Unified Software Development Process
(3C05/D22)



## Unit 5: USDP

Objectives:
- Introduce the main concepts of iterative and incremental development
- Discuss the main USDP phases



## USDP

- USDP is an industry standard software development process
  - Free!
  - The generic process for the UML
- USDP is:
  - Use-case and risk driven
  - Architecture centric
  - Iterative and incremental
- For reference: Ivar Jacobson, Grady Booch, James Rumbaugh: The Unified Software Development Process. Addison Wesley. 1999

## USDP for your project…

- USDP is a generic software engineering process. It has to be customised (instantiated) for your project:
  - In-house standards
  - Document templates
  - Tools
  - Databases
  - Lifecycle modifications
- Rational Unified Process is an instantiation of USDP. RUP is a product marketed and owned by IBM Software.
- RUP also has to be instantiated for your project!

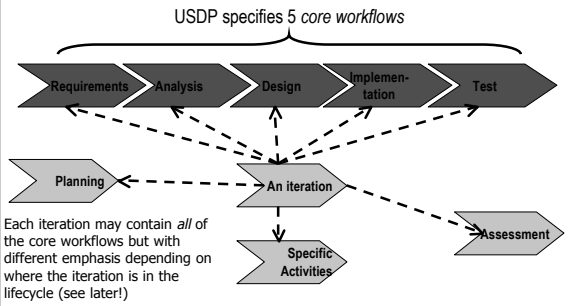


## Iterations

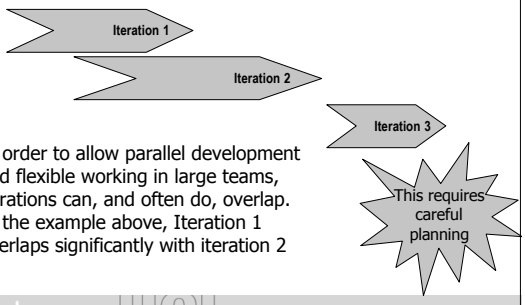
- Iterations are the key to the USDP
- Each iteration is like a mini-project including:
  - Planning
  - Analysis and design
  - Integration and test
  - An internal or external release
  - The result of an iteration is an increment
- We arrive at a final product release through a sequence of iterations
- Iterations contain workflows
- Iterations are organised into phases



## Iteration Workflows



## Iterations may overlap




In order to allow parallel development and flexible working in large teams, iterations can, and often do, overlap. In the example above, Iteration 1 overlaps significantly with iteration 2



## Increments

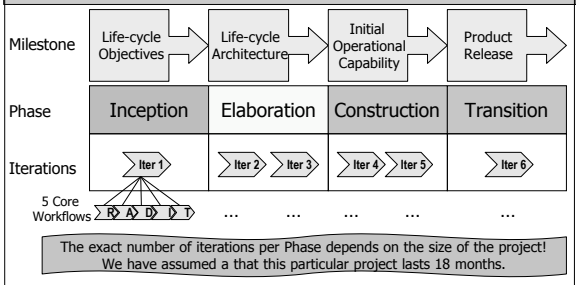
- Each iteration generates internal (or external) releases of various artefacts which together constitute a baseline
- A baseline is a set of reviewed and approved artefacts that:
  - Provides an agreed basis for further review and development
  - Can be changed only through a formal procedure such as configuration and change management
- An increment is the difference between the release of one iteration and the release of the next
  - The result of an iteration is an increment



## USDP Lifecycle

- The USDP lifecycle is divided into a sequence of phases
- Each phase may include many iterations
  - The exact number of iterations per phase depends on the size of the project!
  - One iteration per phase for small projects
- Each phase concludes with a major milestone

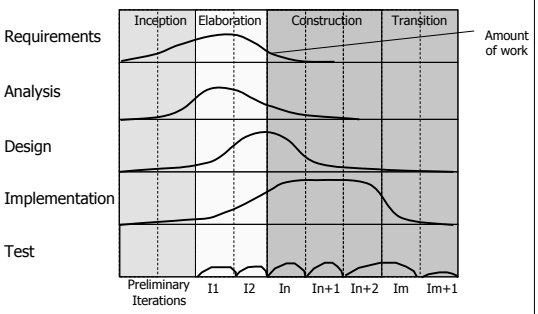
## USDP Phases




The exact number of iterations per Phase depends on the size of the project! We have assumed a that this particular project lasts 18 months.

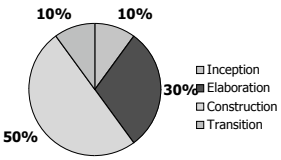


## Phases and Workflows



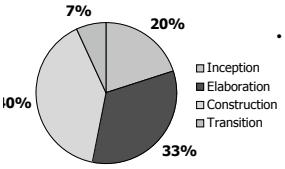



## Time for a typical project




- If we consider a project of "typical" difficulty, then this is how the total time for the project is likely to be distributed over the phases

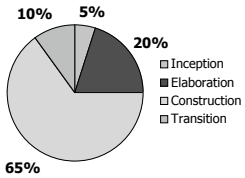
## Time for a difficult project




- If we consider a project of greater than normal difficulty, then this is how the total time for the project is likely to be distributed over the phases
- Note that for more difficult projects more time is spent in the early phases



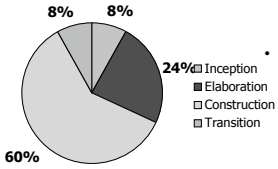
## Resource for a typical project




- If we consider a project of "typical" difficulty, then this is how the total resource for the project is likely to be utilised over the phases



## Resource for a difficult project

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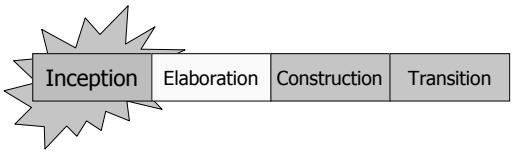
## Phases

- For each phase we will consider:
  - The goal for the phase
  - The focus in terms of the core workflows
  - The milestone at the end of the phase





## Inception

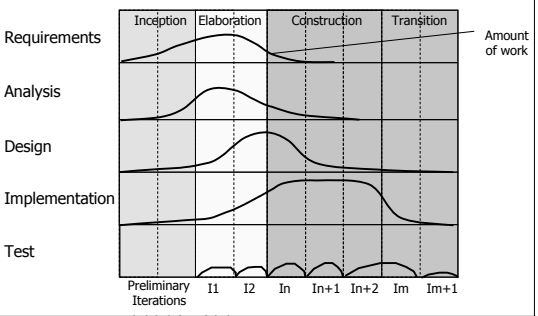





## Inception - Goals

- Establish feasibility of the project
- Create a business case
- Capture key requirements
- Scope the system
- Identify critical risks
- Create proof of concept prototype

## Phases and Workflows






## Inception - Focus

- Requirements – establish business case, scope and core requirements
- Analysis – establish feasibility
- Design – design proof of concept or technical prototypes
- Implementation – build the proof of concept prototype
- Test – not generally applicable

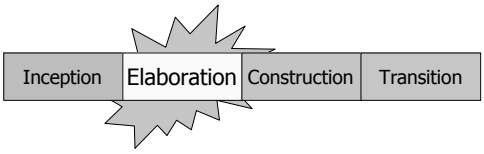
N.B. The blue bars indicate approximately the relative amount of resource needed



## Life Cycle Objectives

- Conditions of satisfaction:
  - System scope has been defined
  - Key requirements for the system have been captured. These have been defined and agreed with the stakeholders
  - An architectural vision exists. This is just a sketch at this stage
  - A Risk Assessment
  - A Business Case
  - Project feasibility is confirmed
  - The stakeholders agree on the objectives of the project

## Elaboration



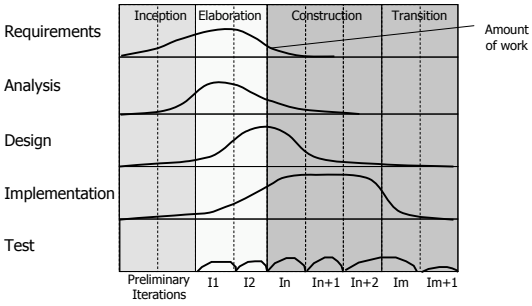



## Elaboration - Goals

- Create an executable architectural baseline
- Refine Risk Assessment
- Define quality attributes (defect rates etc.)
- Capture use-cases to 80% of the functional requirements
- Create a detailed plan for the construction phase
- Formulate a bid which includes resources, time, equipment, staff and cost



## Phases and Workflows



## How many use-cases?

- Our goal is to find sufficient use-cases to allow us to build a system
- Aim to identify about 80% of the use-cases based on a consideration of functional requirements
  - The other 20% will come out in later phases if important
- Aim to model in detail only about 40% to 80% of the set of identified use-cases
- For each use-case modelled in detail, only a small fraction of the possible scenarios may need to be modelled

Model *just enough* use-cases to capture the information you need!



## Elaboration - Focus

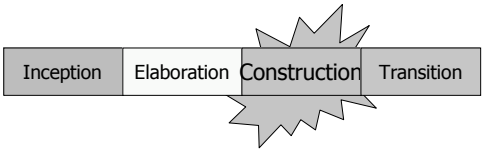
- Requirements – refine system scope and requirements
- Analysis – establish what to build
- Design – create a stable architecture
- Implementation – build the architectural baseline
- Test – test the architectural baseline



## Life Cycle Architecture

- Conditions of satisfaction:
  - A resilient, robust executable architectural baseline has been created
  - The Risk Assessment has been updated
  - A project plan has been created to enable a realistic bid to be formulated
  - The business case has been verified against the plan
  - The stakeholders agree to continue

## Construction



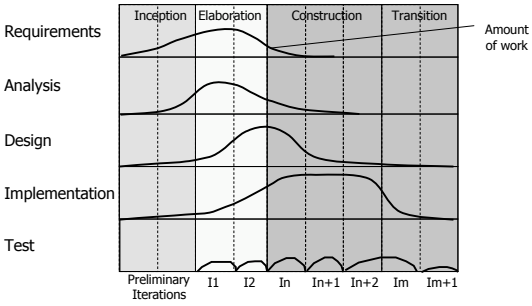



## Construction - Goals

- Completing use-case identification, description and realisation
- Finish analysis, design, implementation and test
- Maintain the integrity of the system architecture
- Revise the Risk Assessment



## Phases and Workflows



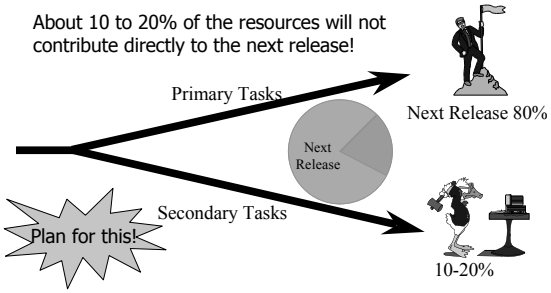
## Construction - Focus

- Requirements – uncover any requirements that had been missed
- Analysis – finish the analysis model
- Design – finish the design model
- Implementation – build the Initial Operational Capability
- Test – test the Initial Operational Capability



## Plan for two lines of work…

About 10 to 20% of the resources will not contribute directly to the next release!






## Primary and secondary tasks

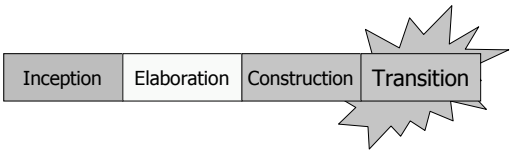
- Primary tasks:
  - Everything that contributes directly to the next increment
- Secondary tasks:
  - Everything else!
  - Attack risks with behavioural prototypes
  - Solve critical problems with taskforces (tiger teams)
  - Research into problem and solution domains
  - Bug tracking and reporting

## Initial Operational Capability

- Conditions of satisfaction:
  - The product is ready for beta testing in the user environment



## Transition

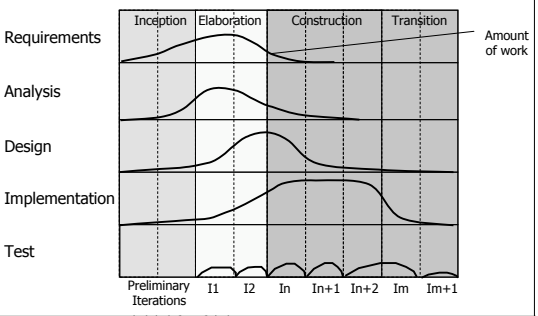





## Transition - Goals

- Correct defects
- Prepare the users site for the new software
- Tailor the software to operate at the users site
- Modify software if unforeseen problems arise
- Create user manuals and other documentation
- Provide customer consultancy
- Conduct post project review

## Phases and Workflows






## Transition - Focus

- Requirements – not applicable
- Analysis – not applicable
- Design – modify the design if problems emerge in beta testing
- Implementation – tailor the software for the users site and correct problems uncovered in beta testing
- Test – beta testing and acceptance testing at the users site



## Product Release

- Conditions of satisfaction:
  - Beta testing, acceptance testing and defect repair are finished
  - The product is released into the user community

## Key Points

- USDP is the iterative and incremental software engineering process for the UML
- USDP has four phases:
  - Inception
  - Elaboration
  - Construction
  - Transition
- Each phase may have one or more iterations
- Each iteration has five iteration workflows
  - Requirements, Analysis, Design, Implementation,Test