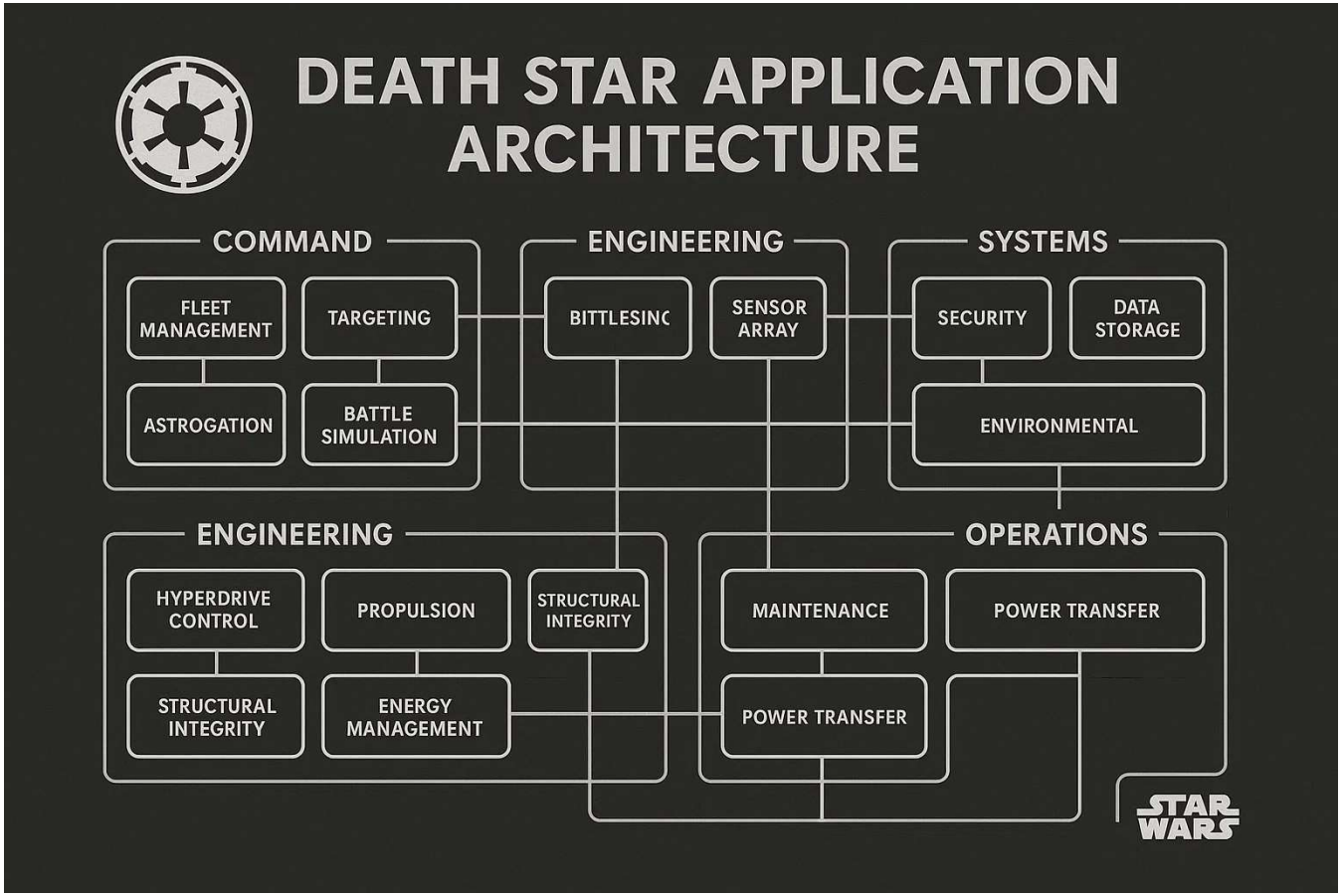
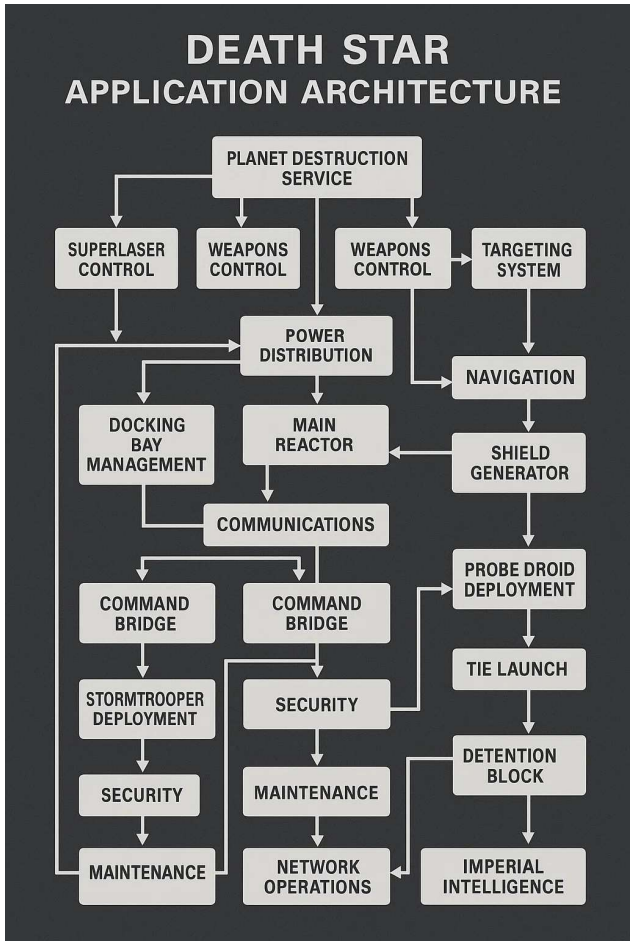




Pictures created by https://sora.chatgpt.com/

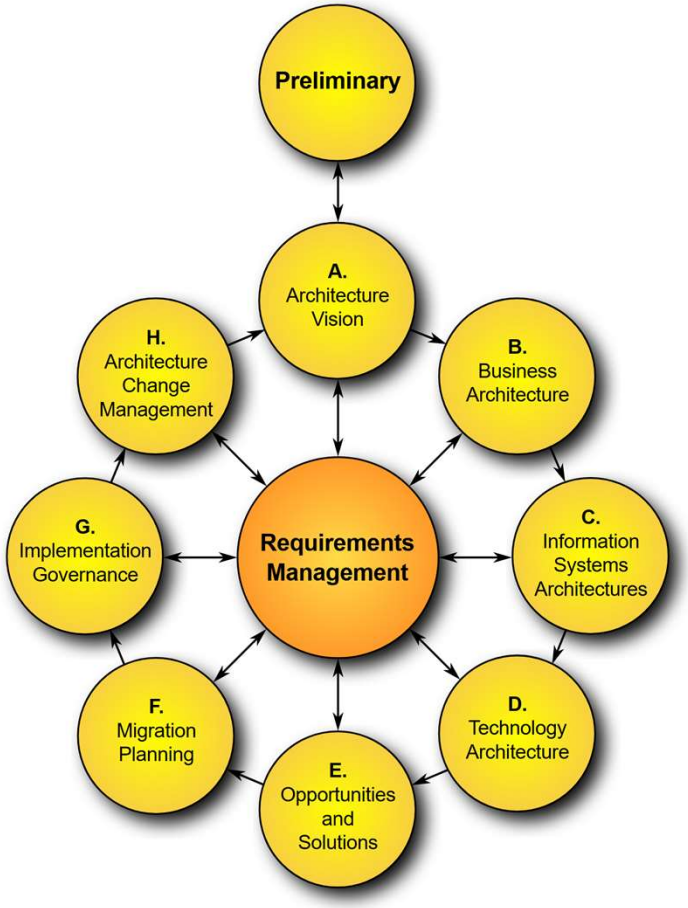
APPLICATION ARCHITECTURE

Prof. Dr. Norbert Frick

ORGANIZATIONAL REMINDER

Lecture Date	Lecture Schedule	Exercise Date (MS Teams Meetings)	Deliverables (due 23:59)
16.04.2025	Introduction to the course **(online, VoD)**	Bonus exercise	22.04.
23.04.2025	IT Strategy/ Strategic & Operational IT Management	25.04.	29.04.
30.04.2025	Architecture Management	02.05.	06.05.
07.05.2025	Business Architecture **(online, VoD)**	09.05.	13.05.
14.05.2025	Requirements Engineering 1/2	16.05.	20.05.
21.05.2025	IT Outsourcing **(Guest lecture)**	23.05.	27.05.
28.05.2025	Requirements Engineering 2/2	30.05.	03.06.
04.06.2025	Application Architecture	06.06.	17.06.
11.06.2025	**NO LECTURE!!!**	no exercise	---
18.06.2025	IT Service Management **(online, VoD)**	20.06.	01.07.
25.06.2025	**NO LECTURE!!!**	no exercise	---
02.07.2025	IT Security **(Guest lecture)**	05.07.	09.07.
09.07.2025	IT Project & Program Management	11.07.	15.07.
16.07.2025	Recap & Exam preparation	no exercise	---
13.08.2025	**EXAM** ***(13:00-14:30, rooms tbd)***		
tbd	**RETRY EXAM** ***(??:00-??:00, room tbd)***		

RECAP: TOGAF - ADM



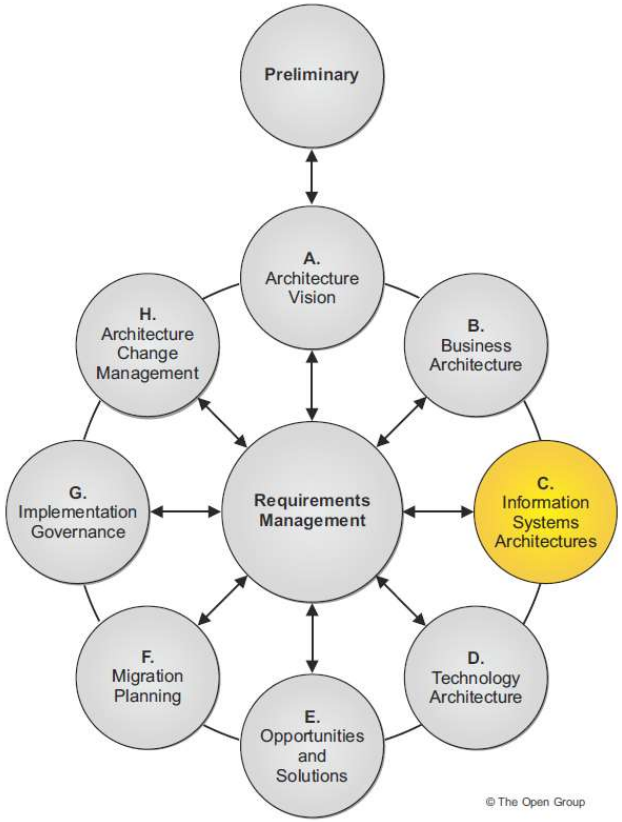
RECAP: ADM - INFORMATION SYSTEMS ARCHITECTURE

Objectives

- Develop the Target Application Architecture that enables the Business Architecture and the Architecture Vision, in a way that addresses the Statement of Architecture Work and stakeholder concerns
- Identify candidate Architecture Roadmap components based upon gaps between the Baseline and Target Application Architectures

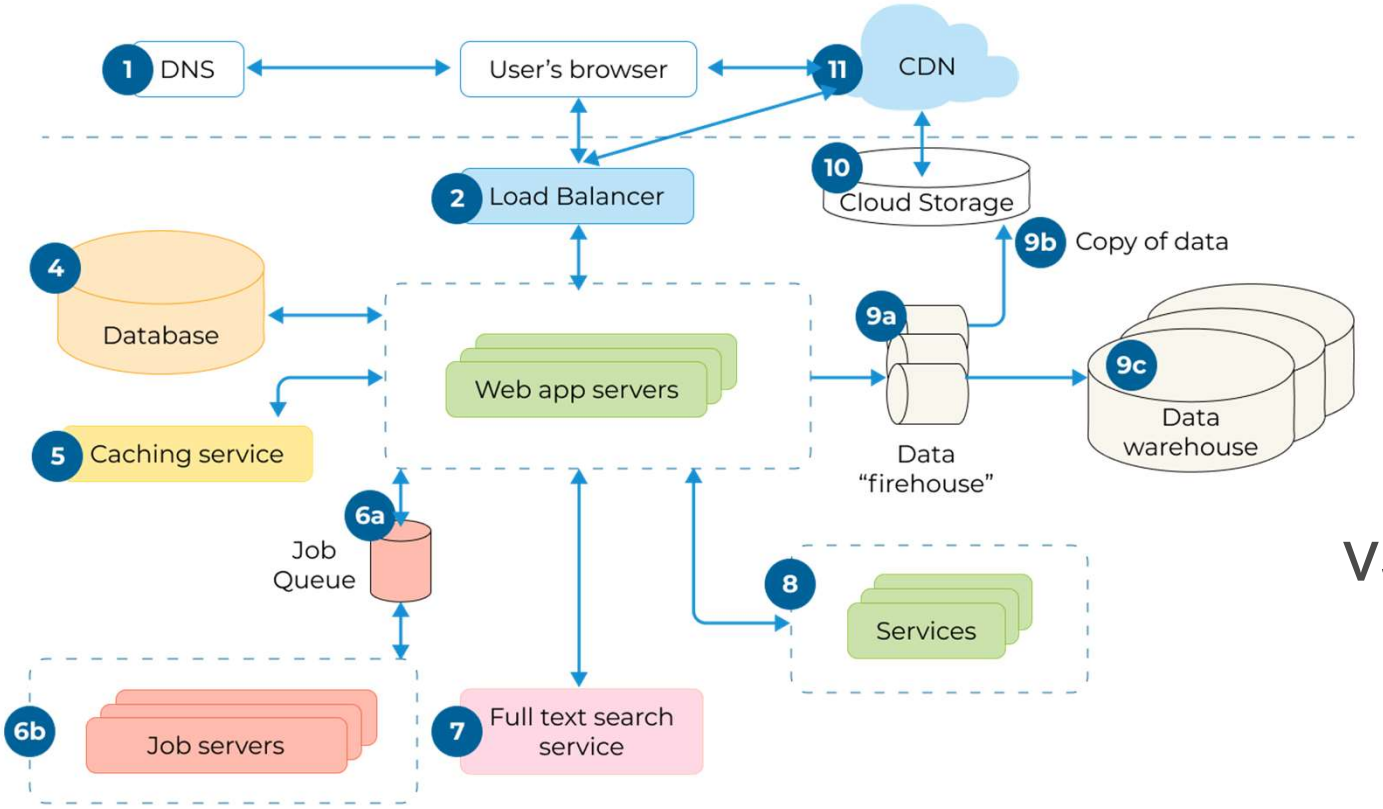
Output

- Refined and updated versions of the Architecture Vision phase deliverables, where applicable:
  - Statement of Architecture Work
  - Validated application principles, or new application principles
- Draft Architecture Definition Document including:
  - Baseline Application Architecture, Approved, if appropriate
  - Target Application Architecture, Approved
  - Views corresponding to the selected viewpoints, addressing key stakeholder concerns
- Draft Architecture Requirements Specification including such Application Architecture requirements as:
  - Gap analysis results
  - Applications interoperability requirements
  - Relevant technical requirements that will apply to this evolution of the architecture development cycle
  - Constraints on the Technology Architecture about to be designed
  - Updated business requirements, if appropriate
  - Updated data requirements, if appropriate
- Application Architecture components of an Architecture Roadmap



Quelle: The Open Group, TOGAF Standard, Document Number: C220, TOGAF 10

WHAT IS AN APPLICATION ARCHITECTURE? 1/3



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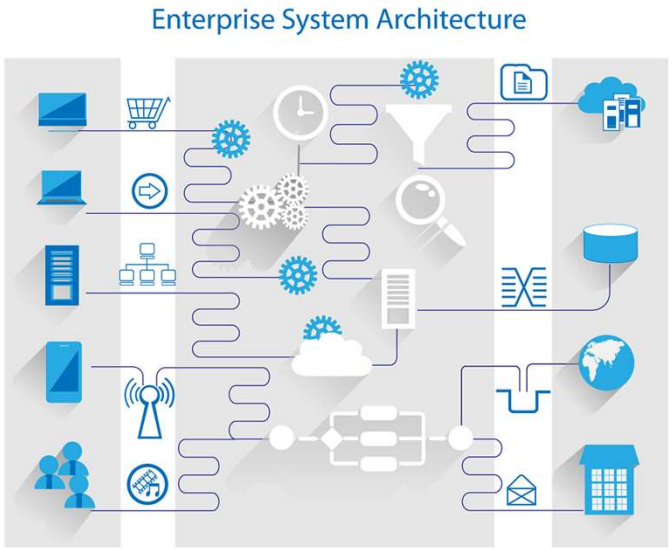
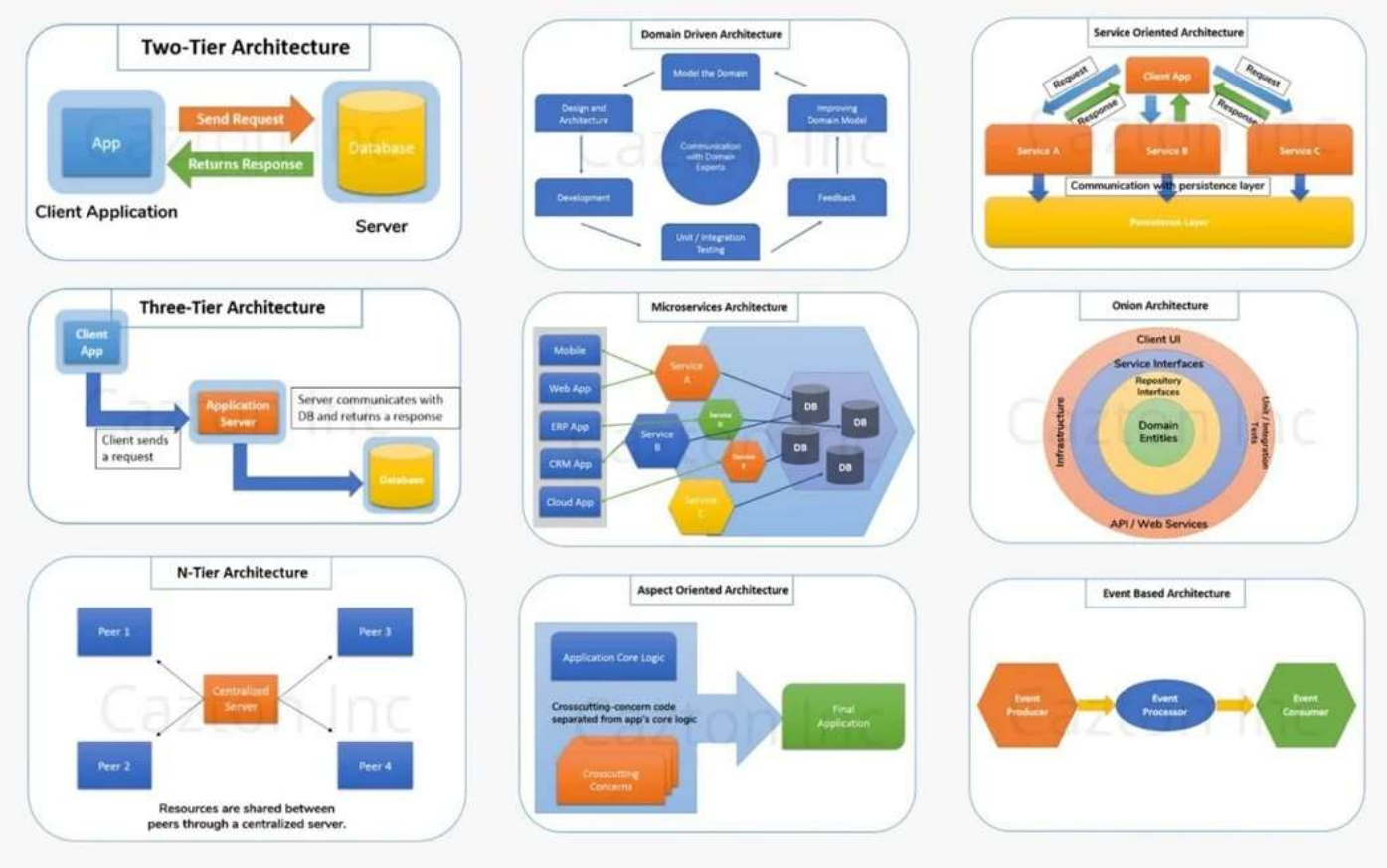
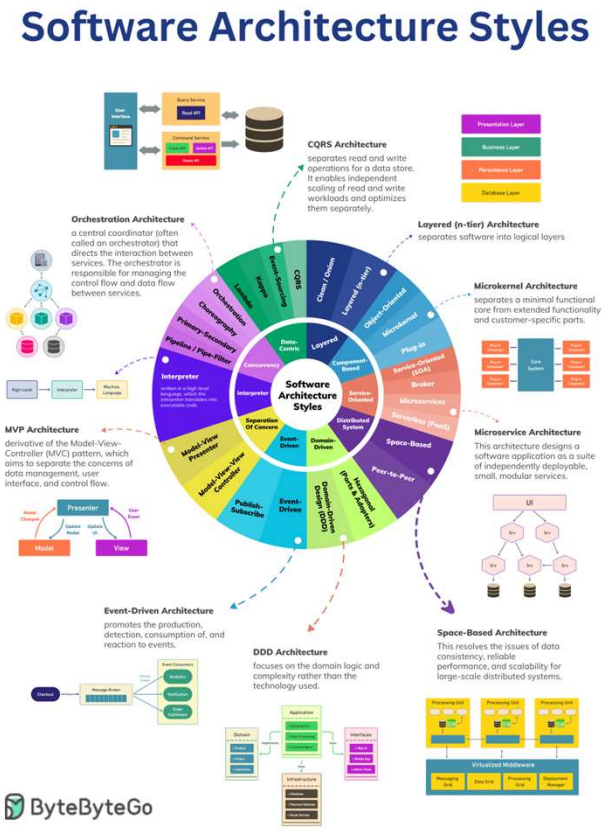


Source: https://litslink.com/blog/web-application-architecture

WHAT IS AN APPLICATION ARCHITECTURE? 2/3





Source: https://cazton.com/consulting/enterprise/software-architecture

Source: https://bytebytego.com/guides/software-architecture/

WHAT IS AN APPLICATION ARCHITECTURE? 3/3

In TOGAF (The Open Group Architecture Framework), "Application Architecture" refers to the structured approach to designing and implementing software applications within an organization, ensuring they align with business needs and interact effectively with other systems. It's about defining the "what, why, who, and how" of applications, including their structure, functionality, and integration with other IT and business components.

Source: https://en.wikipedia.org/wiki/The_Open_Group_Architecture_Framework

CASE: E-COMMERCE PLATFORM “GLOBALSHOP”

It’s an online retail system with various components that support different business functions across the organization.

Your job as an IT-architect is to help GLOBALSHOP to do a transformation to a more sophisticated IT-environment!

IT'S ALL ABOUT DOCUMENTATION

Picture created by https://sora.chatgpt.com/

APPLICATION ORGANIZATION MATRIX

The Application Organization Matrix is a two-dimensional table that depicts the relationships between applications and organizational units within an enterprise. This matrix helps identify which applications are used by which departments, enabling architects to:

- Track ownership and usage of applications across the organization
- Identify applications that support multiple departments
- Determine if any organizational units lack necessary application support
- Define application sets used by particular organization units

Applications / Organization Units	Sales & Marketing	Customer Service	Warehouse & Logistics	IT Department	Finance Department
E-commerce Web Portal	✓	✓		✓	
Customer Relationship Management	✓	✓			
Inventory Management System			✓	✓	
Payment Processing System	✓			✓	✓
Order Management System	✓	✓	✓		
Business Intelligence Platform	✓			✓	✓

APPLICATION ROLE MATRIX

The Application Role Matrix depicts the relationships between applications and business roles that use them within the enterprise. This matrix helps:

- Map applications to specific roles
- Understand application security requirements
- Support gap analysis to determine whether any applications are missing
- Define the application set used by particular roles

Applications / Roles	Customer	Sales Manager	Customer Service Rep	Warehouse Manager	System Admin	Finance Manager
E-commerce Web Portal	✓	✓	✓		✓	
Customer Relationship Management		✓	✓			
Inventory Management System				✓	✓	
Payment Processing System	✓				✓	✓
Order Management System		✓	✓	✓		
Business Intelligence Platform		✓			✓	✓

APPLICATION FUNCTION MATRIX

The Application Function Matrix depicts the relationship between applications and business functions within the enterprise.

This matrix enables:

- Understanding which applications support which business functions
- Determining whether there are missing applications
- Defining application sets used by particular business functions
- Revealing potential areas for application consolidation

Applications / Business Functions	Product Management	Order Processing	Customer Management	Inventory Management	Payment Processing	Marketing & Promotions
E-commerce Web Portal	✓	✓	✓		✓	✓
Customer Relationship Management			✓			✓
Inventory Management System	✓			✓		
Payment Processing System		✓			✓	
Order Management System		✓	✓	✓		
Business Intelligence Platform	✓		✓	✓	✓	✓

APPLICATION INTERACTION MATRIX

The Application Interaction Matrix depicts communications relationships between applications. This matrix:

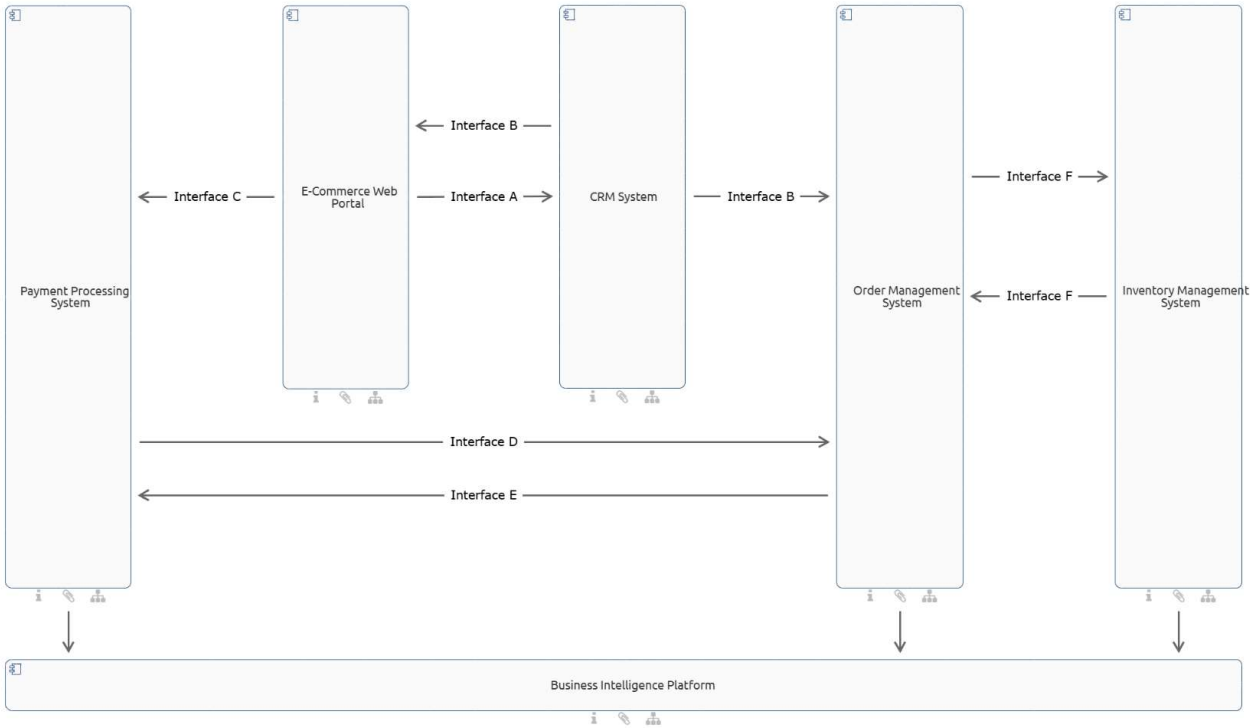
- Shows how applications exchange information
- Identifies dependencies between applications
- Helps analyze the impact of changes to applications
- Provides a matrix form equivalent of the Interface Catalog or Application Communication diagram
- Represents application services, logical application components, and physical application components on both axes

Applications	E-commerce Web Portal	CRM System	Inventory System	Payment System	Order System	BI Platform
E-commerce Web Portal	-	Sends customer data	Checks inventory	Sends payment requests	Sends orders	Sends usage data
CRM System	Gets customer orders	-	-	-	Gets order status	-
Inventory Management System	Updates stock levels	-	-	-	Updates inventory	Sends inventory data
Payment Processing System	Returns payment status	-	-	-	Sends payment confirmations	Sends transaction data
Order Management System	Updates order status	Updates customer records	Requests stock	Requests payments	-	Sends order data
Business Intelligence Platform	-	-	-	-	-	-

APPLICATION COMMUNICATION DIAGRAM

The Application Communication Diagram provides a visual representation of how applications communicate with each other. It:

- Shows application components and interfaces between components
- May associate data entities with interfaces where appropriate
- May associate business services with applications where appropriate
- Focuses on logical communication rather than technical details

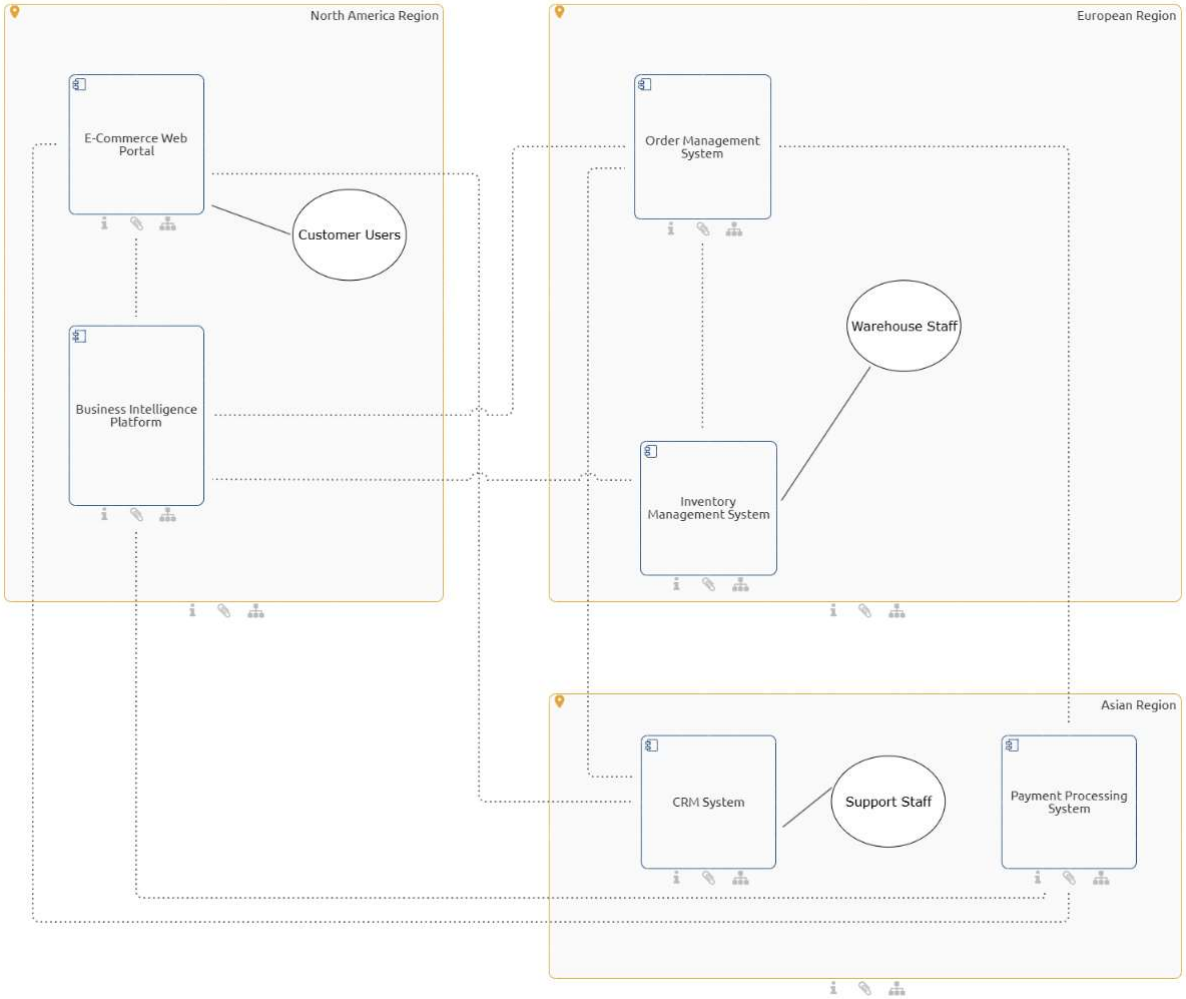


APPLICATION USER LOCATION DIAGRAM

The Application and User Location

Diagram depicts:

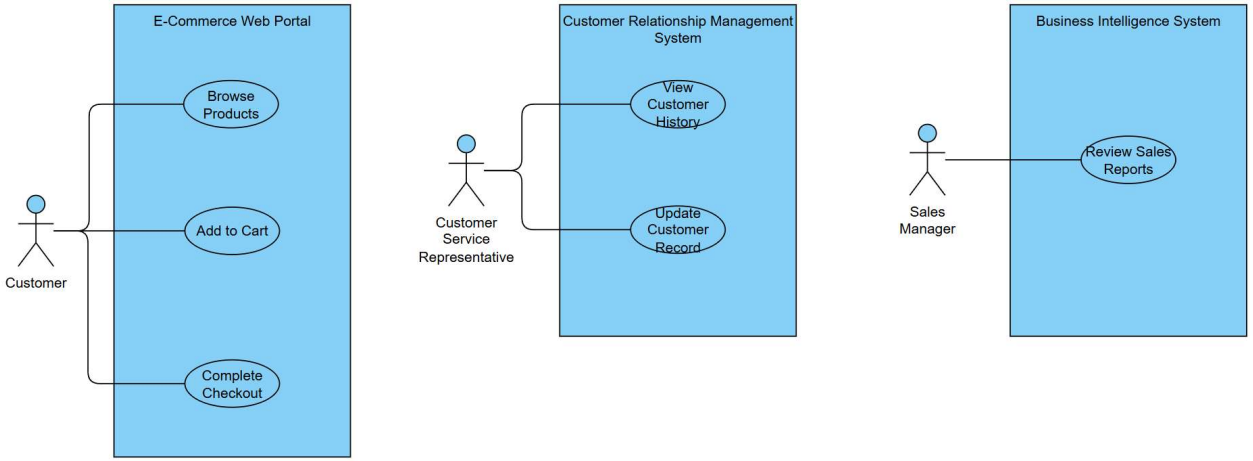
- Business locations from which users typically interact with applications
- Hosting locations of application infrastructure
- Network connections between users and applications
- Potential performance issues related to geographic distribution



USE CASE DIAGRAM

The Application Use Case Diagram displays the relationships between consumers and providers of application services. It:

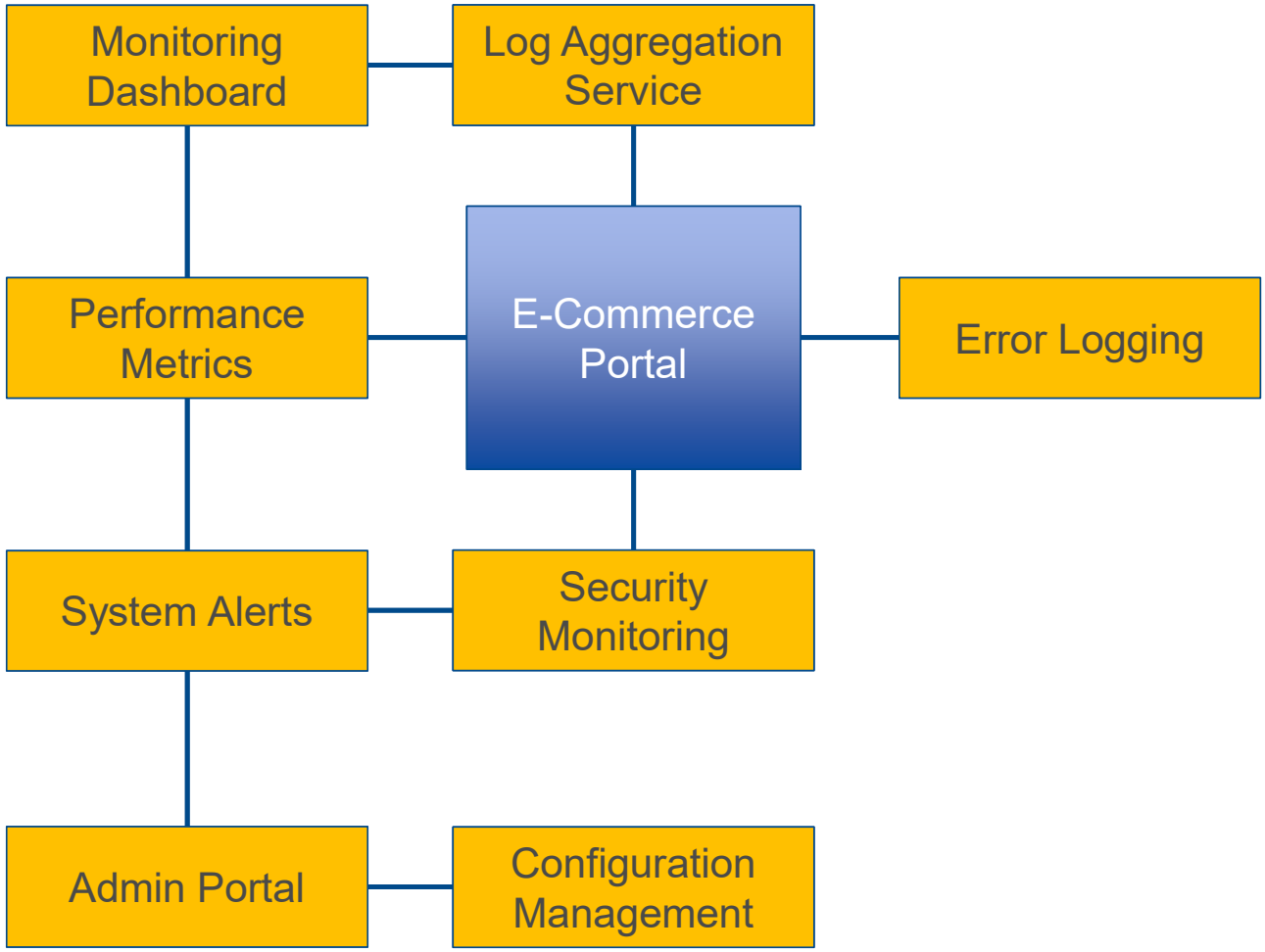
- Shows how actors use application services
- Provides added richness in describing application functionality
- Illustrates how and when application functionality is used
- Can evolve to include technical realization details
- Can be reused in more detailed systems design work



ENTERPRISE MANAGEABILITY DIAGRAM

The Enterprise Manageability Diagram shows how applications interact with components that support operational management. It:

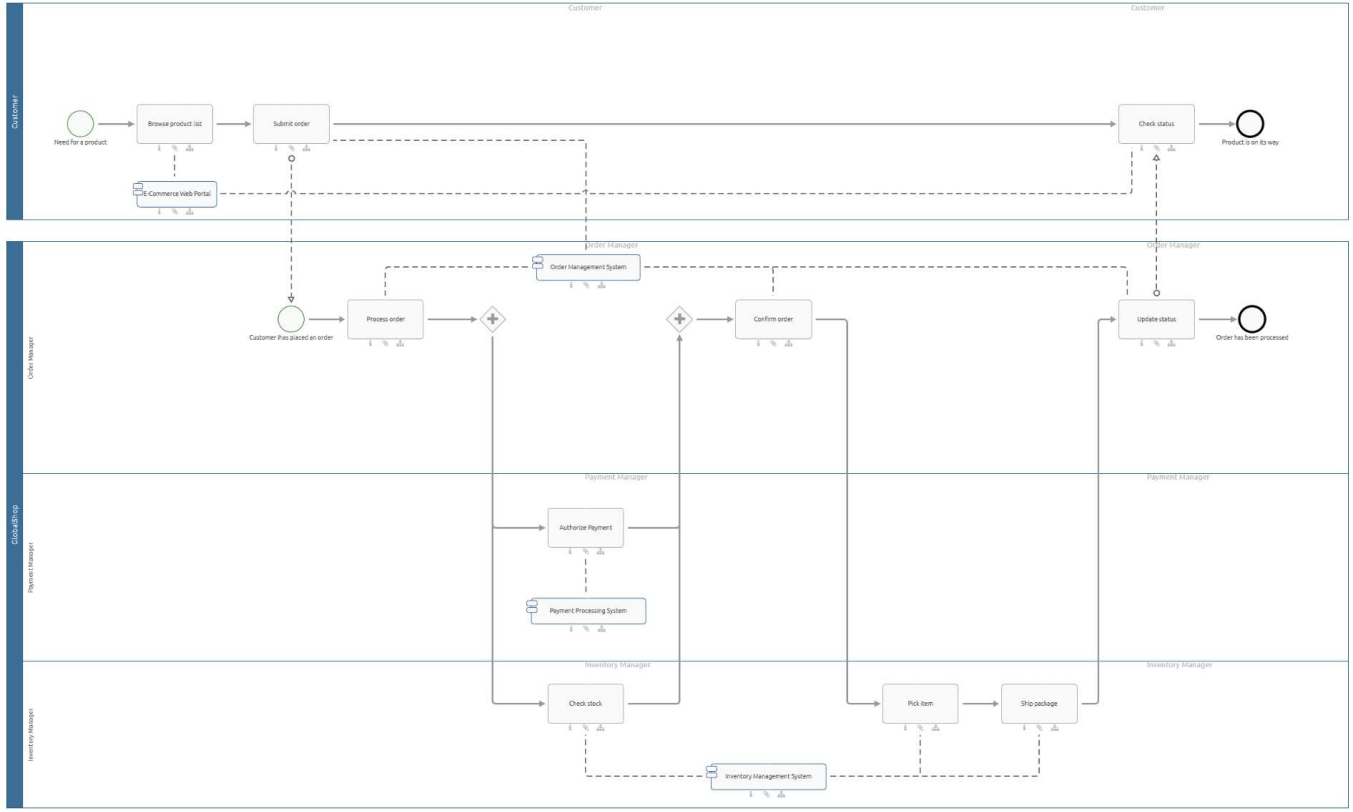
- Illustrates how applications are monitored, maintained, and managed
- Shows integration with management tools and systems
- Identifies components for logging, monitoring, and administrative functions
- Helps ensure the architecture is operationally viable



PROCESS APPLICATION REALIZATION DIAGRAM

The Process Application Realization Diagram depicts the sequence of events when multiple applications are involved in executing a business process. It:

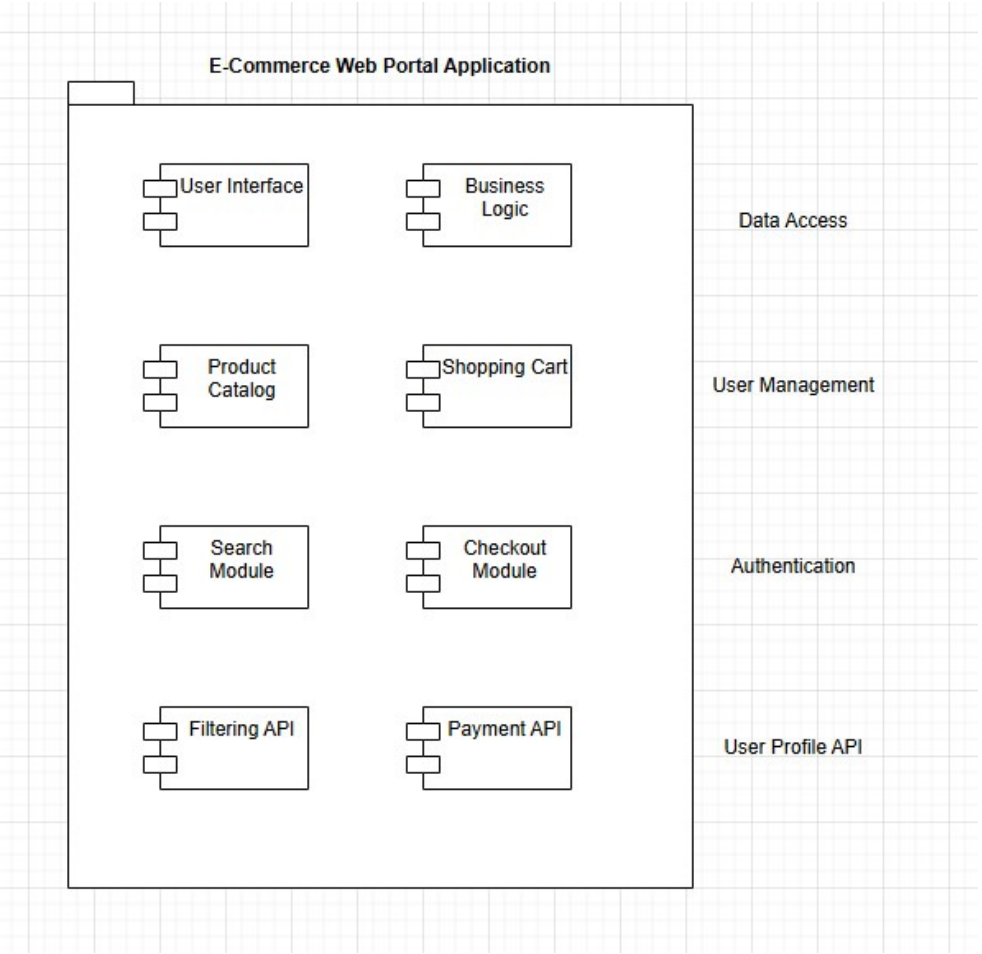
- Enhances the Application Communication Diagram by adding sequencing constraints
- Shows hand-off points between batch and real-time processing
- Identifies complex sequences that could be simplified
- Reveals potential rationalization points
- May identify process efficiency improvements



SOFTWARE ENGINEERING DIAGRAM

The Software Engineering Diagram breaks applications into packages, modules, services, and operations from a development perspective. It:

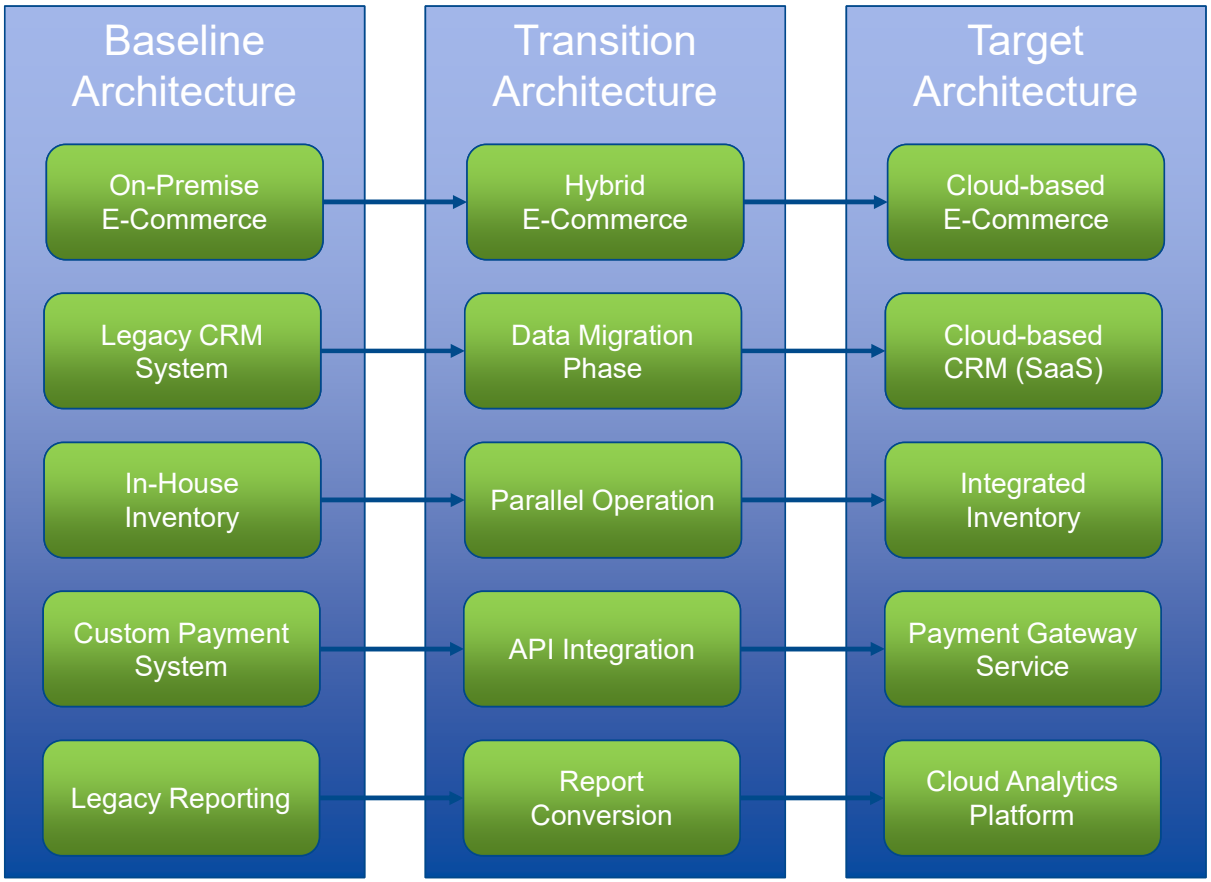
- Enables detailed impact analysis when planning migration stages
- Helps analyze opportunities for reuse and rationalization
- Identifies dependencies between software components
- Is ideal for application development teams
- Supports detailed planning of implementation work



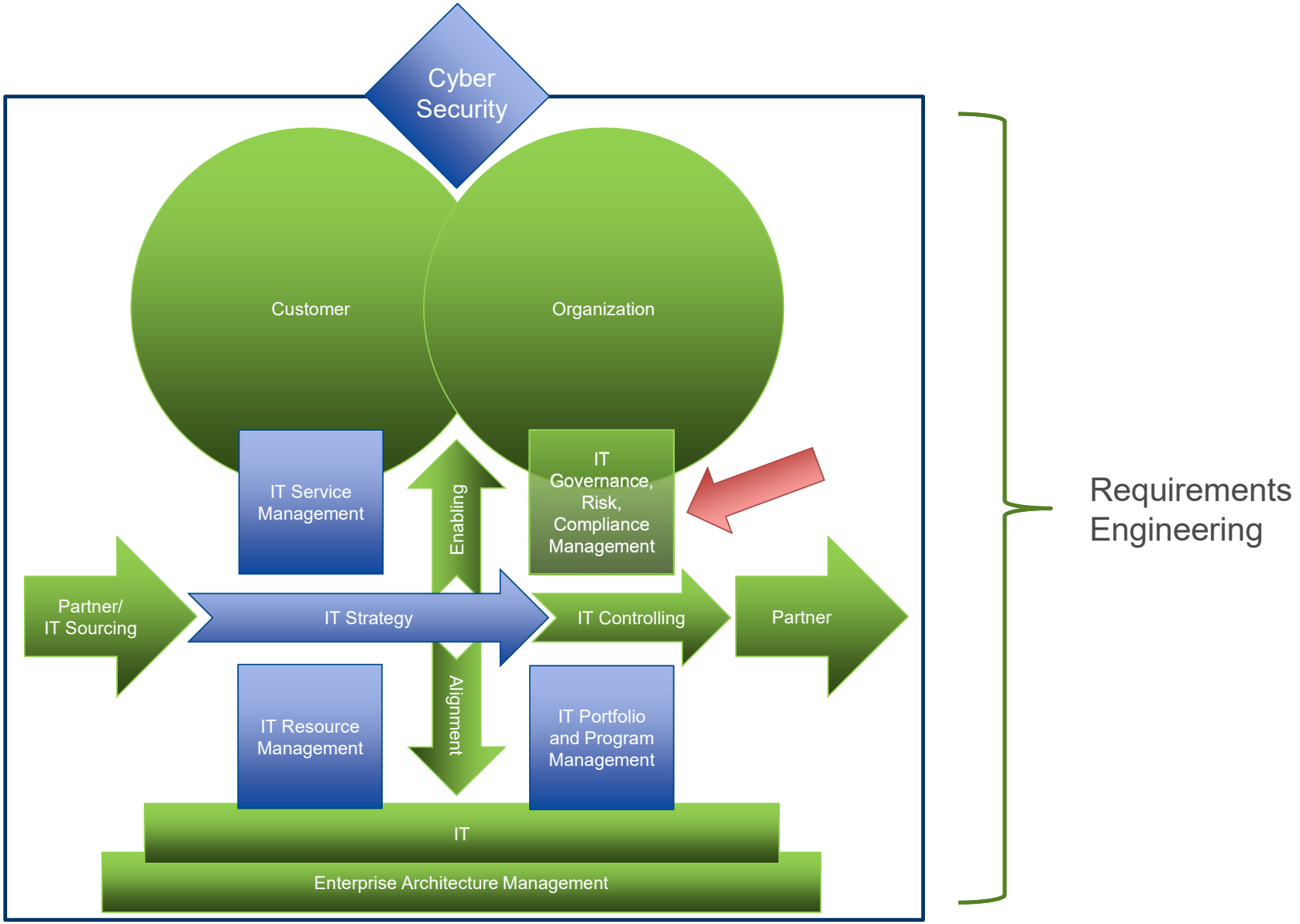
APPLICATION MIGRATION DIAGRAM

The Application Migration Diagram identifies the migration of applications from baseline to target architectures. It:

- Enables more accurate estimation of migration costs
- Identifies temporary applications, staging areas, and infrastructure required during migration
- Shows the sequence and dependencies of application migrations
- Supports planning of transition architectures



WHAT HAVE WE COVERED SO FAR?



COBIT FRAMEWORK, LETS HAVE A LOOK…

https://www.youtube.com/watch?v=v1Q-Zxf8rHQ

COBIT FRAMEWORK, NOW WHAT?

Figure 1.1—The Context of Enterprise Governance of Information and Technology

Source: De Haes, Steven; W. Van Grembergen; *Enterprise Governance of Information Technology: Achieving Alignment and Value, Featuring COBIT 5*, 2nd ed., Springer International Publishing, Switzerland, 2015, *https://www.springer.com/us/book/9783319145464*

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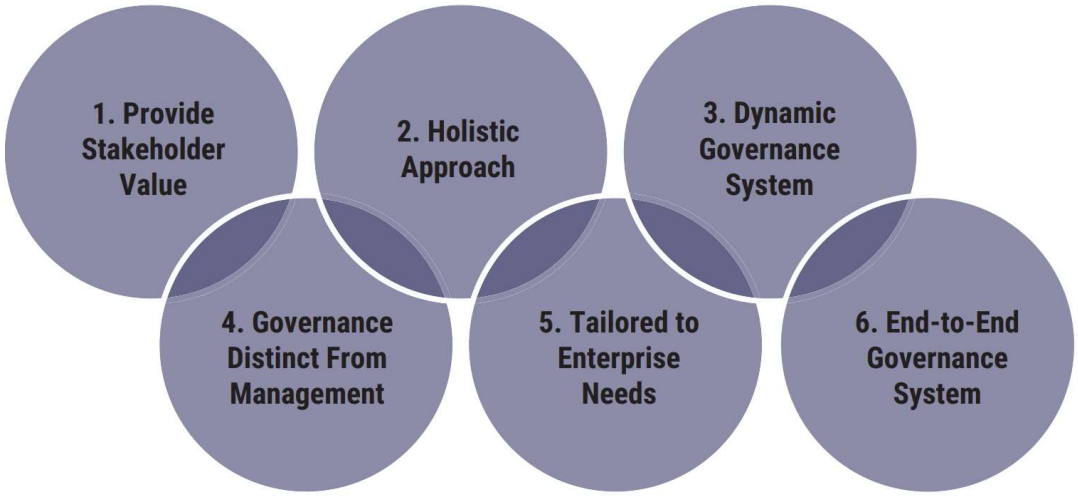
COBIT – SYSTEM PRINCIPLES

Figure 3.1—Governance System Principles



1. Each enterprise needs a governance system to satisfy stakeholder needs and to generate value from the use of I&T. Value reflects a balance among benefits, risk and resources, and enterprises need an actionable strategy and governance system to realize this value.
2. A governance system for enterprise I&T is built from a number of components that can be of different types and that work together in a holistic way.
3. A governance system should be dynamic. This means that each time one or more of the design factors are changed (e.g., a change in strategy or technology), the impact of these changes on the EGIT system must be considered. A dynamic view of EGIT will lead toward a viable and future-proof EGIT system.
4. A governance system should clearly distinguish between governance and management activities and structures.
5. A governance system should be tailored to the enterprise's needs, using a set of design factors as parameters to customize and prioritize the governance system components.
6. A governance system should cover the enterprise end to end, focusing not only on the IT function but on all technology and information processing the enterprise puts in place to achieve its goals, regardless where the processing is located in the enterprise

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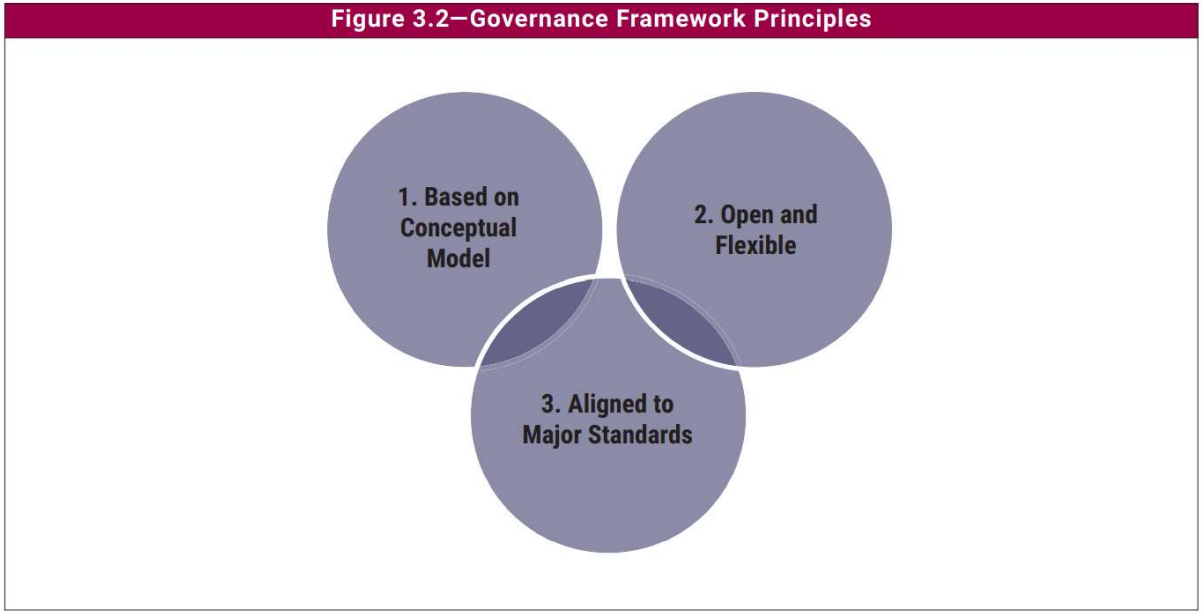
COBIT – FRAMEWORK PRINCIPLES

Figure 3.2—Governance Framework Principles



1. A governance framework should be based on a conceptual model, identifying the key components and relationships among components, to maximize consistency and allow automation.
2. A governance framework should be open and flexible. It should allow the addition of new content and the ability to address new issues in the most flexible way, while maintaining integrity and consistency.
3. A governance framework should align to relevant major related standards, frameworks and regulations.

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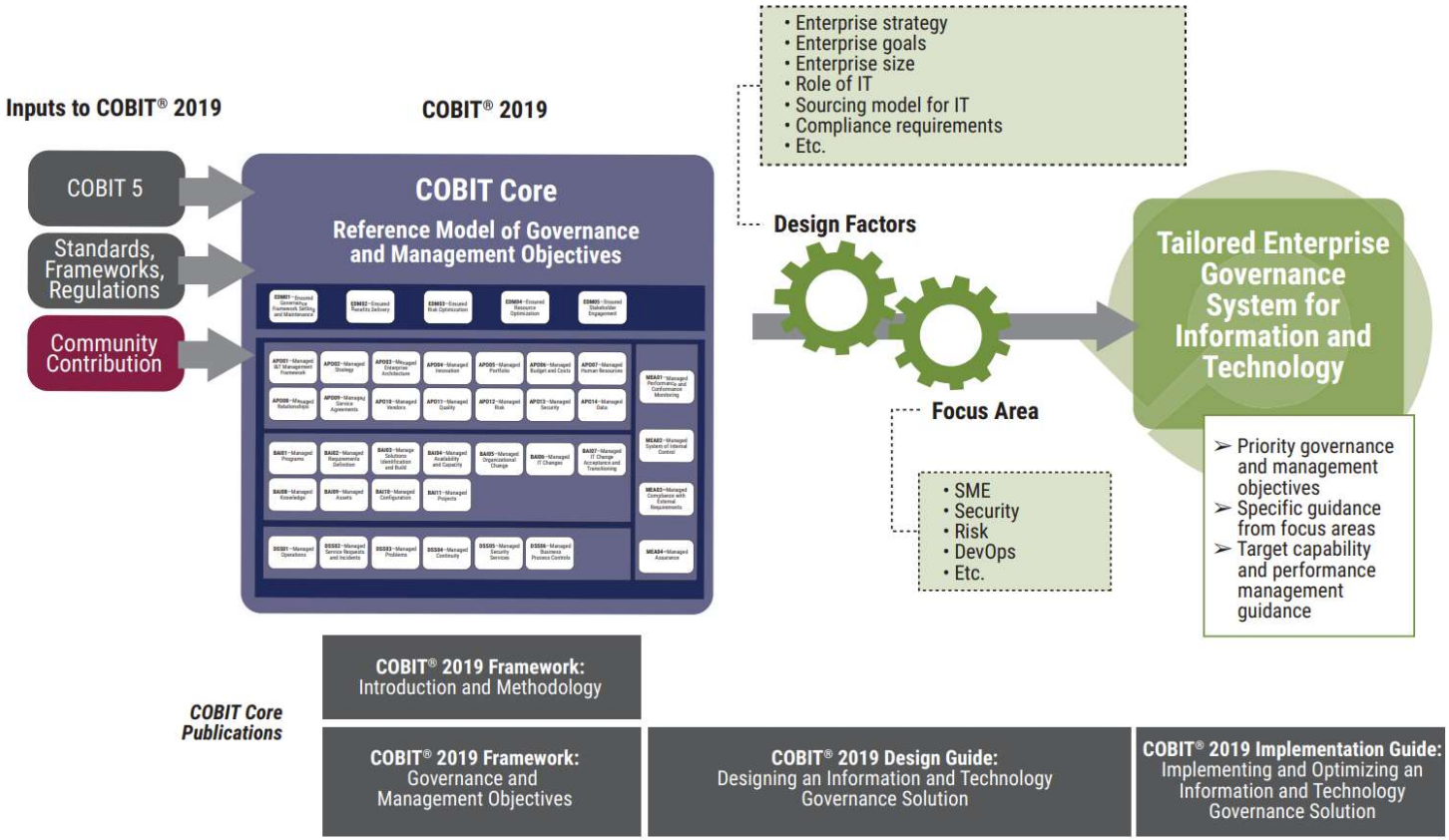
COBIT – OVERVIEW

Figure 4.1—COBIT Overview



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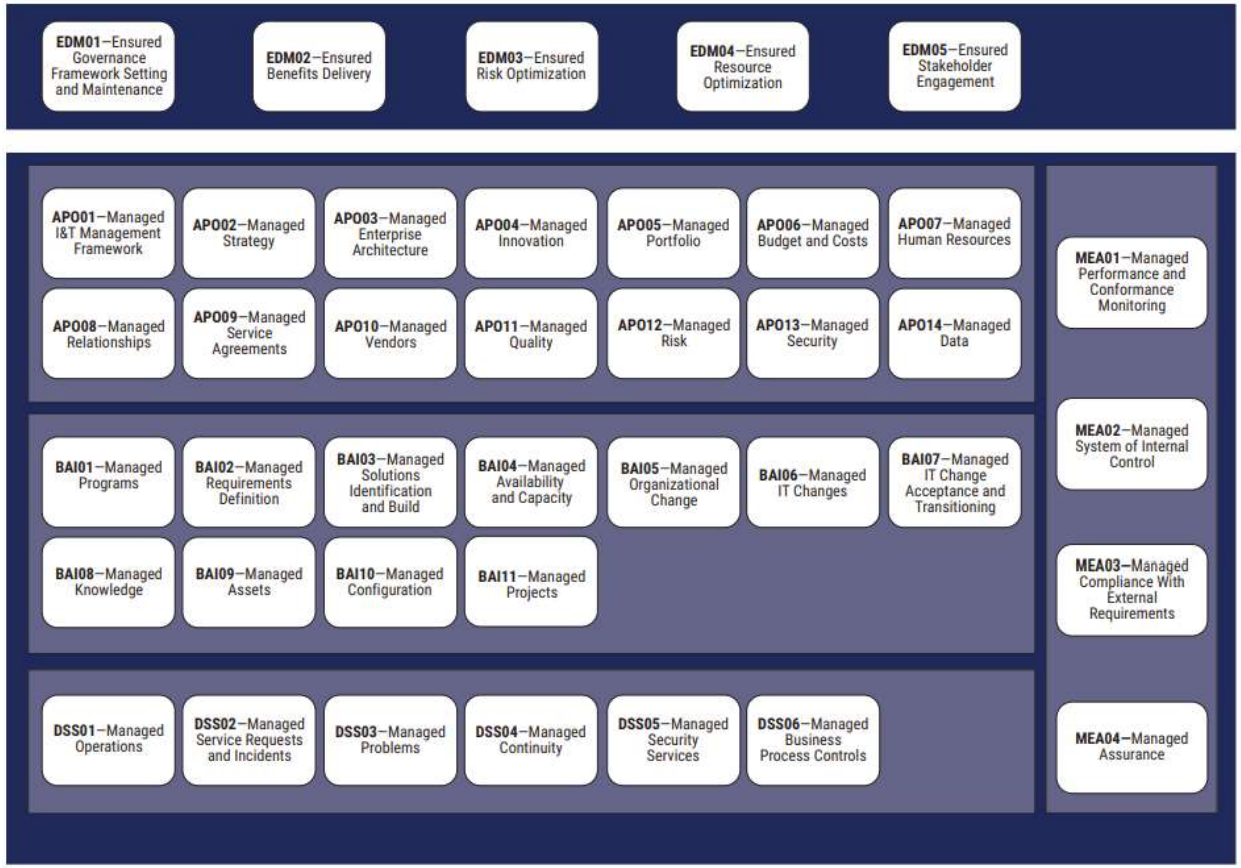
COBIT – CORE MODEL

Figure 4.2—COBIT Core Model



The governance and management objectives in COBIT are grouped into **five domains**. The domains have names with verbs that express the key purpose and areas of activity of the objective contained in them:

- **Governance objectives** are grouped in the **Evaluate, Direct and Monitor (EDM)** domain. In this domain, the governing body evaluates strategic options, directs senior management on the chosen strategic options and monitors the achievement of the strategy.
- **Management objectives** are grouped in four domains:
  - **Align, Plan and Organize (APO)** addresses the overall organization, strategy and supporting activities for I&T.
  - **Build, Acquire and Implement (BAI)** treats the definition, acquisition and implementation of I&T solutions and their integration in business processes.
  - **Deliver, Service and Support (DSS)** addresses the operational delivery and support of I&T services, including security.
  - **Monitor, Evaluate and Assess (MEA)** addresses performance monitoring and conformance of I&T with internal performance targets, internal control objectives and external requirements.

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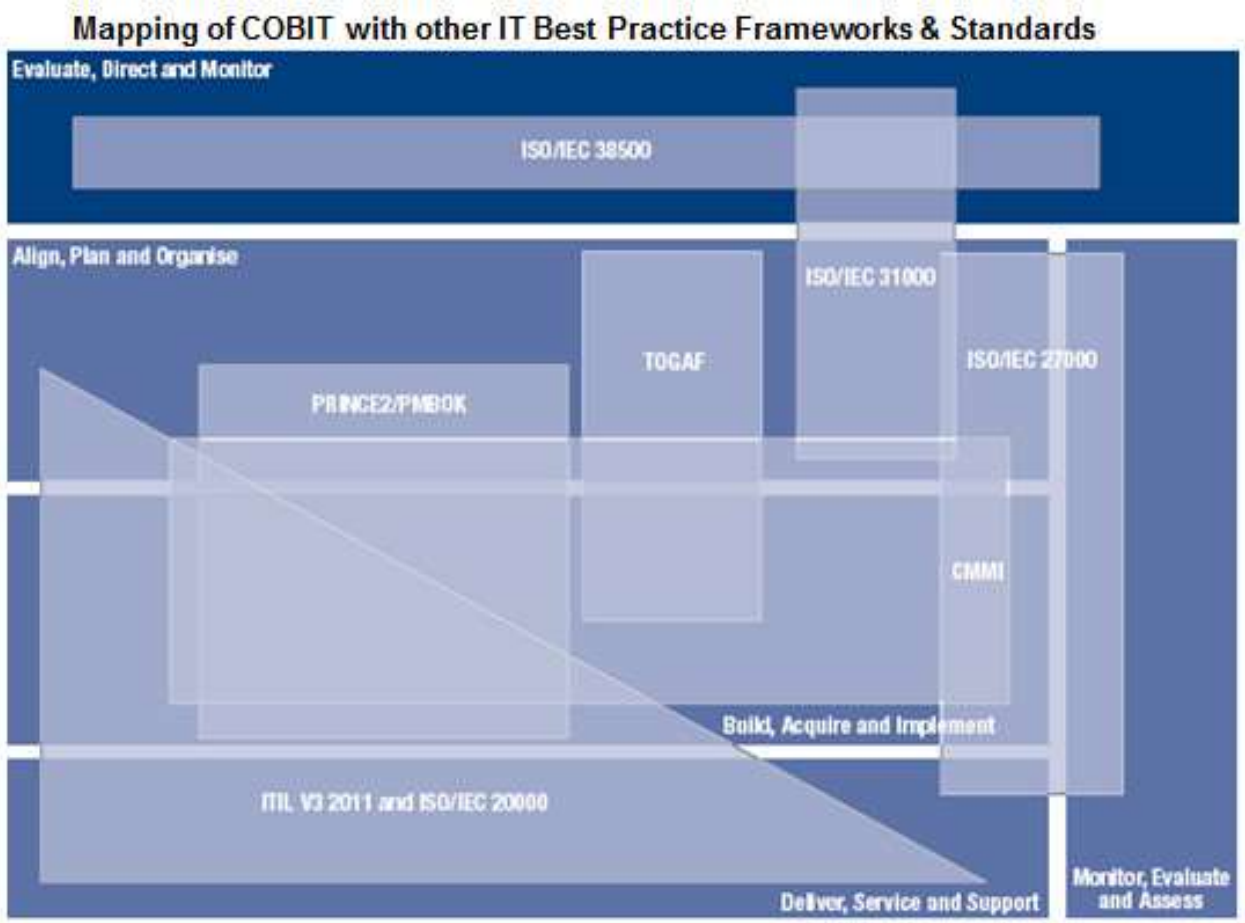
COBIT AND OTHER IT BEST PRACTICE FRAMEWORKS



(Source: https://www.linkedin.com/pulse/implement-institutionalize-gdpr-requirements-leveraging-rajiv-k-dua/, last access: 03.06.25)