LECTURE 2

The Concept of Enterprise Architecture

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In This Lecture

- The concept of enterprise architecture
- The practice of using enterprise architecture for improving business and IT alignment
- EA artifacts as fundamental components of enterprise architecture and their essential properties
- The role of architects in enterprise architecture practices
- The place of architecture functions in organizations

What Is Enterprise Architecture?

- **Enterprise architecture** (EA) can be defined as a collection of special documents (artifacts) describing various aspects of an organization from an integrated business and IT perspective intended to bridge the communication gap between business and IT stakeholders, facilitate information systems planning and thereby improve business and IT alignment

- Enterprise architecture typically describes business, applications, data, infrastructure and sometimes other domains relevant from the perspective of business and IT, e.g. integration or security
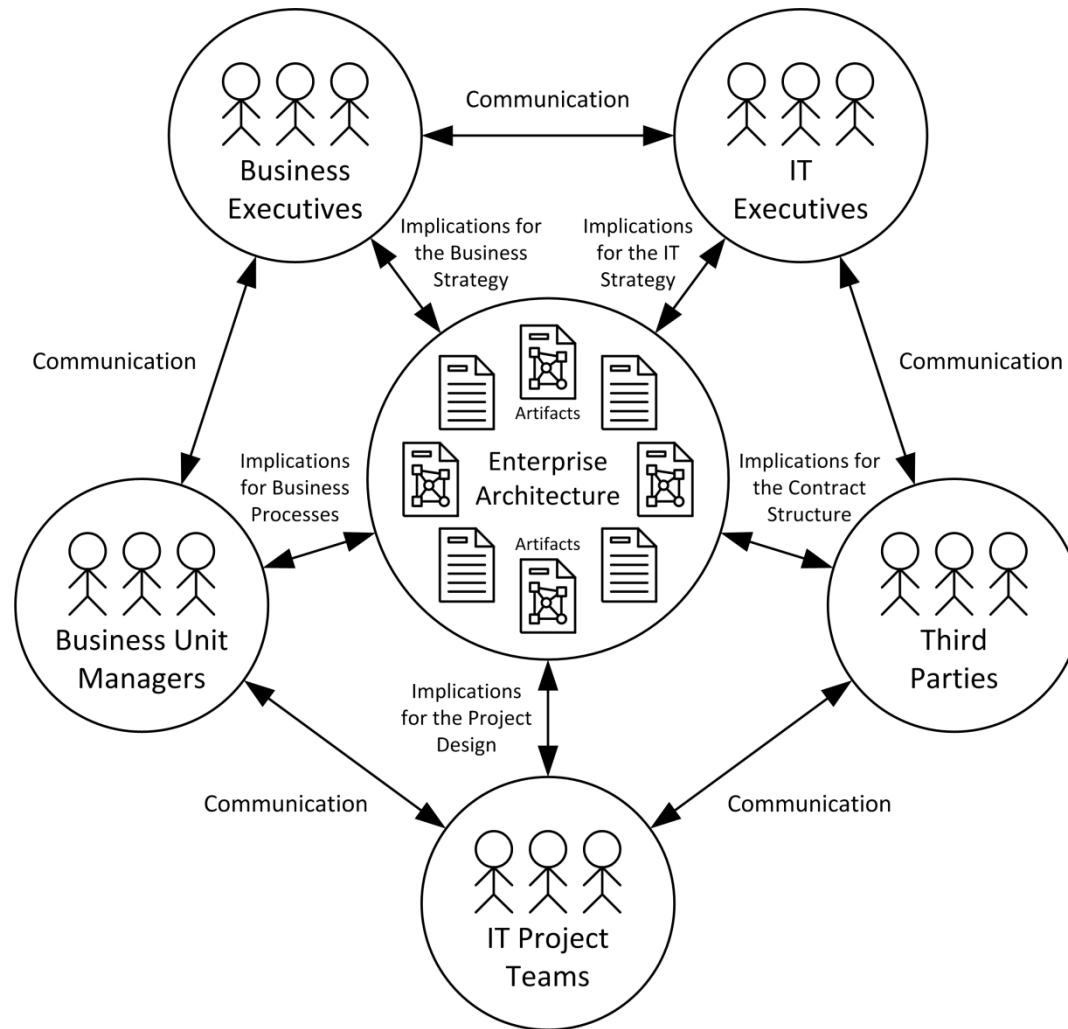
The Essence of Enterprise Architecture

- Enterprise architecture provides effective instruments facilitating communication, collaboration and mutual understanding between different groups of actors

- Using EA documents for supporting discussions helps alleviate communication problems resulting from disparate knowledge, interests and goals of various involved actors

- Essentially, enterprise architecture can be considered as a *communication medium* between diverse business and IT stakeholders in organizations

EA Documents and Organizational Actors

- To business executives EA documents explain the implications of planning decisions for the business strategy
- To IT executives EA documents explain the implications of planning decisions for the IT strategy
- To business unit managers EA documents explain the impact of planning decisions on their business processes
- To IT project teams EA documents explain the implications of planning decisions for specific IT projects
- To third parties EA documents explain the implications of planning decisions for the structure of specific contracts

EA as an Instrument for Communication

Specifics of Enterprise Architecture

- Enterprise architecture has not much in common with building architecture

- Organizations as dynamic socio-technical systems cannot be designed or engineered and then built

- Organizations are extremely complex, organic and living entities that gradually evolve over time

- Enterprise architecture is a pragmatic set of descriptions useful for managing the evolution of organizations

- The term "enterprise architecture" is purely metaphorical and is only an umbrella term for multiple diverse documents used for information systems planning

Domains of Enterprise Architecture

- The informational contents of enterprise architecture typically encompass the following common **EA domains**:

  - **Business domain** – covers customers, capabilities, processes, roles, etc.

  - **Applications domain** – covers programs, systems, custom software, vendor products, etc.

  - **Data domain** – covers data entities, structures, sources, etc.

  - **Integration domain** – covers interfaces, connections, interaction protocols, integration platforms, etc.

  - **Infrastructure domain** – covers hardware, servers, operating systems, networks, etc.

  - **Security domain** – covers firewalls, authentication mechanisms, identity and access management systems, encryption, etc.
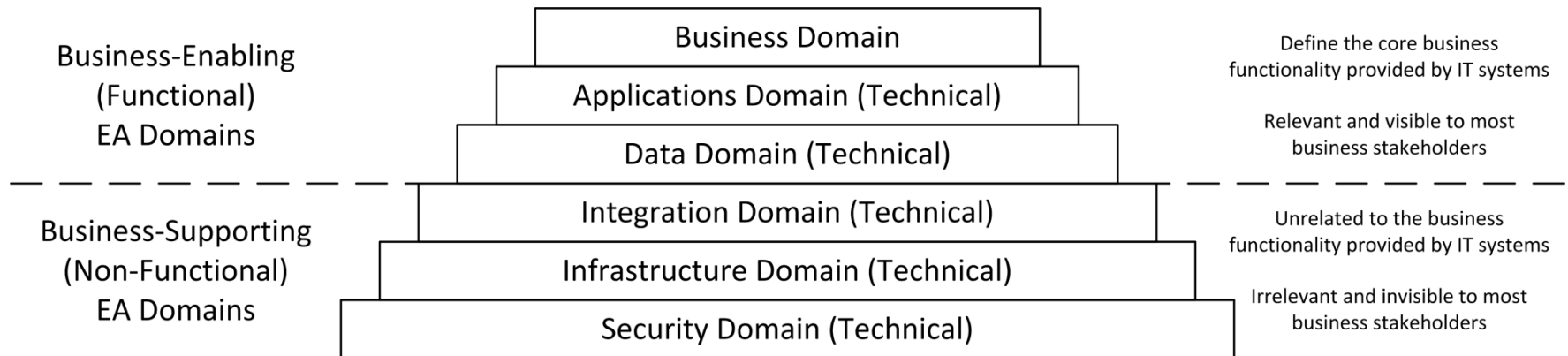
EA Domains as a Stack

- The set of common EA domains can be represented as a multilayered stack of domains, where lower layers underpin higher layers:

  - Applications automate business processes
  - Data is used by applications
  - Integration mechanisms link all applications and data together
  - Infrastructure hosts all applications, databases and integration platforms
  - Security mechanisms permeate all other EA domains

- The business domain is non-technical in nature, while all other EA domains are **technical domains** directly related to respective technologies

Enabling and Supporting EA Domains

- All EA domains can be also separated into business-enabling domains and business-supporting domains
- **Business-enabling EA domains** occupy the top layers of the stack and represent functional domains
- These domains are relevant to business stakeholders and define the core business functionality of IT systems
- **Business-supporting EA domains** occupy the bottom layers of the stack and represent non-functional domains
- These domains are irrelevant to business stakeholders and unrelated to business functionality of IT systems

The Stack of EA Domains

Business-Enabling (Functional) EA Domains

Business-Supporting (Non-Functional) EA Domains

Business Domain

Applications Domain (Technical)

Data Domain (Technical)

Integration Domain (Technical)

Infrastructure Domain (Technical)

Security Domain (Technical)

Define the core business functionality provided by IT systems

Relevant and visible to most business stakeholders

Unrelated to the business functionality provided by IT systems

Irrelevant and invisible to most business stakeholders

Generally, enterprise architecture can describe any domains considered as important from the perspective of the relationship between business and IT

The Practice of Enterprise Architecture

- The practice of enterprise architecture, or simply an **EA practice**, is an organizational practice of using specific documents called EA artifacts for improving communication between business and IT stakeholders, facilitating information systems planning and improving business and IT alignment

- An EA practice is a multifaceted organizational practice embracing all EA-related artifacts, people, processes, software and their interaction

- An EA practice penetrates an entire organization, involves numerous actors and modifies most IT-related decision-making processes

An EA Practice and Organization

- An EA practice is not a separate standalone activity, but rather an integral part of the organizational organism

- An EA practice requires integration with other organizational processes, most importantly with strategic management and project management

- The role of an EA practice is to translate abstract business considerations into the designs of specific IT solutions implementing these considerations

An EA Practice and Other Processes

- The strategic management process takes relevant information from the external business environment as an input and produces abstract business considerations guiding an organization as an output

- An EA practice takes these abstract business considerations as an input and produces specific implementable designs of IT solutions as an output

- The project management process takes these implementable designs as an input and produces optimal IT solutions corresponding to these designs as an output

- All these processes are continuous, carried out simultaneously and imply constant feedback

The Position of an EA Practice
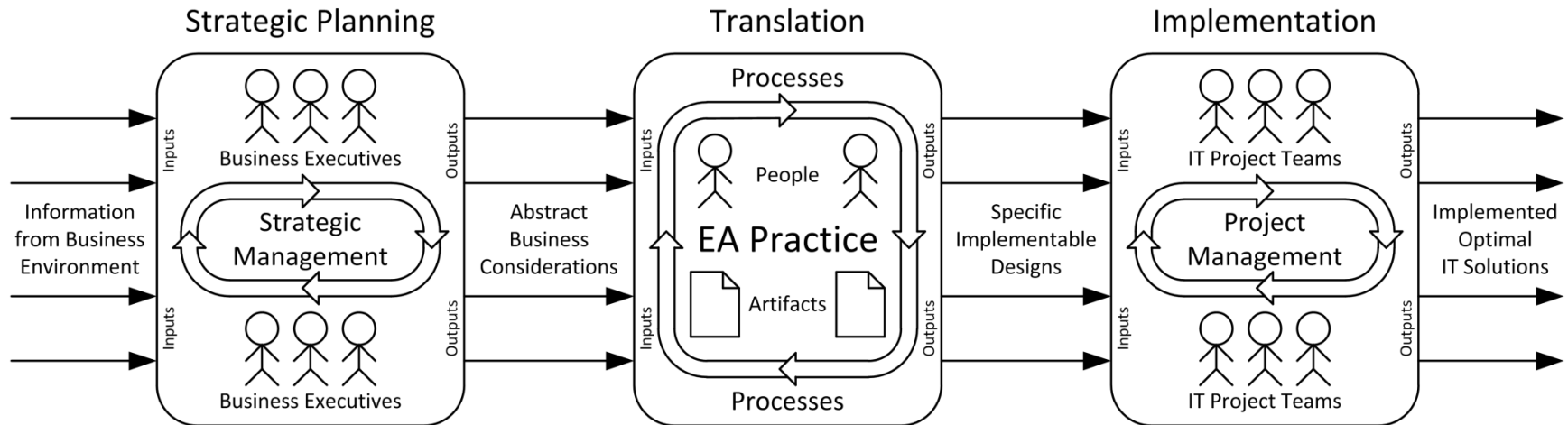
As a mediator between strategic management and projects management, an EA practice enables effective coordination of plans and activities between all relevant actors involved in strategic decision-making and implementation of IT systems resulting in improved business and IT alignment

Enterprise Architecture Artifacts

- Separate documents constituting enterprise architecture are typically called as **EA artifacts**

- EA artifacts provide descriptions of an organization from different perspectives important for the various actors involved in strategic decision-making and implementation of IT systems

- An EA practice implies using specific sets of EA artifacts for improving communication between different actors

- EA artifacts can be very diverse and differ in their informational contents, general meanings and lifecycles

Informational Contents of EA Artifacts

- From the perspective of their informational contents, various EA artifacts can have different:
  - Representation formats - textual, graphical and tabular formats or a mix of these formats
  - Levels of detail - range in their granularity from very high-level abstractions to pretty low-level details
  - Organizational scopes - range from entire organizations and lines of business to separate change initiatives and IT projects
  - EA domains - business, applications, data, integration, infrastructure and security domains as well as their combinations
  - Temporal states - current state (now), short-term future state (<1 year), mid-term future state (2-3 years), long-term future state (3-5 years), stateless and their combinations

Duality of EA Artifacts

- **Duality of EA artifacts** implies that the information provided by these artifacts is relevant to two different audiences simultaneously, satisfies the information needs of both these audiences and presented in a convenient format appealing to both audiences
- Duality allows using EA artifacts as a means of communication between different groups of actors
- **Explicit duality** is when different parts of EA artifacts are relevant to different groups of actors
- **Implicit duality** is when same parts of EA artifacts are interpreted differently by different actors

Example of a Dual EA Artifact
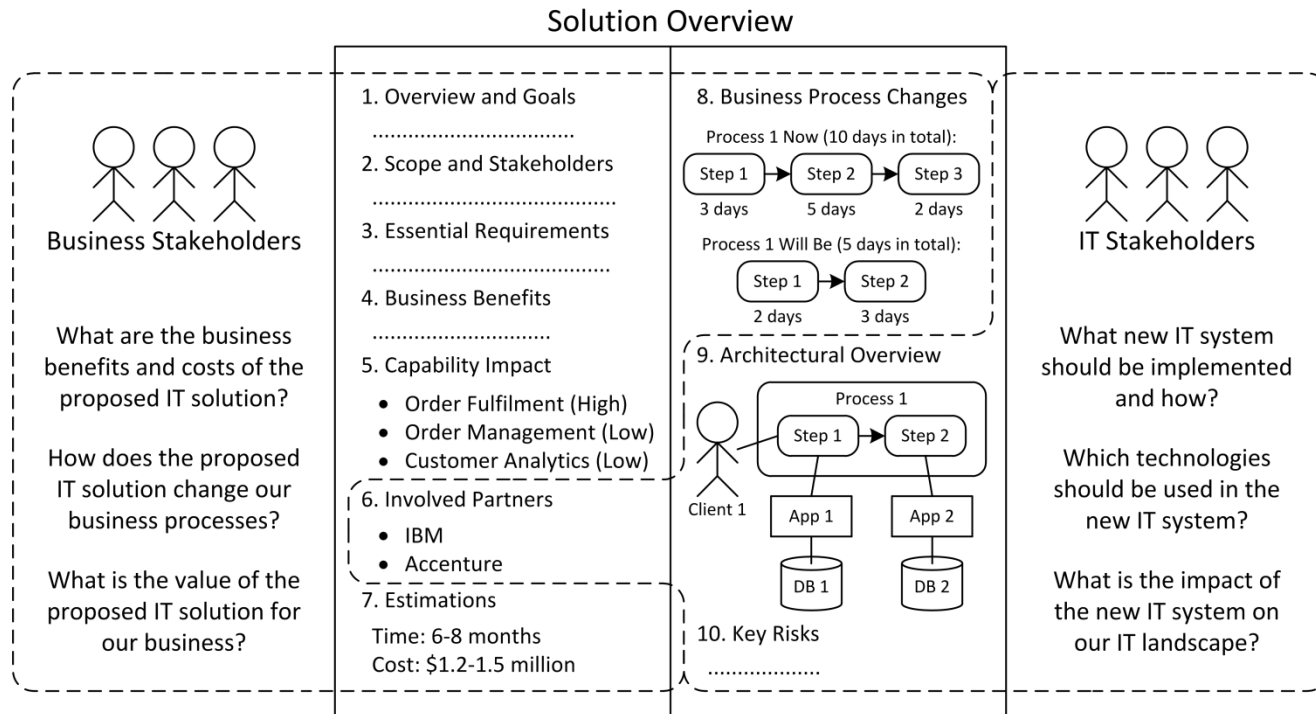
This solution overview helps business and IT stakeholders make optimal collective planning decisions regarding the launch of a new IT initiative

Two Meanings of EA Artifacts

- From the perspective of their general meaning in an EA practice all EA artifacts can be separated into decisions EA artifacts and facts EA artifacts

- **Decisions EA artifacts** represent made planning decisions, i.e. achieved and formalized agreements between various stakeholders regarding the desired future course of action

- **Facts EA artifacts** represent documented objective facts, i.e. reflections of the actual current situation in an organization as it is

Decisions EA Artifacts

- Decisions EA artifacts may represent these decisions:
  - How an organization needs to work from the IT perspective
  - Where an organization should invest its IT dollars
  - How a particular IT solution should be implemented
- They always have certain implications for the future
- These EA artifacts are always developed or updated *collaboratively* by all relevant stakeholders
- After decisions EA artifacts are created and approved, all stakeholders should act according to these decisions
- All EA artifacts describing the future, and all stateless EA artifacts, can be considered as decisions EA artifacts

Facts EA Artifacts

- Facts EA artifacts may document these facts:
  - What technologies the organizational IT landscape uses
  - What IT assets an organization possesses, runs and maintains
  - How the existing IT systems and databases are interconnected
- They have no implications for the future
- These EA artifacts may be developed or updated solely by specific actors
- After facts EA artifacts are created, they can be used by any actors as reference materials for planning purposes
- All EA artifacts describing only the current state can be considered as facts EA artifacts

Decisions and Facts EA Artifacts

Artifacts	Decisions EA artifacts	Facts EA artifacts
State	Either the future state or stateless	Only the current state
Represent	Made planning decisions	Documented objective facts
Implications	Always have implications for the future	Have no implications for the future
Developed	Collaboratively by all stakeholders	Solely by specific actors
Format	Optimized for productive teamwork, ease of editing and distribution	Optimized for long-term storage, searchability and analysis of information
Nature	Subjective, i.e. based on the interests and opinions of specific people	Objective, i.e. based on acknowledged facts and independent of specific people
Role	Primary, i.e. provide instruments for communication, decision-making and planning	Supporting, i.e. provide the information base required for developing decisions EA artifacts
Purpose	Help make optimal planning decisions	Help store the facts important for IT planning
Outcome	Stakeholders act according to the made decisions	Can be used by any actors as reference materials

Two Lifecycles of EA Artifacts

- From the perspective of their lifecycles in an EA practice all EA artifacts can be separated into permanent EA artifacts and temporary EA artifacts

- **Permanent EA artifacts** are long-lived EA artifacts often existing for many years

- **Temporary EA artifacts** are short-lived EA artifacts often existing for several months or even weeks

Permanent EA Artifacts

- Permanent EA artifacts live and evolve together with an organization

- They are created once and then updated when necessary according to the ongoing changes in an organization and its business environment

- After being developed these EA artifacts are constantly used, continuously maintained and occasionally discarded when become irrelevant

- Most EA artifacts covering wider scopes beyond specific IT initiatives or projects tend to be permanent EA artifacts

Temporary EA Artifacts

- Temporary EA artifacts are transitory, single-purposed and disposable

- They are created at specific moments for particular purposes, used as intended and then immediately discarded or archived

- Due to their short lifespan, the very need to update or maintain temporary EA artifacts is usually absent

- All EA artifacts covering narrow scopes (e.g. separate IT initiatives or projects) tend to be temporary

Permanent and Temporary EA Artifacts

Artifacts	Permanent EA artifacts	Temporary EA artifacts
Scope	Wide scope, beyond specific IT initiatives	Narrow scope, limited to specific IT initiatives
Lifespan	Long-lived, often exist for years	Short-lived, exist for months or even weeks
Usage	Created once, periodically updated, constantly used and occasionally discarded	Created for particular purposes, used as intended and then immediately discarded

Examples of EA Artifacts

EA Artifact	Principles	Landscape Diagram	Solution Design
Example	Principle 1: Standardized Business Processes Statement: .... Rationale: .... Implications: .... Principle 2: Single Customer View Statement: .... Rationale: .... Implications: .... Principle 3: Business Continuity Statement: .... Rationale: .... Implications:		
Description	General imperatives defining how the whole organization needs to work, updated on a yearly basis	A snapshot of the current IT landscape in a specific business function, maintained up-to-date	A detailed technical description of a specific IT project which is going to be implemented shortly

Analysis of EA Artifacts

Format	Textual	Graphical	Textual and graphical
Detail	Very low level of detail	Low level of detail	High level of detail
Scope	Entire organization	Business function	Separate IT project
Domains	Business	Applications, data and integration	Business, applications, data and infrastructure
State	Stateless (no specific time focus)	Current state	Short-term future state
Dual	Yes	No	Yes
Meaning	Decisions	Facts	Decisions
Lifecycle	Permanent	Permanent	Temporary

The Role of Architects in an EA Practice

- The key actors of an EA practice are **architects**

- Architects act as chief IT planners in organizations

- Ideal architects are effective communicators, team players, innovators and systems thinkers knowledgeable in both business and IT

- Architects are "T-shaped" professionals in connecting business and IT, i.e. specialists in finding optimal IT strategies and solutions satisfying business strategies and needs

General Responsibilities of Architects

- Communicating with various business and IT stakeholders and understanding their concerns

- Facilitating the dialog and conversation between different stakeholders

- Finding, proposing and discussing optimal planning decisions satisfying the concerns of stakeholders

- Developing and updating EA artifacts for supporting discussions and documenting the achieved agreements

- Establishing and maintaining a repository of EA artifacts

- Establishing, running and optimizing EA-related processes

Architects as Developers of EA Artifacts

- Architects are the key developers of all EA artifacts

- Architects are responsible for involving relevant stakeholders, collecting necessary data and completing all other activities required to develop EA artifacts

- However, the typical process of developing and updating EA artifacts differs significantly for decisions EA artifacts and facts EA artifacts

Developing Decisions EA Artifacts

- The development and update of decisions EA artifacts is a complex, creative and tricky process

- Decisions EA artifacts are always developed *collaboratively* by architects and their stakeholders

- Essentially, the collaborative development of decisions EA artifacts is the actual process of IT planning

- Even though architects usually act as facilitators or drivers of their development, fundamentally decisions EA artifacts are products of a collective teamwork

- Decisions EA artifacts are normally created in a proactive manner
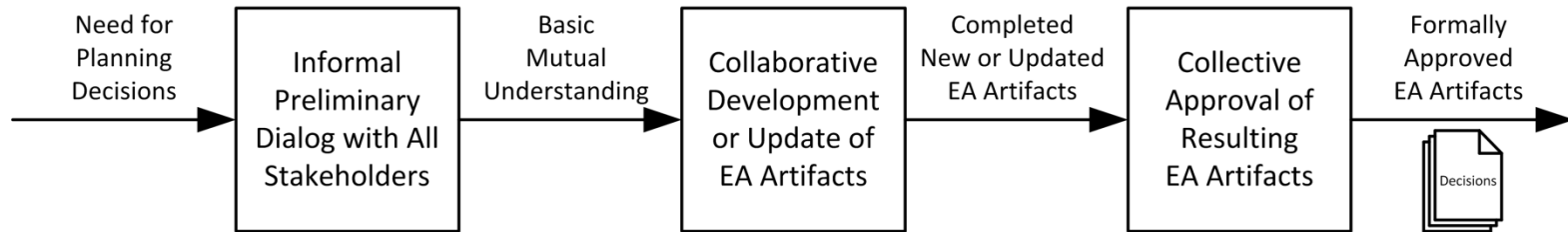
Developing Facts EA Artifacts

- The development and update of facts EA artifacts is a more simple, routine and straightforward process

- Unlike decisions EA artifacts, facts EA artifacts may be developed by individual architects alone or with only a minimal involvement of other actors

- Facts EA artifacts are often created in a reactive manner on an as-necessary basis

Processes for Developing EA Artifacts

Decisions EA Artifacts

(Represent made planning decisions)

Need for Planning Decisions → **Informal Preliminary Dialog with All Stakeholders** → Basic Mutual Understanding → **Collaborative Development or Update of EA Artifacts** → Completed New or Updated EA Artifacts → **Collective Approval of Resulting EA Artifacts** → Formally Approved EA Artifacts (Decisions)
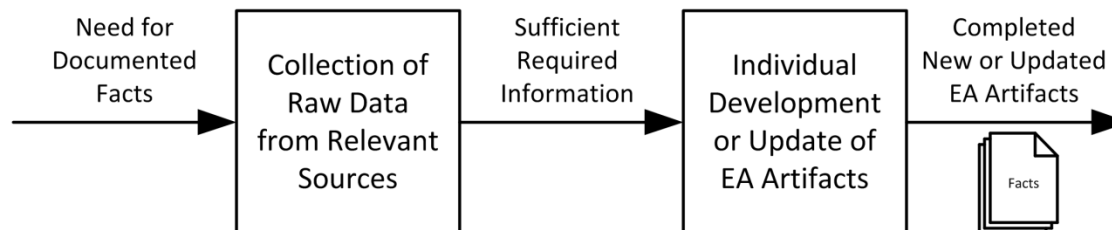
Developed: Collaboratively by all stakeholders
Architects: Act as drivers and facilitators
Process: Complex, creative and politicized

Value: Realized during the development process
Priority: Process over product
Success Factor: Involvement of all stakeholders

Facts EA Artifacts

(Represent documented objective facts)

Need for Documented Facts → **Collection of Raw Data from Relevant Sources** → Sufficient Required Information → **Individual Development or Update of EA Artifacts** → Completed New or Updated EA Artifacts (Facts)

Developed: By individual architects alone
Architects: Act as sole developers
Process: Straightforward and routine

Value: Realized after development is completed
Priority: Product over process
Success Factor: Accuracy of all descriptions

EA Artifacts, Architects and Other Actors
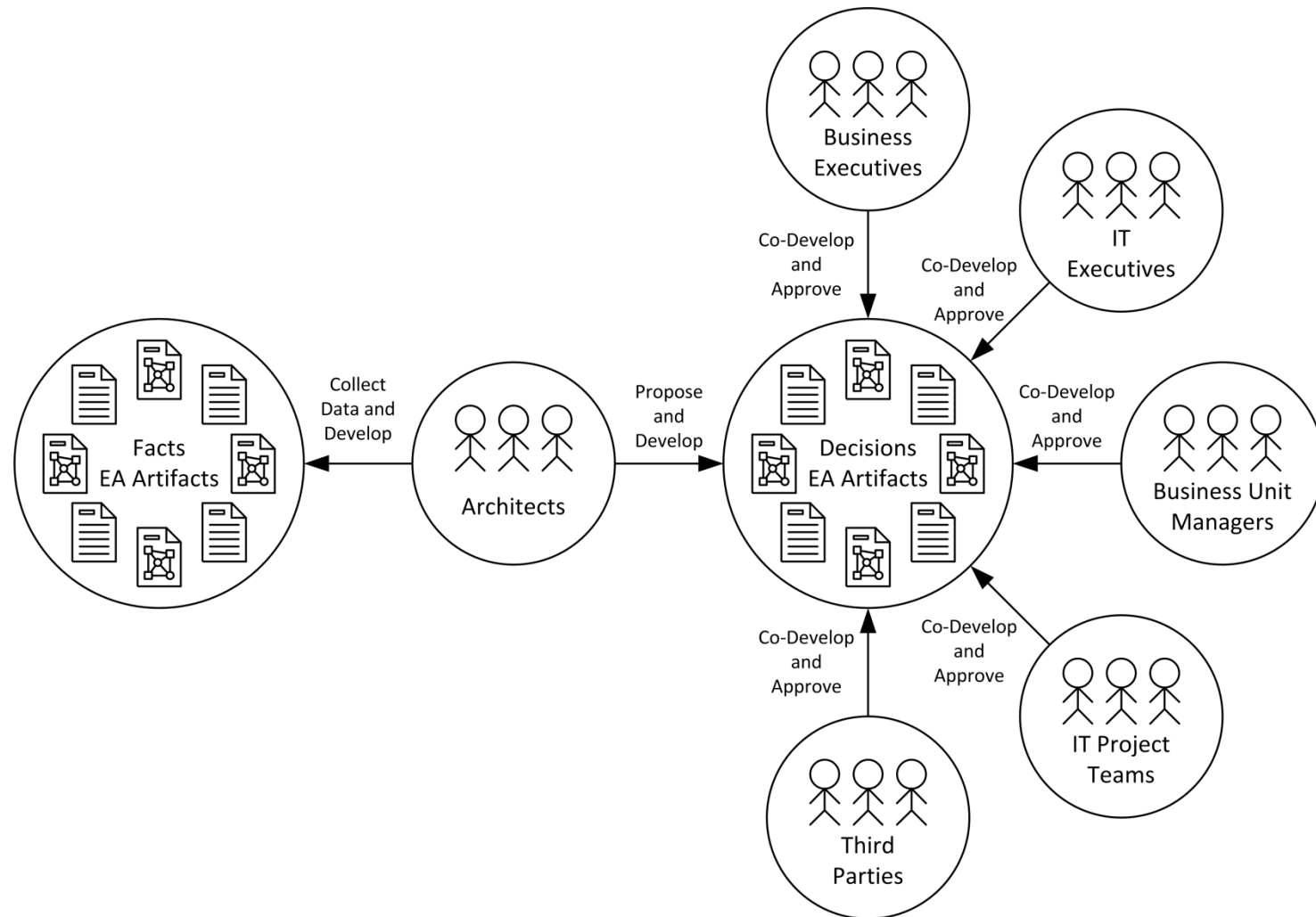
Architecture Functions in Organizations

- An EA practice is implemented by an **architecture function**

- An architecture function is a separate organizational function usually reporting to the CIO and responsible for an EA practice and for organization-wide IT planning

- An architecture function can be considered as a specialized planning subunit of the IT department

- The main purpose of an architecture function is to enable and support primary activities, e.g. production and sales

Architecture Functions and Architects

- All architects employed by an organization typically reside in its architecture function

- An architecture function may employ different types of architects and architecture managers

- Different types of architects may focus on different EA domains and organizational scopes

- Common denominations of architects include chief architects, enterprise architects, principal architects, domain architects and solution architects

- An architecture function typically also includes one or more **architecture governance bodies**

Lecture Summary

- Enterprise architecture is as a collection of artifacts describing an organization that help bridge the communication gap between business and IT

- An EA practice is a complex and multifaceted practice of using EA artifacts for effective collaboration

- EA artifacts are special documents providing different views of an organization important for various actors

- EA artifacts represent either made planning decisions, or documented objective facts, many EA artifacts are dual

- Architects are the key actors of an EA practice and chief developers of EA artifacts

In the Next Lecture

- The next lecture will discuss the position of enterprise architecture and an EA practice in the broader organizational, managerial and historical context

QUESTIONS?

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Full Teaching Pack Available on Request

The full teaching pack based on the books ***The Practice of Enterprise Architecture: A Modern Approach to Business and IT Alignment*** and ***Enterprise Architects: The Agents of Digital Transformation*** is available on request to the author (kotusev@kotusev.com)