Introduction to Software Development & Process Models

HCL

Trivial and non-trivial applications

- A program you write for a college assignment
- A program you write in class to learn a concept
- A program you write for fun
- An application that is used as part of a system to monitor vital signs during surgery
- An application that manages the pension program of a large company
- An ERP system

HCL

What is a project?

"A project is a temporary endeavour undertaken to create a unique product, service of result."

-- A Guide to the Project Management Body of Knowledge (4th Edition), Project Management Institute

- Temporary
- Unique outcome

HCL

What is a process?

- "An *organized* group of *related* activities that *work together* to *transform* one or more kinds of *input* into *outputs* that are *of value*…"

  -- Michael Hammer (The Agenda)

Benefits of the process approach

- “Divide and conquer” benefits
- Consistent and predictable results
  - Increased customer confidence
- Efficiency
  - Optimisation possibiliies (better use of resources, reduced cycle time…)
  - Can be visually mapped & measured to enable identification of opportunities for improvement
  - Consistent set of work activities

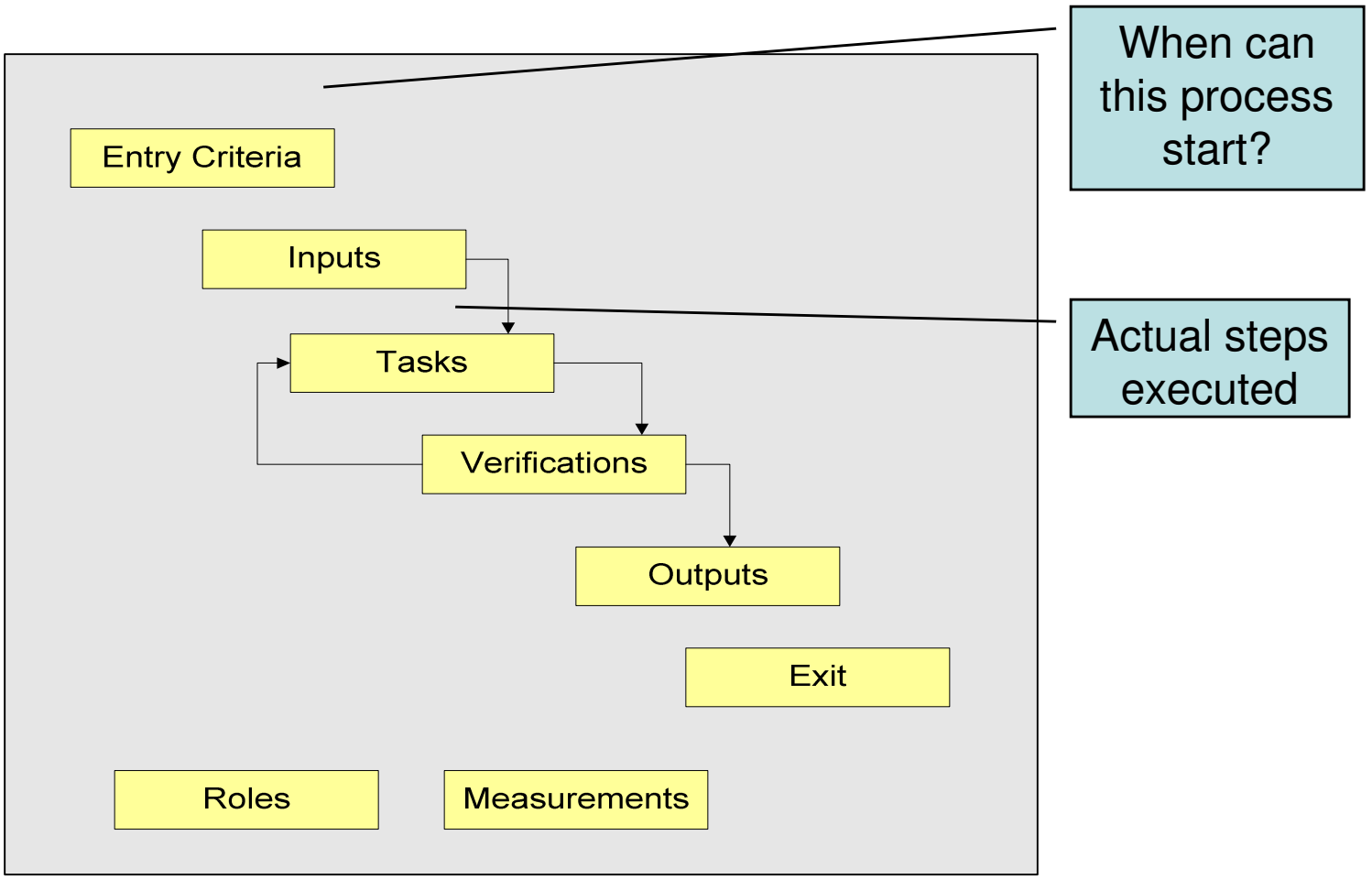
Process Attributes

E=**E**ntry criteria

T=**T**asks

V=**V**erification

X=e**X**it criteria



What is a Software Engineering?

"(1) The application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software; that is, the application of engineering to software. (2) The study of approaches as in (1)."

-- IEEE Standard Glossary of Software Engineering Terminology,"

IEEE std 610.12-1990, 1990.

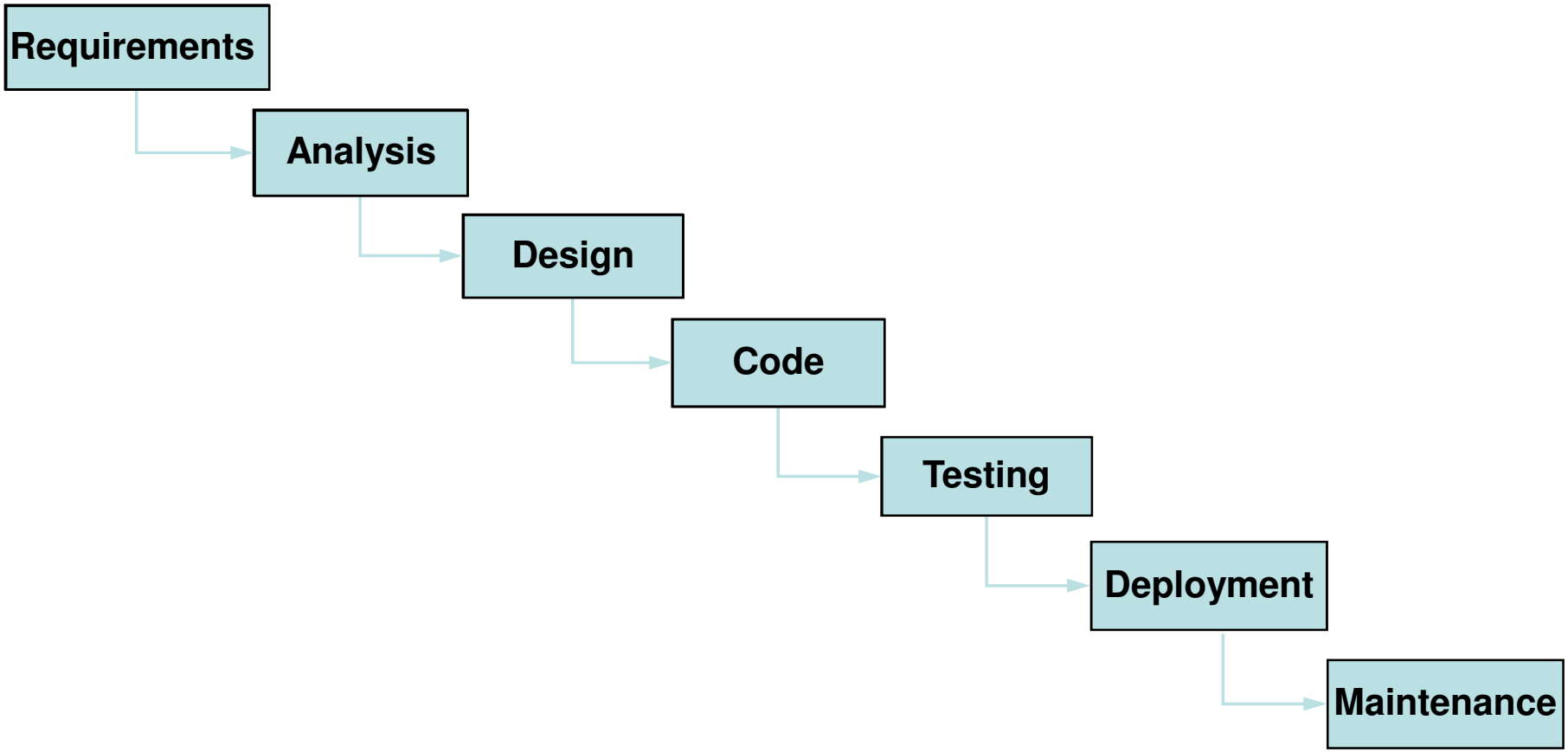
- Objective
  - Efficiently build good quality software

HCL

Software process models

- Build-and-fix
- Waterfall
- Spiral
- Unified

Waterfall model



RAD (Rapid Application Development)

- Applicable for applications where requirements are well defined and applications can be broken into well defined components which can be developed in parallel.
- This emphasizes extremely short development cycle.
- The RAD model is a "high speed" adaptation of the linear sequential model in which rapid development is achieved by using a component-based construction approach.

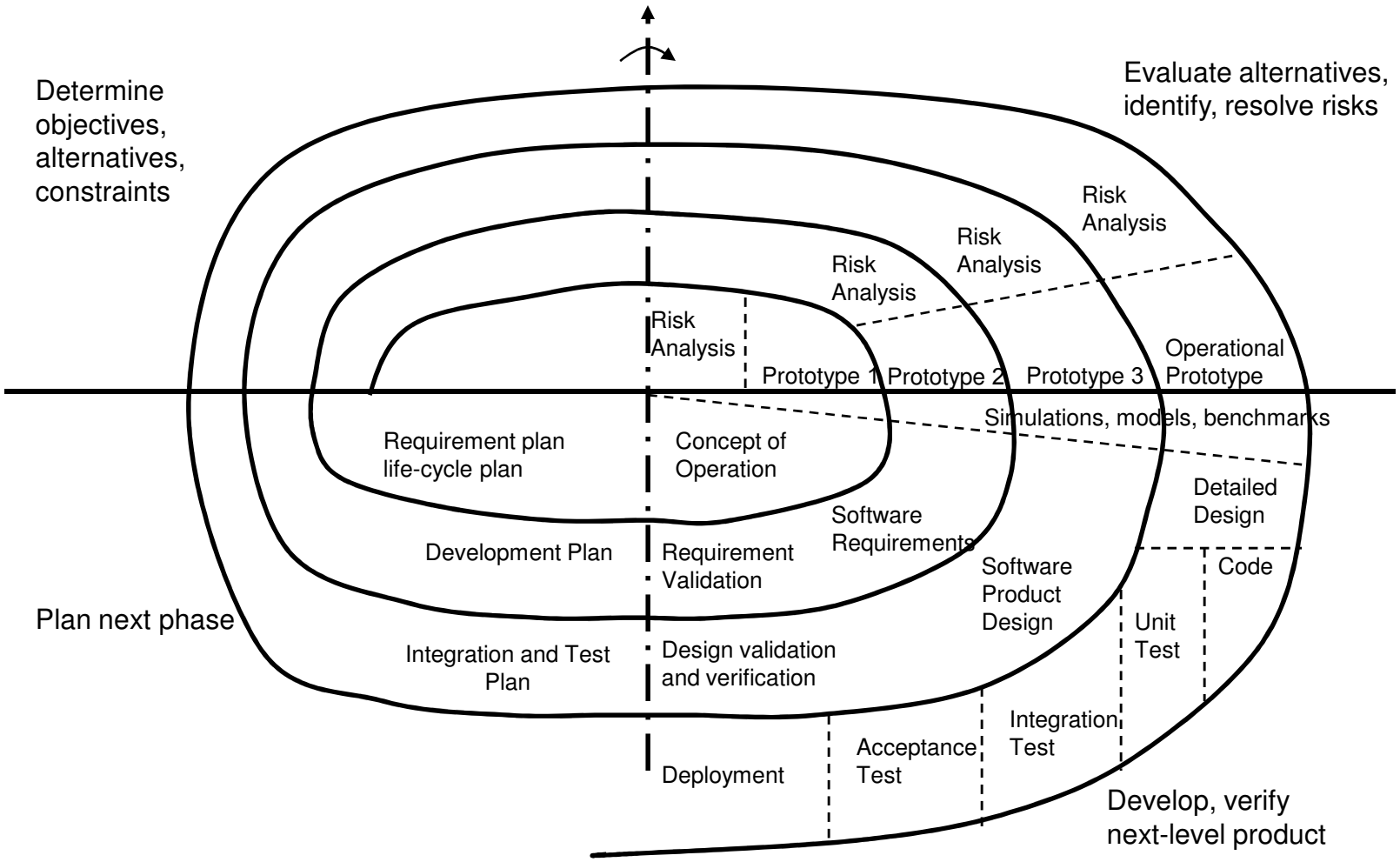
HCL

Practical effects of the waterfall model

- Advantages
  - Simple to comprehend and implement
  - Disciplined separation of aspects of software development
- Disadvantages
  - Big Bang approach to integration, testing, deployment
  - Problems not really ‘seen’ until near delivery date
  - Process does not accommodate natural uncertainties. Risk inadequately addressed
  - Working version not available till very late
  - Blocking states” may result

HCL

Spiral model



-- Barry Boehm, A Spiral Model of Software Development and Enhancement, 1986

Spiral Model

- Evolutionary
- Iterative
  - Development of the system through repeated cycles
- Incremental
  - Developing parts of the system at a time
- Risk driven
- Prototype driven

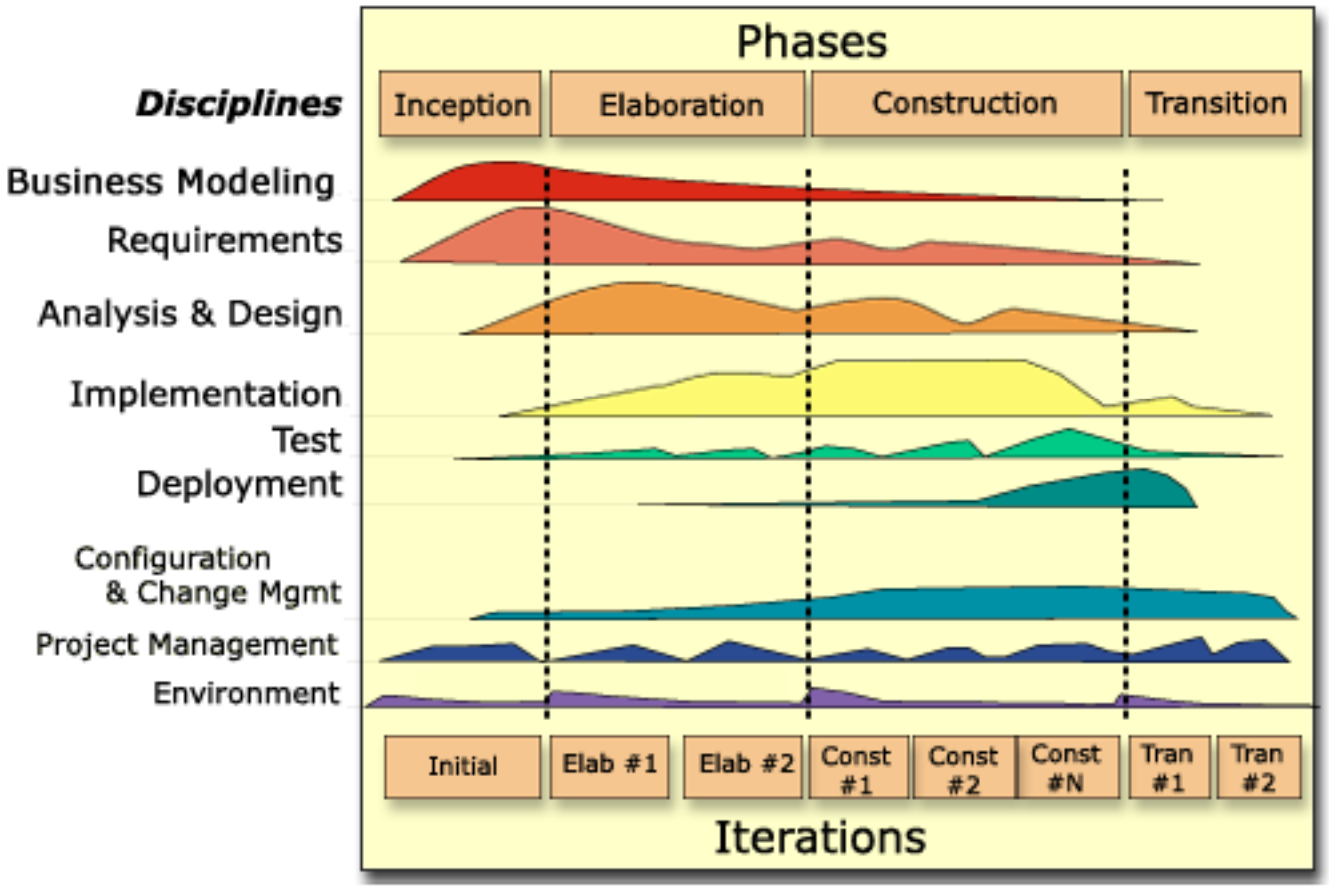
HCL

IBM Rational Unified Process

- Based on the Unified Process proposed by Ivar Jacobson, Grady Booch and James Rumbaugh
- Draws on root causes and symptoms of software development problems and best practices

HCL

IBM RUP


Phases
Disciplines
Inception
Elaboration
Construction
Transition
Business Modeling
Requirements
Analysis & Design
Implementation
Test
Deployment
Configuration & Change Mgmt
Project Management
Environment
Initial
Elab #1
Elab #2
Const #1
Const #2
Const #N
Tran #1
Tran #2
Iterations

Agile approaches

- Group of methodologies
  - Scrum
  - Extreme Programming
  - Crystal Clear
  - Dynamic Systems Development Model (DSDM)
- Iterative & incremental
- Self-organising teams collaborate to evolve requirements and solutions

HCL

Agile approaches

- Early and continuous delivery of software (in weeks)
- Measure of progress is working software
- Self-organising teams
- Frequent self-assessment by team with the objective of becoming more effective
- Motivated, highly skilled developers who should be trusted
- Developers and customer work together
- Face-to-face interactions given high priority
- Simplicity in all things

HCL