



Enterprise Architecture

Framework



CONTENT

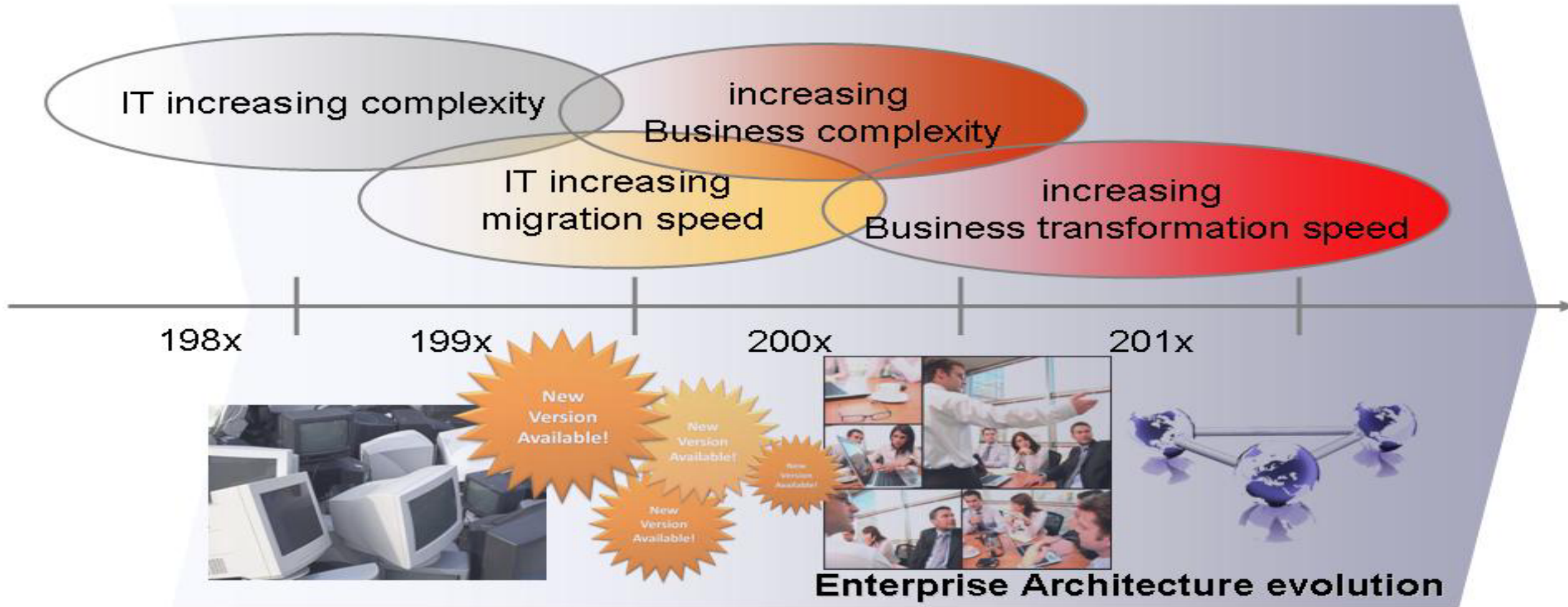
- Enterprise Architecture over the age
- Enterprise Architecture Framework
 - Zachman
 - Togaf
- Enterprise Architecture reference model



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“Enterprise” Architecture Challenges over the ages



IT Project Statistics



Source: Standish Group

Success Rate of Change Projects

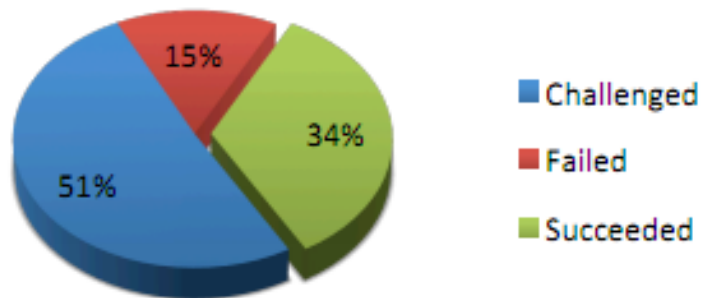


Figure 1 Source: Standish Group, Chaos Study 2011

Table I

Standish project benchmarks over the years

Year	Successful (%)	Challenged (%)	Failed (%)
1994	16	53	31
1996	27	33	40
1998	26	46	28
2000	28	49	23
2004	29	53	18
2006	35	46	19
2009	32	44	24

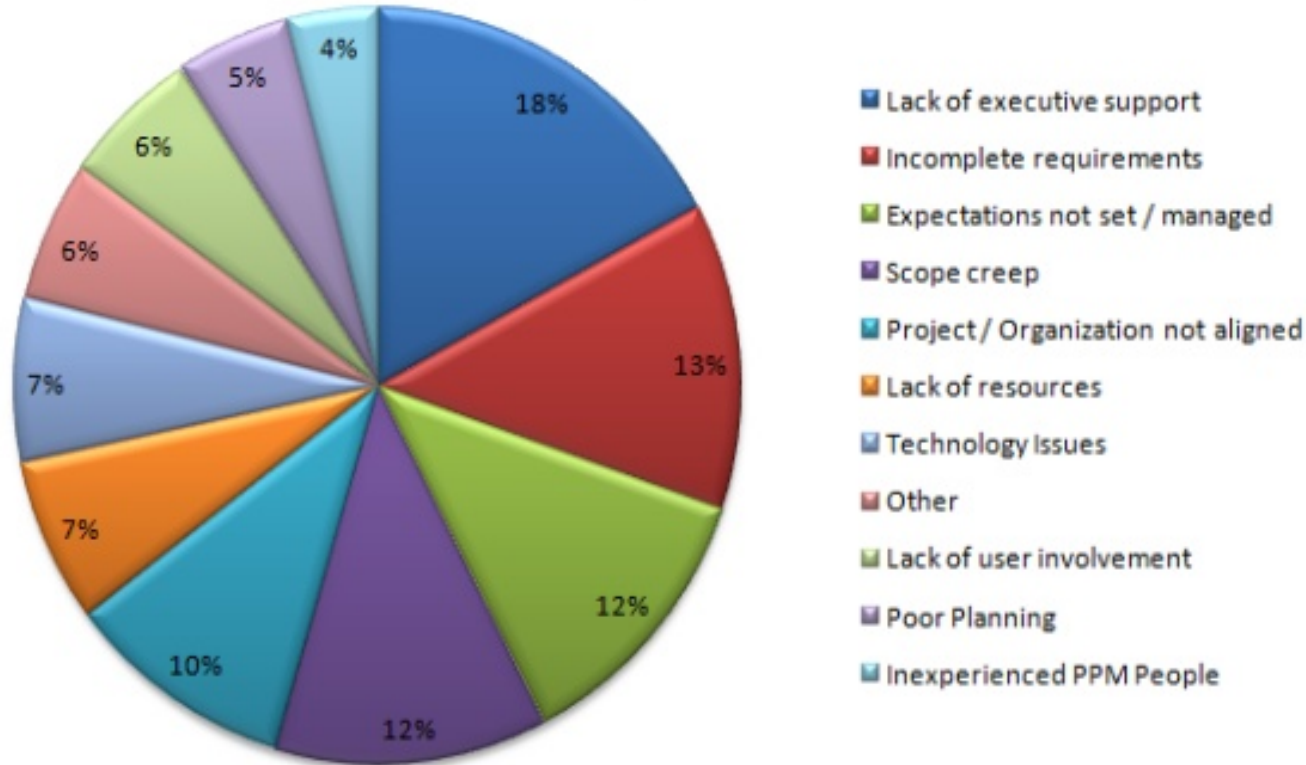
Success/Failure Rates of IT Projects

REASONS

Contributing Factors

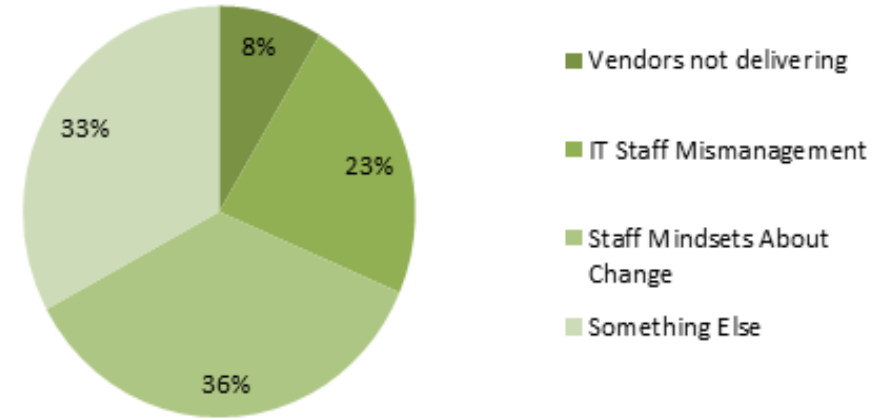


Percentage of reasons for Project Failure

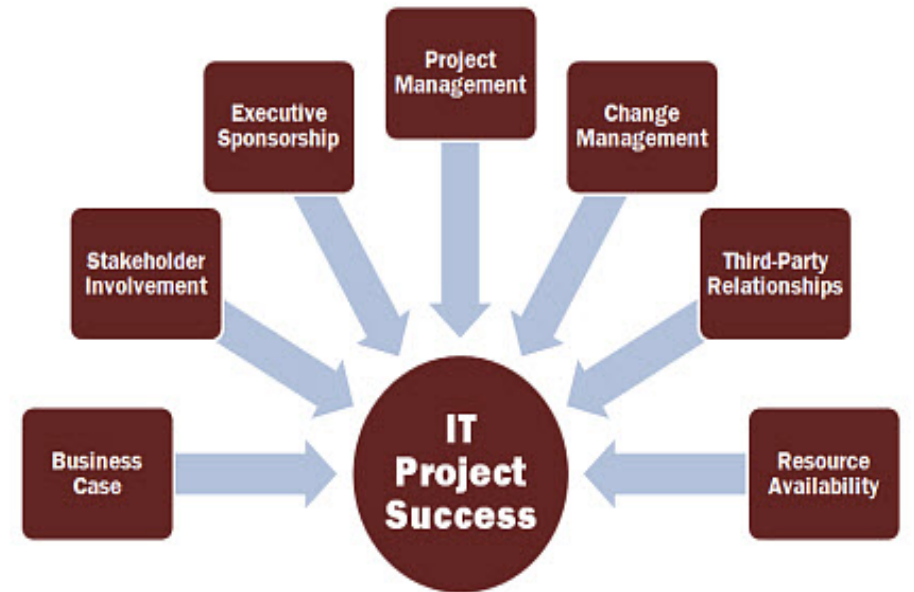


Arras People Benchmark Report 2010

Reasons for IT project /roll out failure



Business vulnerabilities, not technology



Enterprise Architecture Conceptual

สถาปัตยกรรมองค์กร (Enterprise Architecture: EA)

เป็นแนวความคิดใหม่ที่บูรณาการระหว่าง **ระบบเทคโนโลยีสารสนเทศ** เข้ากับ **ธุรกิจ**

อย่างเป็นระบบ โดยการมองสถาปัตยกรรมธุรกิจ (Business Architecture) แล้ว ดำเนินการออกแบบระบบเทคโนโลยีสารสนเทศ ให้เชื่อมโยงกับการดำเนินงานทางธุรกิจได้

อย่างสอดคล้องและมีประสิทธิภาพ ทั้งในระดับ Architecture ไปจนถึง Roadmap ขององค์กร เพื่อผลักดันให้องค์กรสามารถดำเนินการตามนโยบายและวิสัยทัศน์ขององค์กร

Enterprise Architecture Artifacts



Business Architecture

- Defines the business strategy, governance, organization, and key business processes

Data Architecture

- Describes the structure of an organization's logical and physical data assets and data management resources

Application Architecture

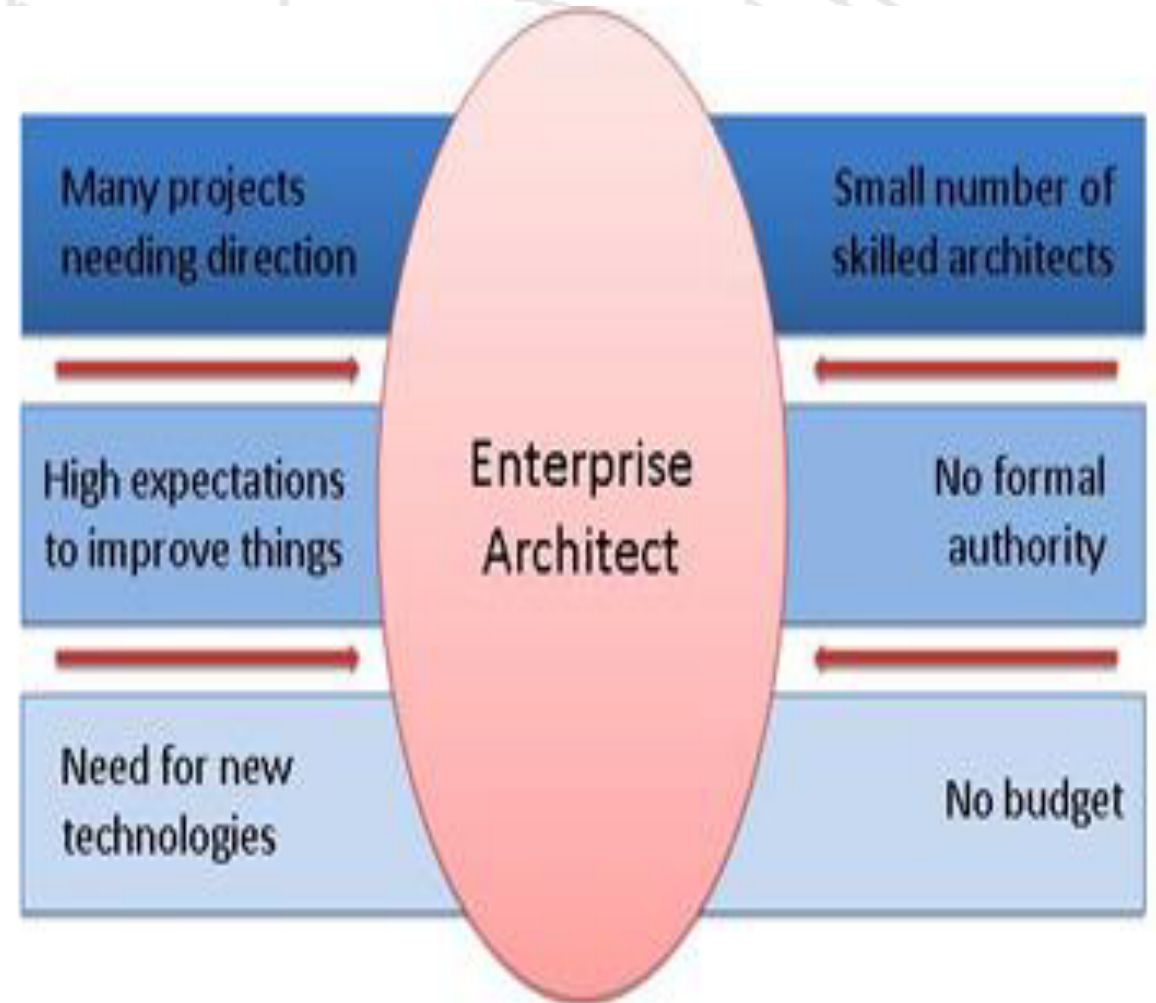
- A blue print for the individual application systems to be deployed, their interactions, and their relationships to the core business processes of the organization

Technology Architecture

- Hardware, Software IT infrastructure, middleware, networks, communications, processing, standards, etc

Why need Enterprise Architecture?

- ในปัจจุบันระบบเทคโนโลยีสารสนเทศเป็นส่วนสำคัญต่อการขับเคลื่อนธุรกิจขององค์กร
- ปัญหาส่วนใหญ่คือการขาดความเชื่อมโยงระหว่างระบบเทคโนโลยีสารสนเทศกับธุรกิจ

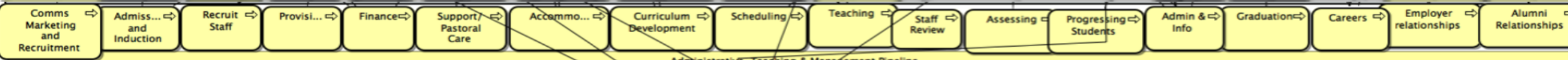
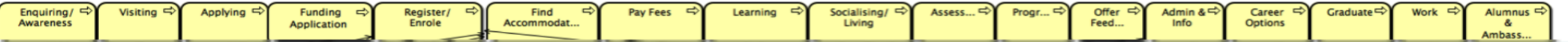


Application with out EA

Student Lifecycle Core Diagram (Technology View "As Is")
 Nikki Rogers, Enterprise Architect, University of Bristol, April 2014

Student Experience

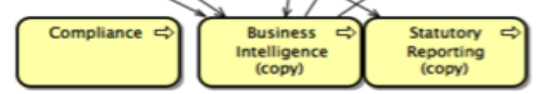
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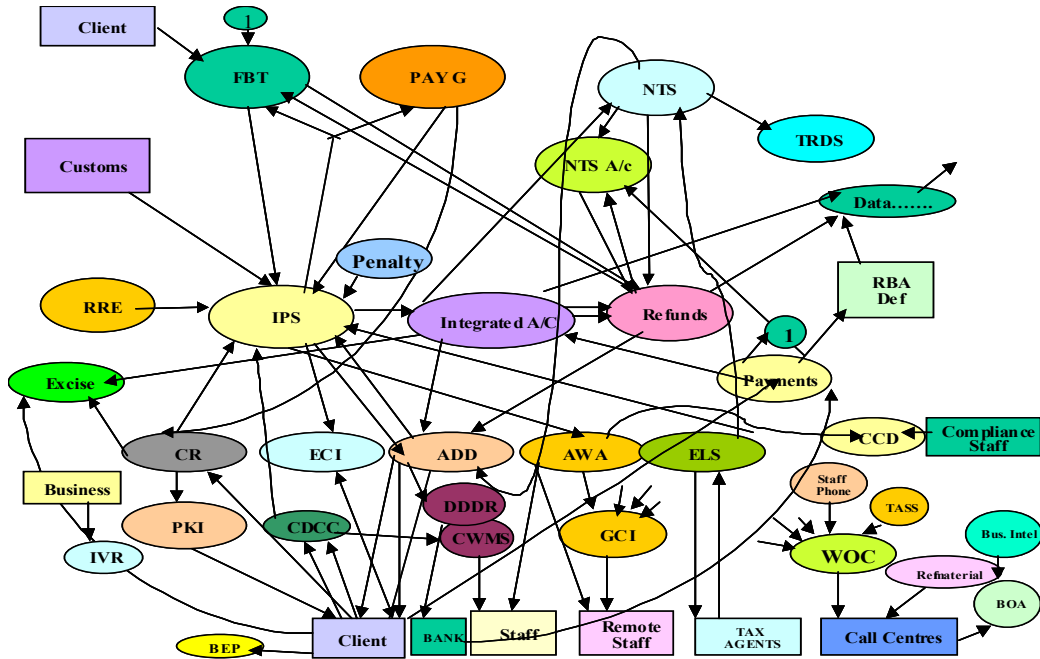
Administrative, Teaching & Management Pipeline

The more RED = the more diversification, the more green = the more unified the solution on offer is.

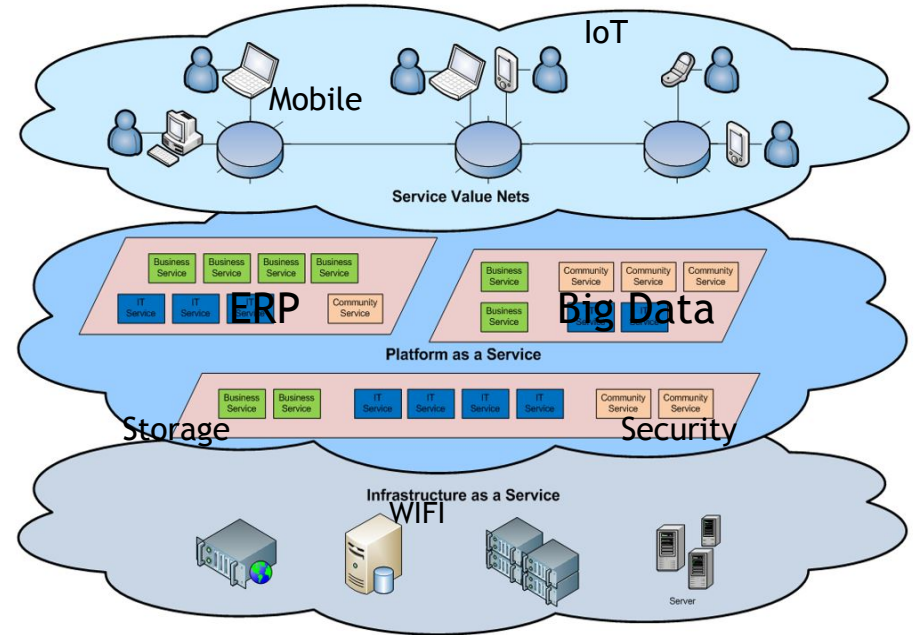
Potential business objects plans for reporting extra to Hobson's EMT AY



without EA vs. with EA



VS.



Without Enterprise Architecture

Inefficient IT

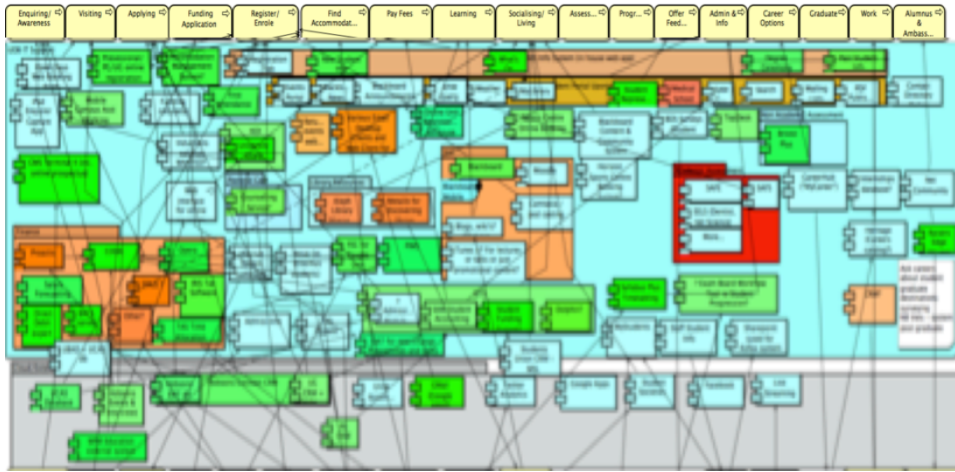
Complex and Delay Response

With Enterprise Architecture

Productive IT

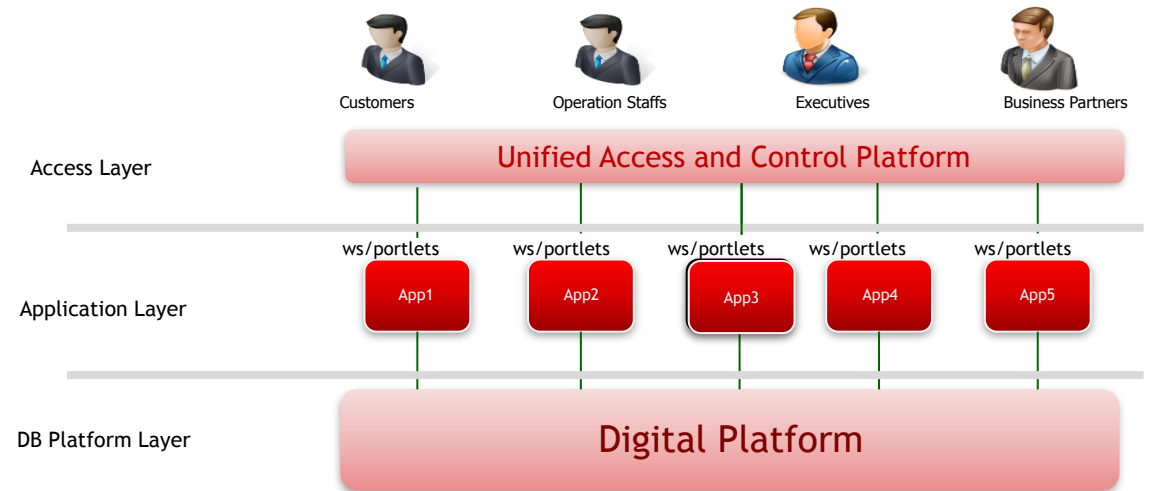
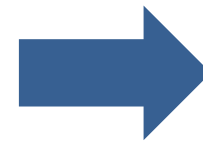
Cloud, Big Data, Social, Mobile

Technology Architecture Improvement



Current Technology Architecture

- เพิ่มบริการใหม่ๆยาก
- ต้องใช้ต้นทุนสูงในการขยายระบบ
- ใช้เวลามากในการแก้ปัญหา
- เกิดความเสี่ยงสูงต่อการดำเนินธุรกิจ



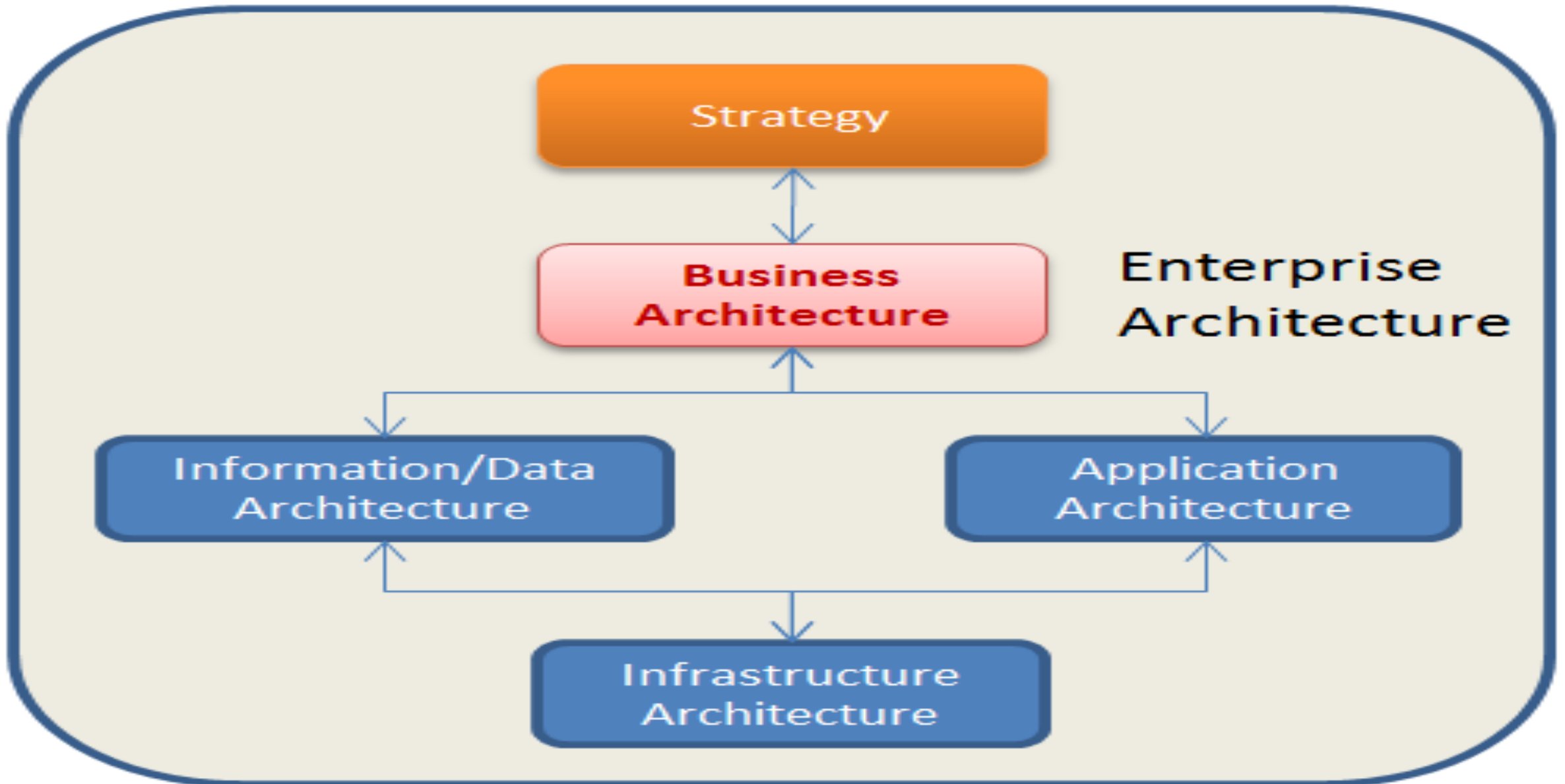
Target Technology Architecture

- สร้าง common platform
- เพิ่มความยืดหยุ่นให้กับเงื่อนไขบริการใหม่
- สามารถผลิต application ได้เร็วขึ้น
- ลดความเสี่ยงต่อการดำเนินการ

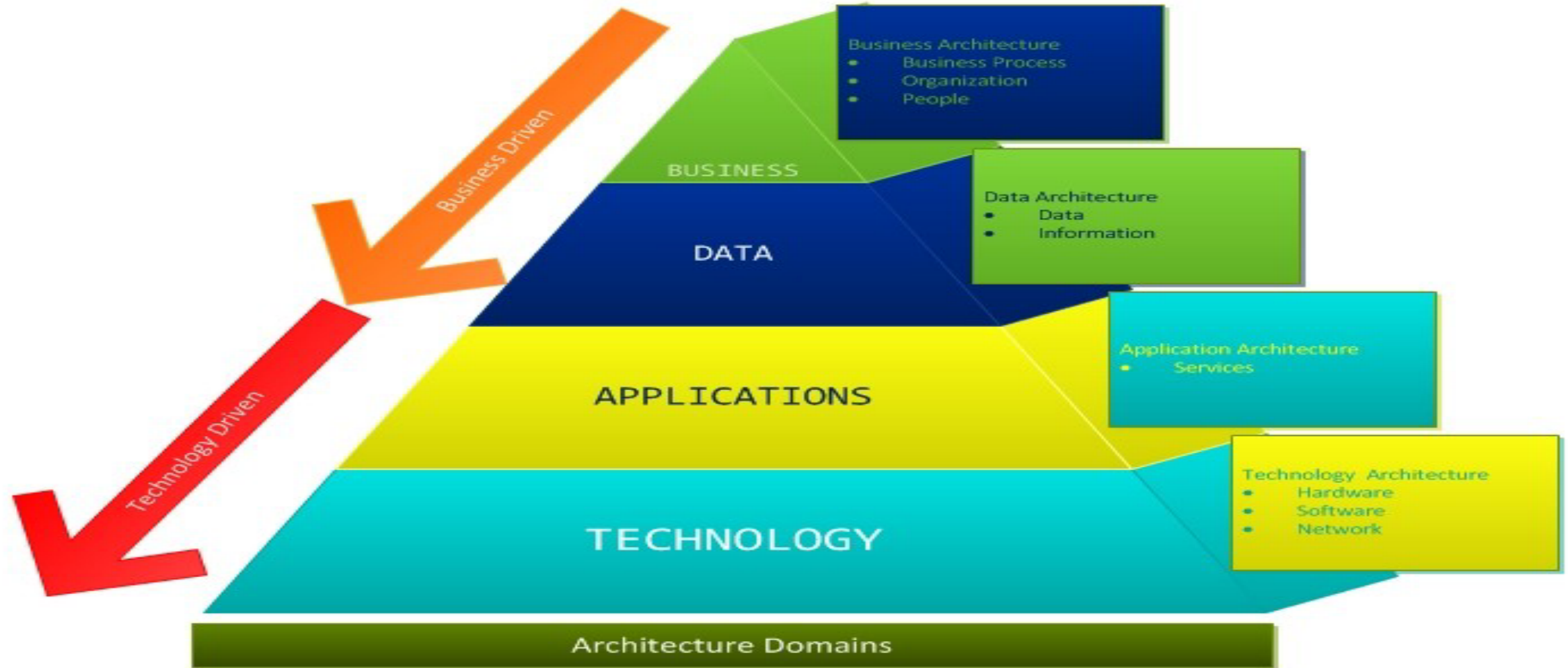
Transform Strategy to outcomes



Enterprise Architecture Overview

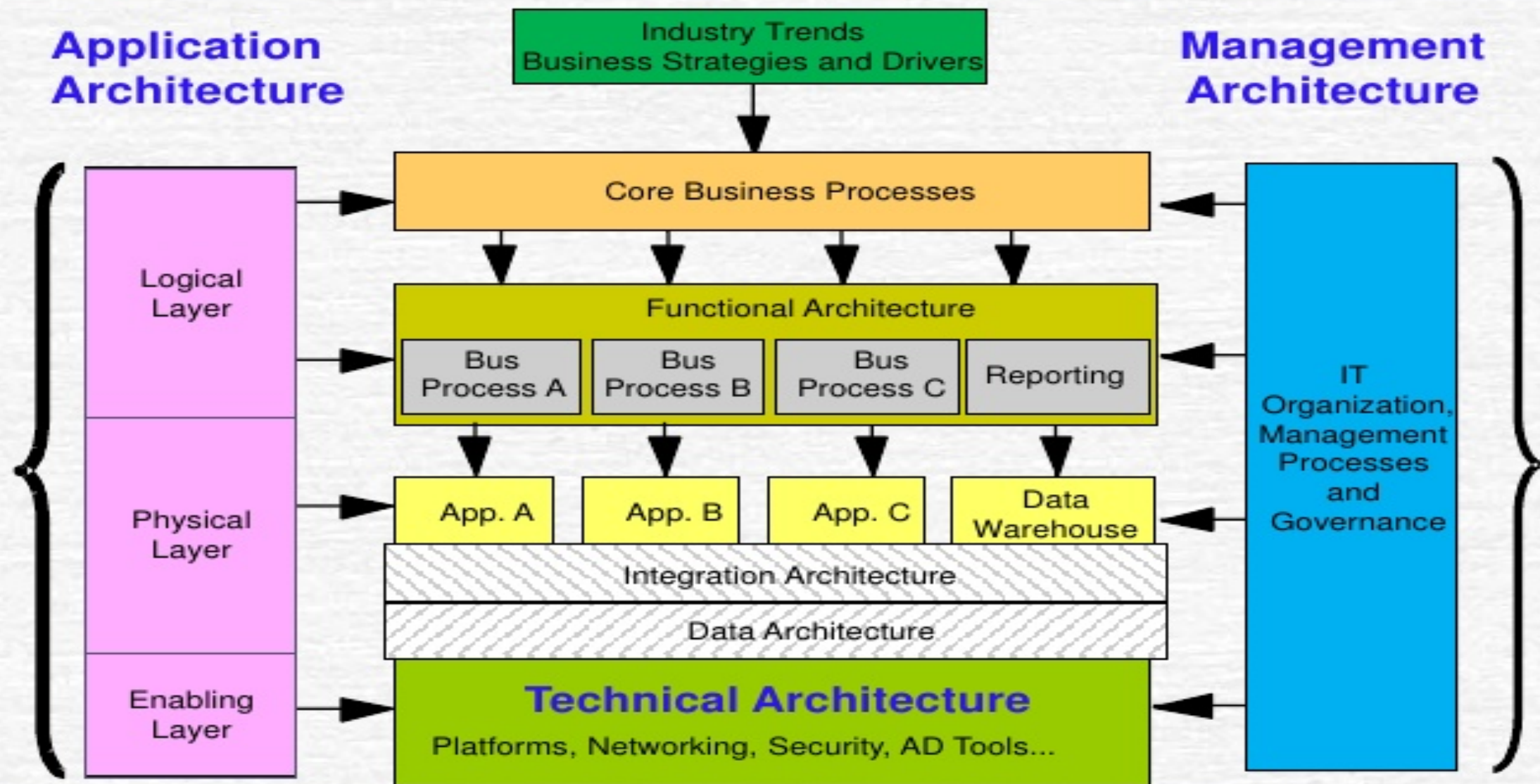


Enterprise Architecture Conceptual



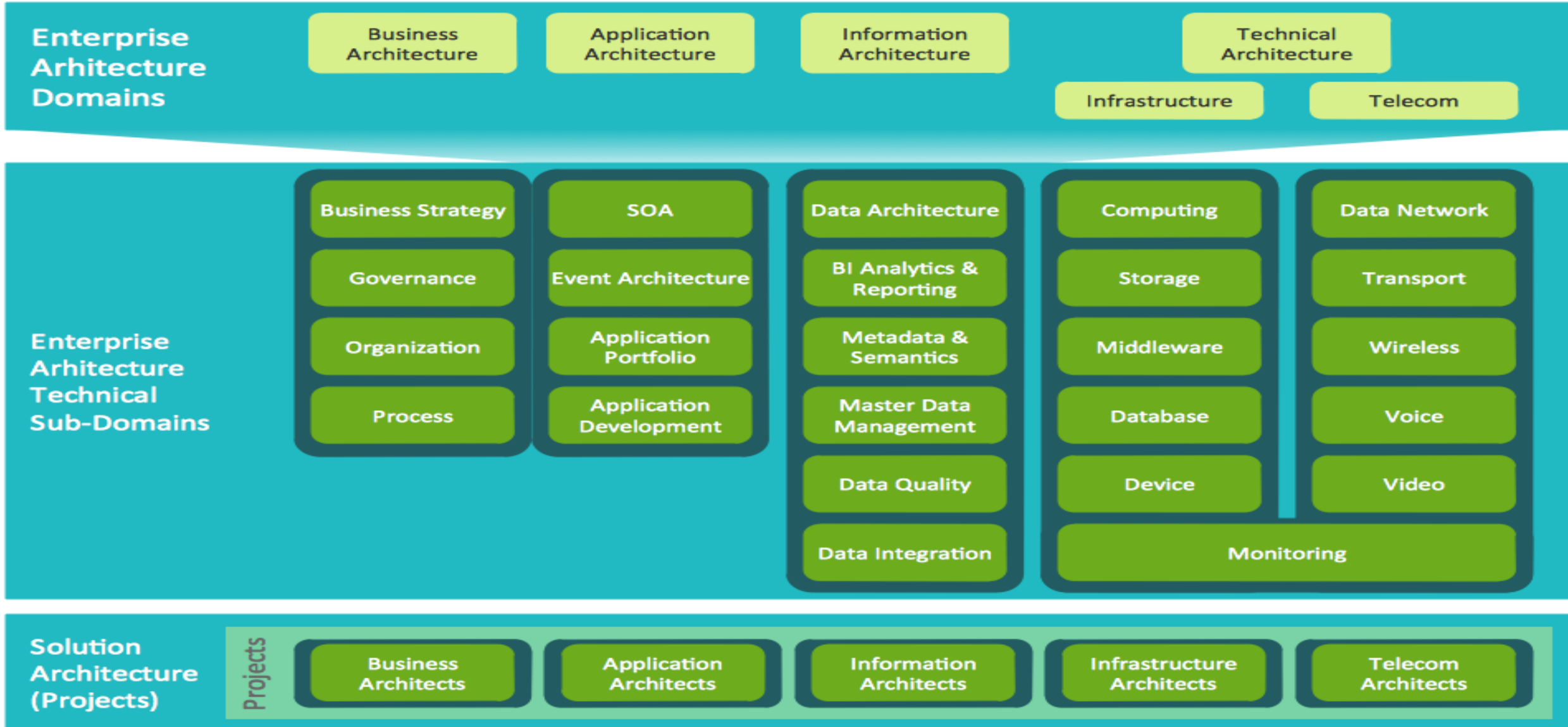
Enterprise Architecture

Enterprise Architecture Conceptual Layers

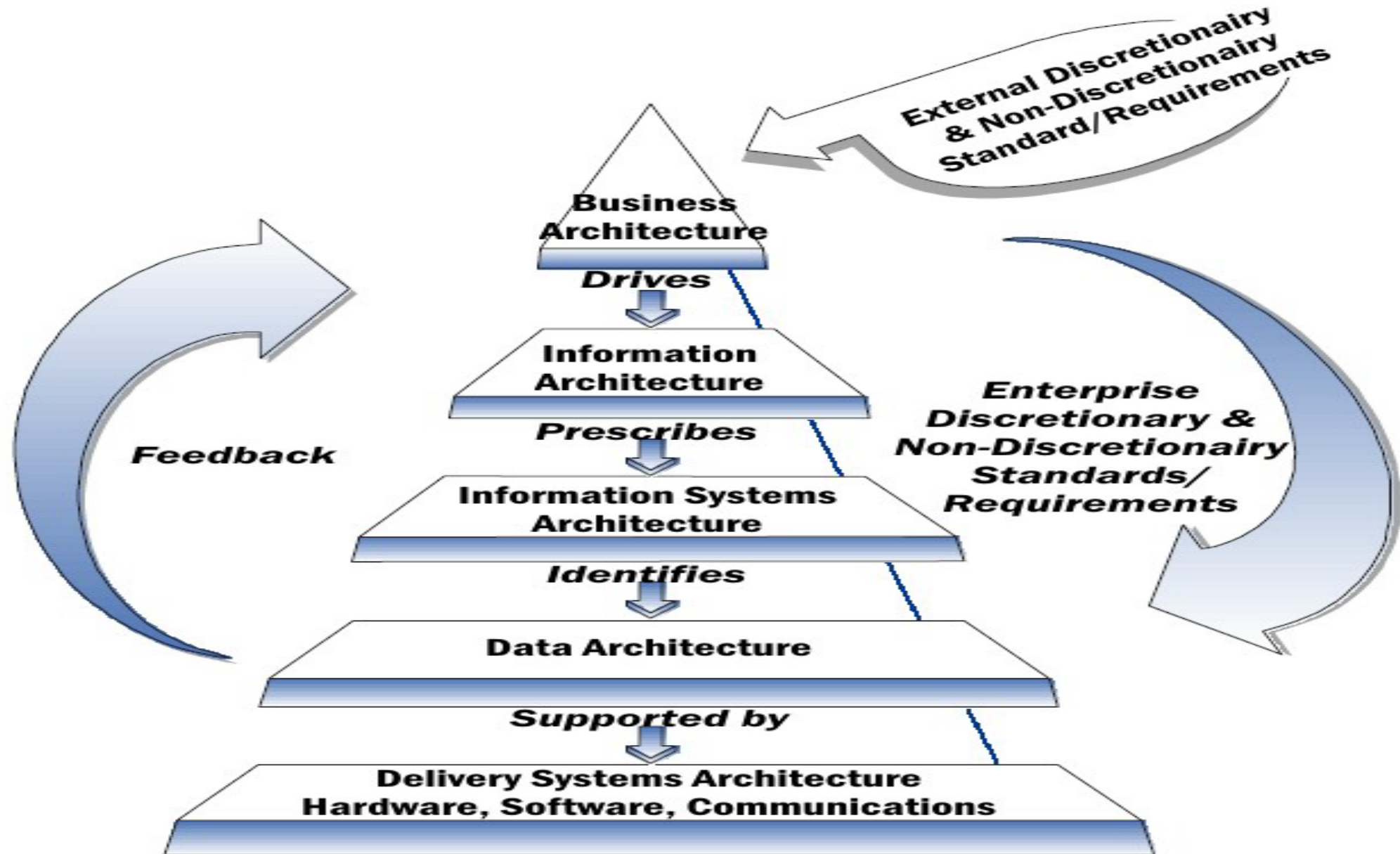


Enterprise Architecture Domains & Sub-Domains

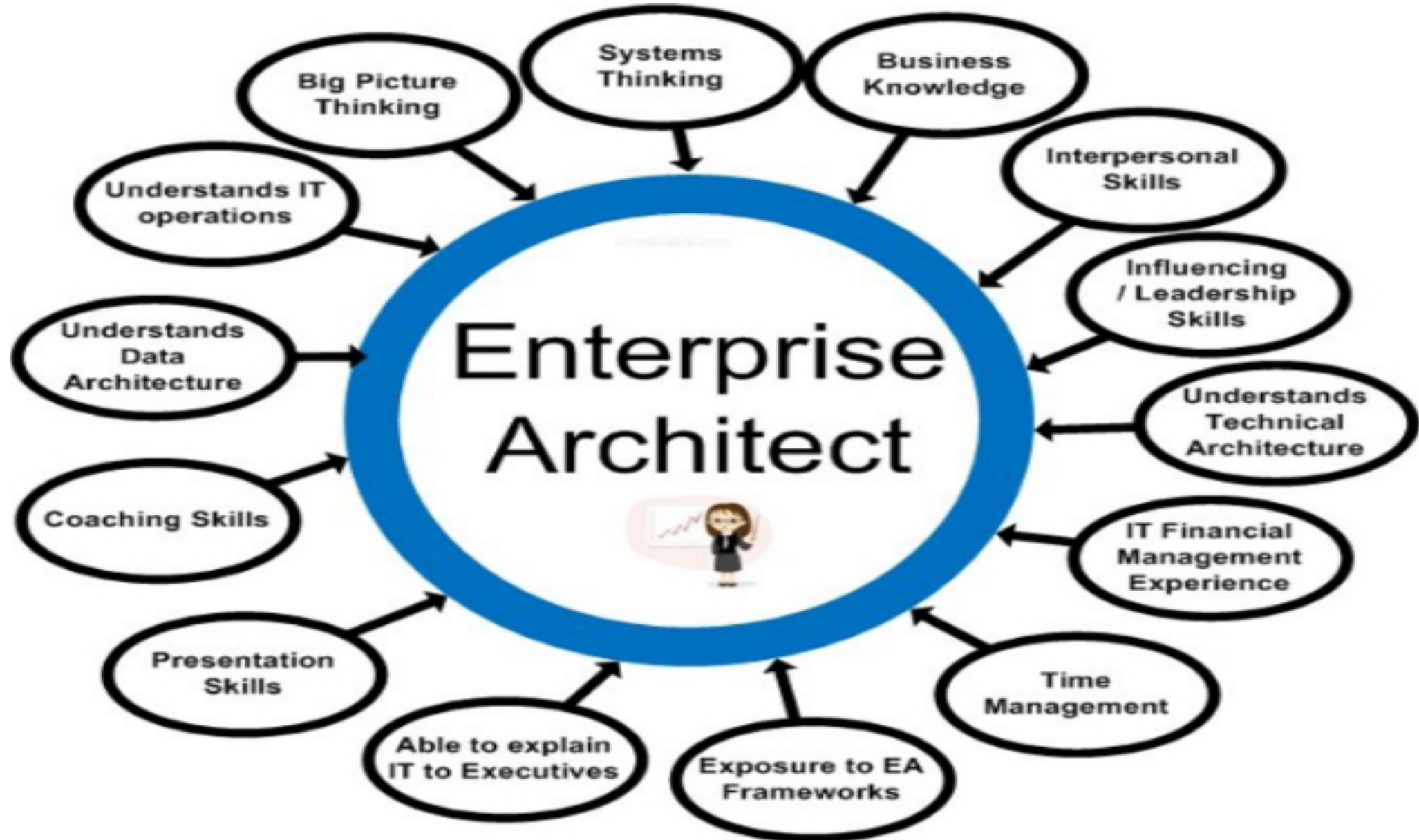
Sub-Domains: EA Domains are further divided into sub-domains depending on the elements within a domain.



Enterprise Architecture Deployment



Enterprise Architecture need Expertise





CONTENT

- Enterprise Architecture over the age
- Enterprise Architecture Framework
 - Zachman
 - Togaf
- Enterprise Architecture reference model

Enterprise Architecture Framework Concept

- **A Methodology to design and develop the architecture**

วิทยาการเพื่อการออกแบบและพัฒนาให้ได้สถาปัตยกรรมที่วัตถุประสงค์และเหมาะสม

- **As must describe the methods to design an information system in terms of its building blocks and to integrate them together**

ต้องมีการอธิบายวิธีการออกแบบระบบข้อมูล ในลักษณะของ โครงสร้างที่มีการเชื่อมโยงกัน

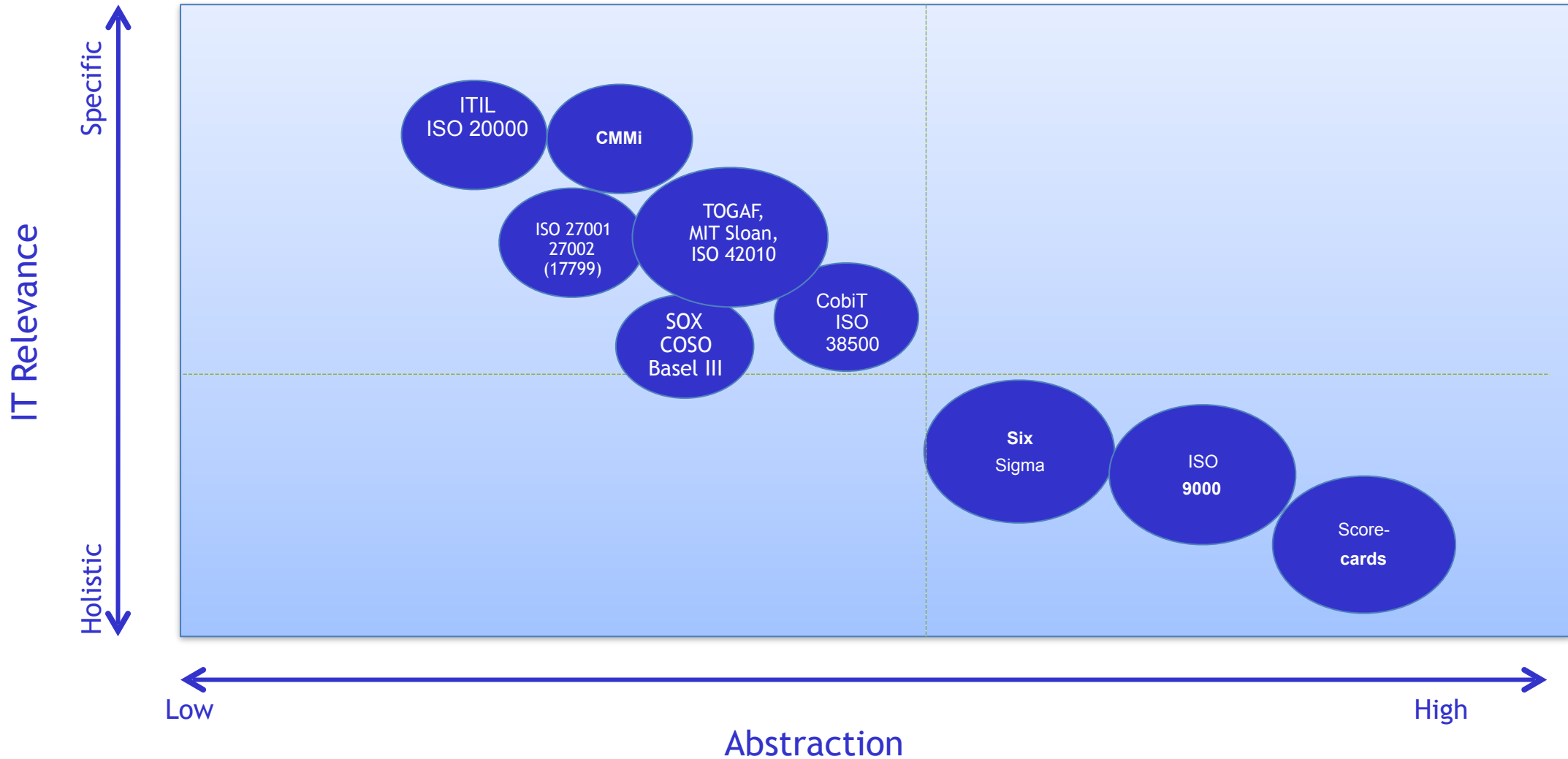
- **Tools and terminologies**

ต้องการเครื่องมือและเทคนิคเฉพาะด้าน

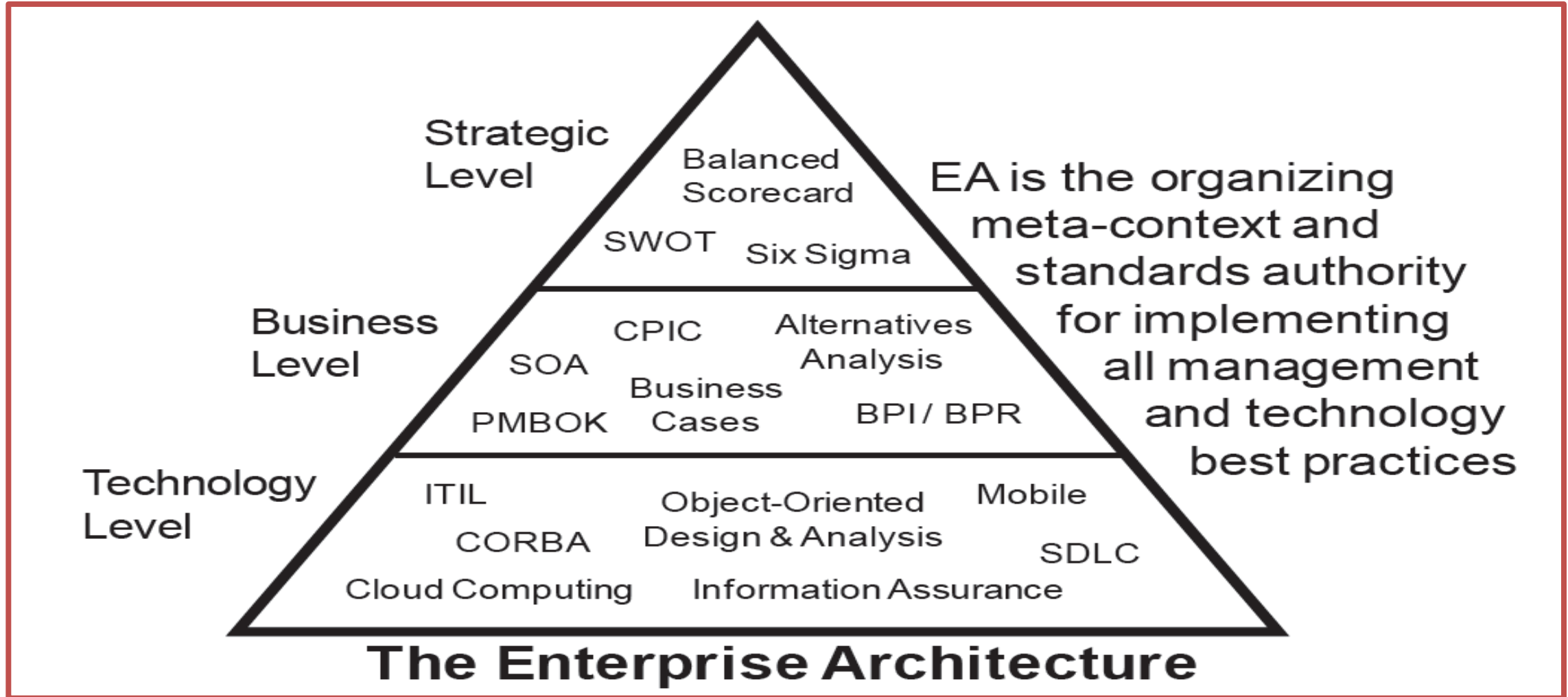
- **Interoperability standards**

ต้องมีการทำงานร่วมกันและมีมาตรฐานเดียวกัน

There are many related standards/guidelines



Organizing management and technology best practices



Enterprise Architecture Domains & Sub Domains

EA Domains and Sub Domains

Application/ Integration

- Enterprise Application Integration Components
- Custom Application Development
- Services Definition
- Process Alignment
- Services/Event Architectures

Information/Data

- Data Integration
- Data Architecture
- Master Data Mgmt
- Metadata Mgmt
- Data Delivery Architecture
- Dashboards & Analytics
- Business Intelligence
- Enterprise Reporting
- Corporate Performance Mgmt
- Data Modeling
- Data Quality
- Content Mgmt

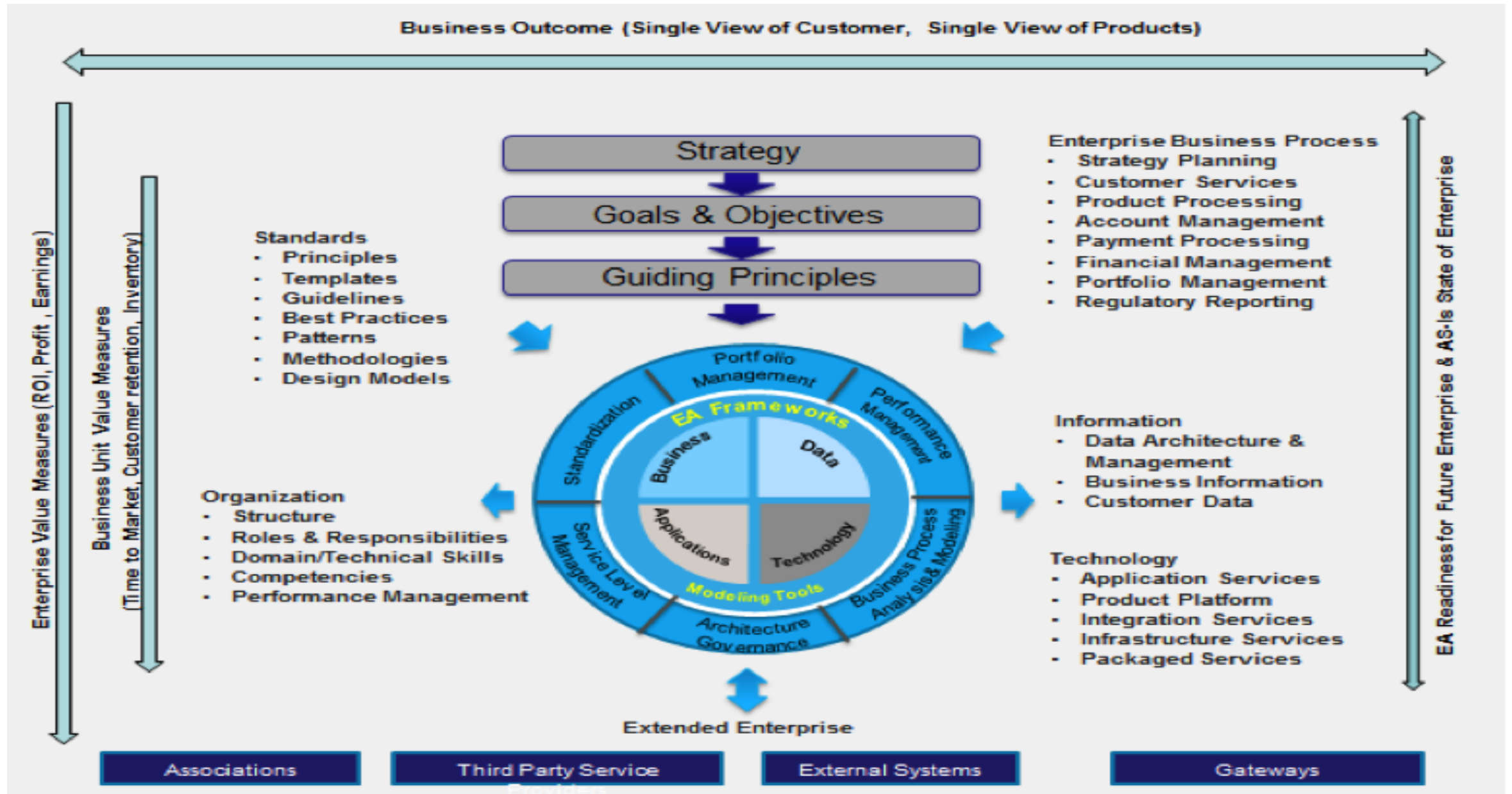
Technical/ Infrastructure

- Servers
- Networks
- Telecom
- Operating Systems
- Desktop
- Middleware
- Database Infrastructure
- Security
- Storage
- Other hardware

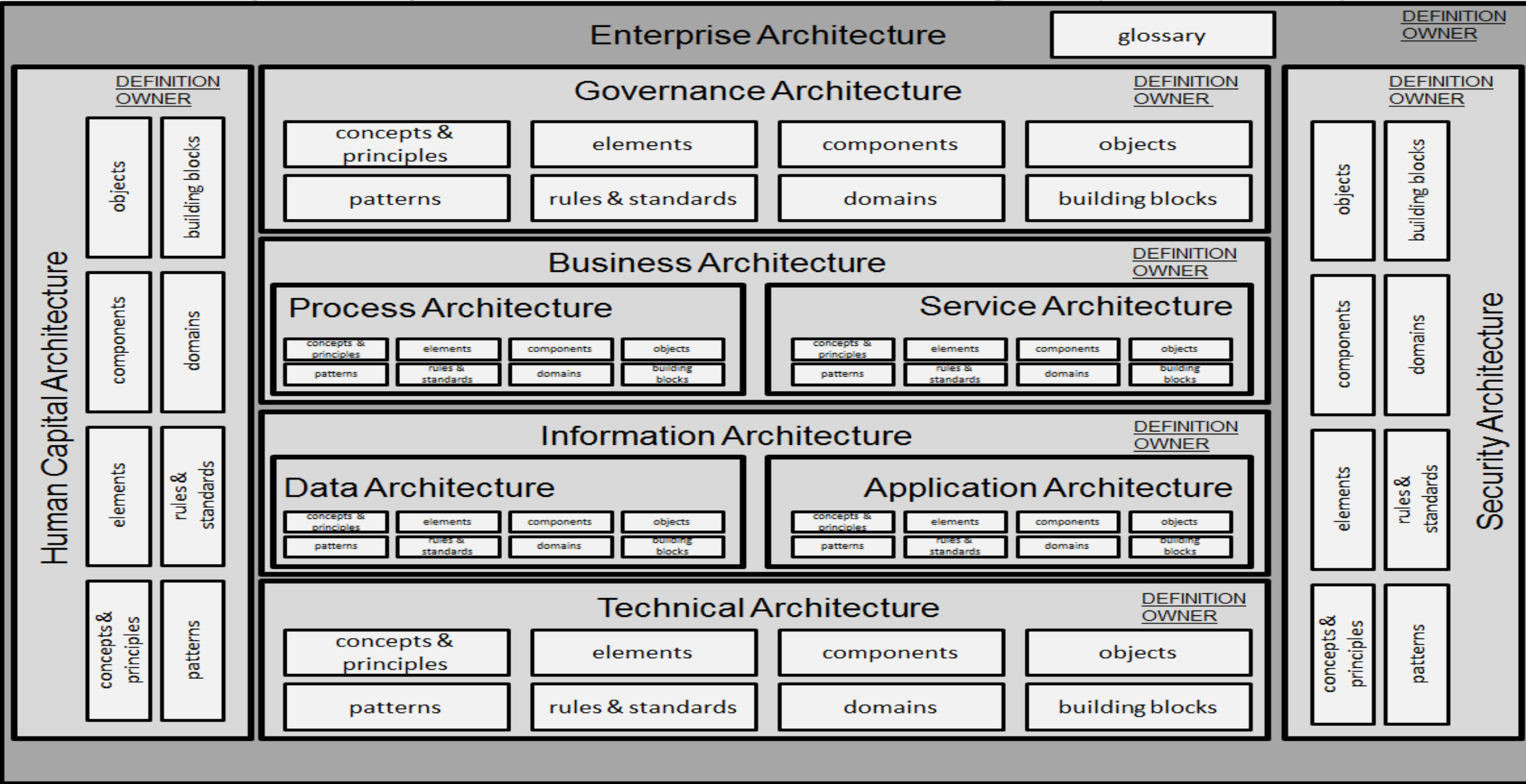
Business Architecture

- Business Requirements
- Business Rules
- Organization Structure
- Critical Success Factors
- Business Process Design & Modeling
- Mission /Vision

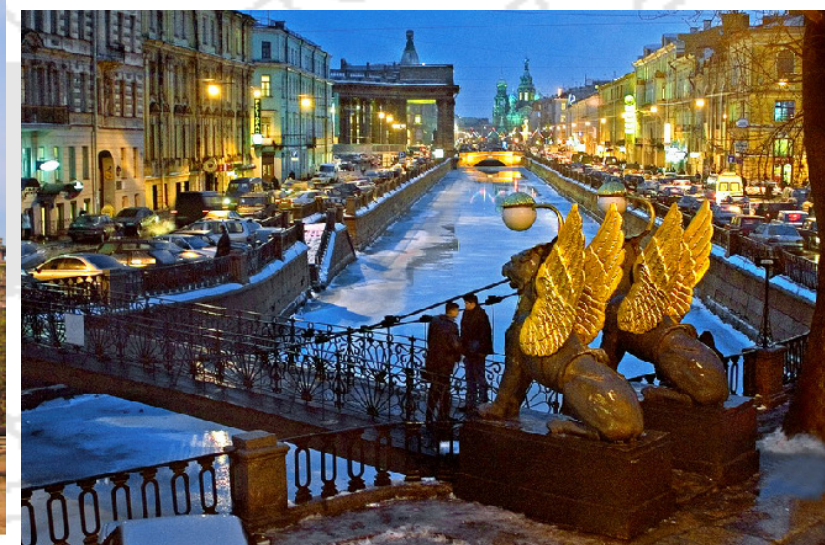
Enterprise Architecture Component



Example Enterprise Architecture Framework Diagram (ideal situation)



Enterprise Architecture by Objective



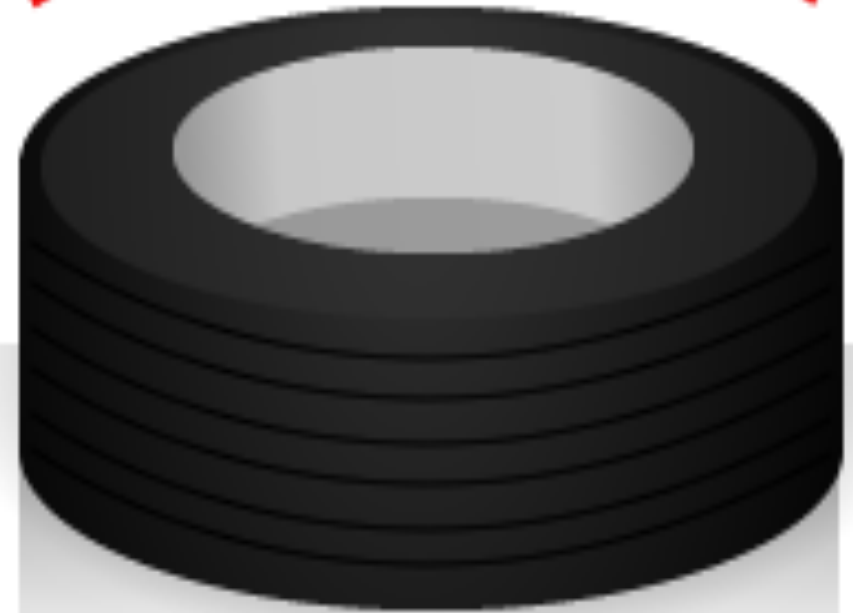
CAMBODGE កម្ពុជា CAMBODIA

Strategy thru Finally Outcome





Don't Reinvent it!



Perfect it!

without EA vs. with EA



VS.











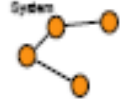
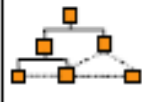


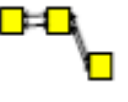
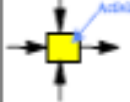
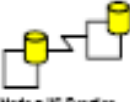
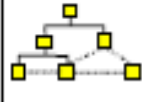

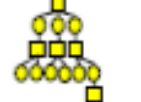
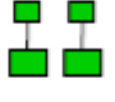
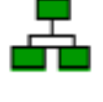










Quick build and difficult to scale
Difficult to apply security

Design for scale and maintain
Secure architecture for growth















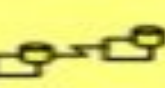





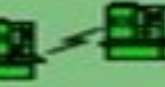
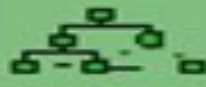
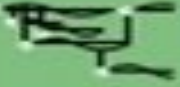















EA : ZACHMAN Framework

- Zachman developed a structure or framework for defining and capturing an architecture
- This framework provides for 6 perspectives or “windows” from which to view the enterprise.

	DATA <i>#What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>	
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 Significant to the Business 	List of Business Goals/Strat 	SCOPE (CONTEXTUAL) <i>Planner</i>
ENTERPRISE MODEL (CONCEPTUAL) <i>Owner</i>	e.g. Semantic Model  Ent = Business Entity Rel = Business Relationship	e.g. Business Process Model  Proc = Business Process IO = Business Resources	e.g. Business Logistics System  Node = Business Location Link = Business Linkage	e.g. Work Flow Model  People = Organization Unit Work = Work Product	e.g. Master Schedule  Time = Business Event Cycle = Business Cycle	e.g. Business Plan  End = Business Objective Means = Business Strategy	ENTERPRISE MODEL (CONCEPTUAL) <i>Owner</i>
SYSTEM MODEL (LOGICAL) <i>Designer</i>	e.g. Logical Data Model  Ent = Data Entity Rel = Data Relationship	e.g. Application Architecture  Proc = Application Function IO = User Views	e.g. Distributed System Architecture  Node = OS Function (Processor, Storage, etc) Link = Line Characteristics	e.g. Human Interface Architecture  People = Role Work = Deliverable	e.g. Processing Structure  Time = System Event Cycle = Processing Cycle	e.g. Business Rule Model  End = Structural Assertion Means = Action Assertion	SYSTEM MODEL (LOGICAL) <i>Designer</i>
TECHNOLOGY MODEL (PHYSICAL) <i>Builder</i>	e.g. Physical Data Model  Ent = Segment/Table/etc. Rel = Pointers/Keys/etc.	e.g. System Design  Proc = Computer Function IO = Data Elements/Sets	e.g. Technology Architecture  Node = Hardware/System Software Link = Line Specifications	e.g. Presentation Architecture  People = User Work = Screen Format	e.g. Control Structure  Time = Execute Cycle = Component Cycle	e.g. Rule Design  End = Condition Means = Action	TECHNOLOGY MODEL (PHYSICAL) <i>Builder</i>
DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) <i>Sub-Contractor</i>	e.g. Data Definition  Ent = Field Rel = Address	e.g. Program  Proc = Language Stmt IO = Control Block	e.g. Network Architecture  Node = Addressing Link = Protocols	e.g. Security Architecture  People = Identity Work = Job	e.g. Timing Definition  Time = Interrupt Cycle = Machine Cycle	e.g. Rule Specification  End = Sub-condition Means = Step	DETAILED REPRESENTATIONS (OUT-OF-CONTEXT) <i>Sub-Contractor</i>
FUNCTIONING ENTERPRISE	e.g. DATA	e.g. FUNCTION	e.g. NETWORK	e.g. ORGANIZATION	e.g. SCHEDULE	e.g. STRATEGY	FUNCTIONING ENTERPRISE

Enterprise Architecture : Zachman framework

	What	How	Where	Who	When	Why	
Scope							Scope
Business Model							Business Model
System Model							System Model
Technology Model							Technology Model
Detailed Representations							Detailed Representations
Functioning Enterprise							Functioning Enterprise
	What	How	Where	Who	When	Why	

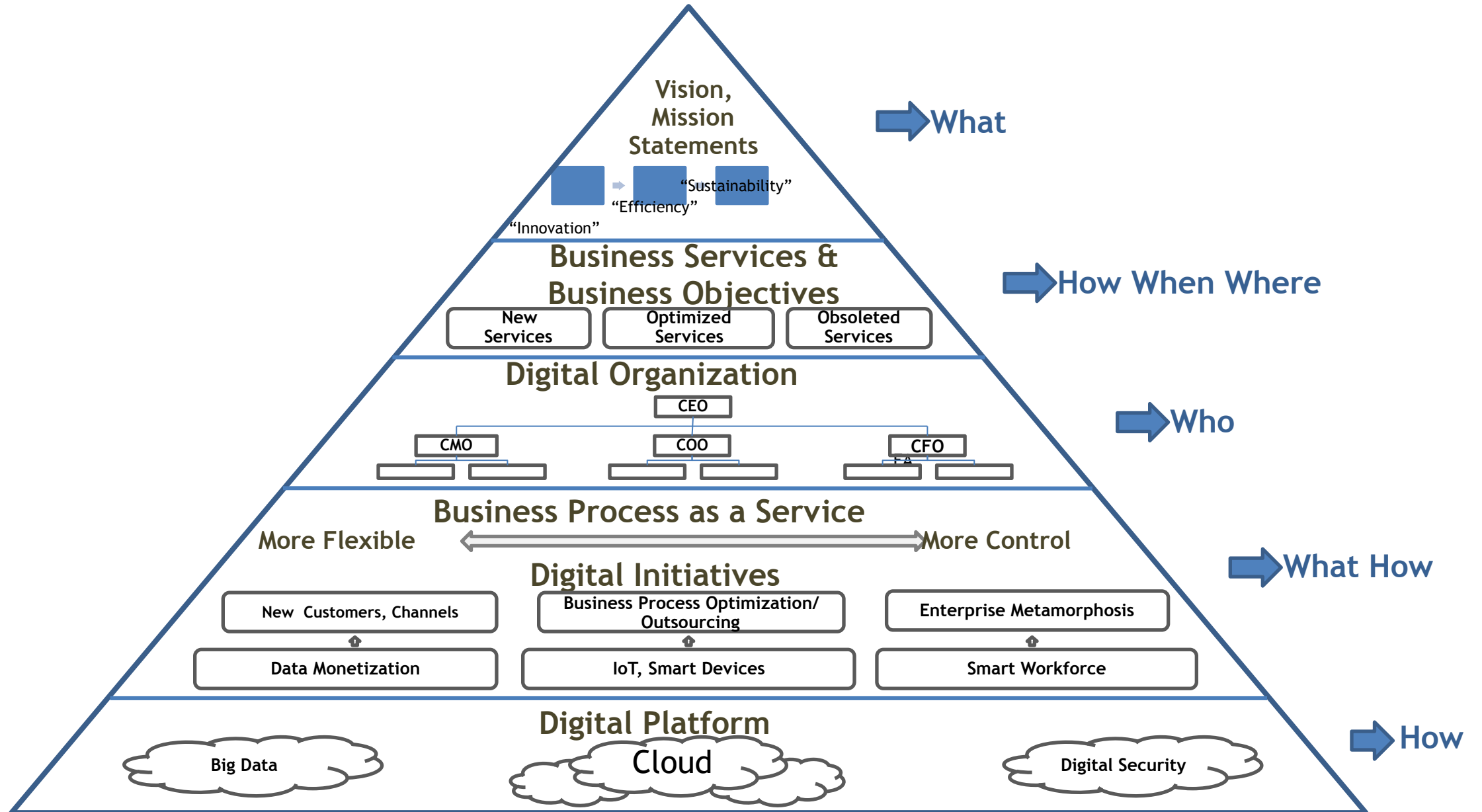
Enterprise Architecture: Zachman Framework

	Why	How	What	Where	When	Who
Contextual	Business Drivers, Mission Alignment	ConOps, Value Chain	List of Business Objects and Subjects	List of Locations	List of Key Business Events	List of Roles, COIs & Organization
Conceptual	Requirements, Performance Objectives, Service Descriptions	Business Services Process Flow, Process Definitions (BPMN)	ERD, Information Exchange Matrix, Business Vocabularies	Locations mapped to roles and processes	Business Domain Event Models	Mapping of roles and processes to COIs and Organization
Logical	Business Rules, Business & Technical Service Levels	Process Simulation (BPEL & UML) Use Cases (UML)	Data Flow Diagrams, Business Taxonomy, Ontology, & Semantics	Systems Architecture, Managed Services locations	Process Orchestration	User Profiles
Physical	Business Activity Monitoring	Business Process Management, COTS Applications	Data Domain Services	Infrastructure Domain Services	Business Process Management, COTS Applications	Security Domain Services (SSO)

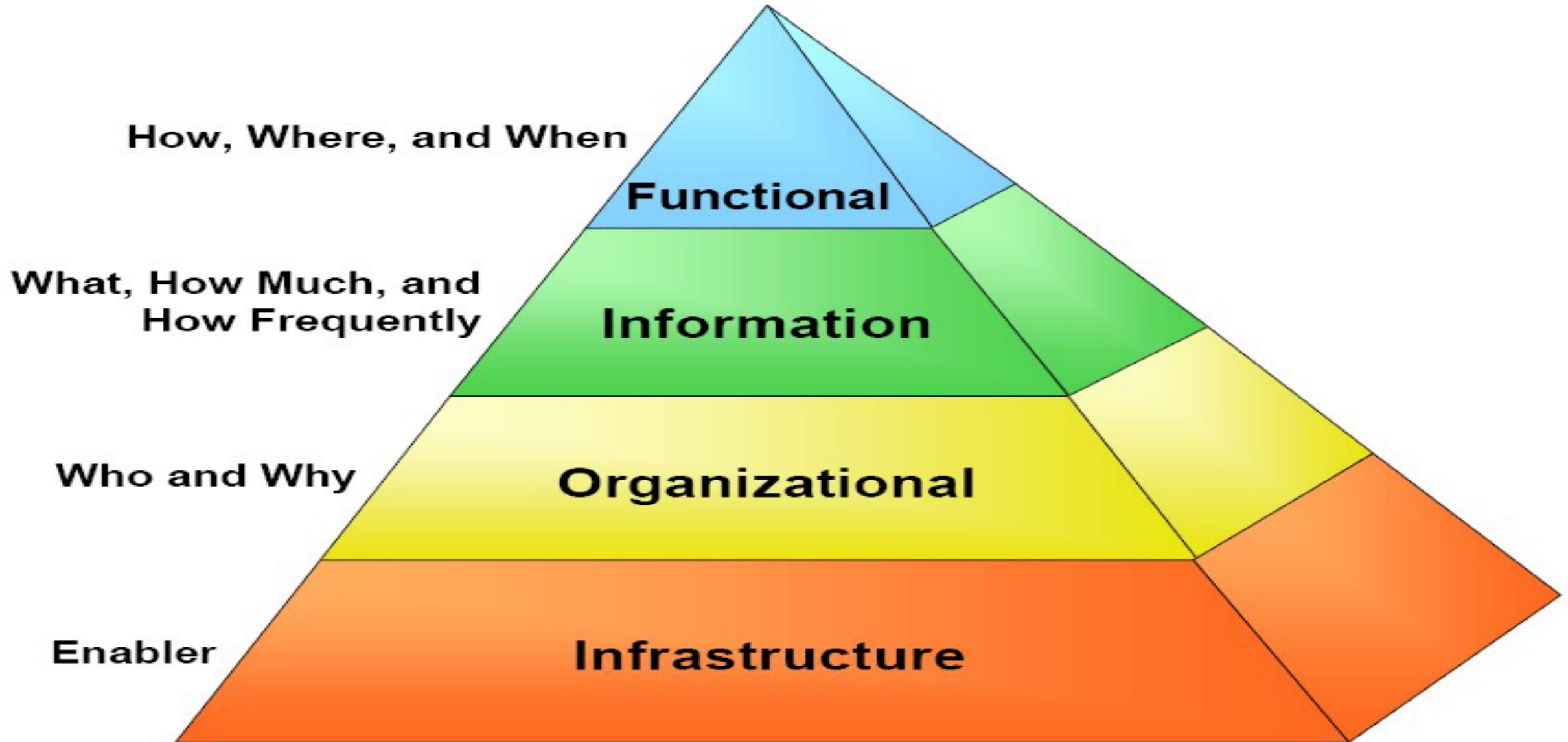
Zachman Framework

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>
Objective/Scope (contextual) <i>Role: Planner</i>	List of things important in the business	List of Business Processes	List of Business Locations	List of important Organizations	List of Events	List of Business Goal & Strategies
Enterprise Model (conceptual) <i>Role: Owner</i>	Conceptual Data/ Object Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
System Model (logical) <i>Role: Designer</i>	Logical Data Model	System Architecture Model	Distributed Systems Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
Technology Model (physical) <i>Role: Builder</i>	Physical Data/Class Model	Technology Design Model	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
Detailed Representation (out of context) <i>Role: Programmer</i>	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Speculation
Functioning Enterprise <i>Role: User</i>	Usable Data	Working Function	Usable Network	Functioning Organization	Implemented Schedule	Working Strategy

Digital Transformation Reference Model



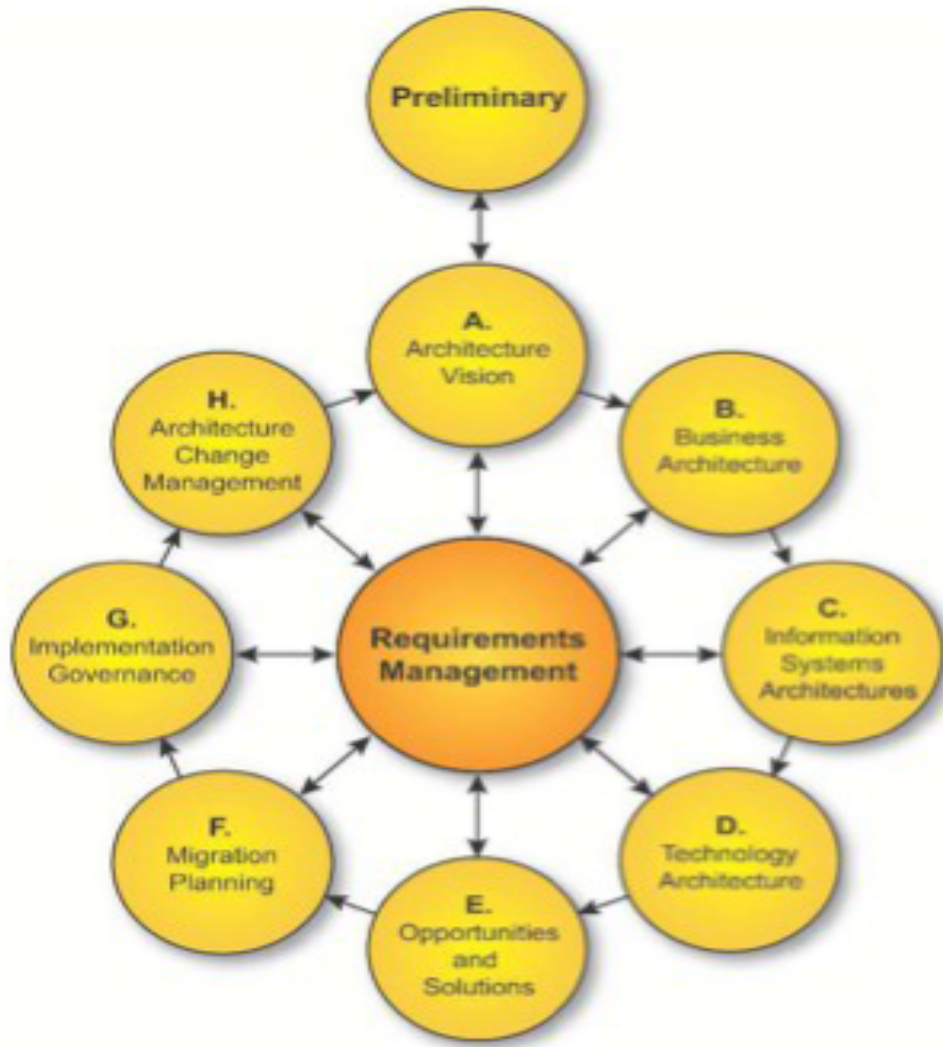
Enterprise Architecture Framework





EA : TOGAF Framework

TOGAF 9 : Using ADM



- The ADM consists of 9 phases:
 - The Preliminary Phase
 - Phase A: Architecture Vision
 - Phase B: Business Architecture
 - Phase C: Information Systems Architectures
 - Phase D: Technology Architecture
 - Phase E: Opportunities & Solutions
 - Phase F: Migration Planning
 - Phase G: Implementation Governance
 - Phase H: Architecture Change Management
 - And Requirements Management
- Each phase contains a series of steps

TOGAF Architecture Development Method

The ADM method consists of eight main phases. As preliminary work, the enterprise architecture framework and architecture principles are fixed for the effort. In the following, a short description of the phases.

A. Architecture vision is the analysis phase of EA project. The project is organized; the scope and domain requirements and constraints are stated. Business scenarios can be used for this.

B. In the Business architecture phase, the current baseline architecture is stated, target architecture is designed and a gap analysis between the two takes place.

C. Information systems architecture consists of the parts Data and Applications. For Data architecture, the types and sources of data needed in the enterprise are defined and a data model is created. A gap analysis is conducted and data model is compared with the business architecture. As to the applications, the applications needed to meet the specified business requirements and data model are turned into an applications architecture and are checked back with the business architecture.

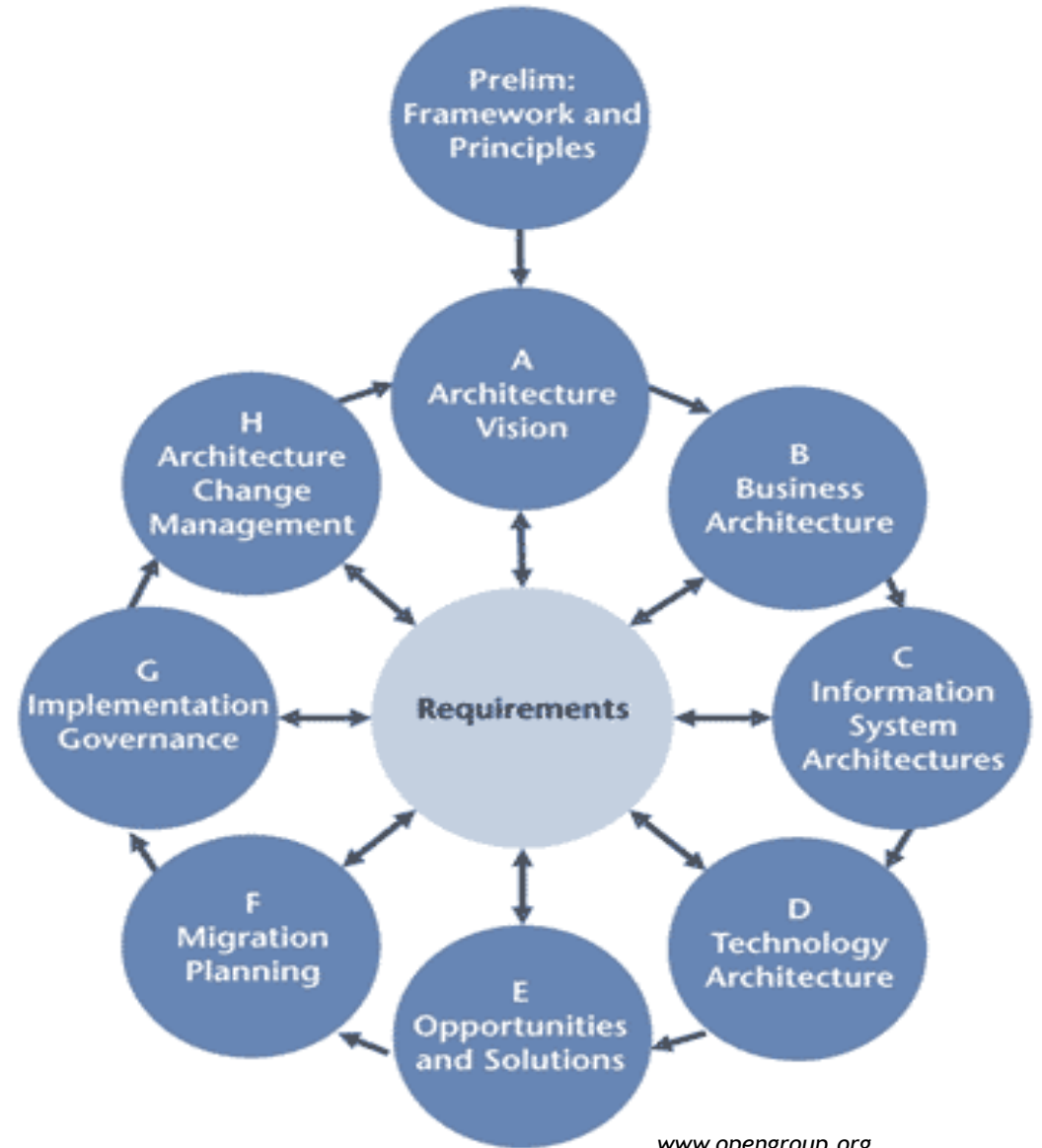
D. For Technology architecture, the previous phases deliver inputs. In this phase, a baseline architecture is stated, and the target technology architecture is designed.

E. Opportunities and solutions is the evaluation phase, where the solutions are selected.

F. Migration planning is the point for checking dependencies in the environment and preparing for implementation of the target architecture.

G. Implementation and Governance is about the administration of implementation and deployment phase of the development project.

H. Architecture change management is the maintenance phase. A new baseline is created and changes in business environment are monitored as well as new technology opportunities.



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C. Information systems architecture consists of the parts Data and Applications. For Data architecture, the types and sources of data needed in the enterprise are defined and a data model is created. A gap analysis is conducted and data model is compared with the business architecture. As to the applications, the applications needed to meet the specified business requirements and data model are turned into an applications architecture and are checked back with the business architecture.

D. For Technology architecture, the previous phases deliver inputs. In this phase, a baseline architecture is stated, and the target technology architecture is designed.

E. Opportunities and solutions is the evaluation phase, where the solutions are selected.

F. Migration planning is the point for checking dependencies in the environment and preparing for implementation of the target architecture.

G. Implementation and Governance is about the administration of implementation and deployment phase of the development project.

H. Architecture change management is the maintenance phase. A new baseline is created and changes in business environment are monitored as well as new technology opportunities.

TOGAF 9 Components

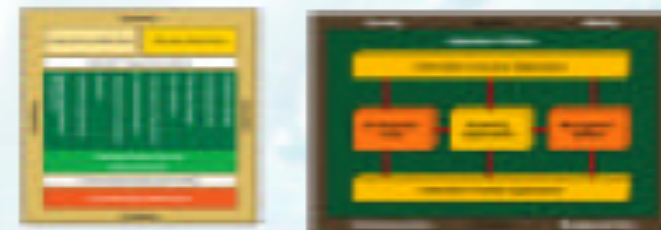
ADM



Architecture Content Framework



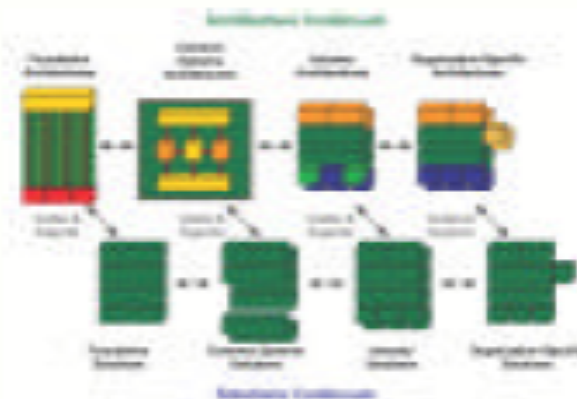
Reference Models



ADM Guidelines & Techniques



Enterprise Continuum



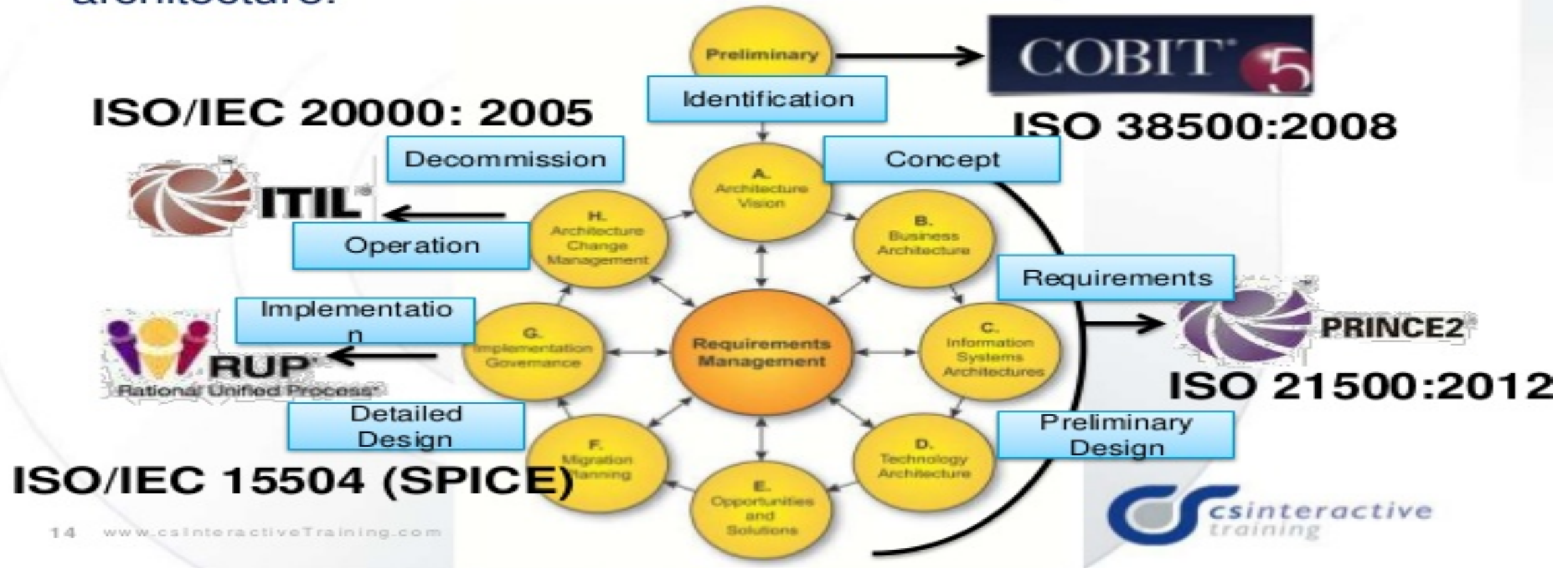
Architecture Capability Framework



TOGAF w. other management frameworks

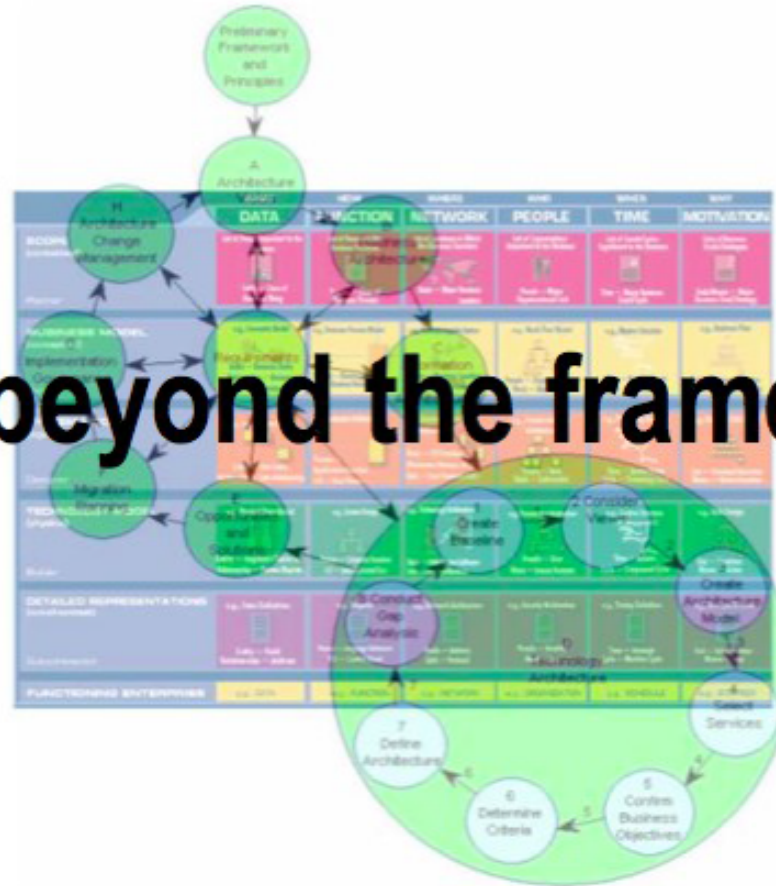
The Open Group Architecture Framework (TOGAF) aligned with other management frameworks

- The Architecture Development Method (ADM) is an iterative approach to planning, designing, realising, and governing the architecture.



Which framework to use ?

look beyond the framework





CONTENT

- Enterprise Architecture over the age
- Enterprise Architecture Framework
 - Zachman
 - Togaf
- Enterprise Architecture reference model

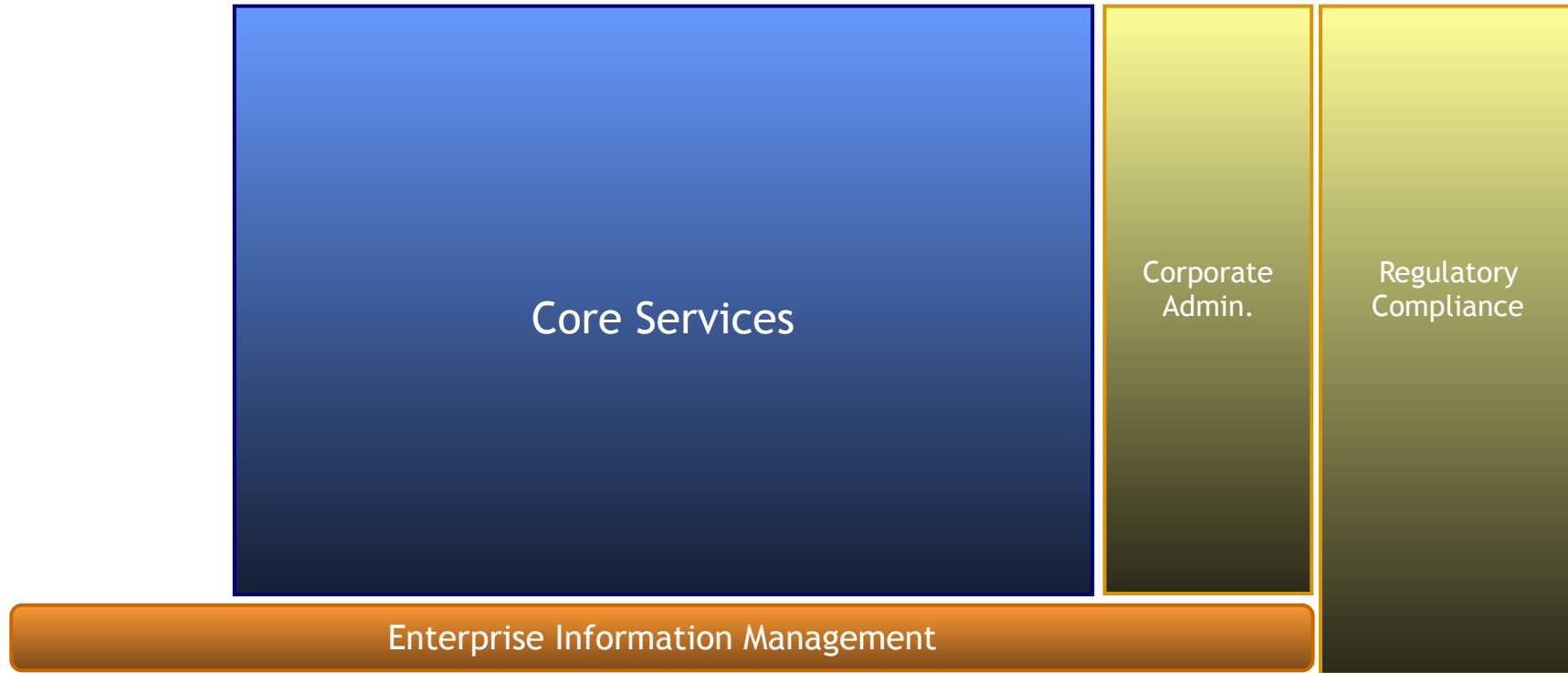
The Enterprise Reference Model



The Enterprise Reference Model



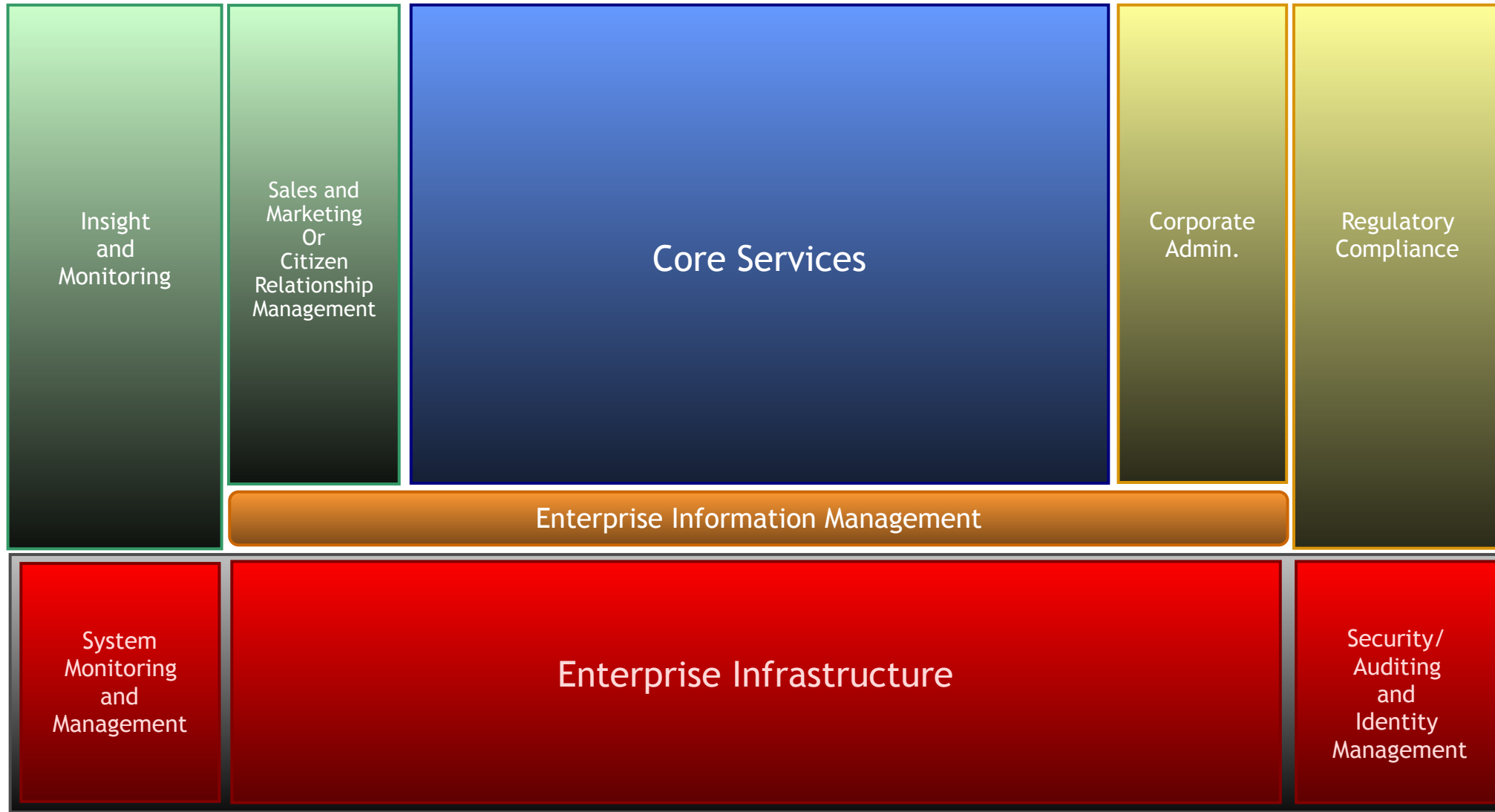
The Enterprise Reference Model



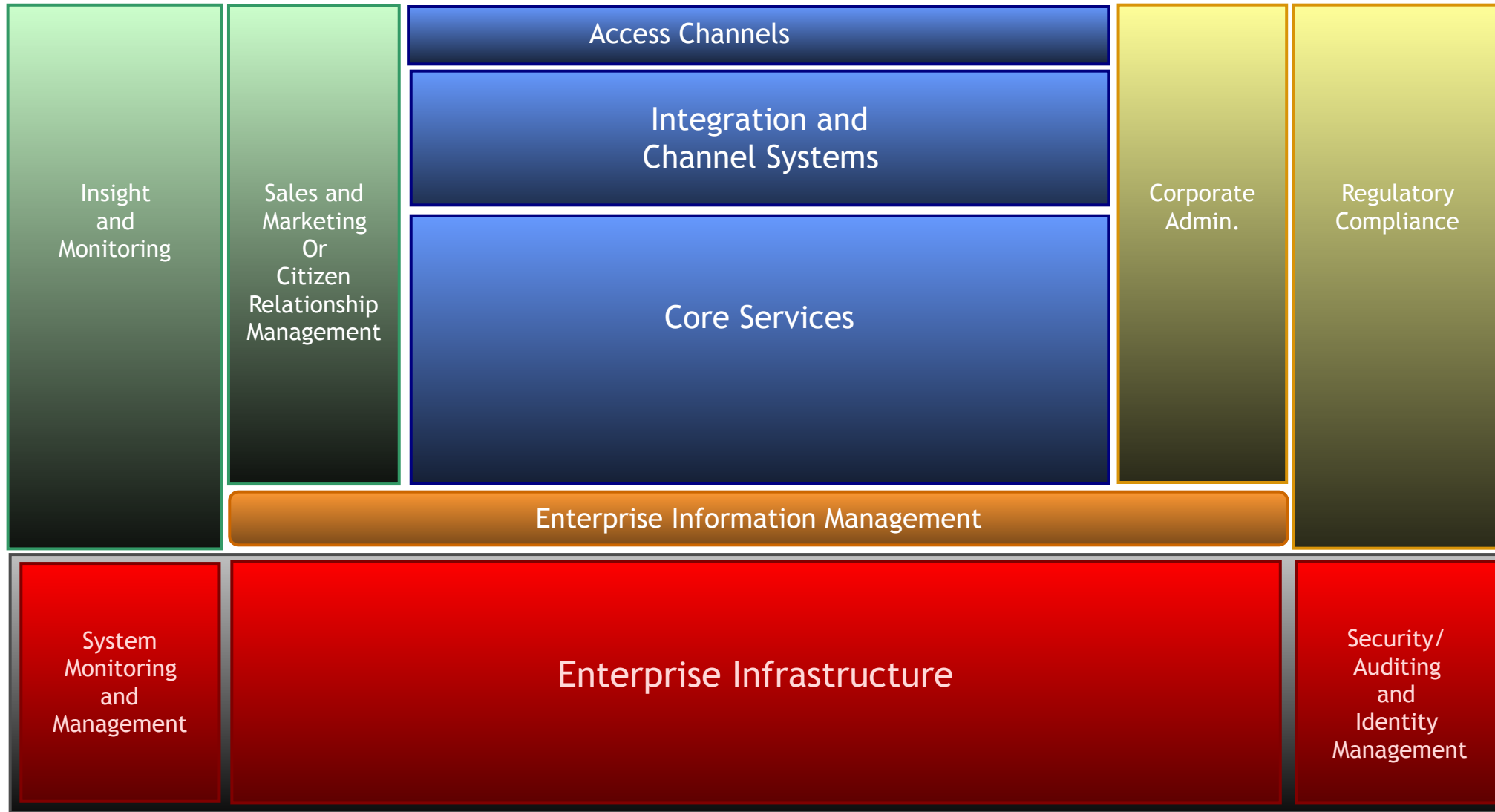
The Enterprise Reference Model



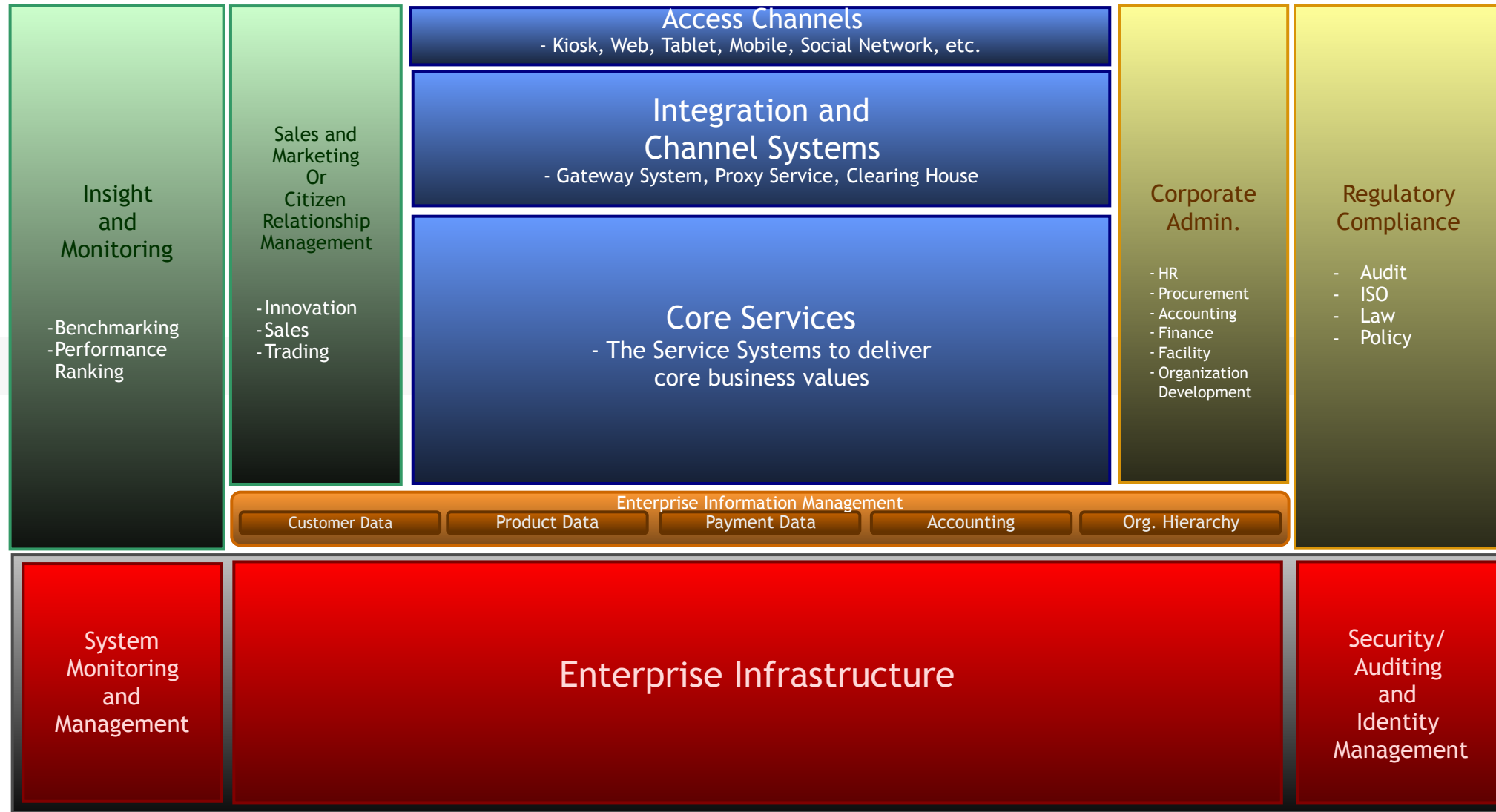
The Enterprise Reference Model



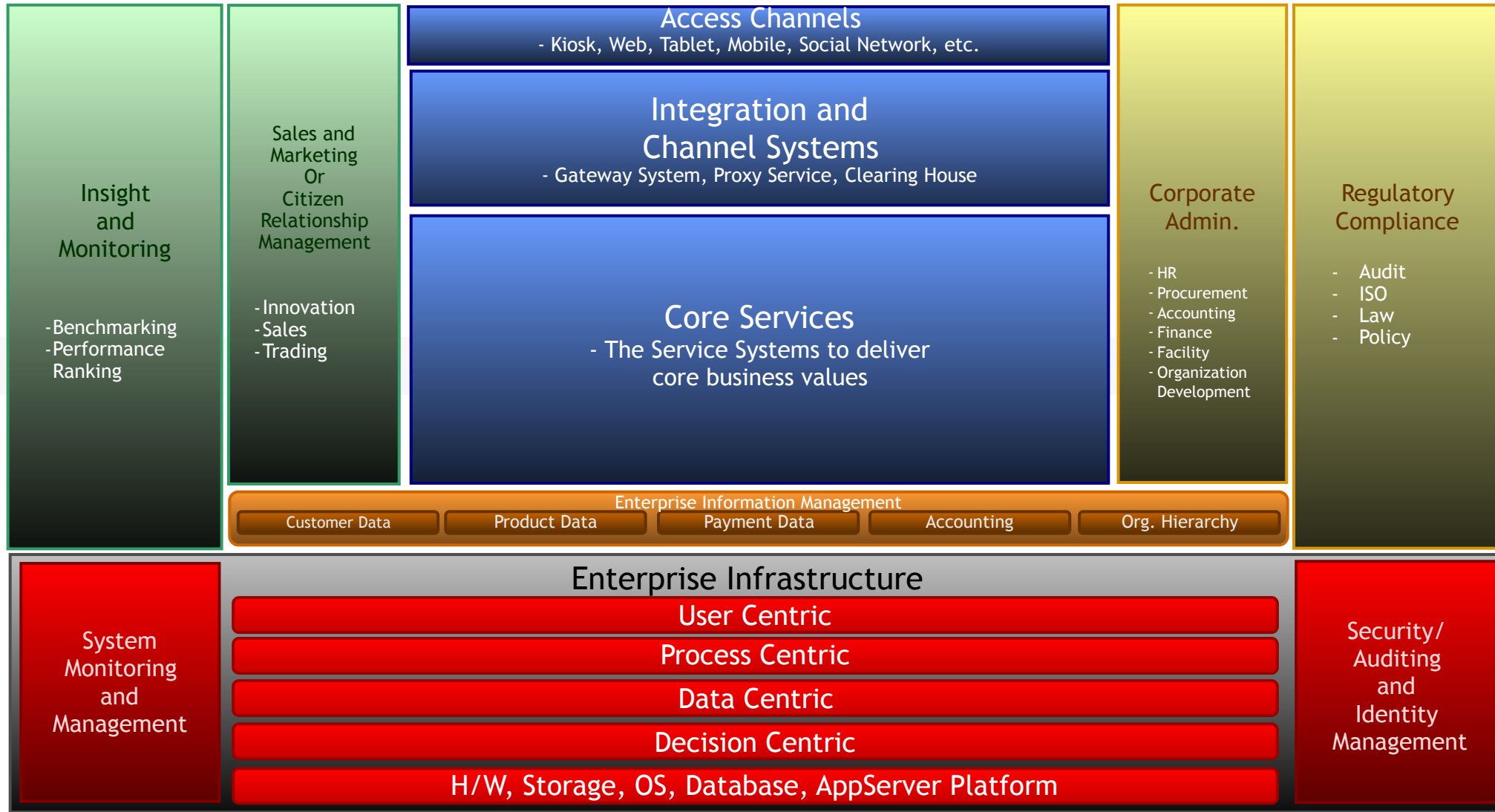
The Enterprise Reference Model



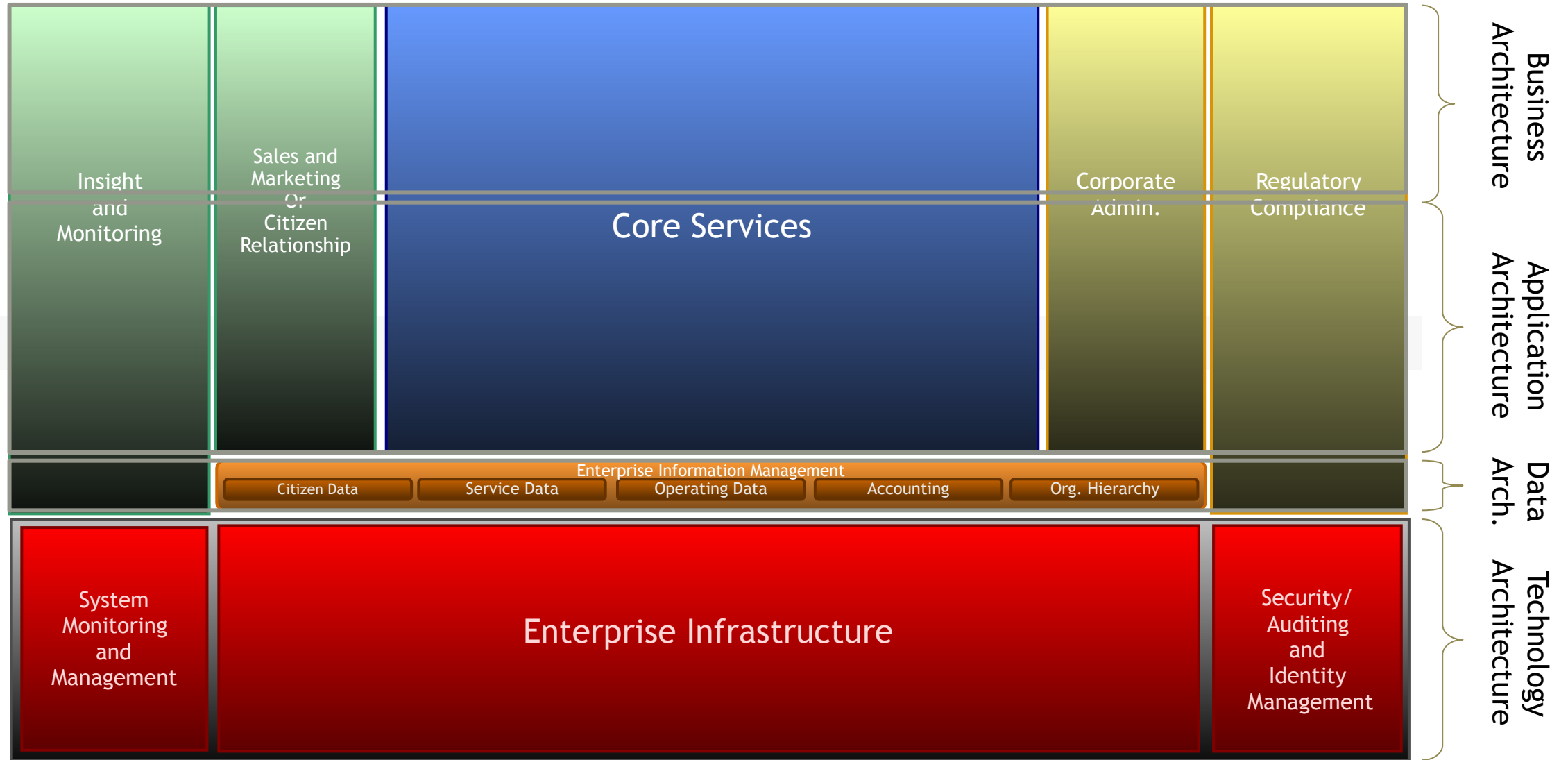
The Enterprise Reference Model



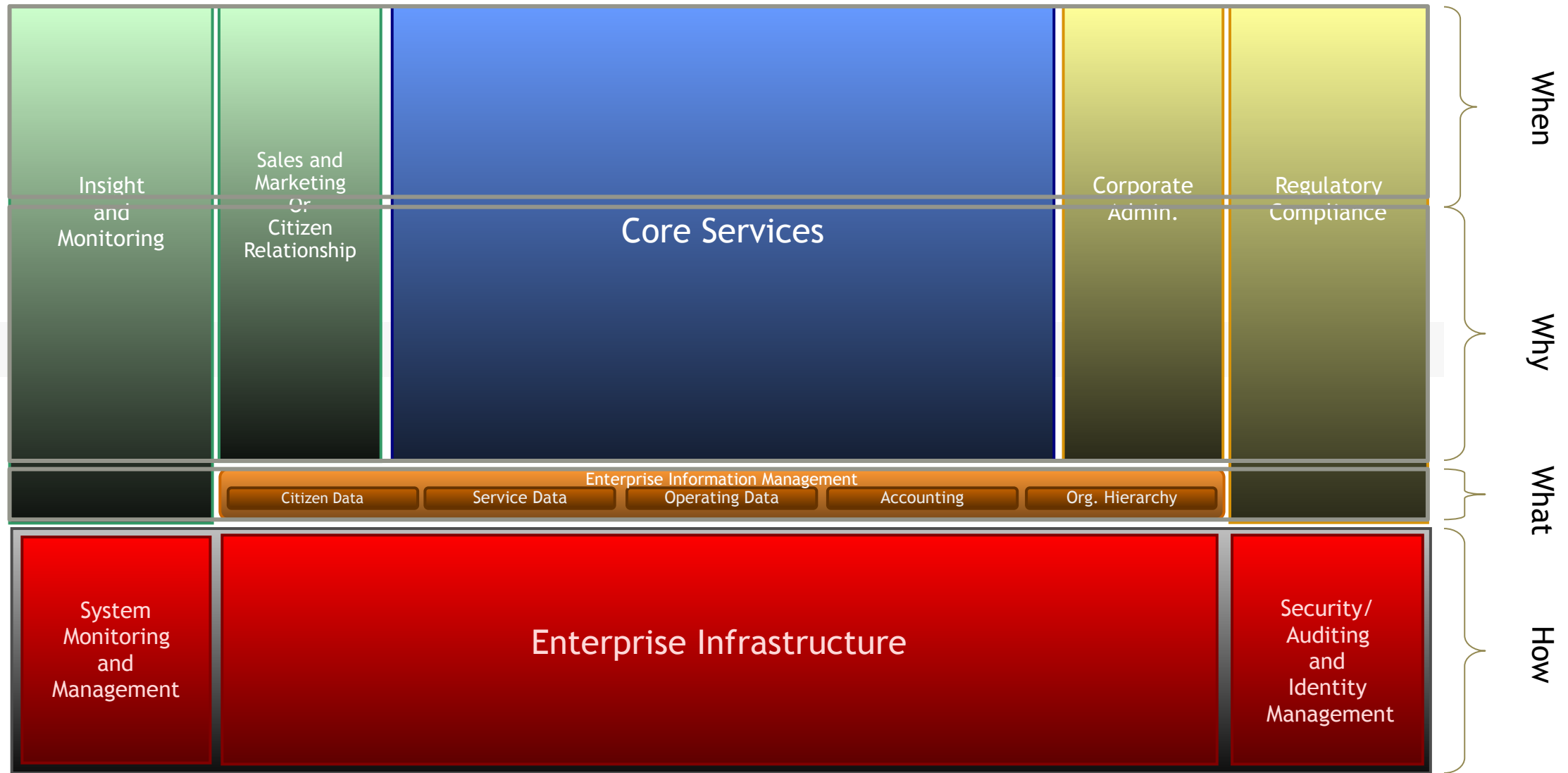
The Enterprise Reference Model



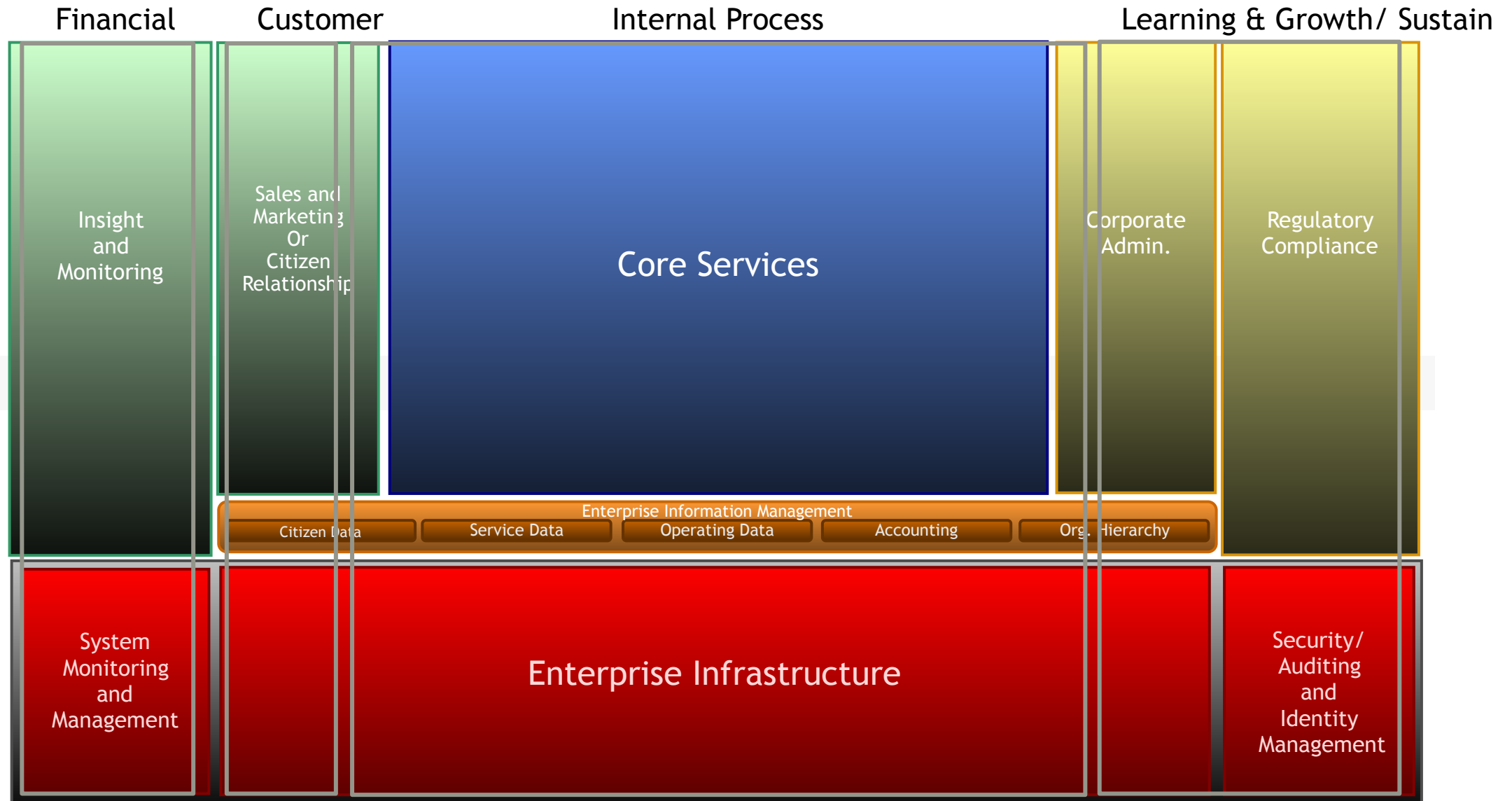
The Enterprise Reference Model with TOGAF



The Enterprise Reference Model with Zachman

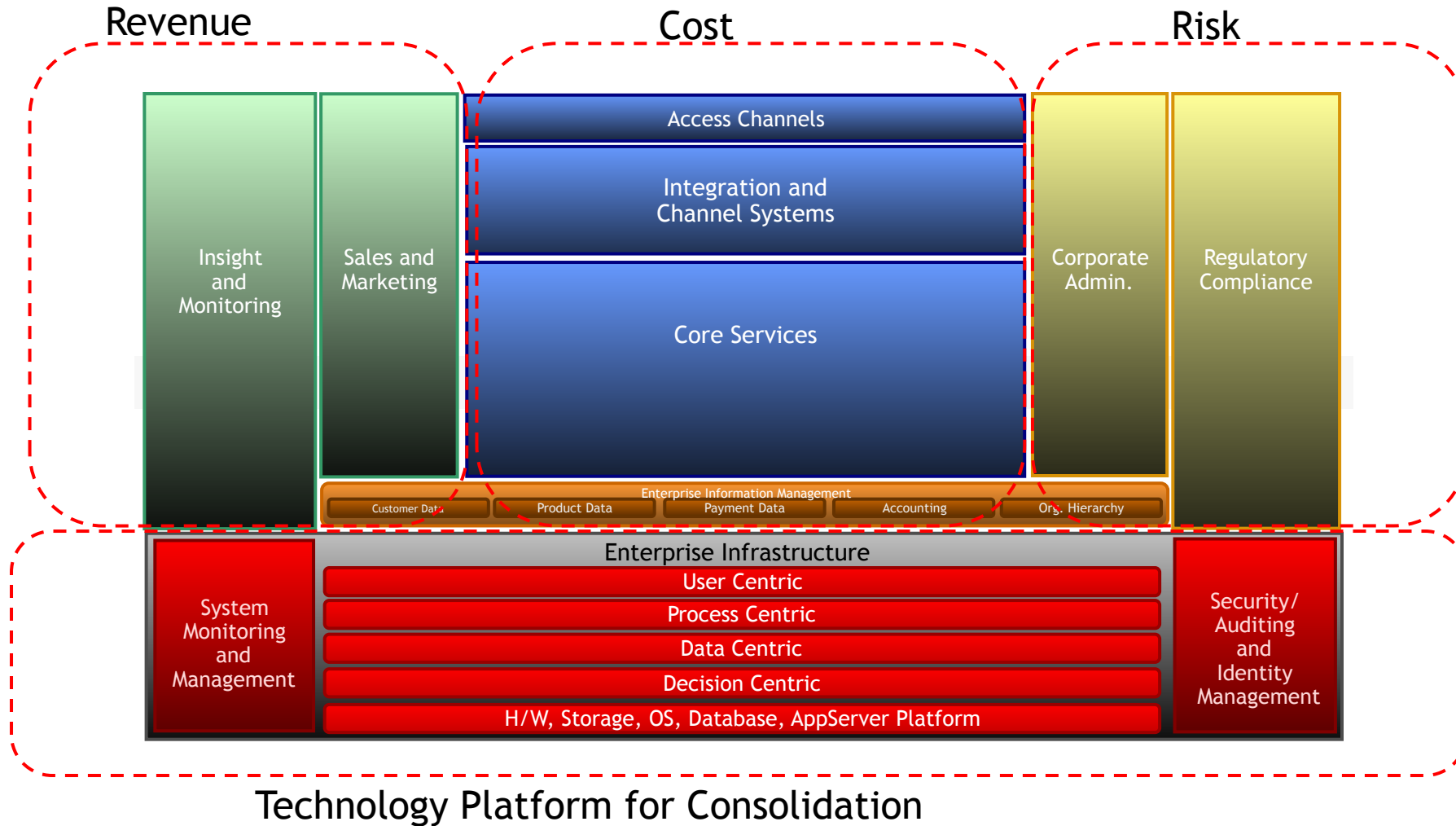


The Enterprise Reference Model with Balanced Score Card



The Enterprise Reference Model

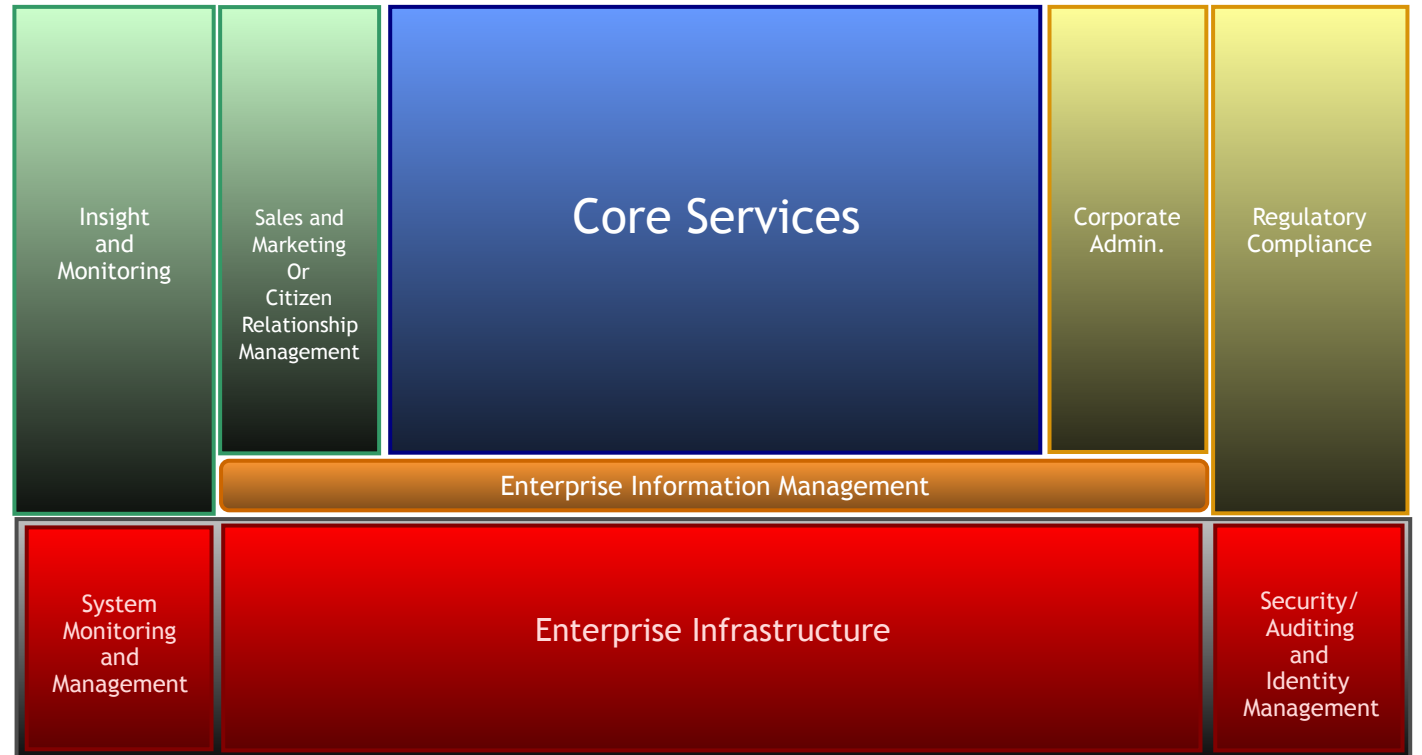
Three Pillars of Organization and Technology Platform



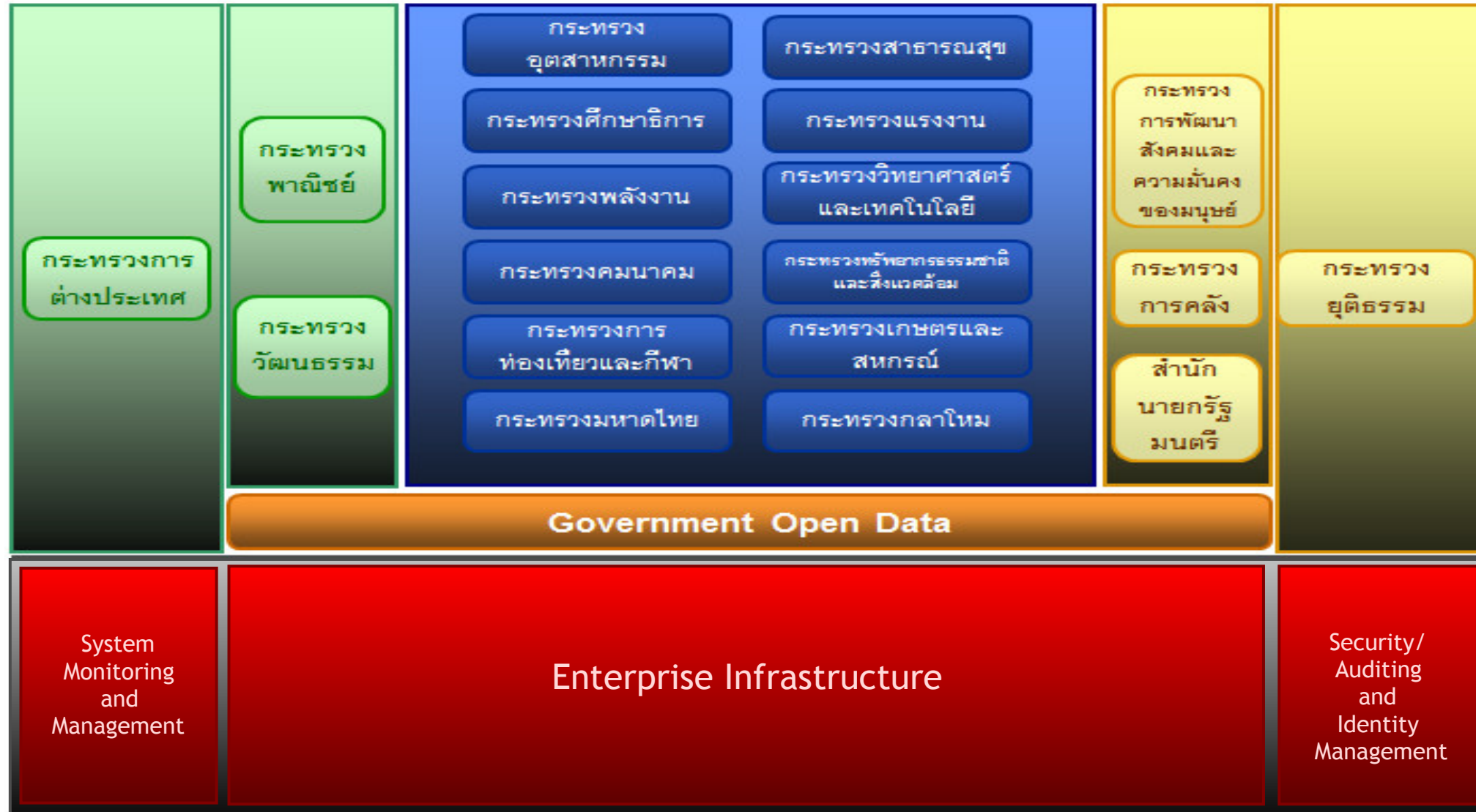
Enterprise Reference Model (ERM)

ERM ช่วยทำให้การมองภาพระหว่าง Business และ IT มีความสอดคล้องกัน

1. มองเห็นกระบวนการทำงานทางธุรกิจได้อย่างครอบคลุมและเป็นระบบ
2. มองเห็นความสอดคล้องระหว่างธุรกิจกับ IT ได้ในระดับ Strategic View
3. สามารถวางระบบ IT ให้สอดคล้องกับธุรกิจ
4. เป็นจุดเริ่มต้นของการทำรายละเอียดในขั้นตอนต่อไป

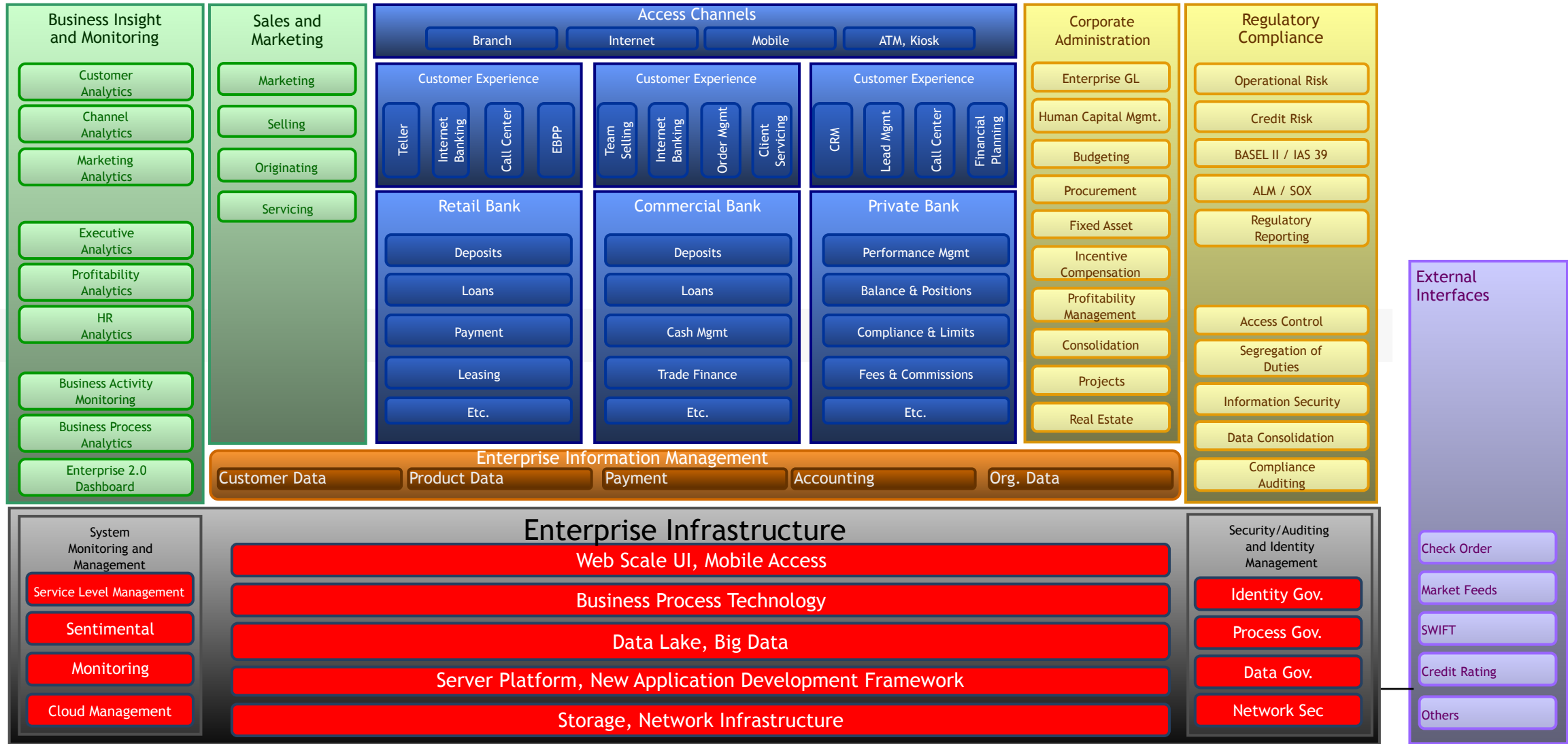


Government Reference Model

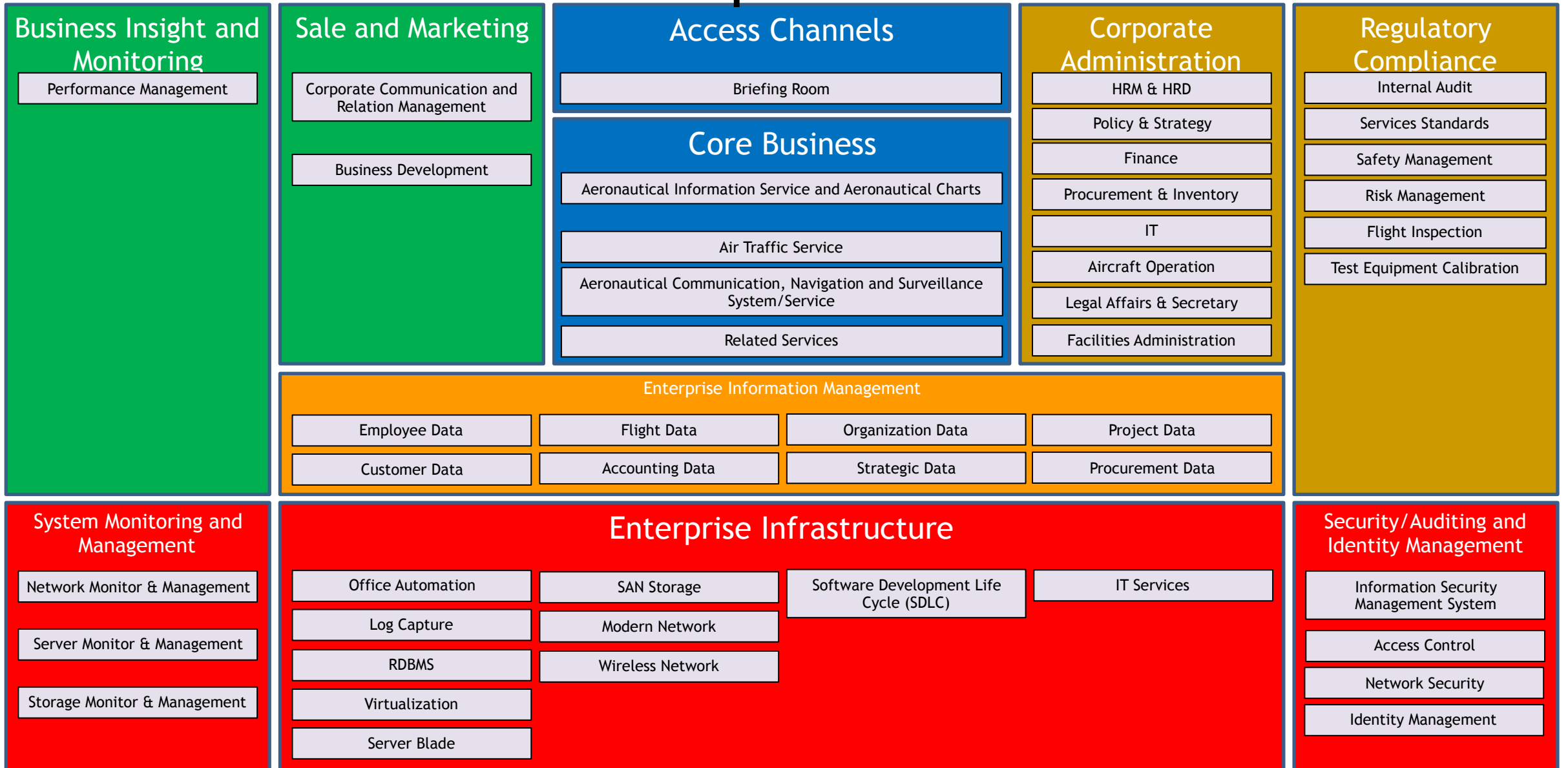


Banking Reference Model

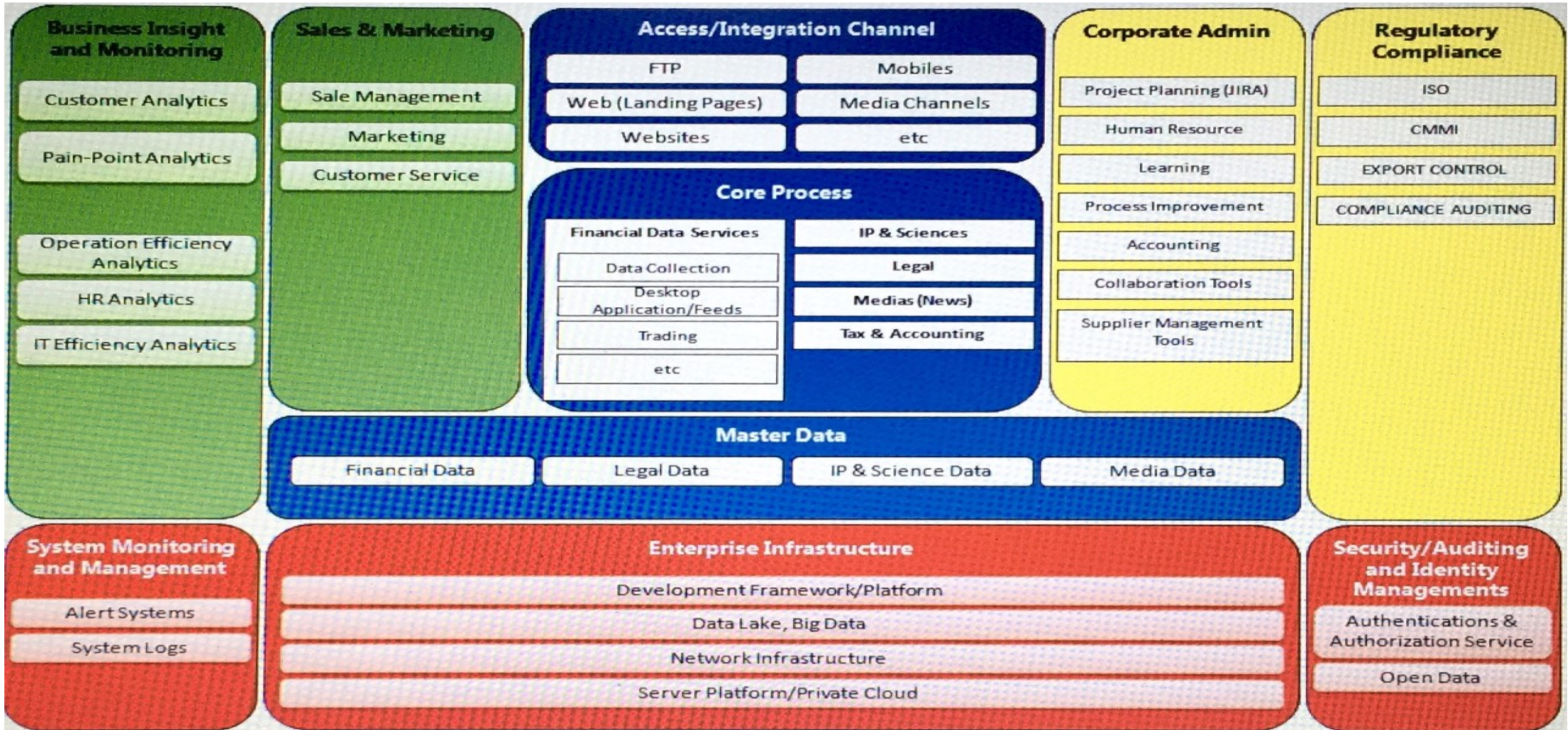
Agile, Secure and Standard Platform



Aeronautical Enterprise Reference Model

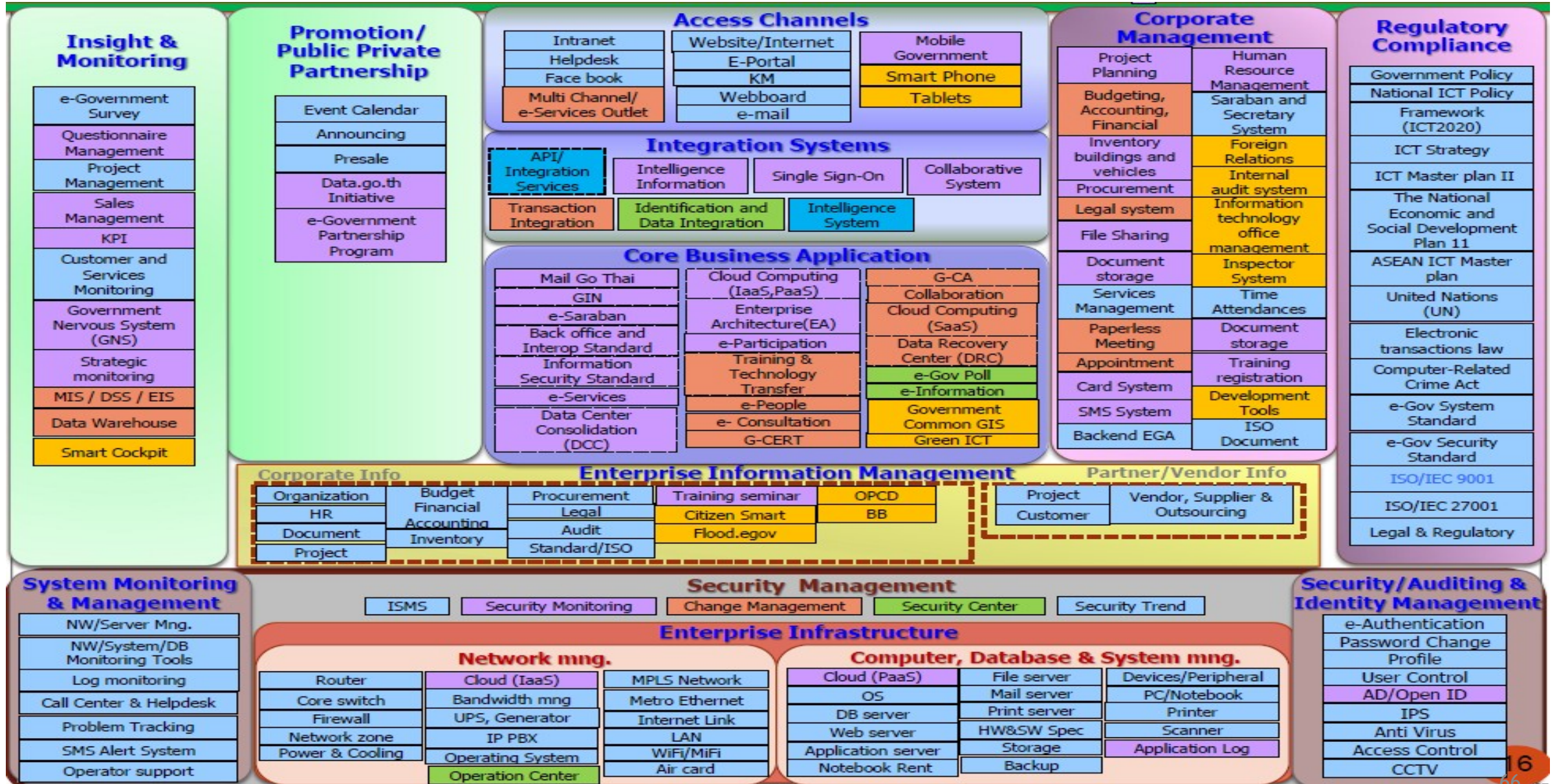


Trading Enterprise Reference Model



Sample Enterprise Reference Model

Current
 56
 58
 Continue
 55
 57
 Future



Digital Transformation Master Plan

Standardization & Optimization

Growth

Initiatives	Projects	2016		2017		2018		2019	
		H1	H2	H1	H2	H1	H2	H1	H2
Executive Intelligence and external integration	Data Interoperability	→			→				
	Information Service for Business Partner	→			→				
Dev Stabilization	DevOps Standards	→							
Business Process Optimization & Application Consolidation	Identify Processes and PMO	→				→			
	Core Processes Optimization		→		→		→		
	Applications Consolidation		→		→		→		
	Open Data for PPP			→		→			
	Business Intelligence		→		→				
Digital Platform	Cloud, Big Data Platform		→		→		→		
	Governance Framework	→							
	Social Integration		→		→				
	Network and Office Automation				→		→		



Group Workshop - The Current State Enterprise Reference Model

Write down your
existing enterprise architecture
foot print

Team Name: xxx

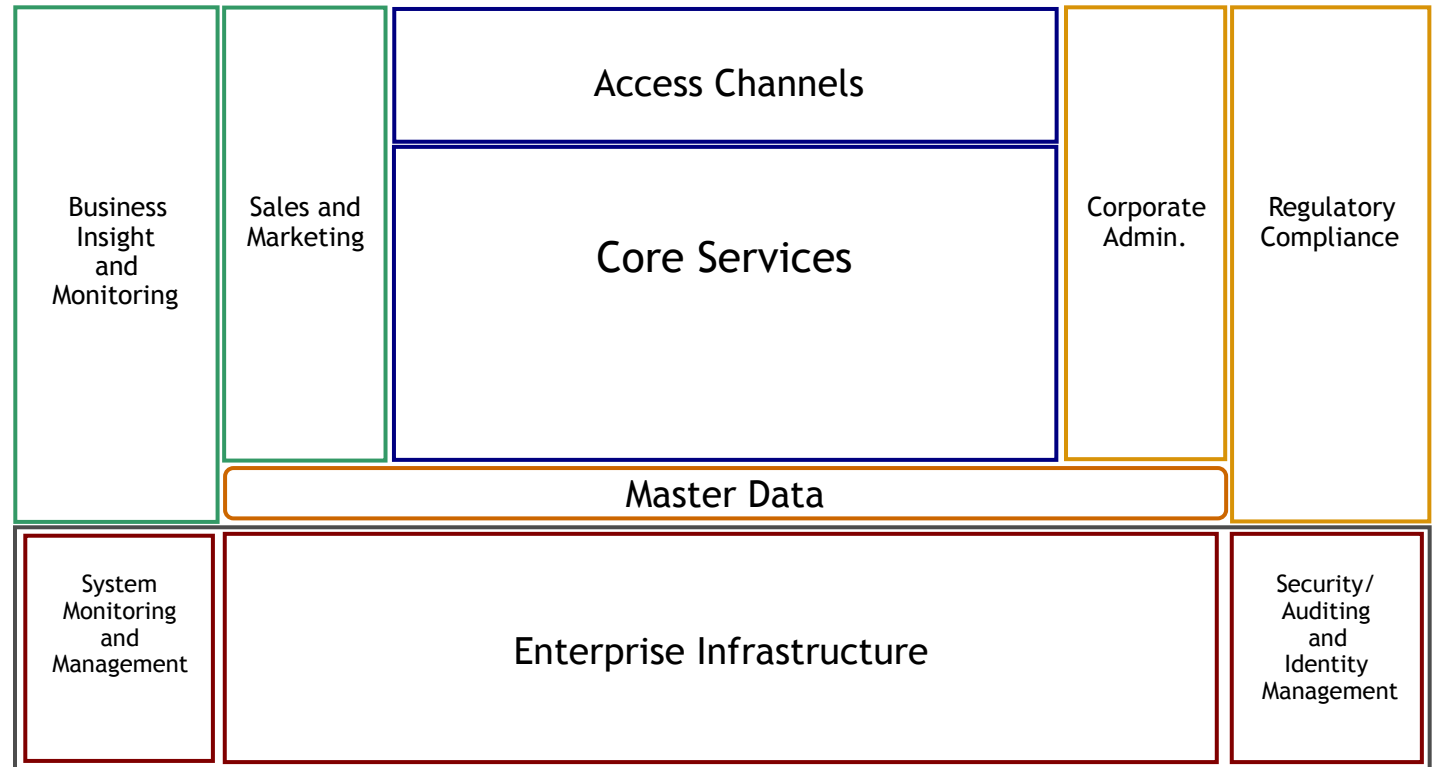
1. Name, Company, E-mail

2. Name, Company, E-mail

3. Name, Company, E-mail

4. Name, Company, E-mail

Enterprise Reference Model



Group Workshop - The Future State Enterprise Reference Model

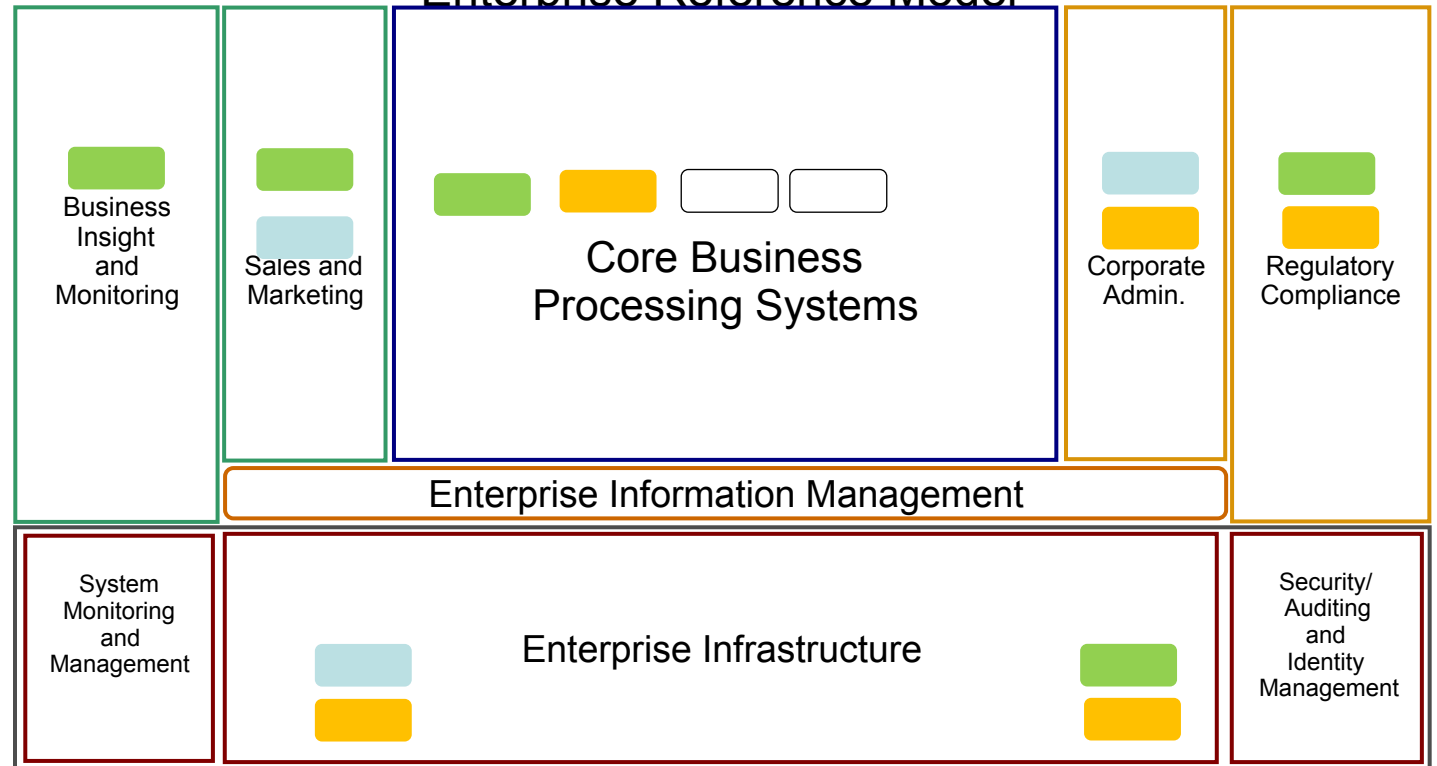
Write down your future state

Team Name: xxx

1. Name, Company, E-mail
2. Name, Company, E-mail

3. Name, Company, E-mail
4. Name, Company, E-mail

Enterprise Reference Model



	New
	Changed
	Retired
	Unchanged

Enterprise Architecture Repository

Owner: Technology Unit

Applications

#	Application Name	Owner	High Level Application Flow with User (SOD) Roles Partitioning (please attach up-to-date document)	Application Integration Details (Online/Batch) to which systems	Data Required	Current Issues	Remarks

Owner: Business Unit

Data

#	Master Data Name	Owner	Description	Change Control of master data (Y/N)	Sample of data structure if any	Current Issues	Ramarks



Thank you very much