Session 6 – Workflows and Phases of Unified Process

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Modified from Introduction to Object-Oriented Analysis and Design with UML and Unified Process, Stephen R. Schach

Chapter Overview

- The Workflows of the Unified Process
- The Phases of the Unified Process
- Why A Two-Dimensional Model?

The Workflows of the Unified Process (contd)

▸ In each increment, part of each of these five workflows is carried out
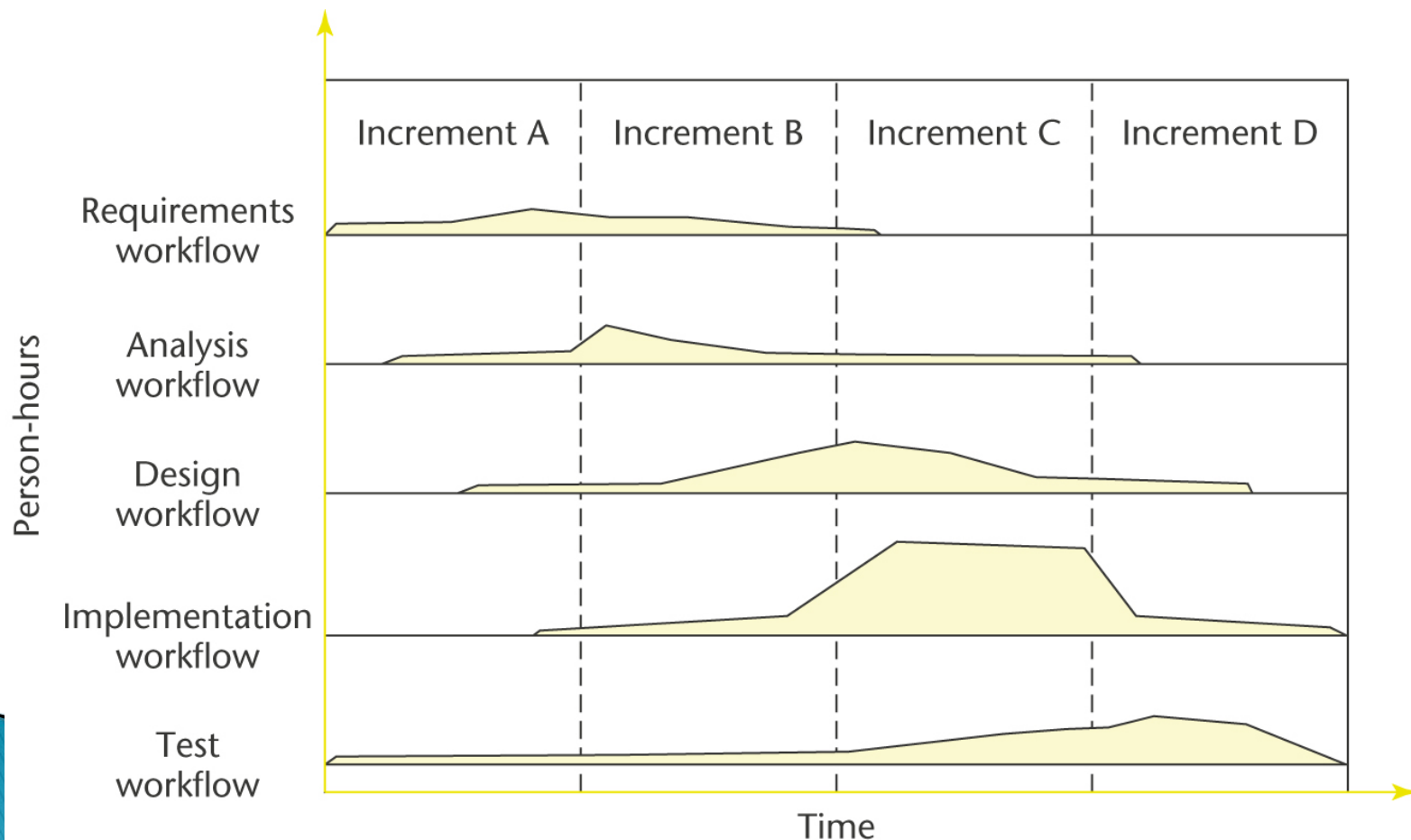
The Workflows of the Unified Process (contd)

- In addition to the five core workflows, the Unified Process includes other workflows
  - Management (Chapter 14)
  - Planning (Chapter 15)

- In this chapter, just the five core workflows are considered

The Requirements Workflow

- The aim of the requirements workflow
  - To ensure that the developers build the right information system

- Chapters 4 and 5 describe how this is done

The Analysis Workflow

- The aim of the analysis workflow
  - To analyze and refine the requirements

- Why not do this during the requirements workflow ?

- The artifacts of the requirements workflow must therefore be expressed in a natural (human) language
  - All natural languages are imprecise

The Analysis Workflow (contd)

- Example from a manufacturing information system:
  - "A part record and a plant record are read from the database. If it contains the letter A directly followed by the letter Q, then calculate the cost of transporting that part to that plant"

- To what does the it refer?
  - The part record?
  - The plant record?
  - Or the database?

The Analysis Workflow (contd)

- Two separate workflows are needed
  - The requirements artifacts must be expressed in the language of the client
  - The analysis artifacts must be precise, and complete enough for the designers

- Session 4 describes how the analysis workflow is performed

The Design Workflow

- The aim of the design workflow is to refine the analysis workflow until the material is in a form that can be implemented by the programmers
  - Many nonfunctional requirements need to be finalized at this time, including
    - Choice of programming language
    - Reuse issues
    - Portability issues

- Session 5 describes the design workflow

The Implementation Workflow

▸ The aim of the implementation workflow is to implement the target information system in the selected implementation language

  ◦ A large information system is partitioned into subsystems

  ◦ The subsystems consist of *components* or *code artifacts*

The Test Workflow

- The test workflow is the responsibility of the quality assurance group
  - Each component is tested as it has been implemented
    - *Unit testing*
  - At the end of each iteration, the completed components are compiled and linked together (*integrated*) and tested
    - *Integration testing*
  - When the product appears to be complete, it is tested as a whole
    - *Product testing*
  - Once the completed product has been installed on the client's computer, the client tests it
    - *Acceptance testing*

The Phases of the Unified Process

▸ In the figure, the increments are identified as phases
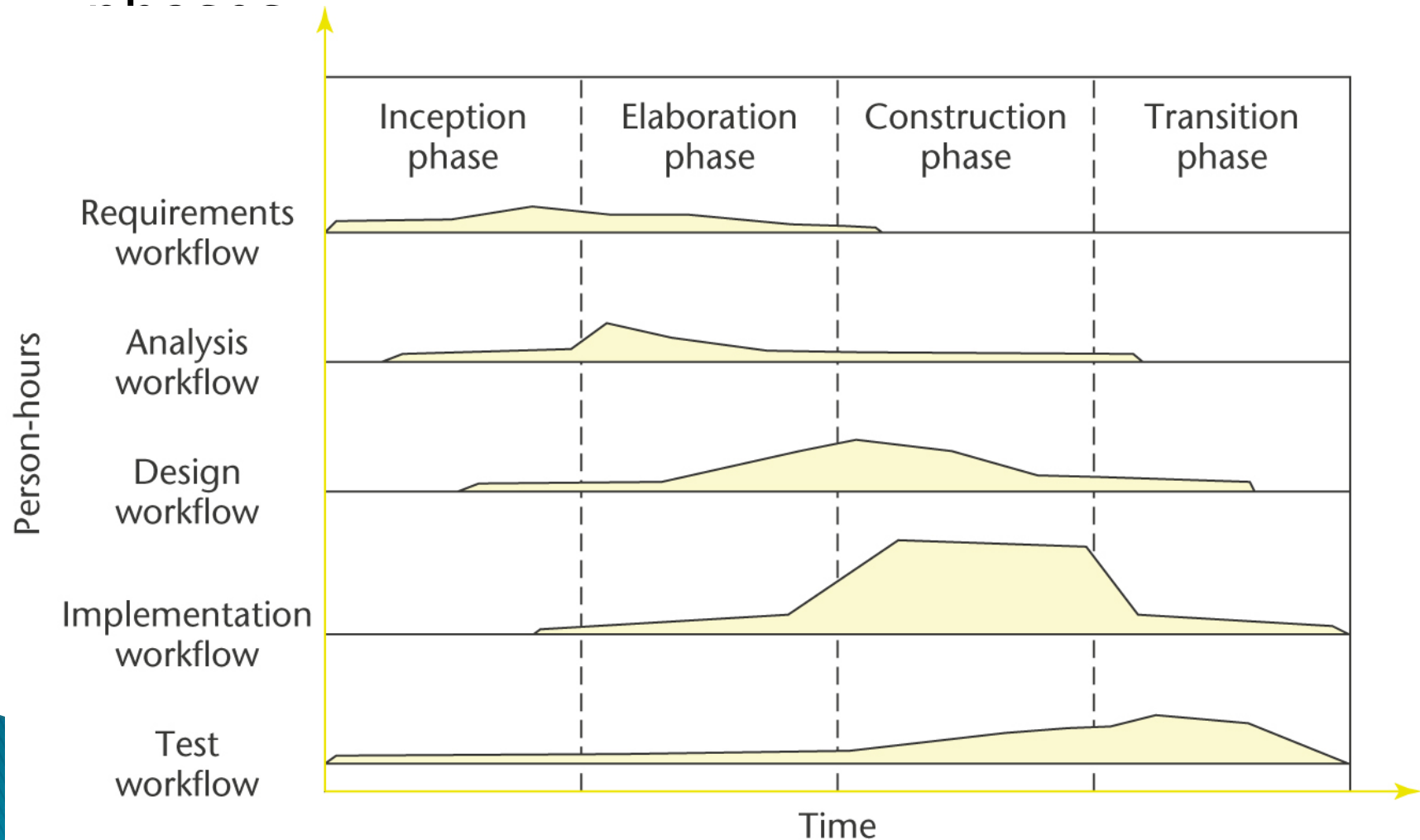
The Phases of the Unified Process (contd)

- The four increments are labeled
  - Inception phase
  - Elaboration phase
  - Construction phase
  - Transition phase

- The phases of the Unified Process are the increments

The Phases of the Unified Process (contd)

- In theory, there could be any number of increments
  - In practice, development seems to consist of four increments

- Every step performed in the Unified Process falls into
  - One of the five core workflows and *also*
  - One of the four phases

- Why does each step have to be considered twice?

The Phases of the Unified Process (contd)

- Workflow
  - Presented in a technical context

- Phase
  - Presented in a business context

The Inception Phase

▸ The aim of the inception phase is to determine whether the proposed information system is economically viable

The Inception Phase (contd)

1. Gain an understanding of the domain

2. Build the business model

3. Delimit the scope of the proposed project
   Focus on the subset of the business model that is covered by the proposed information system

4. Begin to make the initial business case

Inception Phase : Business Factor

- Cost effective ?
- Delivery in time ?
- Risks ?
- Buy or build ?
- Proceed or stop ?

Inception Phase: Identify scope

- Business Model vs Use Case

Inception Phase: Prioritize the use cases

- Prioritize use case based on risk analysis
- 3 types of risks:
  - Technical
  - Requirement
  - Architecture

Inception Phase: Analysis, Design Workflows

- A small amount of the analysis workflow may be performed during the inception phase

- A small amount of the design workflow may be performed, too

The Inception Phase: Implementation Workflow

- No Coding
- Proof-of-concept

The Inception Phase: Test Workflow

- The test workflow commences almost at the start of the inception phase
  - The aim is to ensure that the requirements have been accurately determined

The Inception Phase: Planning

- Insufficient information to do the plan
- Plan itself or the next phase

The Inception Phase: Documentation

▸ The deliverables of the inception phase:
- The initial version of the domain model
- The initial version of the business model (use case)

- A preliminary version of the analysis
- A preliminary version of the architecture

- The initial list of risks
- The initial ordering of the use cases
- The plan for the elaboration phase

- The initial version of the business case

Inception Phase: The Initial Business Case

- Obtaining the initial version of the business case is the overall aim of the inception phase
- This initial version incorporates
  - A description of the scope of the information system
  - Financial details
  - If the proposed information system is to be marketed, the business case will also include
    - Revenue projections, market estimates, initial cost estimates
  - If the information system is to be used in-house, the business case will include
    - The initial cost-benefit analysis

Artifact[1]	Comment
Vision and Business Case	Describes the high-level goals and constraints, the business case, and provides an executive summary.
Use-Case Model	Describes the functional requirements. During inception, the names of most use cases will be identified, and perhaps 10% of the use cases will be analyzed in detail.
Supplementary Specification	Describes other requirements, mostly non-functional. During inception, it is useful to have some idea of the key non-functional requirements that will have a major impact on the architecture.
Glossary	Key domain terminology, and data dictionary.
Risk List & Risk Management Plan	Describes the risks (business, technical, resource, schedule) and ideas for their mitigation or response.
Prototypes and proof-of-concepts	To clarify the vision, and validate technical ideas.
Iteration Plan	Describes what to do in the first elaboration iteration.
Phase Plan & Software Development Plan	Low-precision guess for elaboration phase duration and effort. Tools, people, education, and other resources.
Development Case	A description of the customized UP steps and artifacts for this project. In the UP, one always customizes it for the project.

The Elaboration Phase

- The aim of the elaboration phase is to refine the initial requirements
    - Refine the use cases
    - Refine the architecture
    - Monitor the risks and refine their priorities
    - Refine the business case
    - Produce the project management plan

- The major activities of the elaboration phase are <u>refinements or elaborations</u> of the previous phase

The Tasks of the Elaboration Phase

▸ The tasks of the elaboration phase correspond to:
  ◦ All but completing the requirements workflow
  ◦ Performing virtually the entire analysis workflow
  ◦ Starting the design of the architecture

The Elaboration Phase: Documentation

▸ The deliverables of the elaboration phase include:
  ◦ The completed domain model
  ◦ The completed business model
  ◦ The completed requirements artifacts
  ◦ The completed analysis artifacts
  ◦ An updated version of the architecture
  ◦ An updated list of risks
  ◦ The project management plan (for the rest of the project)
  ◦ The completed business case

Construction Phase

▸ The aim of the construction phase is to produce the first operational-quality version of the information system
  ◦ This is sometimes called the <u>beta</u> release

The Tasks of the Construction Phase

▶ The emphasis in this phase is on
  ◦ Implementation, and
  ◦ Testing
    • Unit testing of modules
    • Integration testing of subsystems
    • Product testing of the overall system

The Construction Phase: Documentation

- The deliverables of the construction phase include:
  - ◦ The initial user manual and other manuals, as appropriate
  - ◦ All the artifacts (beta release versions)
 - ◦ The completed architecture
  - ◦ The updated risk list
  - ◦ The project management plan

The Transition Phase

- The aim of the transition phase is to ensure that the client's requirements have indeed been met
  - Faults in the information system are corrected
  - All the manuals are completed
  - Attempts are made to discover any previously unidentified risks

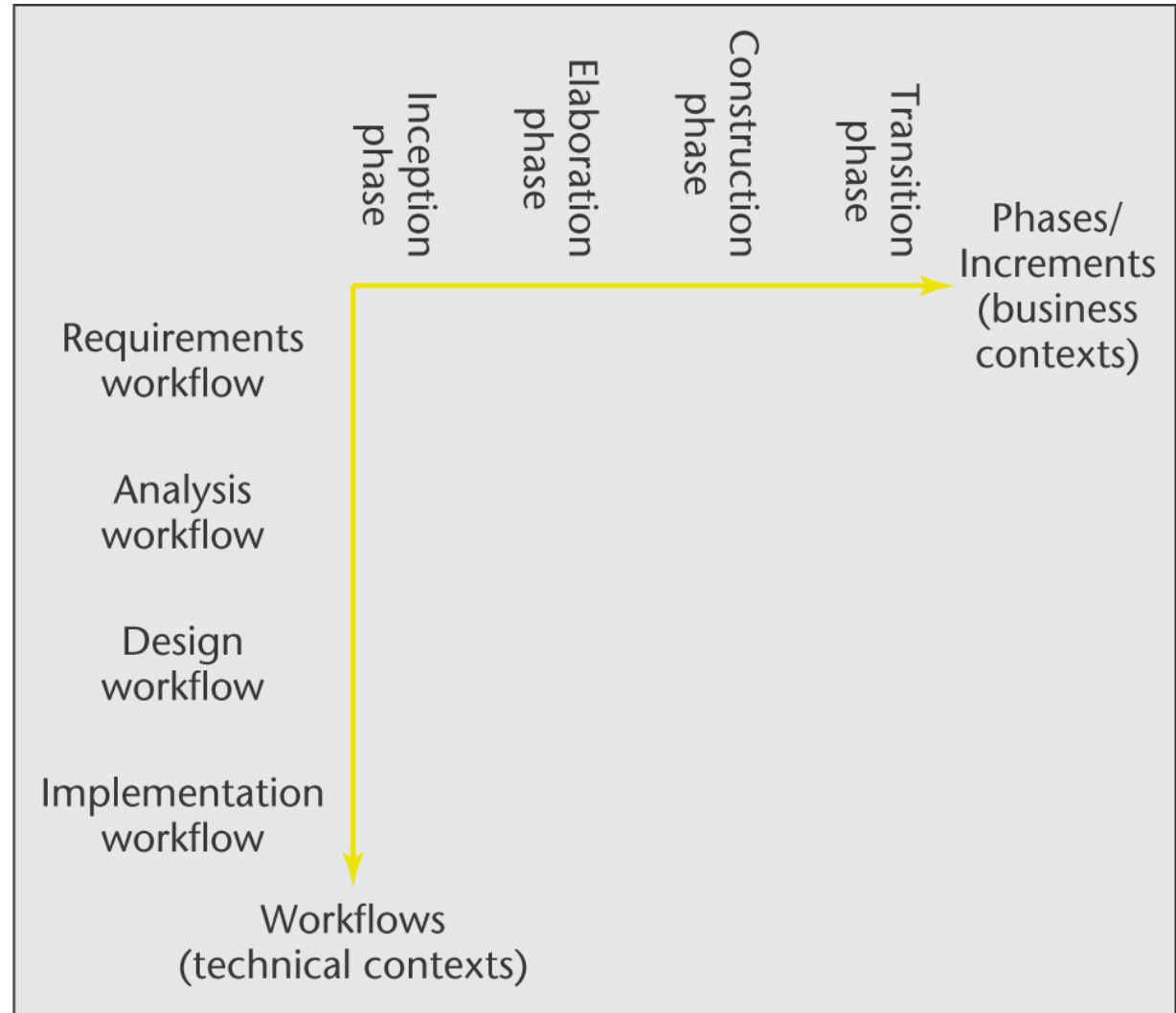- This phase is driven by feedback from the site(s) at which the beta release has been installed

The Transition Phase: Documentation

- The deliverables of the transition phase include:
  - All the artifacts (final versions)
  - The completed manuals

One- and Two-Dimensional Life-Cycle Models
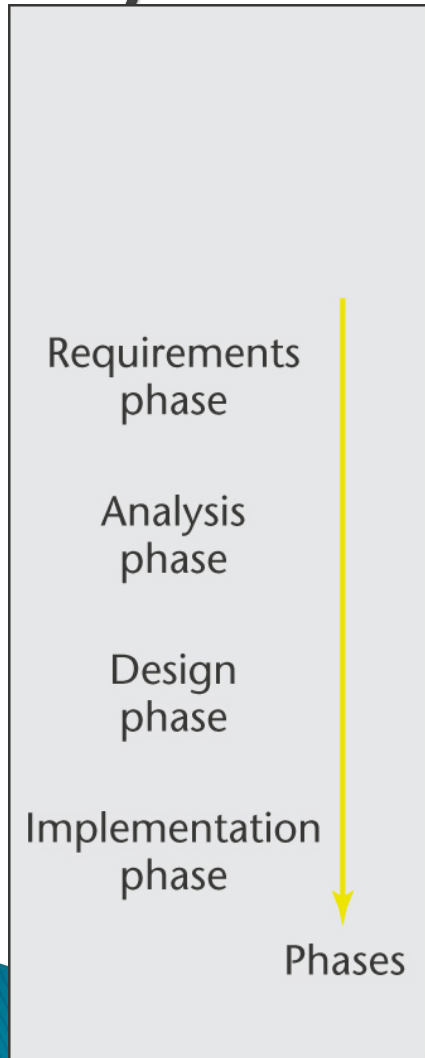

(a)

(b)

Why A Two-Dimensional Model?

- A traditional life cycle is a one-dimensional model
  - Represented by the single axis on the previous slide
    - Example: Waterfall model

- The <u>Unified Process is a two-dimensional model</u>
  - Represented by the two axes on the previous slide

- The two-dimensional figure shows
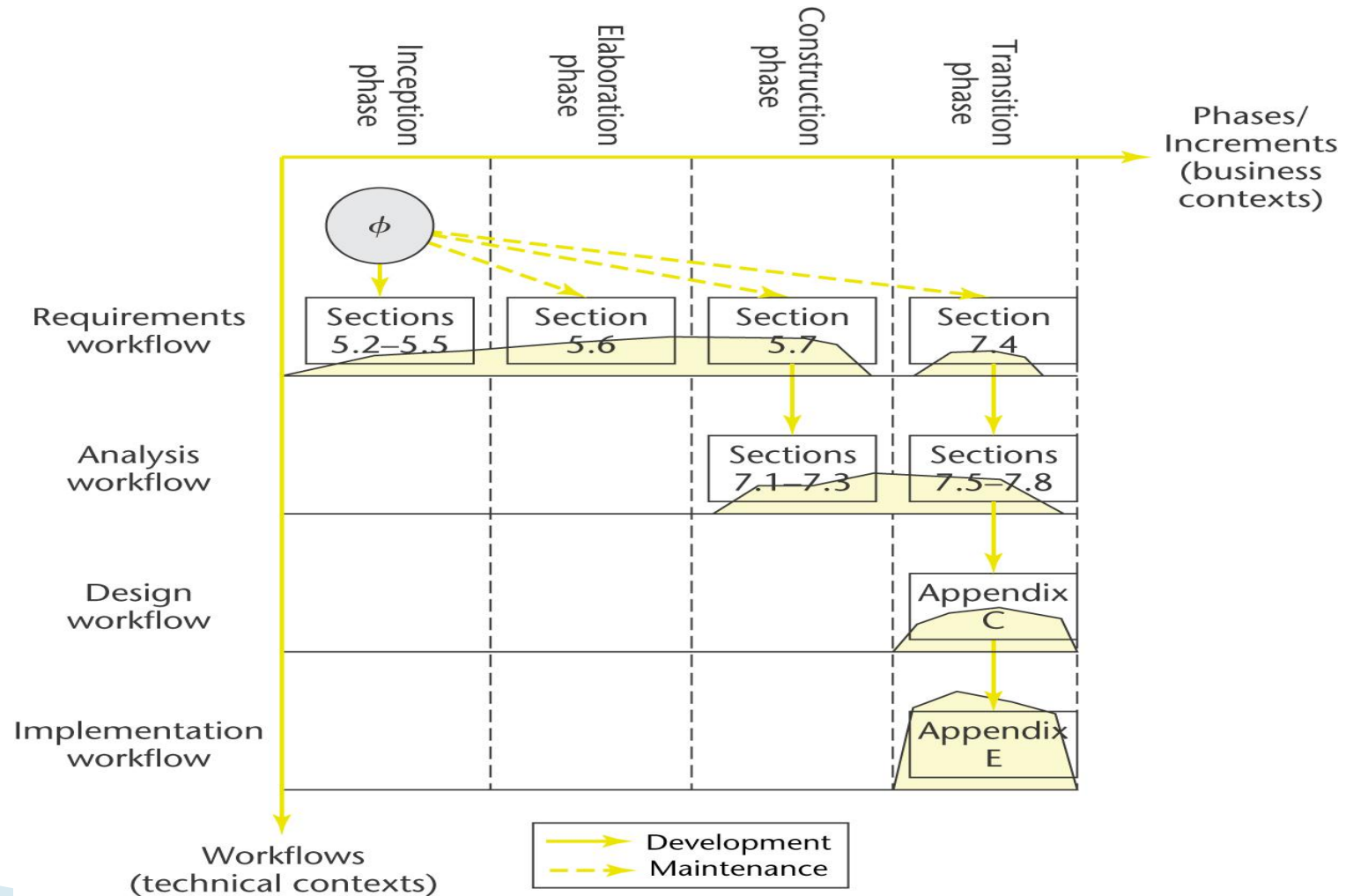 - The workflows (technical contexts), and
  - The phases (business contexts)

Why A Two-Dimensional Model? (contd)
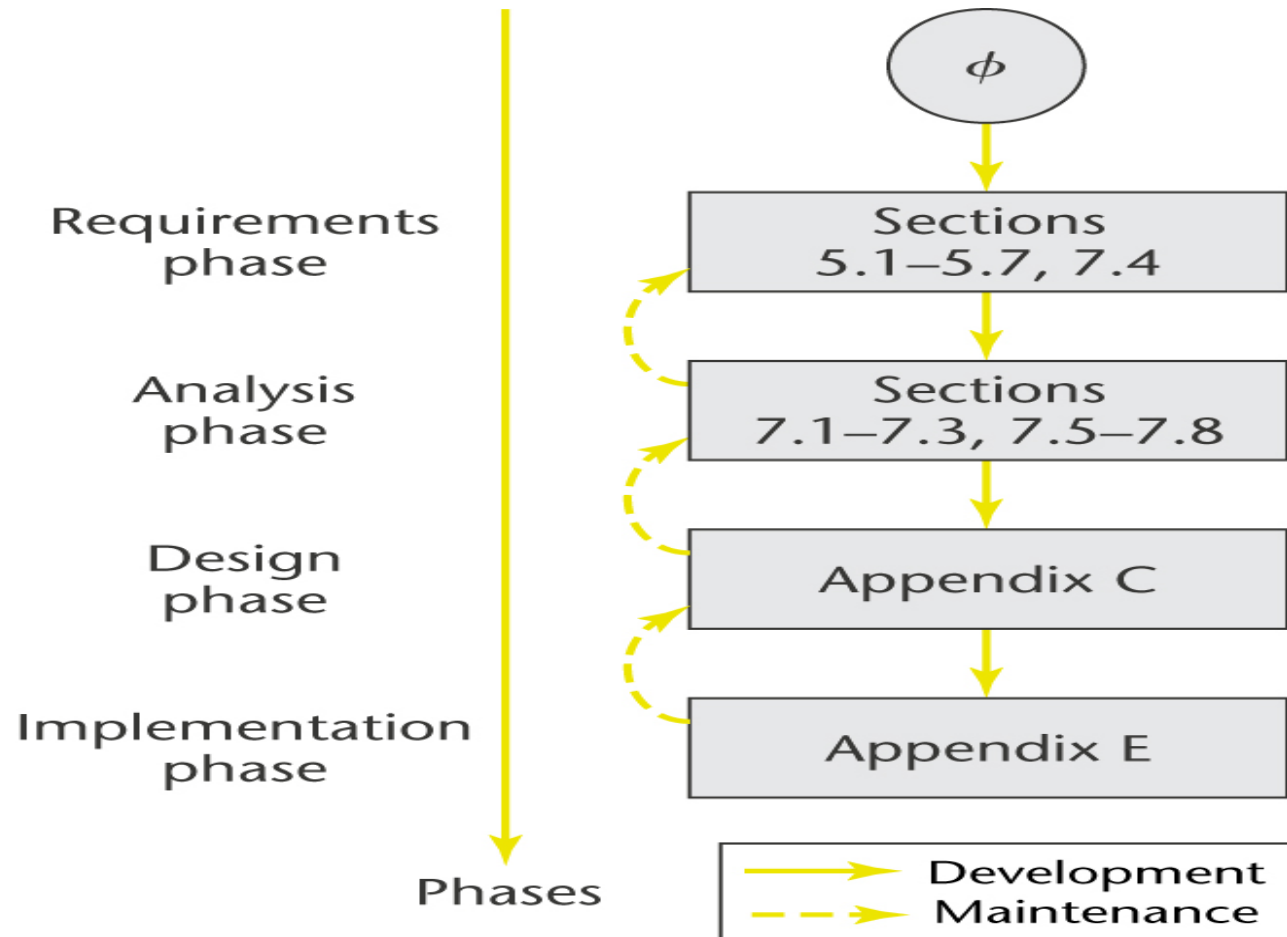
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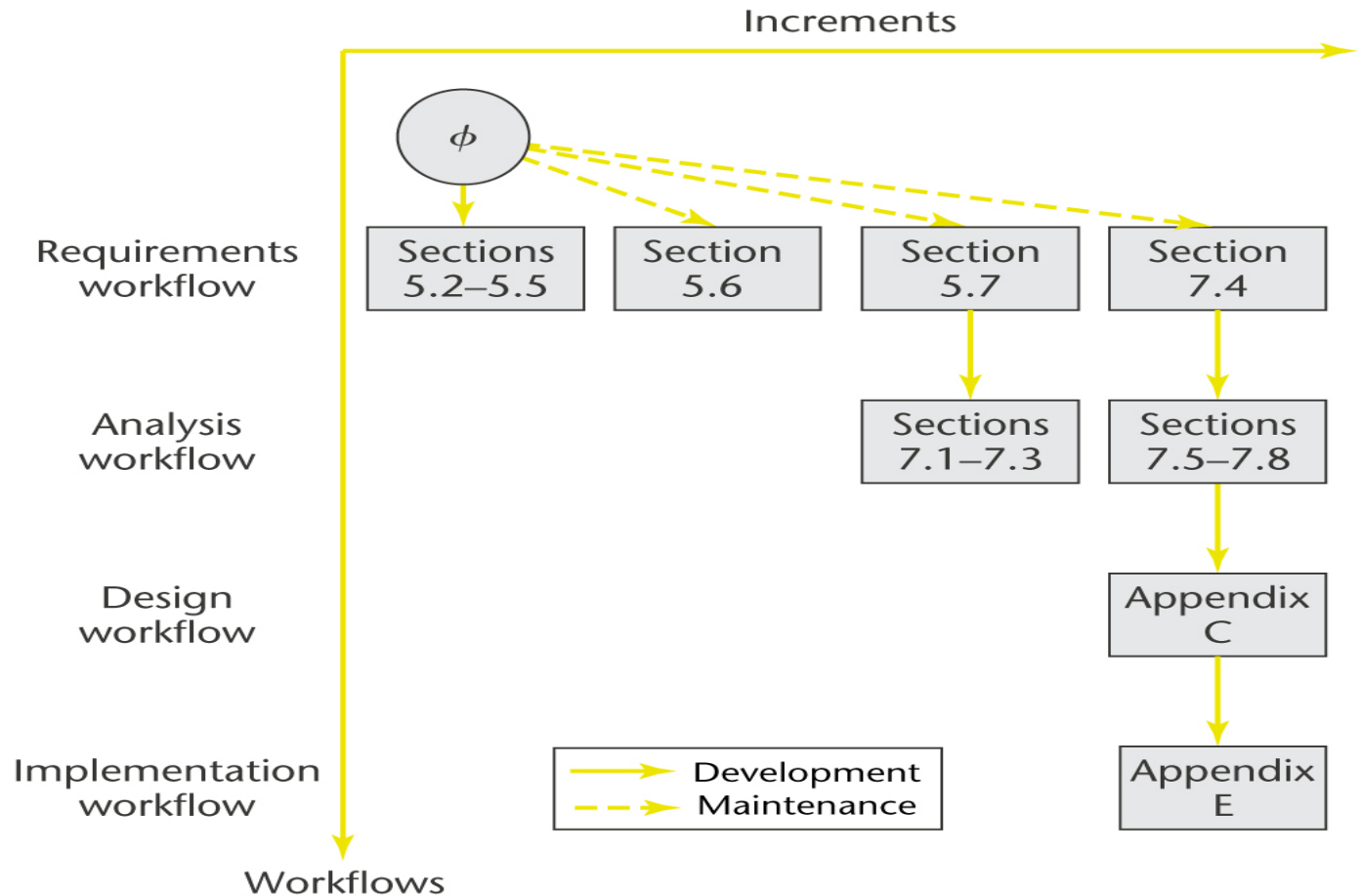
Why A Two-Dimensional Model? (contd)

Why A Two-Dimensional Model? (contd)

- At the beginning of the process, there is not enough information about the information system to carry out the requirements workflow
  - Similarly for the other core workflows

- An information system has to be broken into subsystems

- Even subsystems can be too large at times
  - Modules may be all that can be handled until a fuller understanding of all the parts of the information system as a whole has been obtained

Why A Two-Dimensional Model? (contd)

- The Unified Process is the best solution found to date for treating a large problem as a set of smaller, largely independent subproblems
  ◦ It provides a framework for incrementation and iteration

- The Unified Process also handles the inevitable changes well
  ◦ The moving target problem
  ◦ The inevitable mistakes