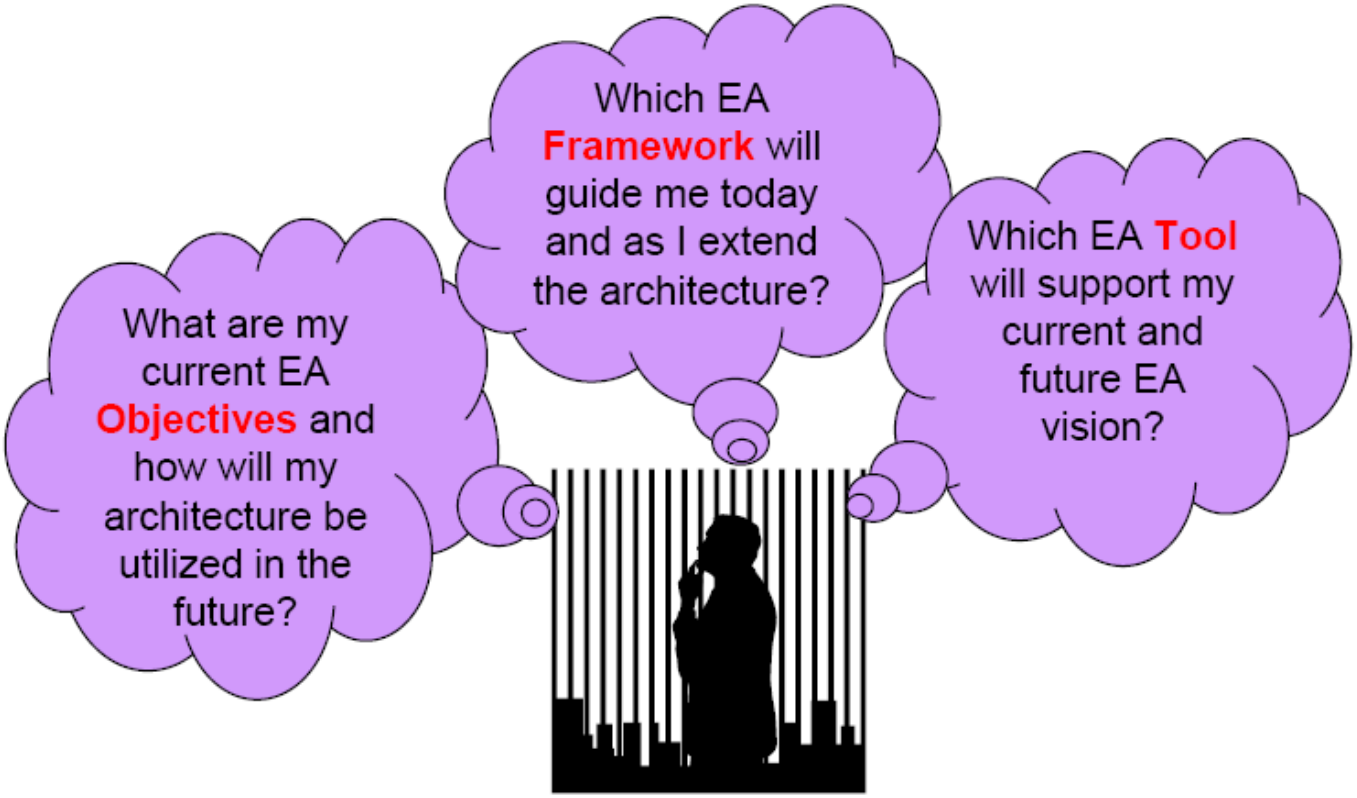
Technical Architecture



Technical Architecture



Three key planning decisions



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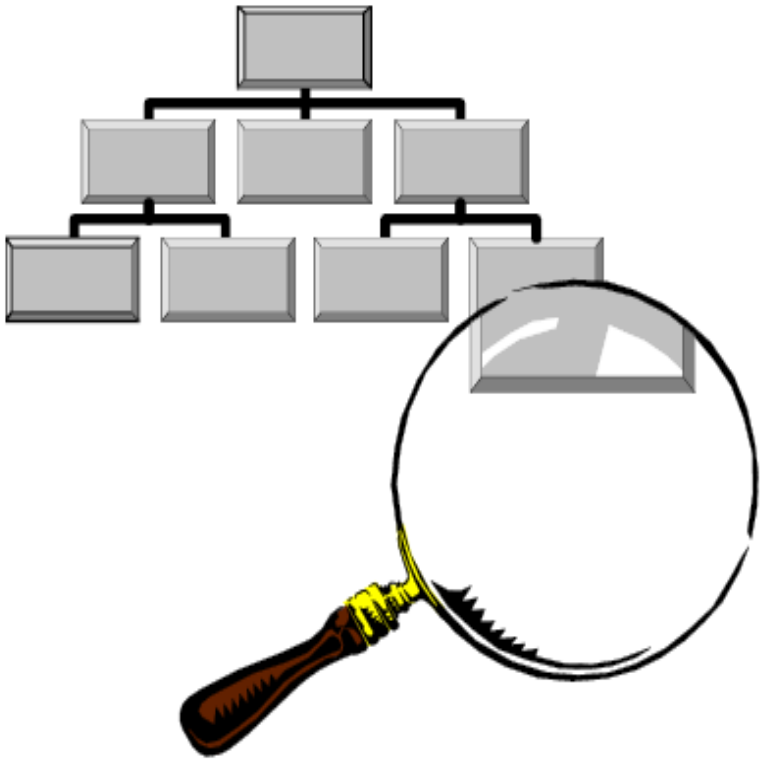
Methodolgies and Frameworks

Enterprise Architecture Terminology



- Today's Enterprise Architecture Frameworks
  - Zachman Framework
  - Meta Group
  - Enterprise-Wide IT Architecture
  - The Open Group
  - Federal Enterprise Architecture
  - DoDAF

Strategic Direction	Business Architecture	Data Architecture	Application Architecture	Technology Architecture

Enterprise Architecture' Frameworks that support objectives

serono
biotech & beyond

THE Open GROUP
Making standards work™

METAGROUP Return On Intelligence℠

Properties

- Customizability
- Correctness
- Compatibility
- Completeness
- Conciseness
- Ability to subset

Properties

- Deliverables
- Methods
- Techniques
- Standards and Practices
- Roles
- Paths

Services

- Education
- Integration
- Demonstration
- Customization
- Implementation

FEAPMO

Methodologies and Frameworks: Zachman

- The Zachman Framework for Enterprise Architecture and Togaf/OpenGroup are the most comprehensive frameworks to include the critical business planning and business model perspectives needed to successfully implement Architecture in an organization

- Over the years, however, as business managers have become more concerned with business processes and with linking strategic goals to business process goals, and both to IS applications and databases, the Zachman framework has become the most popular approach to describing an *Enterprise Architecture*

Zachman Framework

	The Zachman Framework	DATA *What*	FUNCTION *How*	NETWORK *Where*	PEOPLE *Who*	TIME *When*	MOTIVATION *Why*
Business Managers	SCOPE (Contextual) *Planner*	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 Significant to the Business	List of Business Goals/Strategies
	ENTERPRISE MODEL (Conceptual) *Owner*	Semantic Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
IT Managers and Developers	SYSTEM MODEL (Logical) *Designer*	Logical Data Model	Application Architecture	Distributed System Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
	TECHNOLOGICAL MODEL (Physical) *Builder*	Physical Data Model	System Design	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
	DETAILED REPRESENTATIONS (Out-of-Context) *Sub-Contractor*	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Specification
	FUNCTIONING ENTERPRISE	Actual Business Data	Actual Application Code	Actual Physical Networks	Actual Business Organization	Acutal Business Schedule	Actual Business Strategy

Zachman Framework

- There should be concrete relationships between cells on the matrix
- Applications should be associated with specific business processes
- Business processes should have goals and measures that should, in turn, be related upward to corporate goals, and downward to application and system goals
- The architecture stresses both information and the relationships between information that the management team must establish and refine

Zachman Framework issues

- A quick examination of the Zachman Framework, however, will suggest that business processes are not central to Zachman's conception. Business Processes are simply one box among many!
- This is not an architecture that would appeal to a business manager who wanted a balanced view of the resources that support processes
- Equally important, the Zachman's Framework doesn't suggest how resources are aligned to support corporate goals and strategies. Goals are represented on the framework, but they seem to have the same value as everything else (**In other words, the matrix doesn't suggest a top-down alignment)**
- In fact, the Zachman Framework represents a reasonably comprehensive list of concerns, generated by someone who began with an IT perspective
- Significantly, the Zachman Framework is mostly used by IT people who are interested in gaining an overview of the kinds of IT architectures a company might want to support
- Zachman is method neutral and is concerned with content rather than process and does not prescribe the steps for building Enterprise Architectures

What TOGAF Is and Why Companies Are Now Starting to Use It

- What makes TOGAF popular is that it is a definitive and proven step-by-step method for developing and maintaining Enterprise Architecture. It covers the four principal architecture domains of business, information systems (application and data), and technology infrastructure, and focuses strongly on the need for architecture to support business objectives and requirements

- It also takes into account establishing the goals and objectives of the Enterprise architecture effort itself, guiding users on determining how much of the enterprise is needed to model to realize significant gains, and the realities of getting buy-in from throughout the organization

Strategic Systems Planning Lifecycle

The IT Strategy is a business driven lifecycle:

- Understanding of business strategies, priorities and external business environment drive the overall strategic IT objectives
- Analysis of the business changes and priorities drive the characteristics of the IT products & services, IT governance and the required IT capabilities
- Definition of the technology, application and data architectures enable the IT strategy
- Effective IT planning is derived from tactically focusing on closing the gap between current state and the future state
- IT planning is an on-going event constantly refreshed to meet the shifting future state

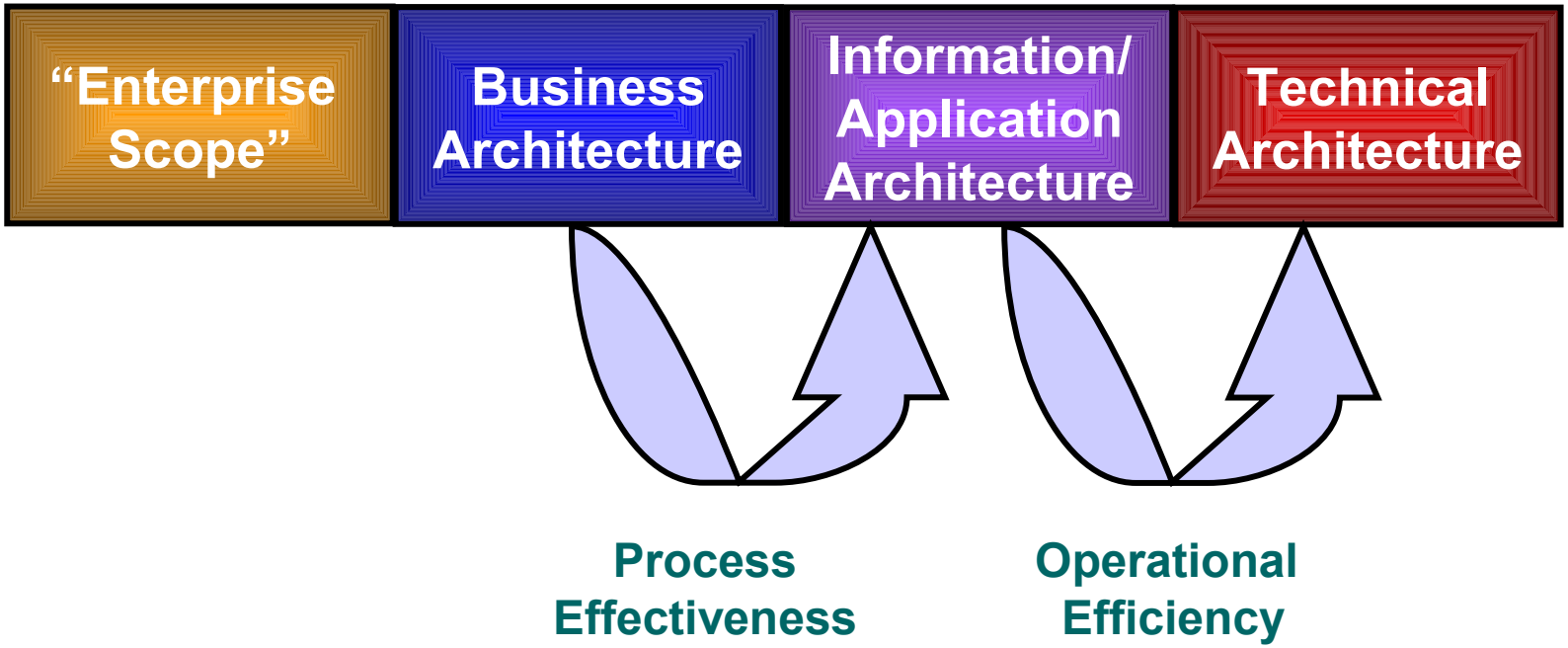
Step 1: Define “Enterprise” Scope

Step 2: Define Strategic Direction

Future

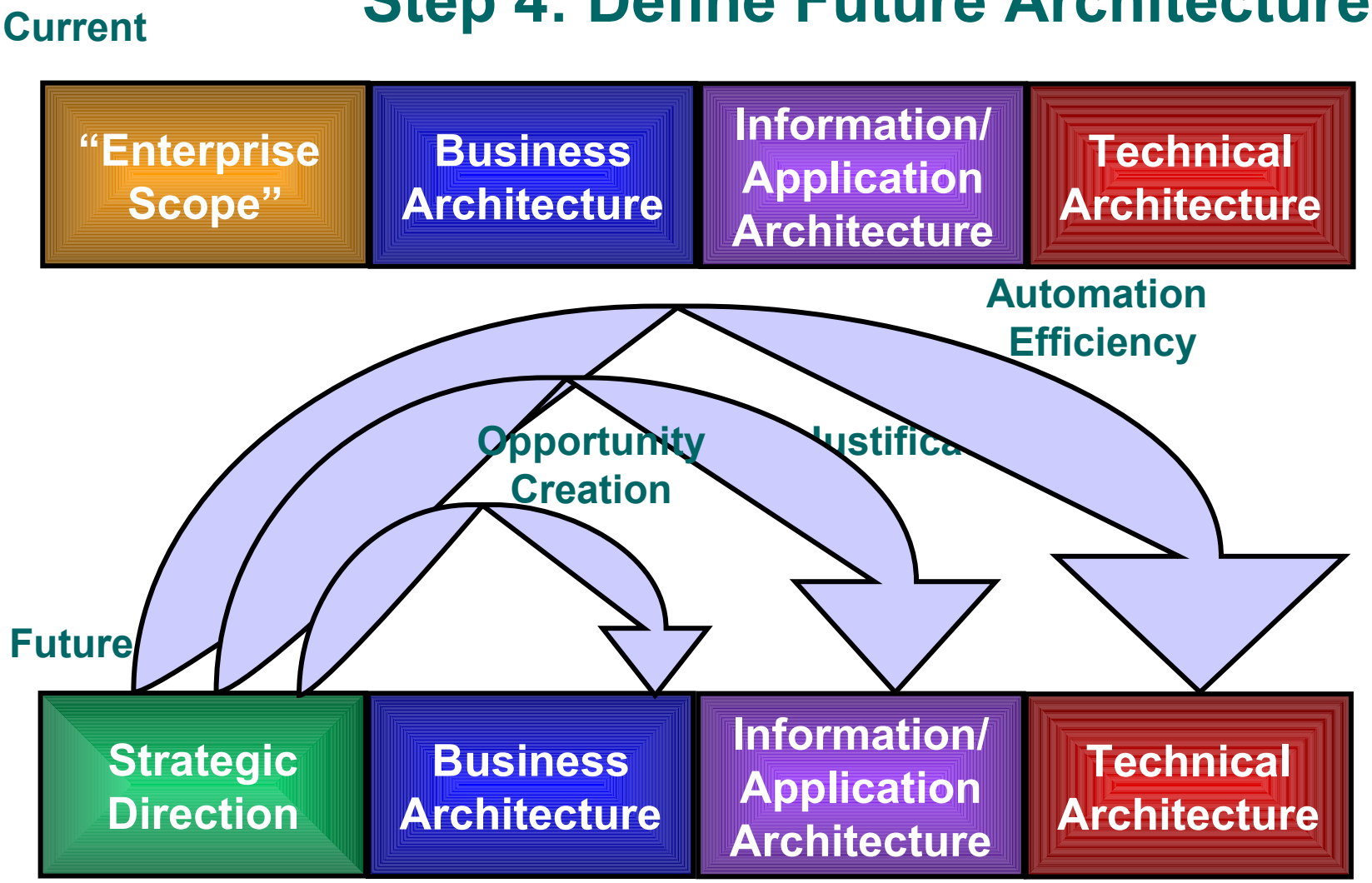
Step 3: Define Current Architecture

Current

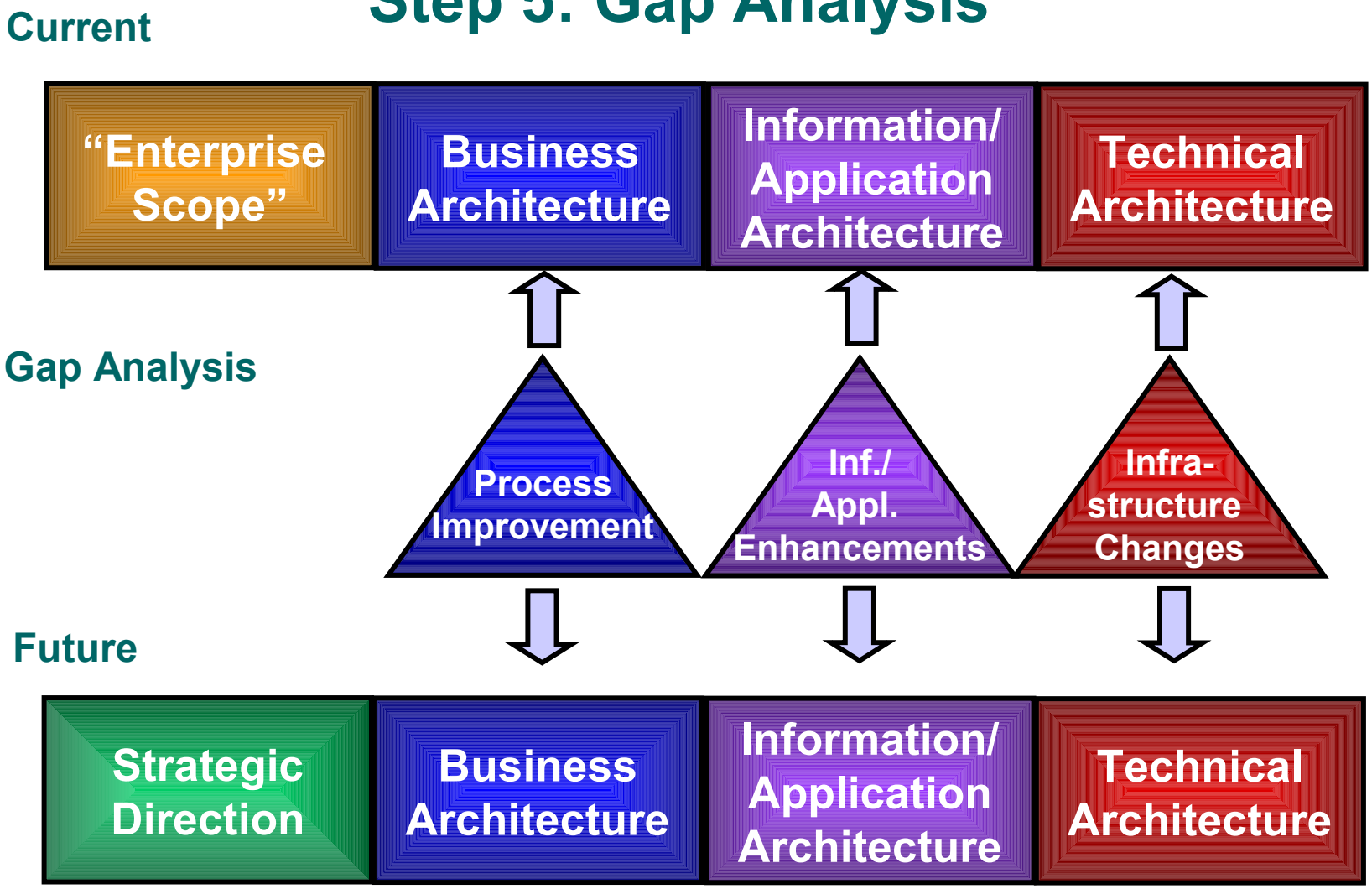


Future

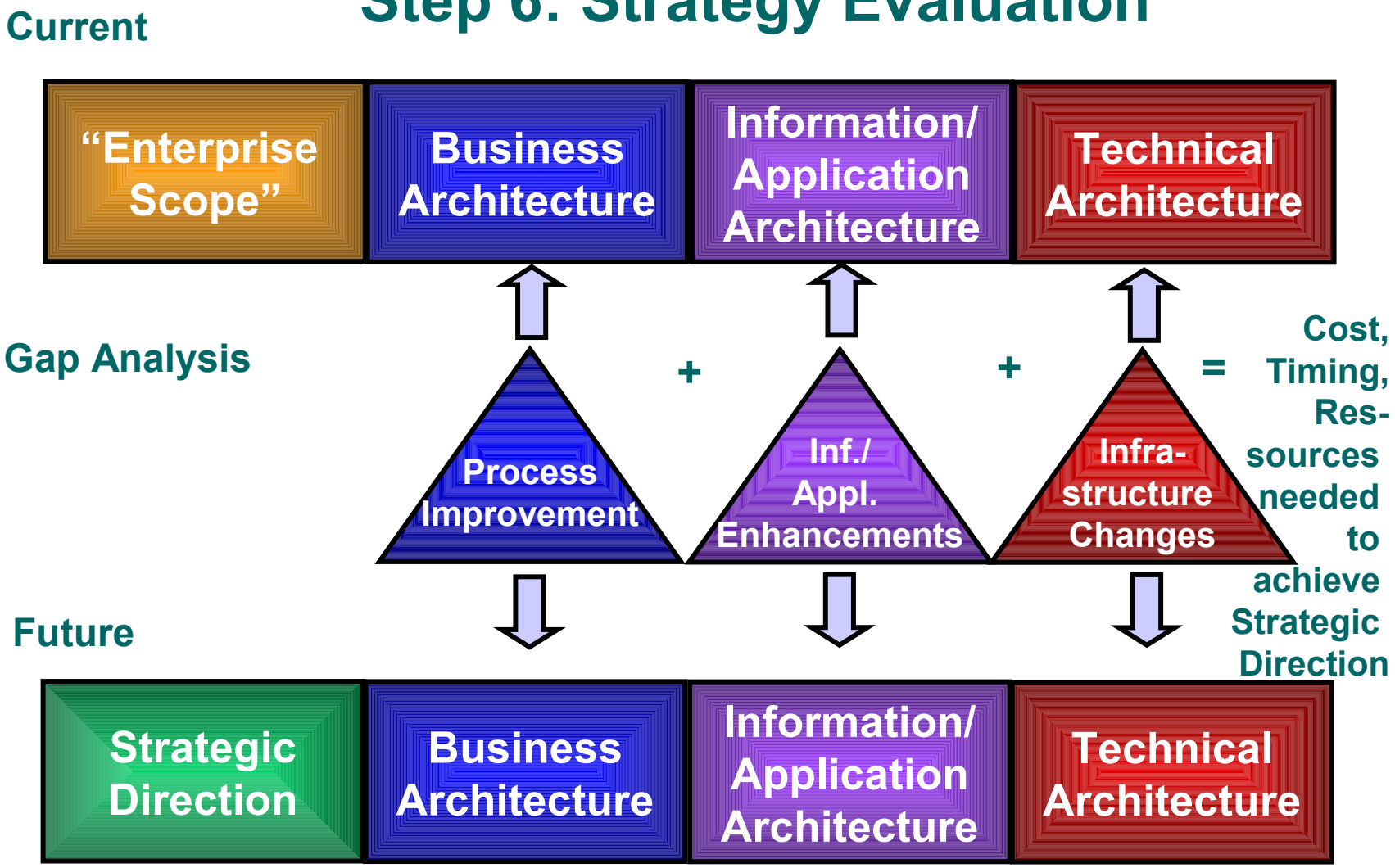
Step 4: Define Future Architecture



Step 5: Gap Analysis



Step 6: Strategy Evaluation



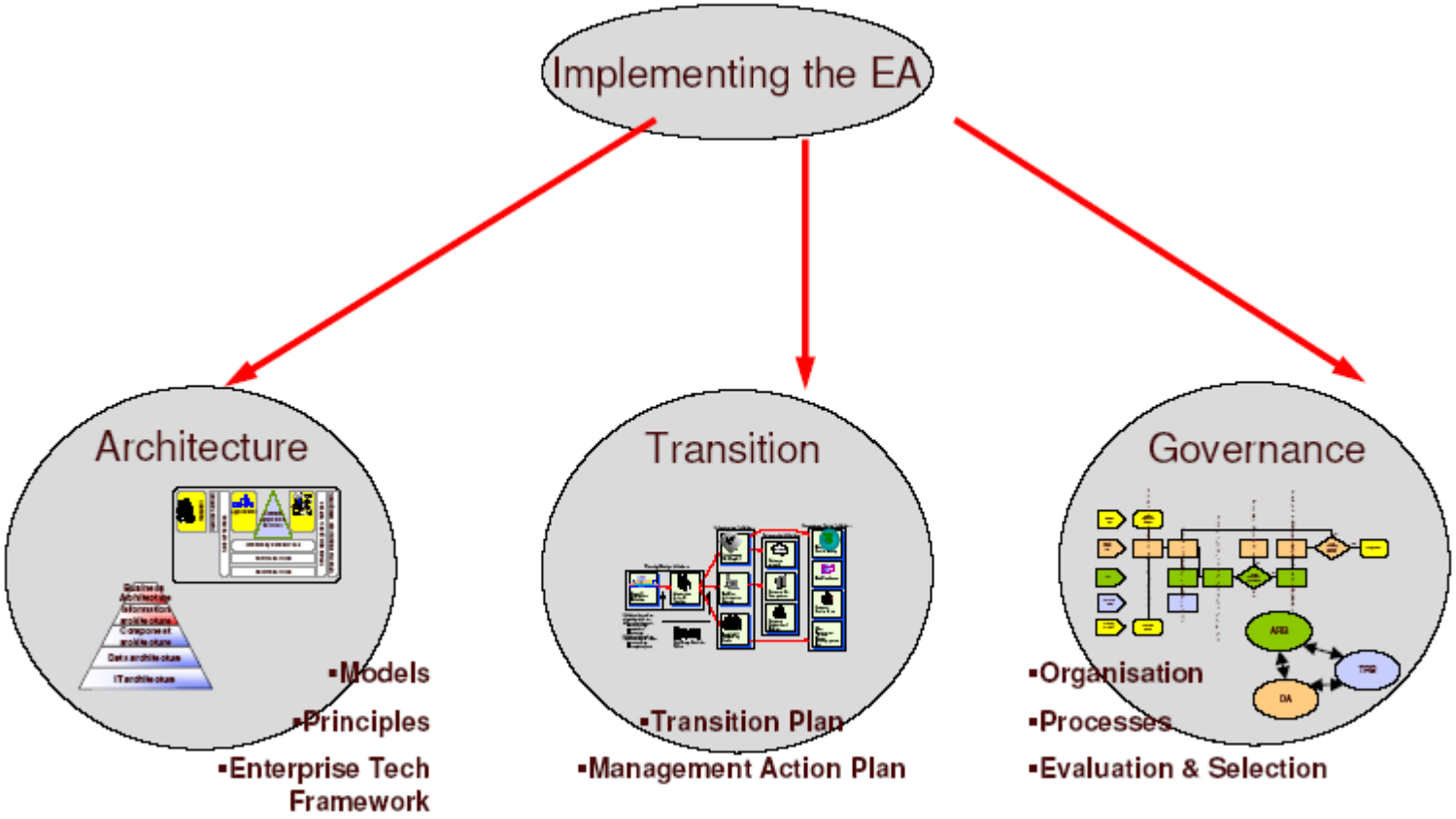
Top-down versus Bottom-up

- A bottom-up approach involves setting infrastructure standards and introducing governance processes to ensure adherence to those standards, while a top-down approach dictates a formal analysis of the current state with respect to business process, application programs, data, and technology components

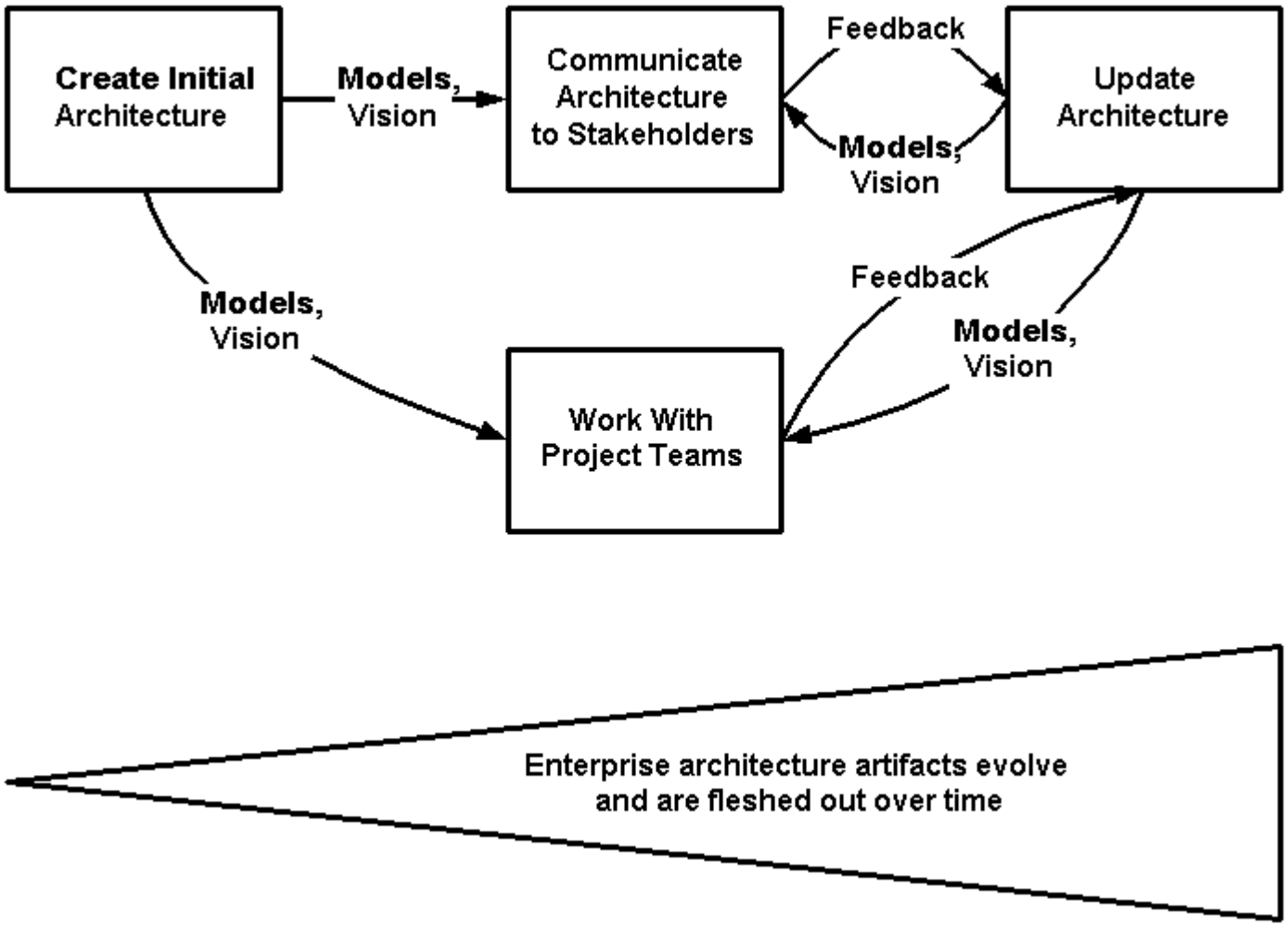
	Top-down	Bottom-up	Change management
Approach	Strategy and planning Applications architecture Infrastructure	Strategy and planning Applications architecture Infrastructure	Strategy and planning Applications architecture Infrastructure
Management	To-be models	As-is models	Projects
User	Business analyst Architect	Operational IT staff	IT portfolio manager IT strategist IT budget controller Architect
Advantage	Provides business process modeling	Assesses change impact and models dependencies	Helps IT prioritize, plan, and budget for business initiatives
Weakness	Hard to maintain accurate descriptions for deployed elements	They're designed for IT and don't link with business processes	Paucity of modeling features

Source: Forrester Aug. 2004

Elements needed to implement an Enterprise Architecture



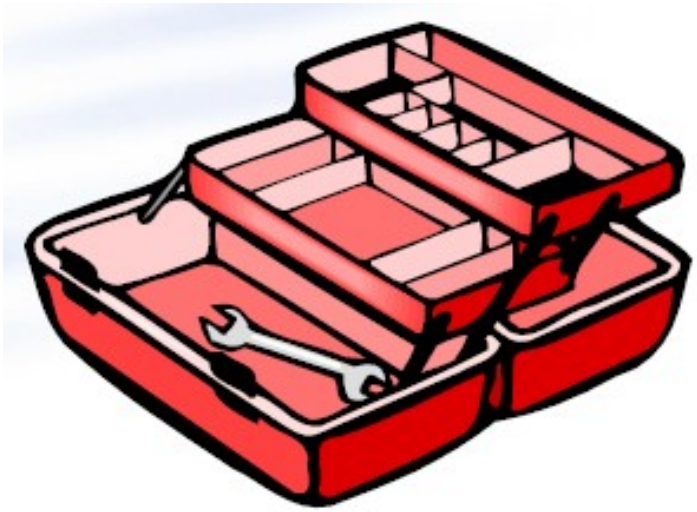
An incremental and iterative approach to Enterprise Architecture



General tool categories used in Enterprise Architecture

- Basics
  - **Communication and collaboration**
  - **Project management**
  - **Office automation**
- Modeling
- Portfolio management
- Content management
- Other . . .

Some are mandatory – others not



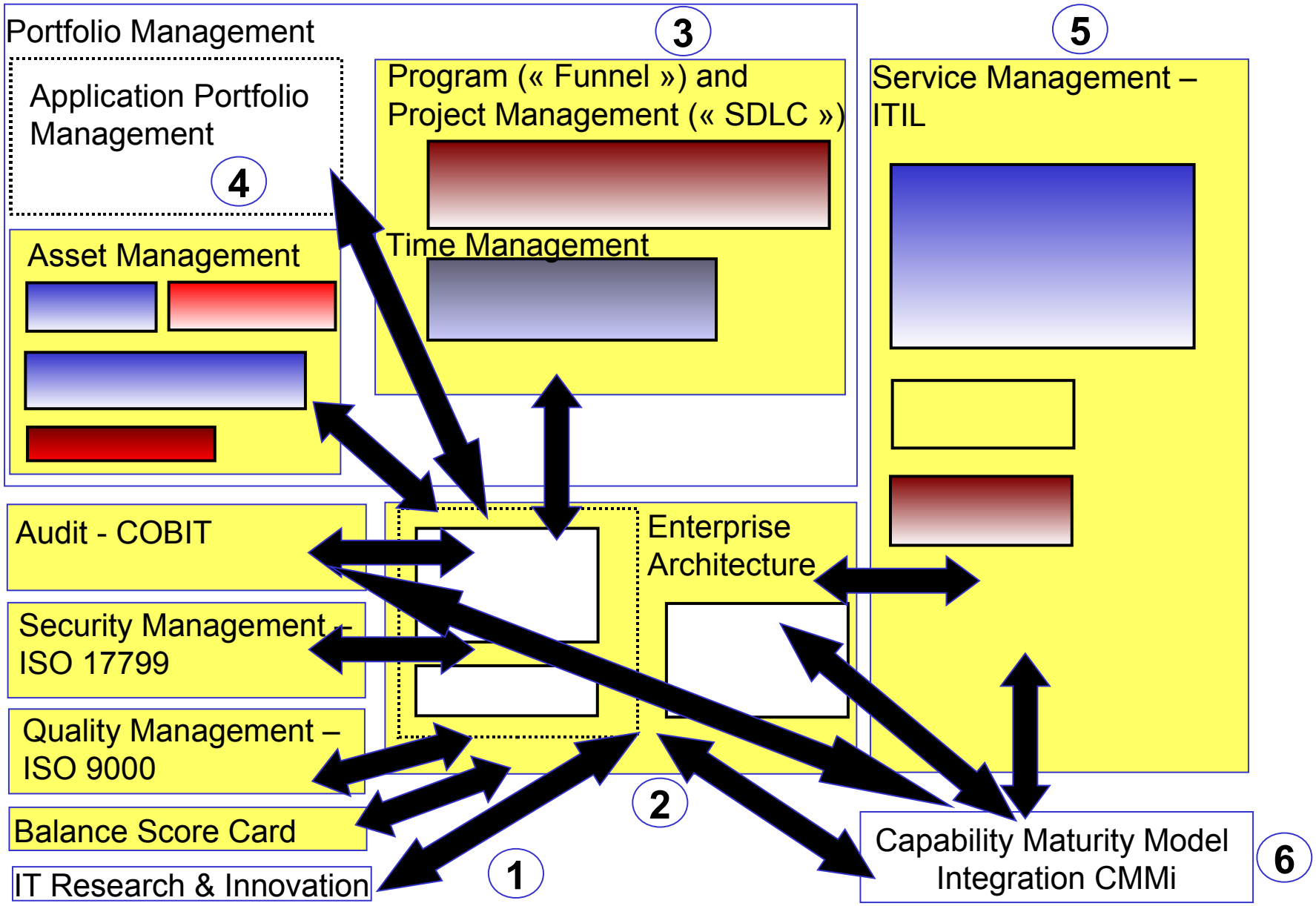
“Most enterprise architecture programs need tools from multiple categories”

Enterprise Architecture Modeling Tools

Institute For Enterprise Architecture Developments

Repository based Tools			
Company	**Products**	**Framework Support**	**Development Facilities**
ASG Software	Rochade		Broad scope of facilities
Méga International	Méga	Zachman	
Troux	Troux		
US Government	EAMS	FEAF, TEAF, C4ISR	
Enterprise Modeling Suites			
Company	**Products**	**Framework Support**	**Development Facilities**
Adaptive	Adaptive IT Portfolio Manager		
Alfabet	Strategic IT Management Solution Framework	SITM framework	
Casewise	Corporate Modeler Enterprise Edition	Casewise Framework, Zachman	Rational Rose, Erwin, PowerDesigner, OracleDesigner, Tibco, Telelogic Doors
Computas	Metis Product Familiy	Zachman, TOGAF, C4ISR, FEAF / TEAF	UML
IDS Scheer	ARIS Collaborative Suite	ARIS Framework	
Popkin Software	System Architect Family	Zachman, TOGAF, C4ISR	Business Process Modeling, IDEF, Gane and Sarson, Yourdon/DeMarco, Ward and Mellor, SSADM method, UML, XML
Proforma	Provision Modeling Suite	Zachman, C4ISR	Rummler-Brache, LOVEM, IDEF, UML, Visio, RUP, ERwin
Ptech	Enterprise Framework	Zachman, C4ISR	UML
Select Business Solutions	Select Enterprise	Zachman	MDA, UML, RUP, Yourdon, XP
Visible	Visible Advantage		IDEF1X and IDEF0

Components linked to an Enterprise Architecture



Conclusions in a nutshell…

- A Serono Enterprise Architecture needs to be considered with a mix and match of a Top-Down and a Bottom-Up approach
- Scope of the EA was defined
- Frameworks have to be taken into consideration
- Business Analysts should design the Business Architecture and embrace BPM
- SOA is associated to a BPM strategy and is relying on the Enterprise architecture program

Questions?

धन्यवाद
Hindi

多謝
Traditional Chinese

ขอบคุณ
Thai

Спасибо
Russian

Gracias
Spanish

Thank You

شكرا
Arabic

Obrigado
Brazilian Portuguese

Danke
German

Grazie
Italian

多谢
Simplified Chinese

Merci
French

நன்றி
Tamil

감사합니다
Korean

ありがとうございました
Japanese

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