Design Defects and Restructuring

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Unified Process Introduction

Basic Characteristics of the Unified Process

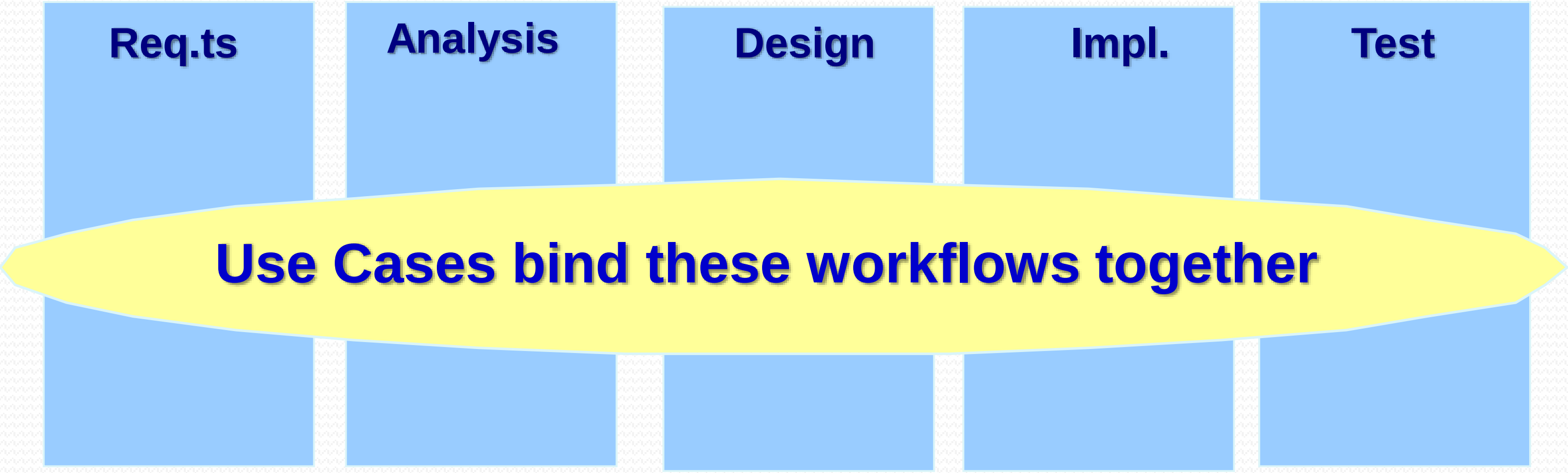
- Object-oriented
- Use-case driven
- Architecture centric
- Iteration and incrementation

Basic Characteristics of the Unified Process

- Object-oriented
  - Utilizes object oriented technologies.
  - Classes are extracted during OOA and designed during OOD.

Use-case driven

  - Utilizes use case model to describe complete functionality of the system



Req.ts

Analysis

Design

Impl.

Test

Use Cases bind these workflows together

Basic Characteristics of the Unified Process

- Architecture centric
  - Focus core architecture in the early iterations
  - In earliest iterations, get high valued requirements
  - View of the whole design with the important characteristics made more visible
  - Expressed with class diagram

Basic Characteristics of the Unified Process

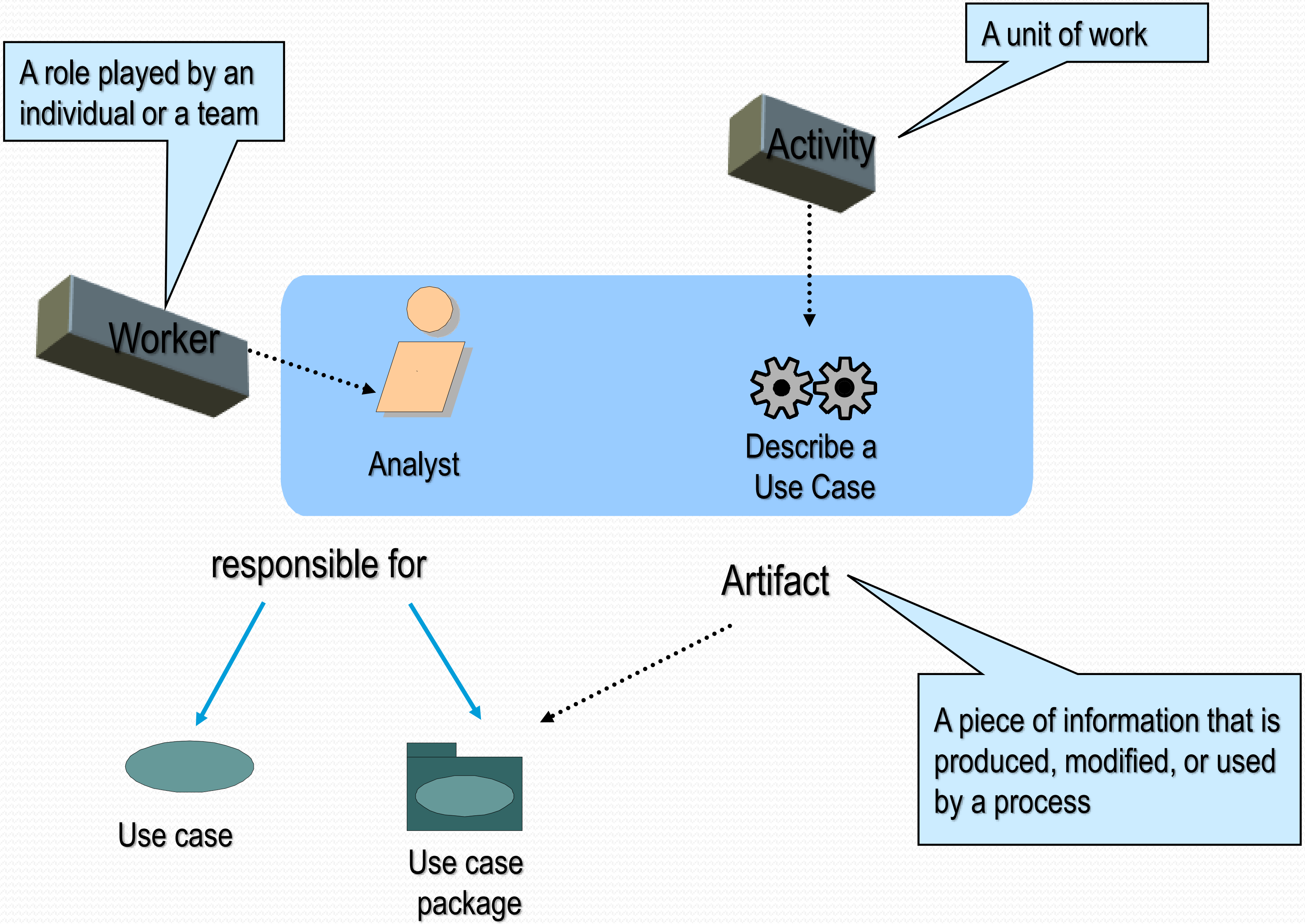
Iteration and incrementation

- Way to divide the work
- Iterations are steps in the process, and increments are growth of the product
- The basic software development process is iterative
  - Each successive version is intended to be closer to its target than its predecessor

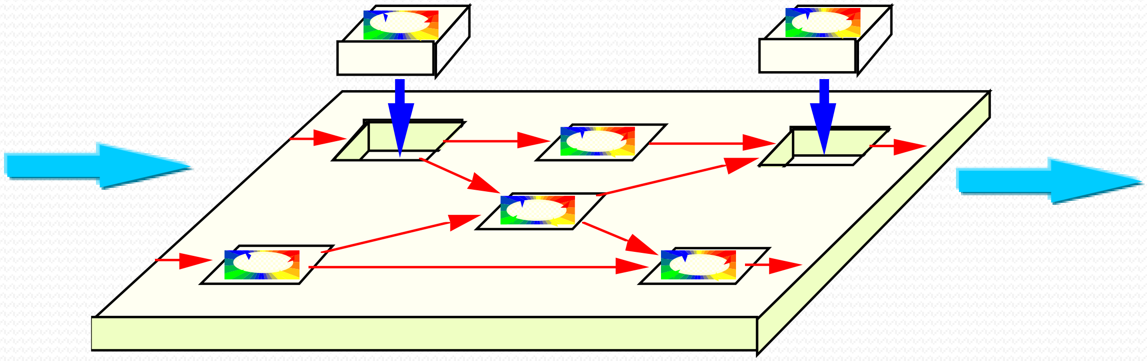
The Rational Unified Process

- RUP is a method of managing OO Software Development
- It can be viewed as a Software Development Framework which is extensible and features:
  - Iterative Development
  - Requirements Management
  - Component-Based Architectural Vision
  - Visual Modeling of Systems
  - Quality Management
  - Change Control Management

The Unified Process is Engineered


A role played by an individual or a team
A unit of work
Activity
Worker
Analyst
Describe a Use Case
responsible for
Artifact
A piece of information that is produced, modified, or used by a process
Use case
Use case package

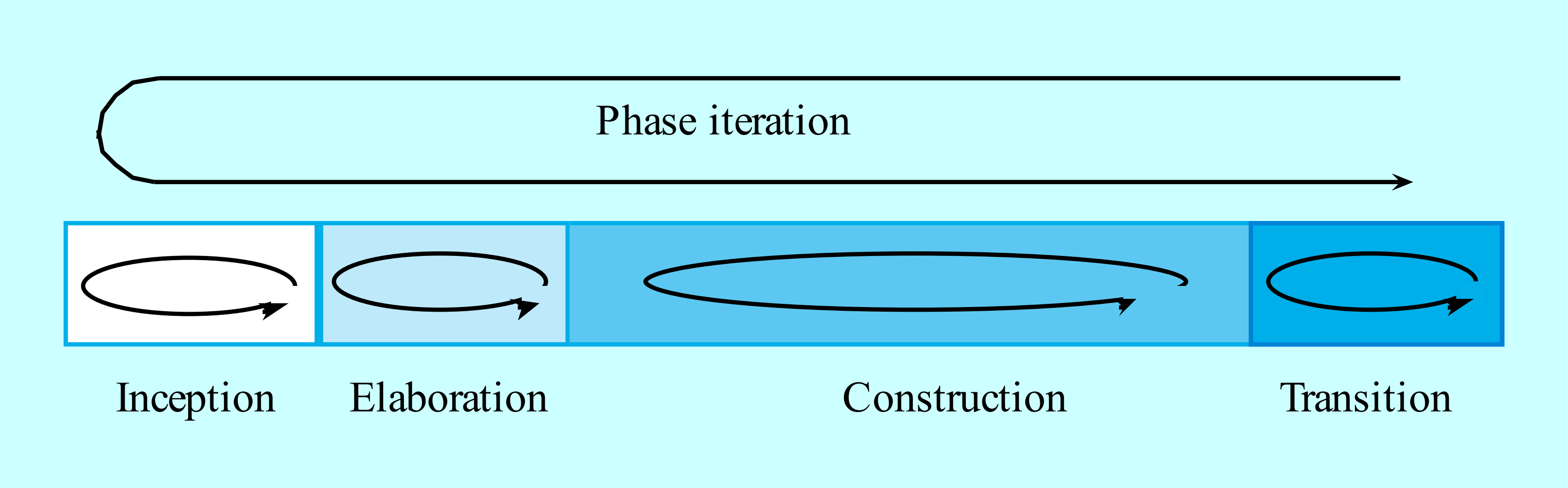
The Unified Process is a Process Framework



While the Unified Process is widely used, there is NO Universal Process!

- The Unified Process is designed for flexibility and extensibility
  - allows a variety of lifecycle strategies
  - selects what artifacts to produce
  - defines activities and workers
  - models concepts
  - IT IS A PROCESS FRAMEWORK for development

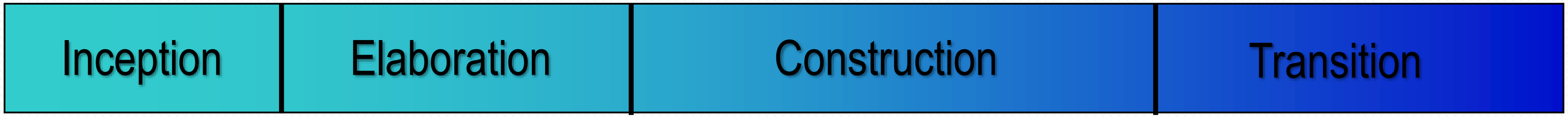
Unified Process Model



Goals and Features of Each Iteration

- Slowly chip away at the project risks:
  - performance risks
  - integration risks (different vendors, tools, etc.)
  - conceptual risks (hunt out analysis and design flaws)
- Perform a "miniwaterfall" project that ends with a delivery of something tangible in code.
- Each iteration is risk-driven.
- The result of a single iteration is an incremental improvement.

Unified Process Phases



Inception Elaboration Construction Transition

- Inception
  - Define **business case**, **risks**, **10% requirements** identified, estimate next phase effort.
- Elaboration
  - **Understanding of problem / architecture**, **risk significant** units are coded/tested, **80%** requirements identified.
- Construction
  - System design, **programming and testing**.
- Transition
  - **Deploy** the system in its operating environment.

The Phases/Workflows of the Unified Process

- Phase is Business context of a step

Workflow is Technical context of a step

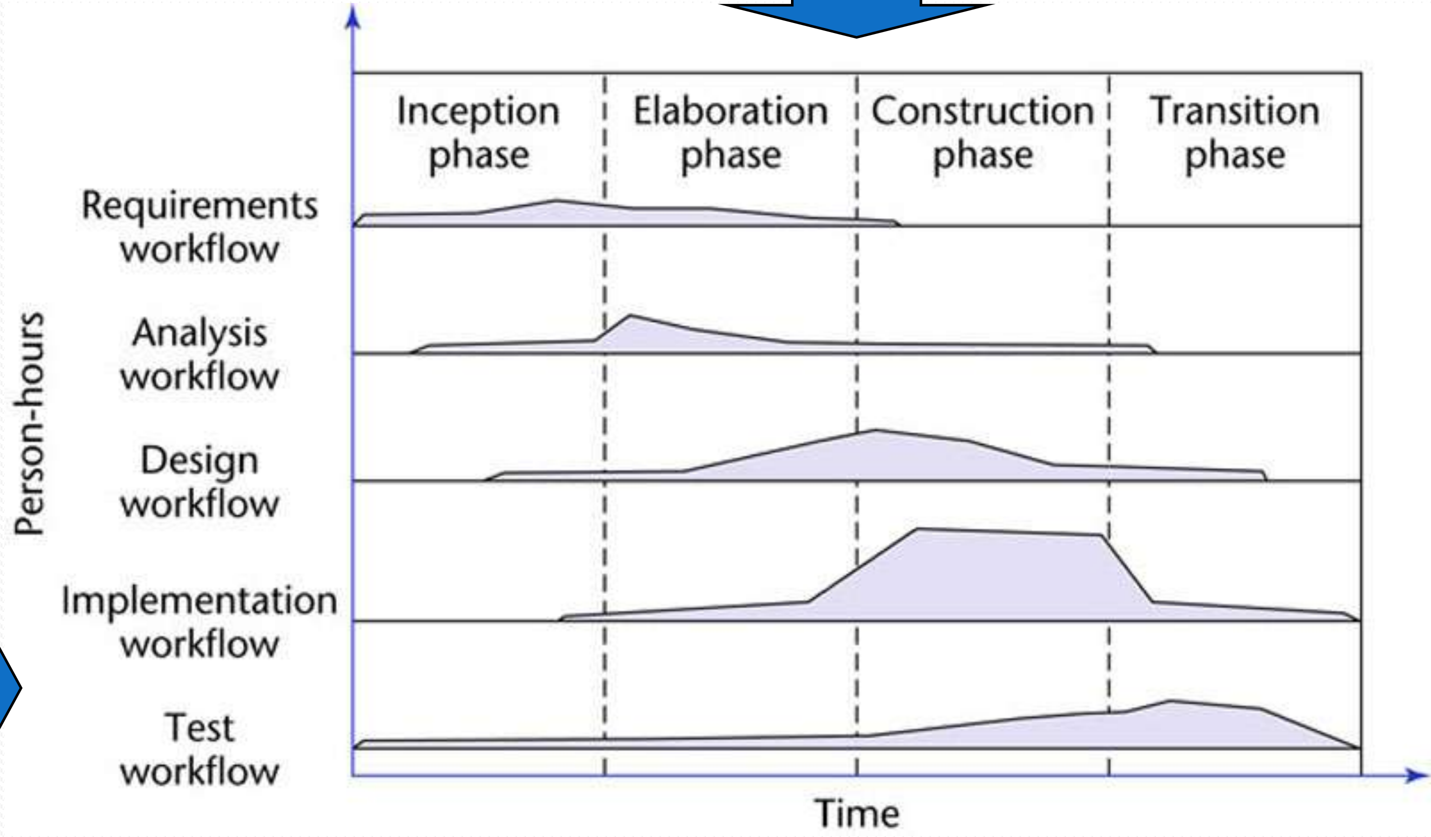


Figure 3.1

The Phases/Workflows of the Unified Process

- **NOTE: Most of the requirements work or workflow is done in the inception phase.**

- **However some is done later.**

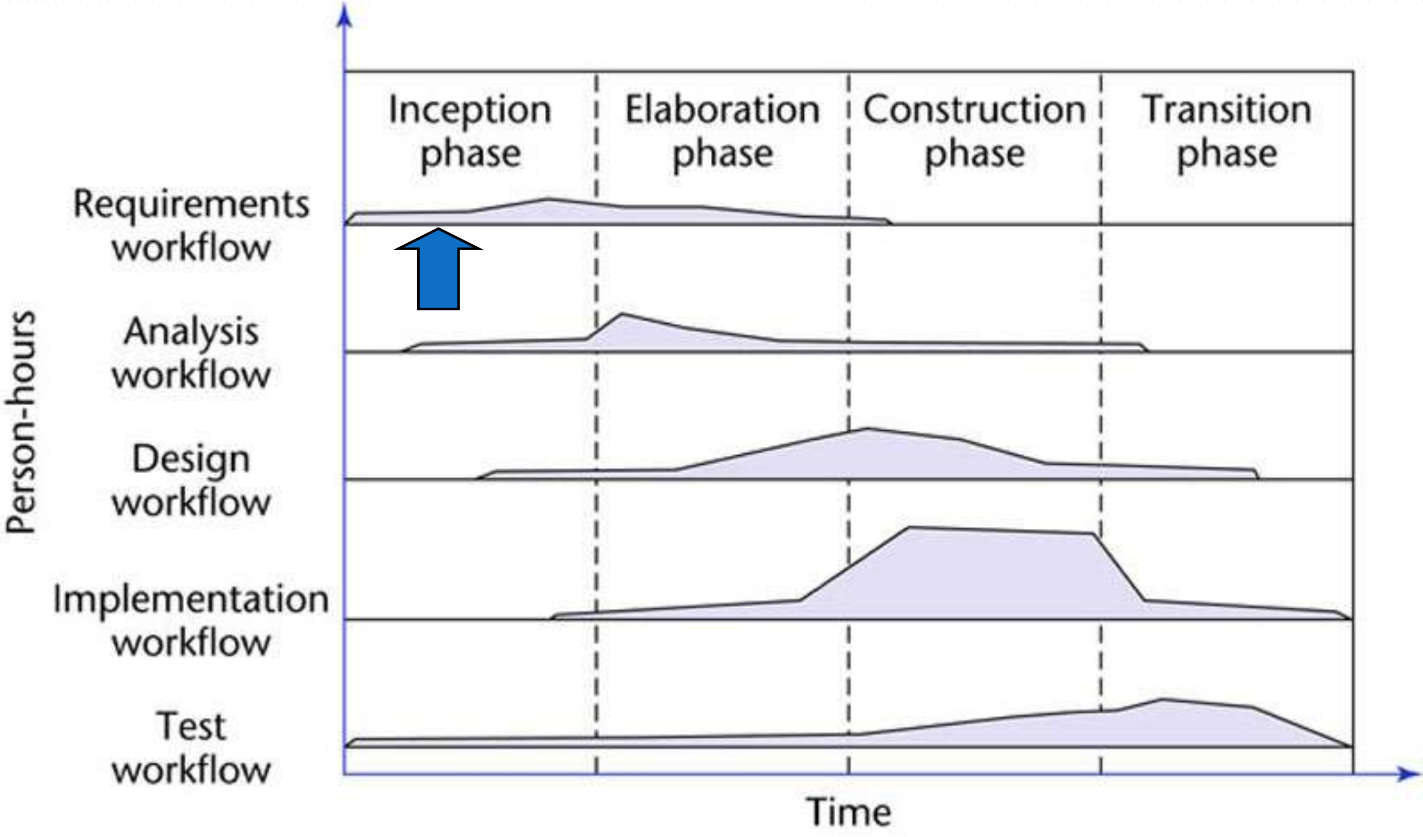


Figure 3.1

The Phases/Workflows of the Unified Process

- **NOTE:** **Most of the implementation work or workflow is done in construction**

- **However some is done earlier and some later.**

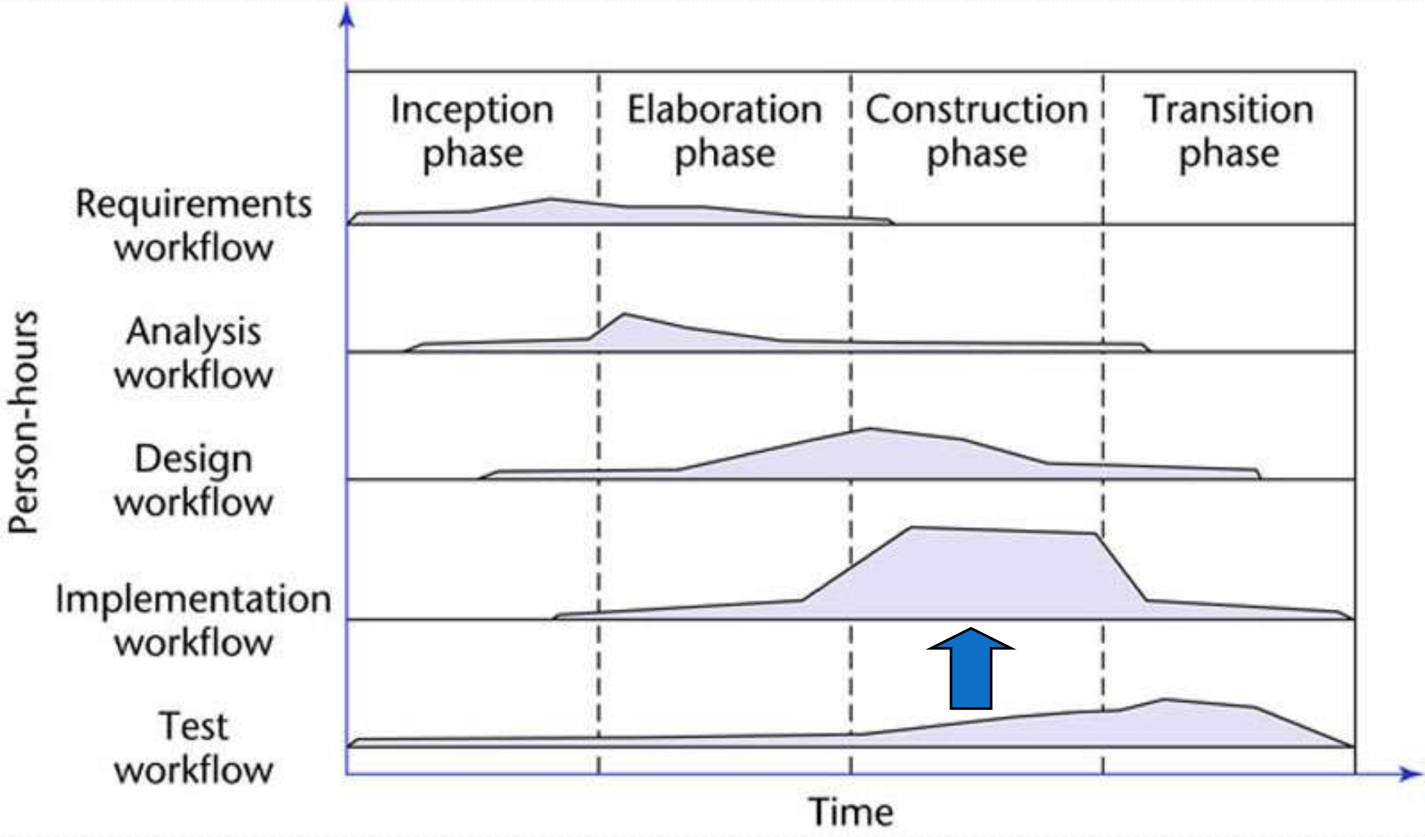


Figure 3.1

Phase Deliverables

Inception Phase	Elaboration Phase	Construction Phase	Transition Phase
• The initial version of the domain model • The initial version of the business model • The initial version of the requirements artifacts • A preliminary version of the analysis artifacts • 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	• 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	• 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 (for the remainder of the project) • If necessary, the updated business case	• All the artifacts (final versions) • The completed manuals

UP Life cycle in four phases

- Inception
- Elaboration
- Construction
- Transition

The Enterprise Unified Process (EUP) adds two more phases to this:

- *Production:* keep system useful/productive after deployment to customer
- *Retirement:* archive, remove, or reuse etc.

Example roles in UP

- *Stake Holder:* customer, product manager, etc.
- *Software Architect:* established and maintains architectural vision
- *Process Engineer:* leads definition and refinement of Development Case
- *Graphic Artist:* assists in user interface design, etc.

Some UP guidelines

- *Attack risks early on* and continuously so, before they will attack you
- Stay focused on *developing executable software* in early iterations
- Prefer *component-oriented* architectures and *reuse existing components*
- Quality is a way of life, not an afterthought

Six best “must” UP practices

1. Time-boxed iterations: *avoid speculative powerpoint architectures”*

2. *Strive for cohesive architecture* and reuse existing components:

- e.g. core architecture developed by small, co-located team
- then early team members divide into sub-project leaders

Six best “must” UP practices

3. Continuously verify quality: *test early & often*, and realistically by integrating all software at each iteration
4. *Visual modeling*: prior to programming, do at least some visual modeling to explore creative design ideas

Six best “must” UP practices

5. *Manage requirements:* find, organize, and track requirements through skillful means

6. *Manage change:*

- disciplined configuration management protocol, version control,
- change request protocol
- baselined releases at iteration ends

Unified Process Workflows

The Unified Process

- The Unified Process IS A
- 2-dimensional systems development process described by a
  - set of phases and (dimension one)
  - Workflows (dimension two)

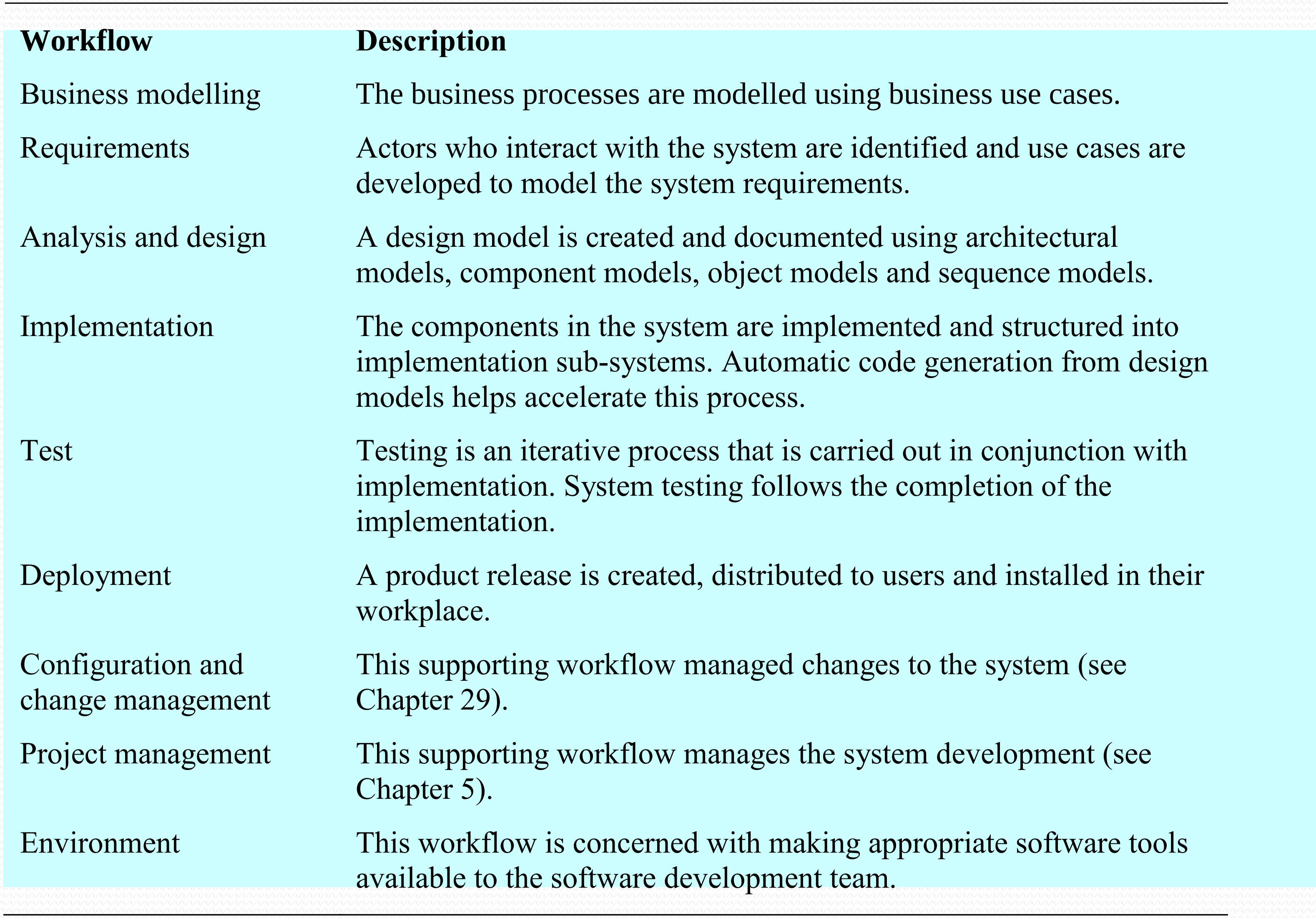
The Unified Process

- Phases
  - Describe the business steps needed to develop, buy, and pay for software development.
  - The business increments are identified as phases
- Workflows
  - Describe the tasks or activities that a developer performs to evolve an information system over time

Process Overview

	Phases (time)			
Workflow (tasks)	Inception	Elaboration	Construction	Transition
Requirements				
Analysis				
Design				
Implementation				
Test				

workflows



Workflow	Description
Business modelling	The business processes are modelled using business use cases.
Requirements	Actors who interact with the system are identified and use cases are developed to model the system requirements.
Analysis and design	A design model is created and documented using architectural models, component models, object models and sequence models.
Implementation	The components in the system are implemented and structured into implementation sub-systems. Automatic code generation from design models helps accelerate this process.
Test	Testing is an iterative process that is carried out in conjunction with implementation. System testing follows the completion of the implementation.
Deployment	A product release is created, distributed to users and installed in their workplace.
Configuration and change management	This supporting workflow managed changes to the system (see Chapter 29).
Project management	This supporting workflow manages the system development (see Chapter 5).
Environment	This workflow is concerned with making appropriate software tools available to the software development team.

Primary Workflows

- The Unified Process

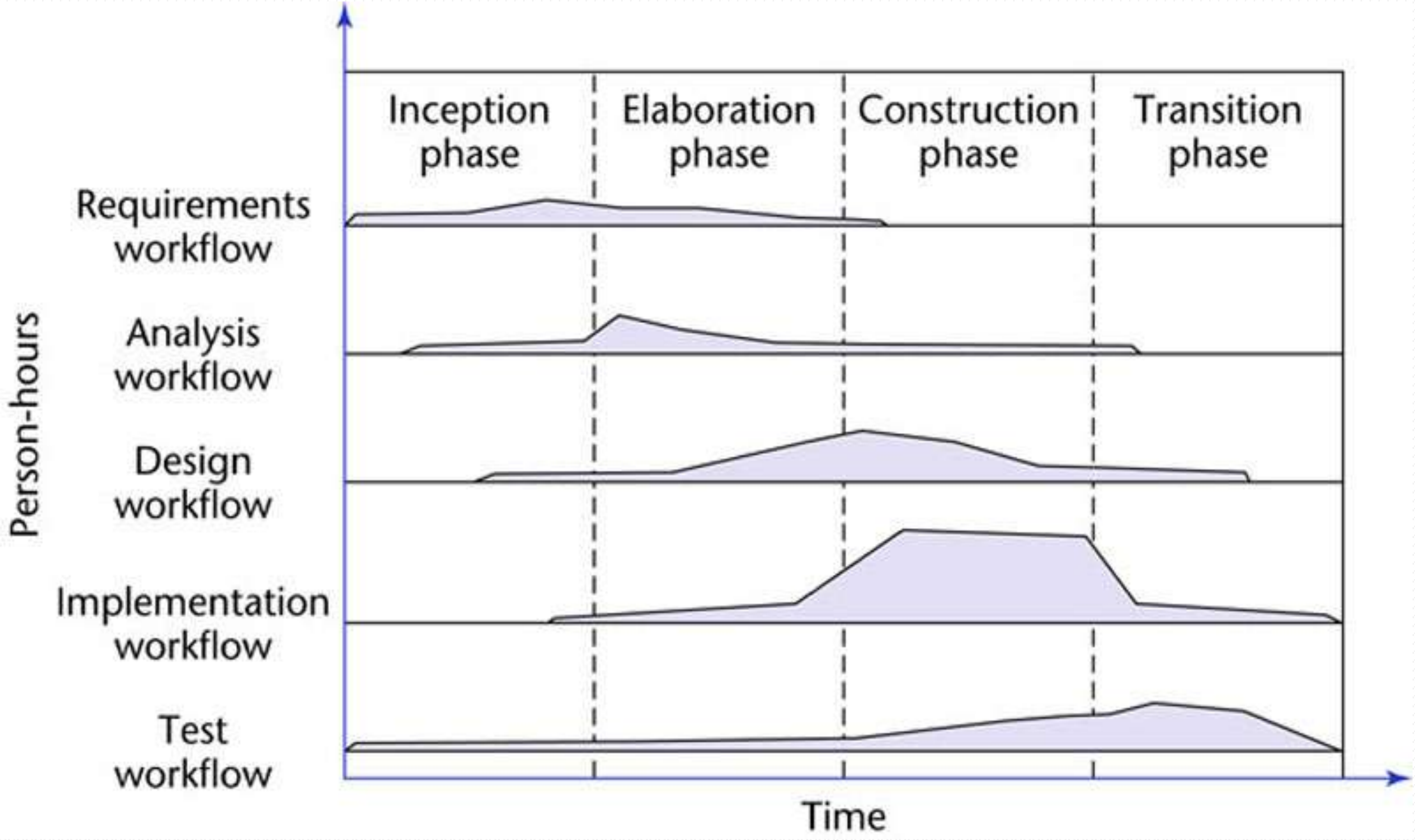
- PRIMARY WORKFLOWS
  - **Requirements workflow**
  - **Analysis workflow**
  - **Design workflow**
  - **Implementation workflow**
  - **Test workflow**
  - **Post delivery maintenance workflow**

- Supplemental Workflows
  - Planning Workflow

Iterations and Workflow

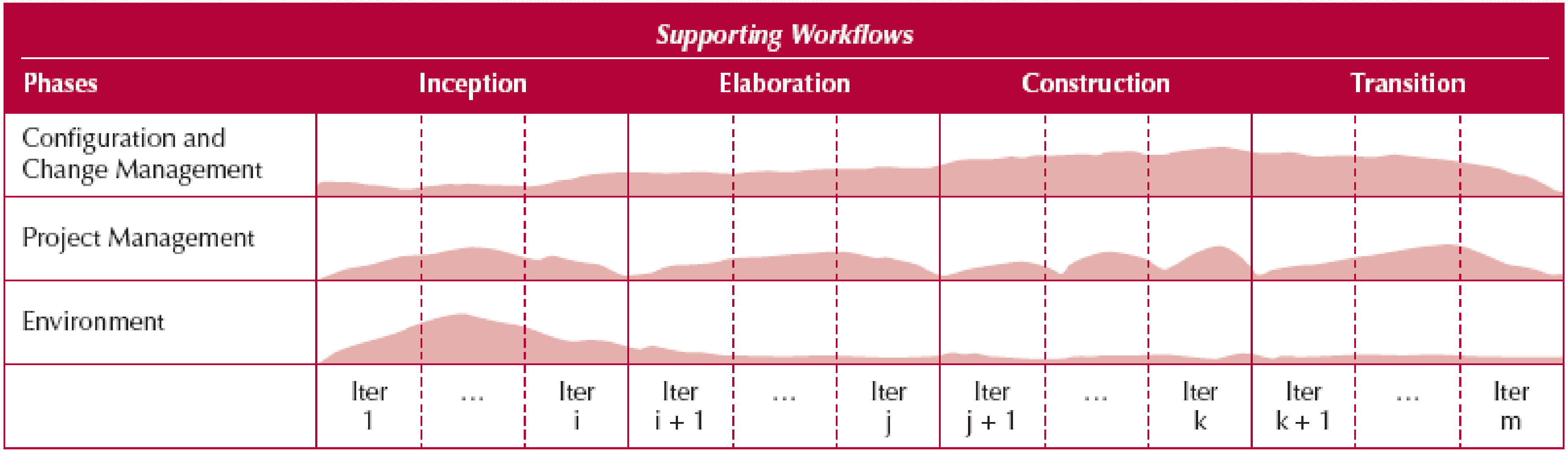
Phases

Core Workflows



Iterations

Supporting Workflows of The Unified Process



Software Project Management Plan

- Once the client has signed off the specifications, detailed planning and estimating begins

- We draw up the software project management plan, including
  - Cost estimate
  - Duration estimate
  - Deliverables
  - Milestones
  - Budget

- This is the earliest possible time for the SPMP

Post delivery Maintenance

- Post delivery maintenance is an essential component of software development
  - More money is spent on post delivery maintenance than on all other activities combined

- Problems can be caused by
  - Lack of documentation of all kinds

- Two types of testing are needed
  - Testing the changes made during post delivery maintenance
  - Regression testing

- All previous test cases (and their expected outcomes) need to be retained

Retirement

- Software is can be made unmaintainable because
  - A drastic change in design has occurred
  - The product must be implemented on a totally new hardware/operating system
  - Documentation is missing or inaccurate
  - Hardware is to be changed—it may be cheaper to rewrite the software from scratch than to modify it

- These are instances of maintenance (rewriting of existing software)
- True retirement is a rare event

- It occurs when the client organization no longer needs the functionality provided by the product