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KSRA Learning Academy

KSRA Learning System

Object Oriented Technique

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Avoiding the Problems

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In This Lecture You Will Learn:

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- the stages in the waterfall life cycle;
- about prototyping and incremental life cycles;
- the importance of project management;
- how users may be involved in a project;
- the role of CASE tools in systems development.

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Problem Solving Model

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- Main phases are
  - Data gathering
  - Problem redefinition
    - These focus on understanding what the problem is about
  - Finding ideas
    - Concerned with understanding more about the nature of the problem and possible solutions
  - Finding solutions
  - Implementation

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Problem Solving Model

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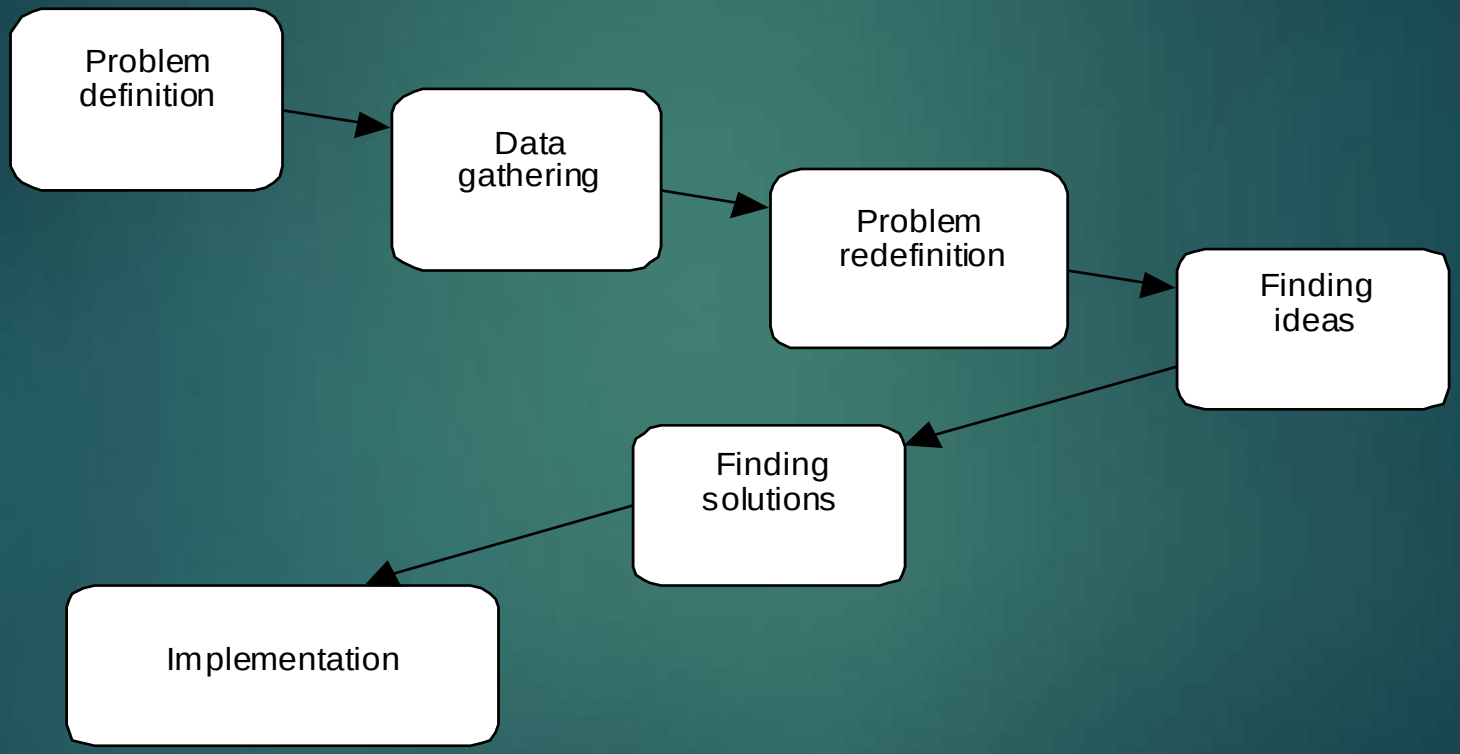

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Project Life Cycles

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- A distinction should be made between
  - Systems development, which incorporates human, software and hardware elements

  - Software development, which is primarily concerned with software systems

- Two important phases are
  - Strategic Information Systems Planning

  - Business Modelling

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Waterfall Life Cycle

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- The traditional life cycle (TLC) for information systems development is also known as the waterfall life cycle model.
  - So called because of the difficulty of returning to an earlier phase.

- The model shown here is one of several more or less equivalent alternatives.
  - Typical deliverables are shown for each phase.

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Traditional Life Cycle

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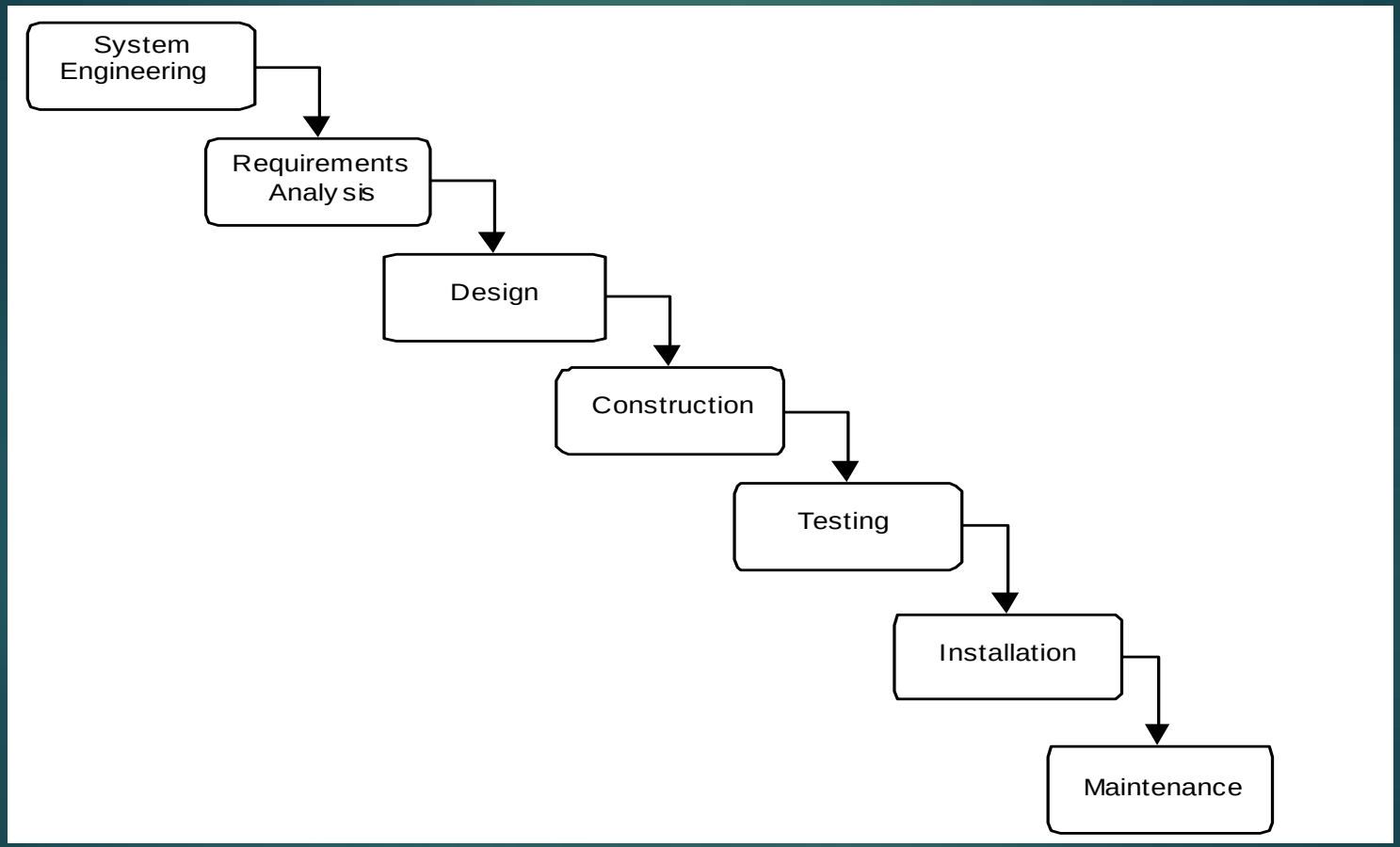

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TLC Deliverables

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- Systems Engineering

  - High level architectural specification

- Requirements Analysis

  -Requirements specification

  -Functional specification

  - Acceptance test specifications

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TLC Deliverables

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- Design
  - Software architecture specification
  - System test specification
  - Design specification
  - Sub-system test specification
  - Unit test specification

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TLC Deliverables

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- Construction

  - Program code

- Testing

  - Unit test report
  - Sub-system test report
  - System test report
  - Acceptance test report
  - Completed system

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TLC Deliverables

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- Installation
  - Installed system
- Maintenance
  - Change requests
  - Change request report

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Problems with TLC

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- Real projects rarely follow such a simple sequential life cycle
- Lapsed time between systems engineering and the final installation is long
- Iterations are almost inevitable in real projects but are expensive & problematic with the TLC
- Unresponsive to changes during project as iteration is difficult

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TLC with Iteration

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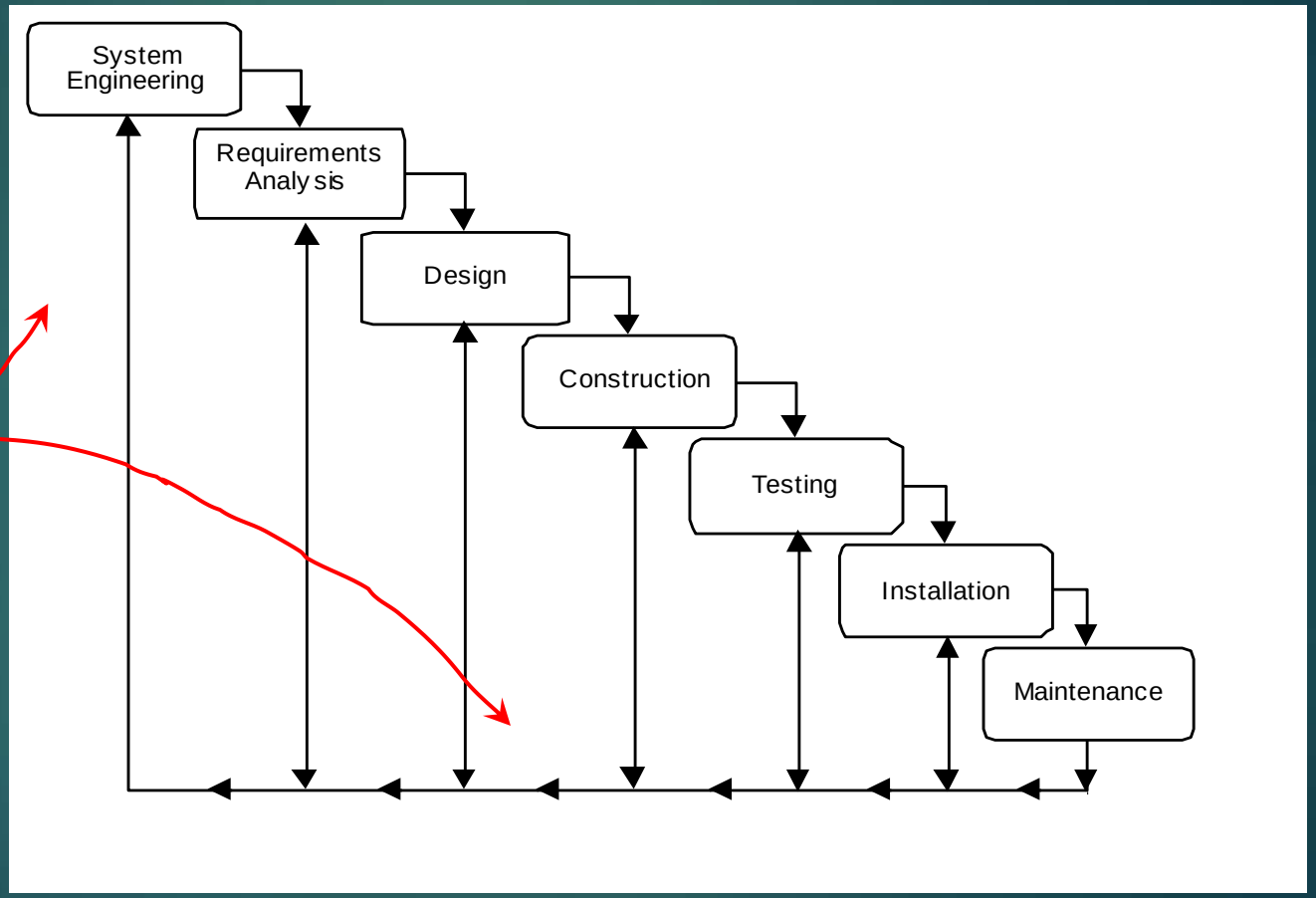
The cost of this form of iteration increases as the project progresses making it impractical and **not** effective



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Strengths of TLC

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- Tasks in phases may be assigned to specialized teams.
- Project progress evaluated at the end of each phase.
- Can be used to manage projects with high levels of risks.

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Prototyping Life Cycle

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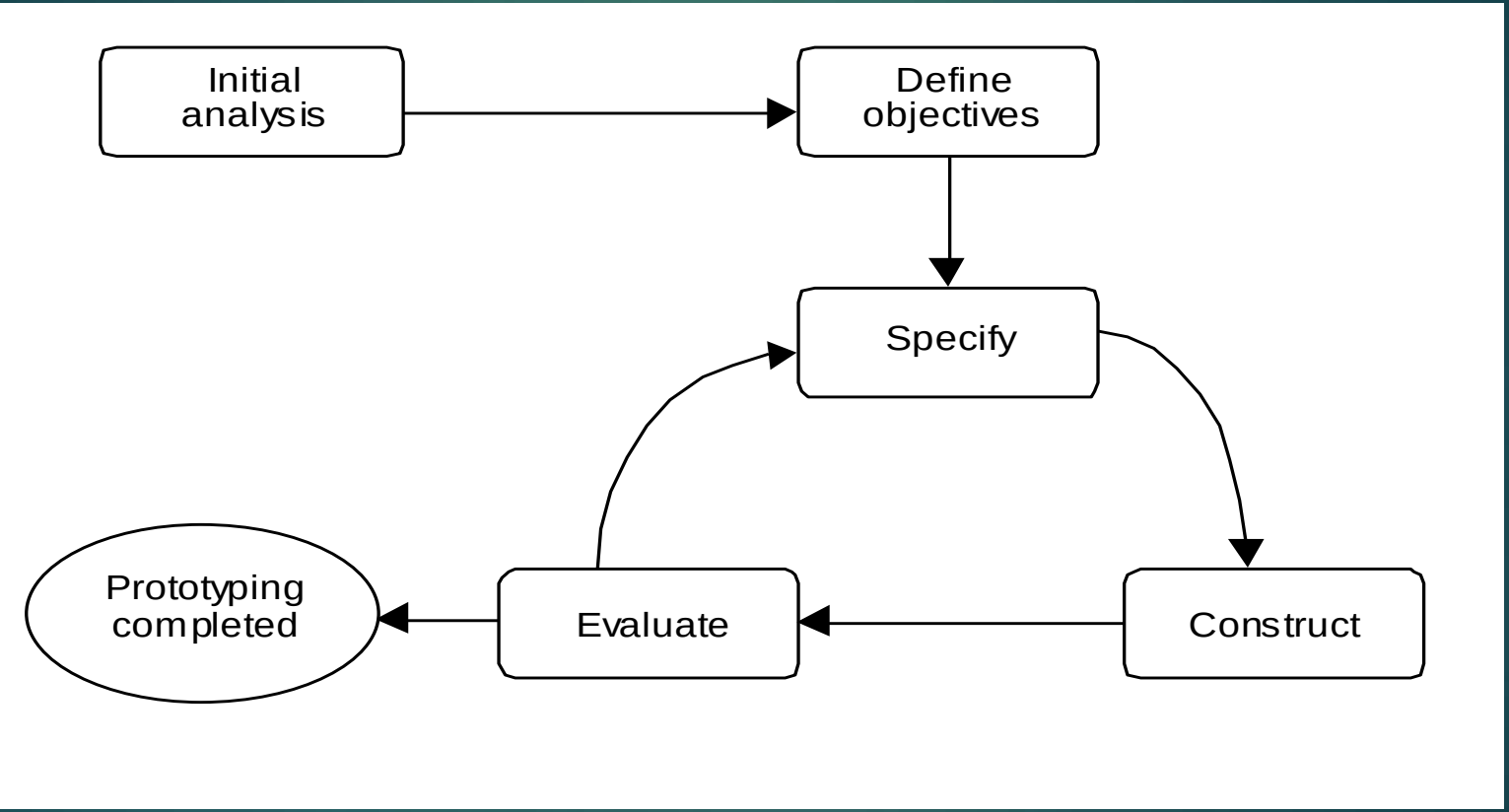

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Prototyping – Advantages:

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- Early demonstrations of system functionality help identify any misunderstandings between developer and client
- Client requirements that have been missed are identified
- Difficulties in the interface can be identified
- The feasibility and usefulness of the system can be tested, even though, by its very nature, the prototype is incomplete

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Prototyping – Problems:

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- The client may perceive the prototype as part of the final system
- The prototype may divert attention from functional to solely interface issues
- Prototyping requires significant user involvement
- Managing the prototyping life cycle requires careful decision making

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Spiral Model & Incremental Development

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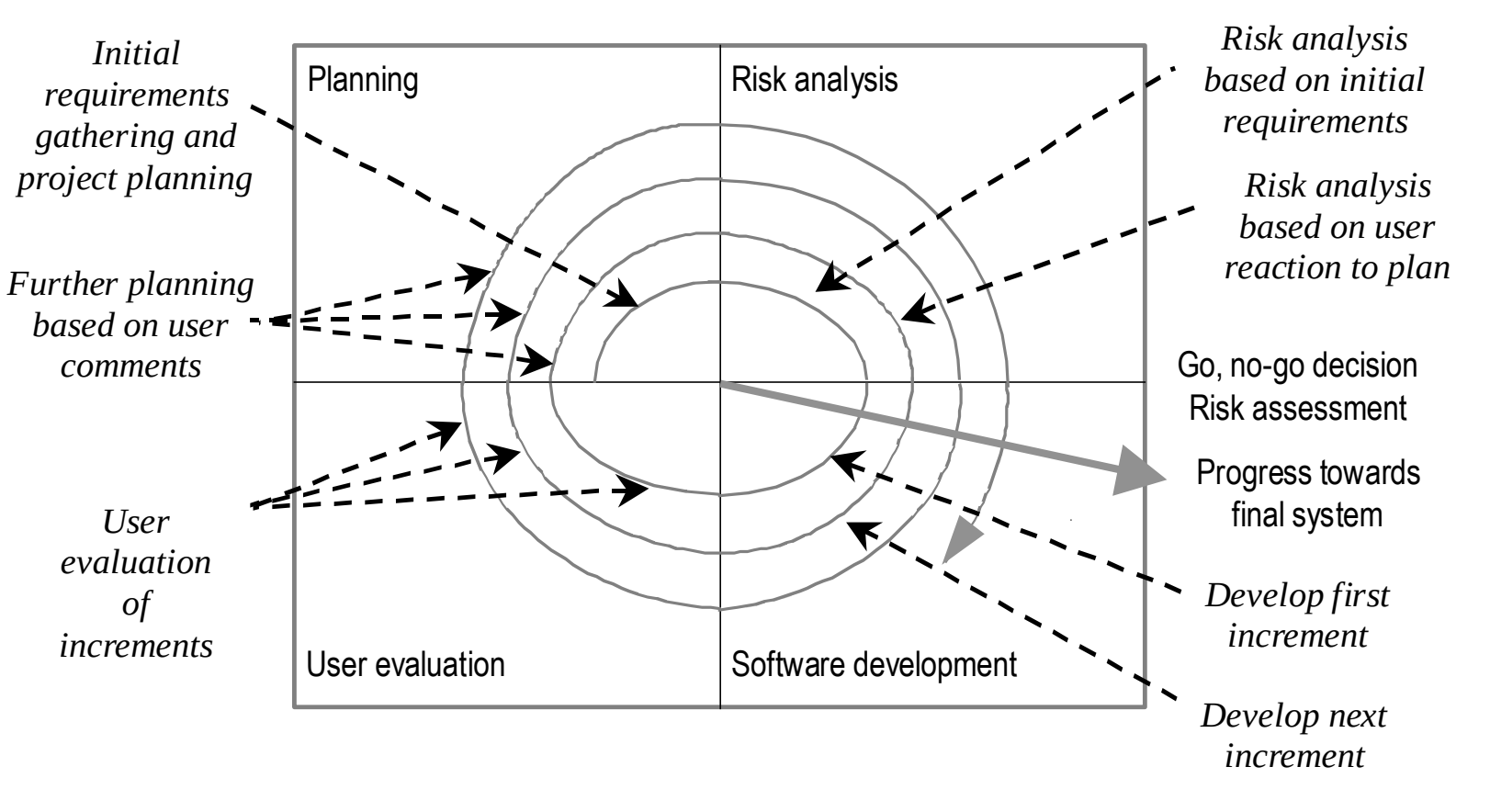

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Unified Software Development Process

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- Captures many elements of best practice
- The phases are:
  - *Inception* is concerned with determining the scope and purpose of the project;
  - *Elaboration* focuses requirements capture and determining the structure of the system;
  - *Construction's* main aim is to build the software system;
  - *Transition* deals with product installation and rollout

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Overview of the Unified Process

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- The Unified Process is a widely used software development process.
- In the Unified Process, a system is built incrementally through a number of iterations in which the designer may perform requirements capturing, analysis, design, implementation and testing tasks.
- Feedback is sought from system users throughout the entire process.
- In early iterations, the designer often focuses more on requirements capturing and analysis.
- In later iterations, the designer tends to emphasize implementation and testing.
- In fact, the iterations are divided into four phases: inception, elaboration, construction and transition, each with a different focus

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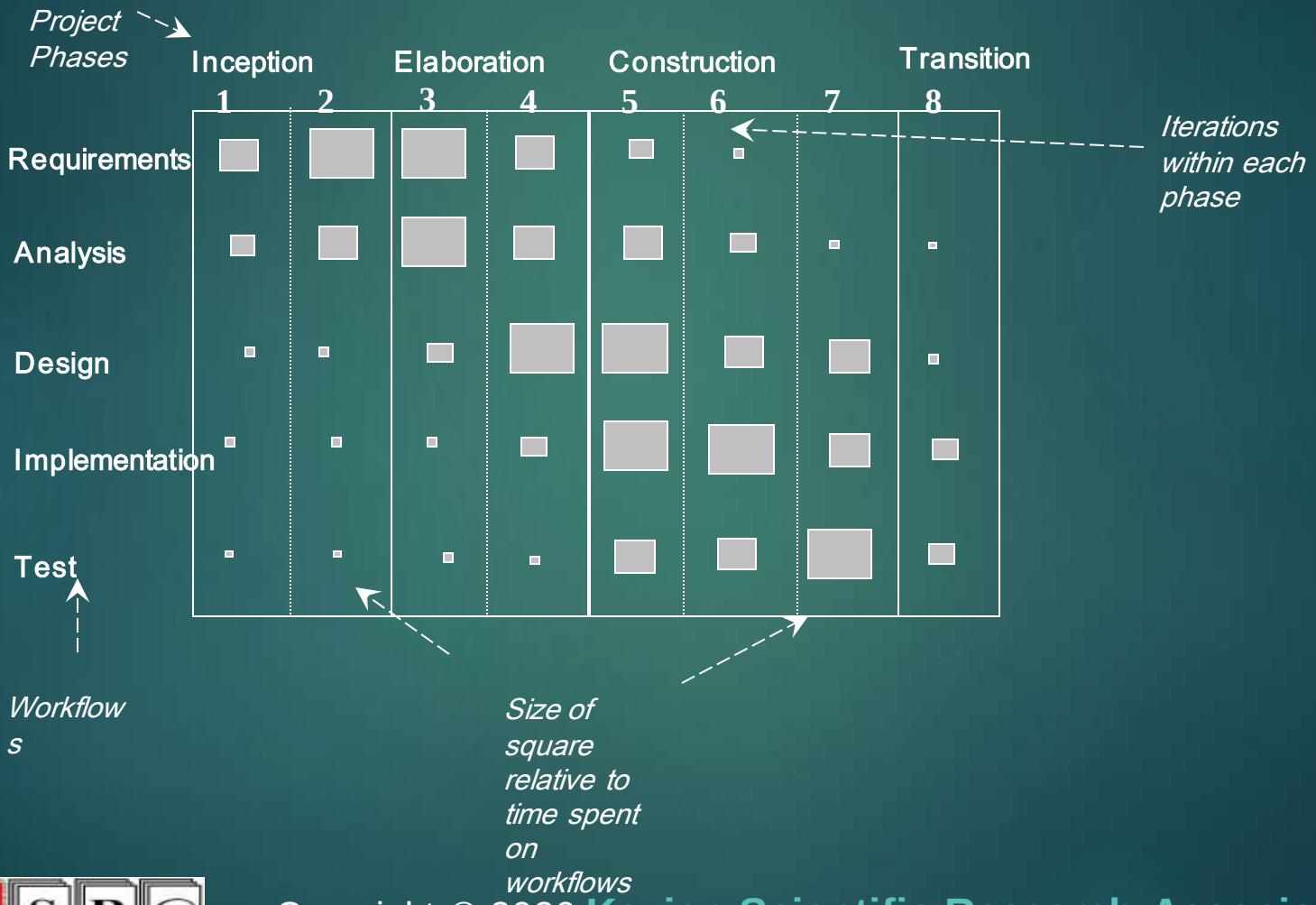

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Overview of the Unified Process (cont'd)

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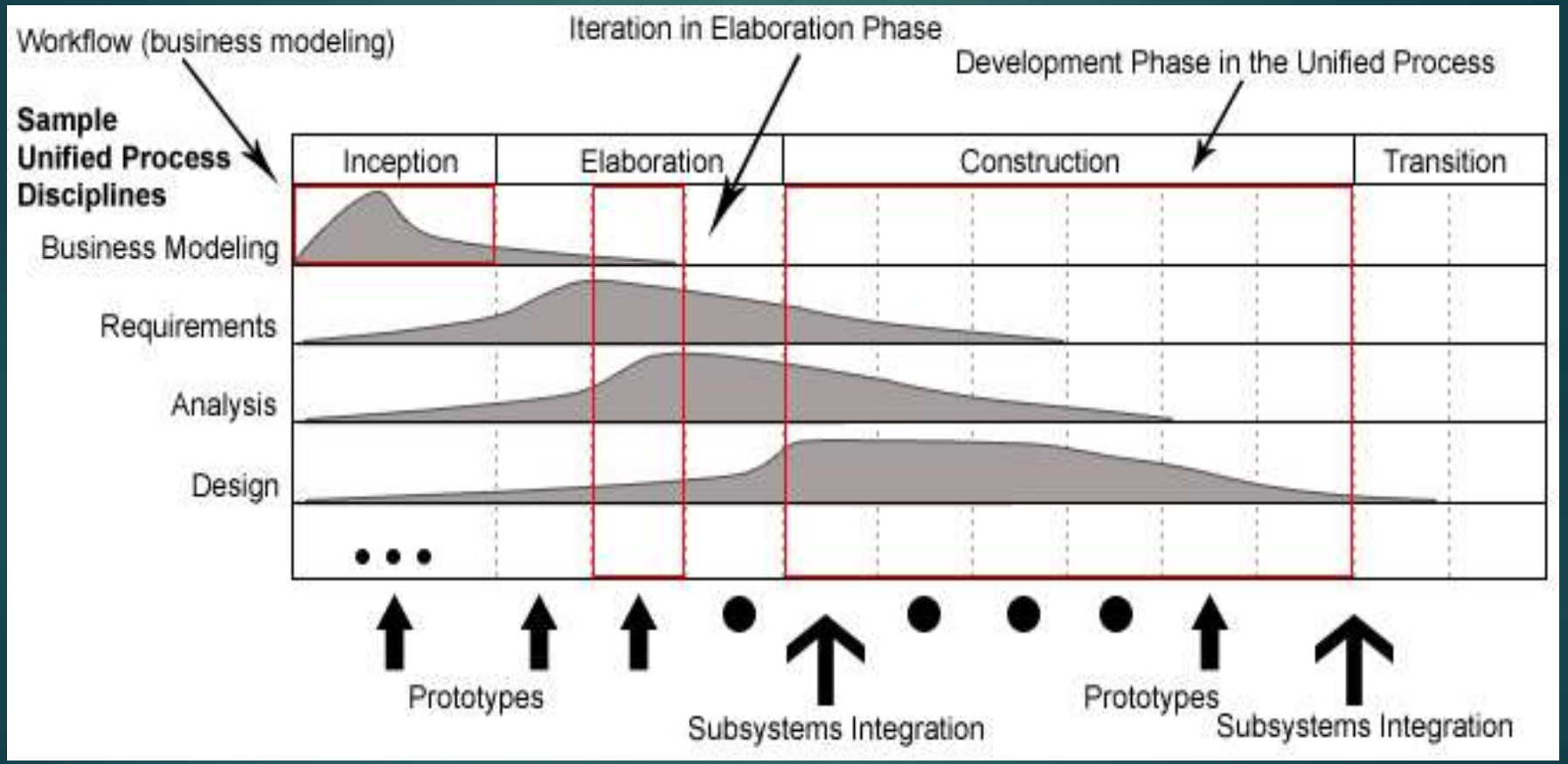

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User Involvement

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- User's can be involved at various levels
  - As part of the development team (DSDM)
  - Via a consultative approach
  - In fact gathering

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Agile Approaches

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- Iterative lightweight approach
- Accepts that user requirements will change during development
- XP and DSDM are considered agile
- Non-agile approaches can be viewed as plan-based

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Agile Approaches

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Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

The Manifesto for Agile Software Development

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Software Development Methods

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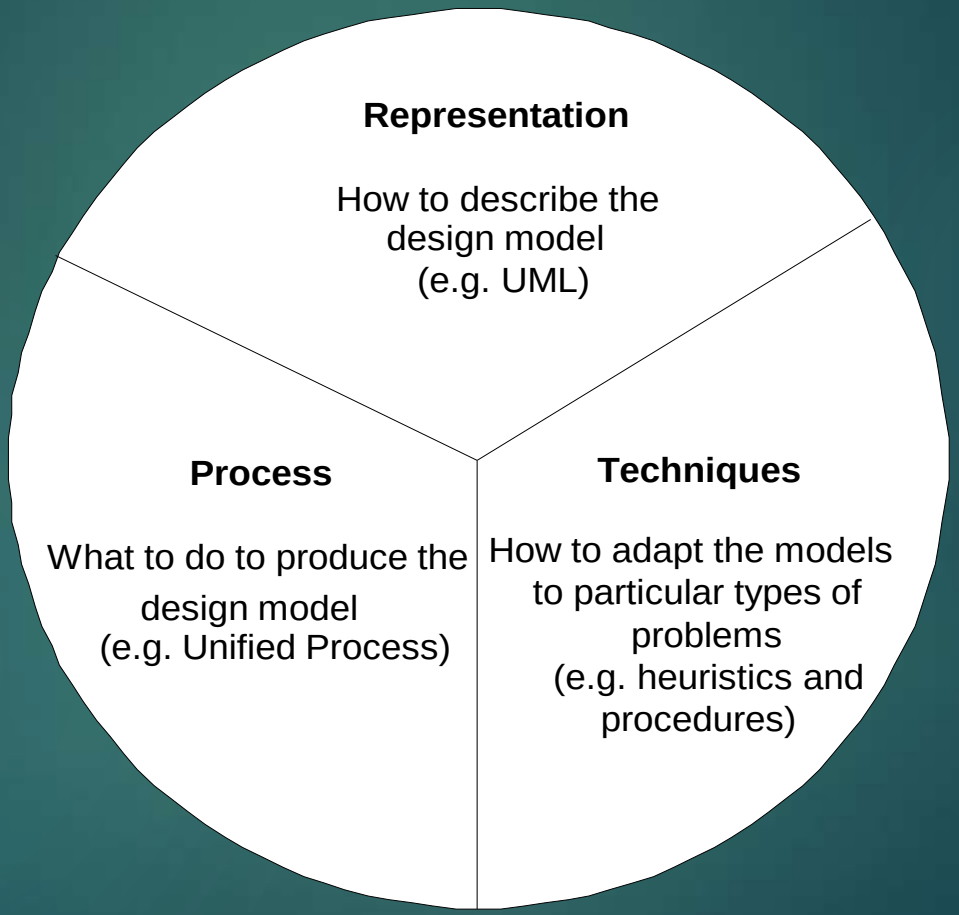

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Computer Aided Software Engineering

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- CASE tools typically provide a range of features including:

  - checks for syntactic correctness;
  - repository support;
  - checks for consistency and completeness;
  - navigation to linked diagrams;

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Computer Aided Software Engineering

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- Features of CASE tools continued
  - layering;
  - traceability;
  - report generation;
  - system simulation;
  - performance analysis;
  - code generation.

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Overview of Visual Paradigm for UML

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- Generate documentation automatically. Documentations can be generated for selected information of the software development project;
- Facilitate project management. The project activities can be planned and managed with ease;
- Facilitate configuration management and version control. Documentations and components of different versions of the system can be managed;
- Check model consistency. Consistency between models of the system can be checked;
- Support model verification and validation. The correctness of the models of the system can be verified and validated;

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Overview of Visual Paradigm for UML

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- Provide multi-user support. Multiple developers can work on the project simultaneously and coherently;
- Generate code. Code can be generated from models;
- Reverse engineering. Models can be generated from code; and
- Provide integration with other tools. The CASE tool can be integrated with domain specific systems or tools so as to accelerate the development process.

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References

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- Hicks (1991)
- Sommerville (1992, 2004) and Pressman (2004)
- Jacobson, Booch and Rumbaugh (1999)
- Chapters 5 and 21 of Bennett, McRobb and Farmer include more detail about the Unified Process
- Curtis H.K. Tsang, Clarence S.W. Lau and Y.K. Leung (2005)

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