

Software Re-Engineering

Lecture: 09



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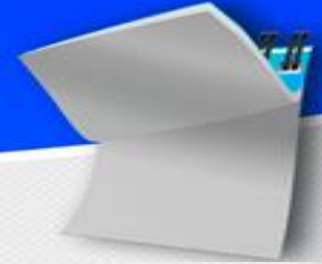
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Sequence [**Todays Agenda**]

Content of Lecture

Phase Reengineering Model

Phase Reengineering Model



- # The phase model of software reengineering was originally proposed by Byrne and Gustafson.
- # The model comprises five phases:
 - Analysis and planning,
 - Renovation,
 - Target system testing,
 - Re-documentation, and
 - Acceptance testing and system transition.
- # The labels on the arcs denote the possible information that flows from the tail entities of the arcs to the head entities.

Phase Reengineering Model



- # A major process activity is represented by each phase.
- # Tasks represent a phase's activities.
- # Tasks can be further decomposed to reveal the detailed methodologies.

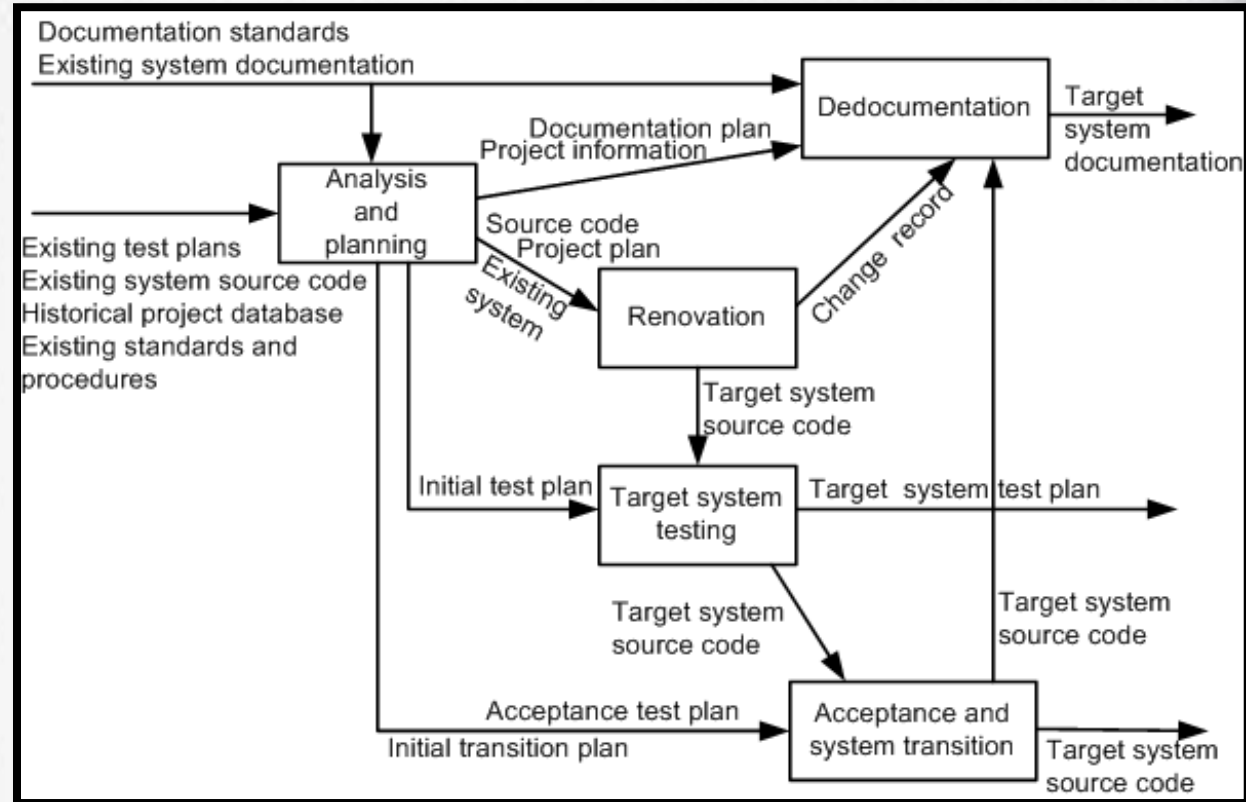
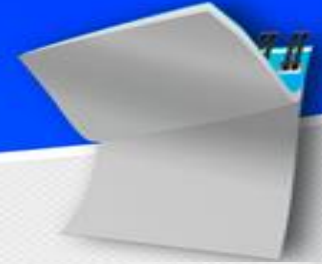


Figure 1 Software reengineering process phases

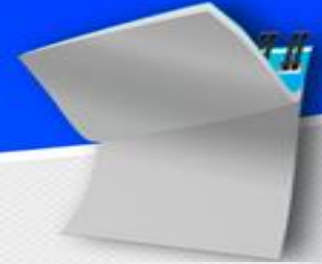
Phase Reengineering Model



Analysis and Planning phase:

- # Analysis addresses three technical and one economic issue.
- # Technical issues:
 - The first technical issue concerns the **present state of the system to be reengineered** and understanding its properties.
 - The second technical issue concerns the **identification of the need for the system to be reengineered**.
 - The third technical issue concerns the specification of the **characteristics of the new system to be produced**.

Phase Reengineering Model



Analysis and Planning phase:

Economic issue:

- The economic issue concerns a **cost and benefit analysis** of the reengineering project.

The economics of reengineering must compare with the:

- Costs,
- Benefits, and
- Risks of developing a new system
- As well as the costs and risks of maintaining an old system.

Phase Reengineering Model



Analysis and Planning phase:

Planning includes :

- Understanding the scope of the work;
- Identifying the required resources;
- Identifying the tasks and milestones;
- Estimating the required effort; and
- Preparing a schedule.

Phase Reengineering Model



Analysis and Planning phase:

■ Tasks to be performed at this phase

Task	Description
Implementation motivations and objectives	List the motivations for reengineering the system. List the objectives to be achieved.
Analyze environment	Identify the differences between the existing and the target environments. Differences can influence system changes.
Collect inventory	Form a baseline for knowledge about the operational system by locating all program files, documents, test plans, and history of maintenance.
Analyze implementation	Analyze the source code and record the details of the code.
Define approach	Choose an approach to reengineer the system.
Define project procedures and standards	Procedures outline how to perform reviews and report problems. Standards describe the acceptable formats of the outputs of processes.
Identify resources	Determine what resources are going to be used; ensure that resources are ready to be used.
Identify tools	Determine and obtain tools to be used in the reengineering project.
Data conversion planning	Make a plan to effect changes to databases and files.
Test planning	Identify test objectives and test procedures, and evaluate the existing test plan. Design new tests if there is a need.
Define acceptance criteria	By means of negotiations with the customers, identify acceptance criteria for the target system.
Documentation planning	Evaluate the existing documentation. Develop a plan to redocument the target system.
Plan system transition	Develop an end-of-project plan to put the new system into operation and phase out the old one.
Estimation	Estimate the resource requirements of the project: effort, cost, duration, and staffing.
Define organizational structure	Identify personnel for the project, and develop a project organization.
Scheduling	Develop a schedule, including dependencies, for project phases and tasks.

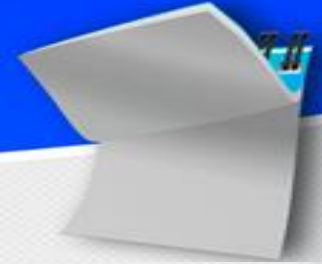
Phase Reengineering Model



Renovation:

- # An operational system is modified into the target system in the renovation phase.
- # Two main aspects of a system are considered in this phase:
 - **Representation of the system**
 - It refers to source code, but it may include the design model and the requirement specification of the existing system.
 - **Representation of the external data**
 - It refers to the database and/or data files used by the system.
 - Often the external data are reengineered, and it is known as data reengineering.

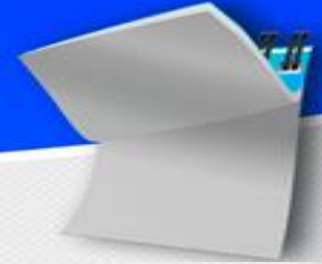
Phase Reengineering Model



Renovation:

- # An operational system can be renovated in many ways, depending upon:
 - The objectives of the project,
 - The approach followed, and
 - The starting representation of the system.
- # It may be noted that the starting representation can be source code, design, or requirements.

Phase Reengineering Model



Renovation - Example:

- # A project in which the objective is to re-code the system from Fortran to C.
- # Figure 2 shows the three possible replacement strategies.
- # First, to perform source-to-source translation, program migration is used.
- # Second, a high-level design is constructed from the operational source code, say, in Fortran, and the resulting design is re-implemented in the target language, C in this case.
- # Finally, a mix of compilation and decompilation is used to obtain the system implementation in C.

Phase Reengineering Model

Renovation - Example:

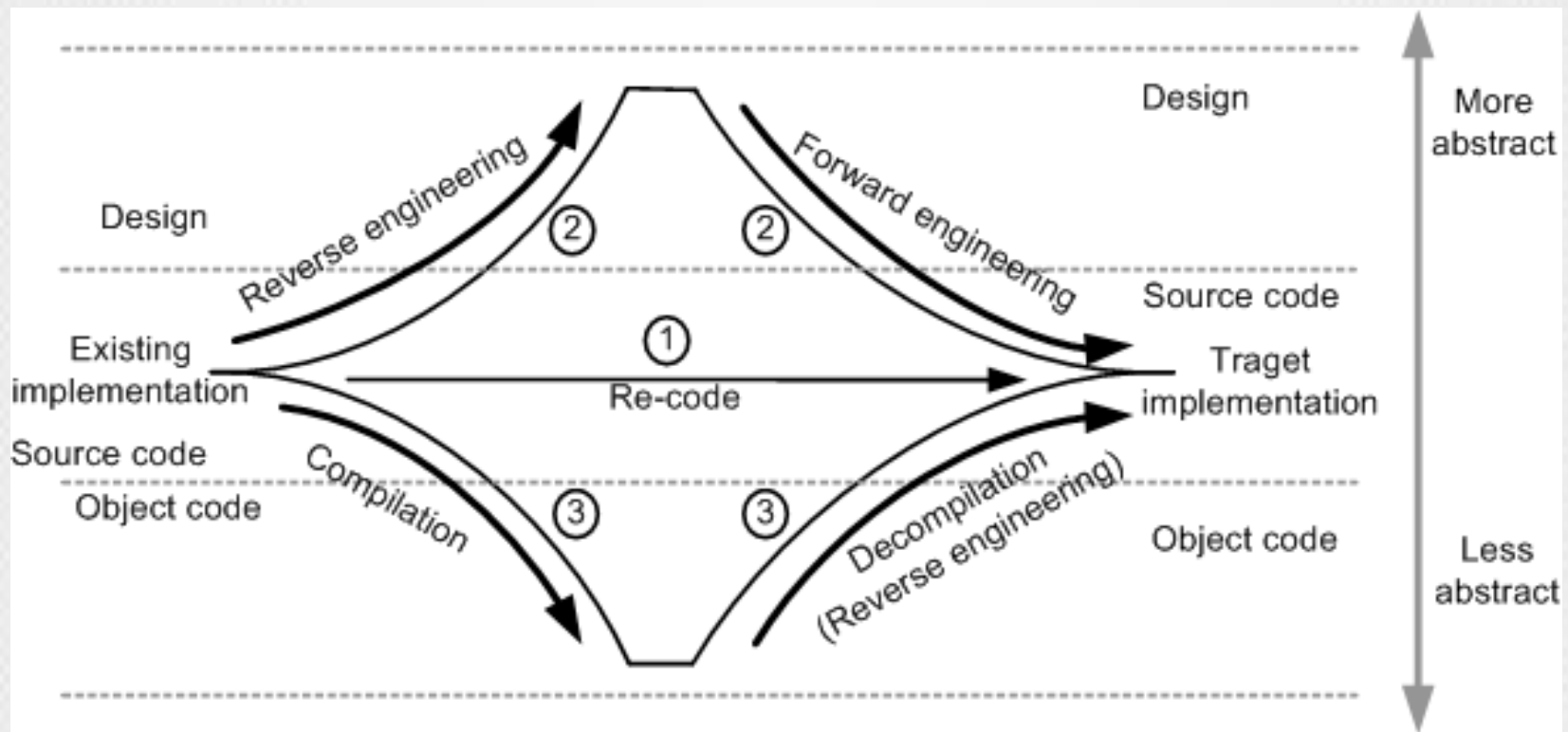
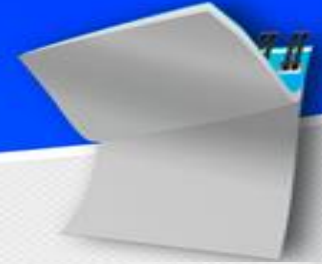


Figure 2 Replacement strategies for recording

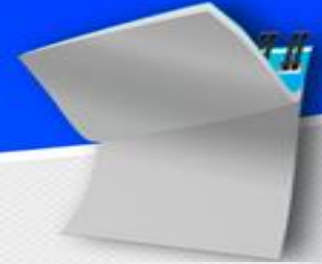
Phase Reengineering Model



Target system testing:

- # In this phase for system testing, faults are detected in the target system.
- # Those faults might have been introduced during reengineering.
- # Fault detection is performed by applying the target system test plan on the target system.
- # The same testing strategies, techniques, methods, and tools that are used in software development are used during reengineering.

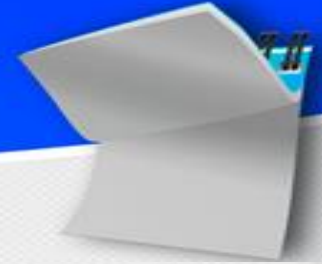
Phase Reengineering Model



Target system testing:

- # For example, apply the existing system-level test cases to both the existing and the new system.
- # Assuming that the two systems have identical requirements, the test results from both the scenarios must be the same.

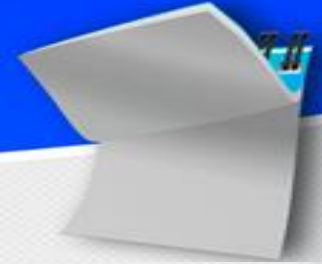
Phase Reengineering Model



Redocumentation:

- # In the redocumentation phase, documentations are rewritten, updated, and/or replaced to reflect the target system.
- # Documents are revised according to the redocumentation plan.
- # The two major tasks within this phase are:
 - Analyze new source code, and
 - Create documentation.

Phase Reengineering Model

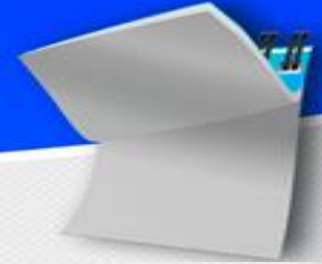


Redocumentation:

Documents requiring revision are:

- Requirement specification.
- Design documentation.
- A report justifying the design decisions, assumptions made in the implementation
- Configuration.
- User and reference manuals.
- On-line help.
- Document describing the differences between the existing and the target system.

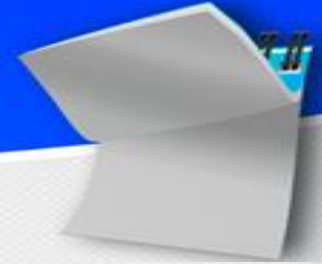
Phase Reengineering Model



Acceptance and system transition:

- # In this final phase, the reengineered system is evaluated by performing acceptance testing.
- # Acceptance criteria should already have been established in the beginning of the project.
- # Should the reengineered system pass those tests, preparation begins to transition to the new system.

Phase Reengineering Model



Acceptance and system transition:

- # On the other hand, if the reengineered system fails some tests, the faults must be fixed; in some cases, those faults are fixed after the target system is deployed.
- # Upon completion of the acceptance tests, the reengineered system is made operational, and the old system is put out of service.
- # System transition is guided by the prior developed transition plan.

Thank You!

