Software Re-Engineering

Lecture: 07

Dr. Syed Muazzam Ali Shah

Department of Software Engineering

National University of Computer & Emerging Sciences

muazzam.ali@nu.edu.pk

Sequence [**Todays Agenda**]

Content of Lecture

- Reengineering Approaches

Reengineering Approaches

- There are five basic approaches to reengineering software systems.
- Each approach advocates a different path to perform reengineering.
- Several considerations are made while selecting a particular reengineering approach.
- Objective of the project;
- Availability of resources;
- The present state of the system being reengineered;
- The risks in the reengineering projects.

Reengineering Approaches

- The five approaches are different in two aspects.
  - The extent of reengineering performed.
  - The rate of substitution of the operational system with the new one.

Reengineering Approaches

- The five approaches have their own risks and benefits.
- In the following, the five basic approaches of software reengineering are introduced one by one.
  - Big Bang Approach.
  - Incremental Approach.
  - Partial Approach
  - Iterative Approach
  - Evolutionary Approach.

Reengineering Approaches

Big Bang Approach:

- The Big Bang Approach replaces the whole system at once.
- Once a reengineering effort is initiated, it is continued until all the objectives are achieved and the target system is constructed.
- This approach is generally used if reengineering cannot be done in parts.

Reengineering Approaches

Big Bang Approach:

- Example:
  - If there is a need to move to a different system architecture, then all components affected by such a move must be changed at once.

Reengineering Approaches

Big Bang Approach:

- Advantages:
  - The consequent advantage is that the system is brought into its new environment all at once
- Advantages:
  - On the other hand, the disadvantage of Big Bang is that the reengineering project becomes a monolithic task, which may not be desirable in all situations.
  - In addition, the Big Bang consumes too much resources at once for large system and takes a long stretch of time before the new system is visible.

Reengineering Approaches

Incremental Approach:

- A system is reengineered gradually, one step closer to the target system at a time.
- Thus, for a large system, several new interim versions are produced and released.
- Successive
- Interim versions satisfy increasingly more project goals than their preceding versions.
- The desired system is said to be generated/reengineered after all the project goals are achieved.

Reengineering Approaches

Incremental Approach:

- Advantages:
  - Locating errors becomes easier (newly added components).
  - It becomes easy for the customer to notice progress, because interim versions are released.
  - Lower risk due to code can be identified and monitored.
- Disadvantages:
  - Needs long time and careful version controls.
  - Even if there is a need, the entire architecture of the

Reengineering Approaches

Partial Approach:

- Only a part of the system is reengineered and then it is integrated with the non-engineered portion of the system.
- The following three steps are followed in the partial approach.
  - Existing system is partitioned into two parts: reengineered and the not reengineered.
  - In the second step, reengineering work is performed using selected approach.
  - The two parts are integrated to make up the new system.

Reengineering Approaches

Partial Approach:

- Advantages.
- Scope of reengineering is decided by considering the level of need, resources, cost, and urgency, etc.
- Disadvantages.
- Special care must be taken while integrating the engineered part with the non-engineered part, otherwise, integration issues may happen.

Reengineering Approaches

Iterative Approach:

- The reengineering process is applied on the source code of a few procedures at a time, with each reengineering operation lasting for a short time.

- This process is repeatedly executed on different components in different stages.

- Consider the following four areas during re-engineering process.
  - Old components not re-engineered.
  - Components currently being re-engineered.
  - Components already re-engineered.
  - New components added to the system

- Their coexistence is necessary for the operational continuity of the system.

Reengineering Approaches

Iterative Approach:

- Advantages.
- Continued operation of the system during reengineering process.
- The maintainers' and the users' familiarities with the system are preserved.
- Disadvantages.
- Need to keep track of the four types of components during the reengineering process.
- In addition, both the old and the newly reengineered components need to be maintained

Reengineering Approaches

Evolutionary Approach:

- Similar to the incremental approach.
- Components of the original system are substituted with re-engineered components but the existing components are grouped by functions and reengineered into new components.
- Focus is on identifying functional objects irrespective of the location of those components within the current system.
- As a result, the new system is built with functionally cohesive components as needed.

Reengineering Approaches

Evolutionary Approach:

- Advantages.
- The resulting design is more cohesive.
- The scope of individual components is reduced.
- Disadvantages.
- All the functions with much similarities must be first identified throughout the operational system; next, those functions are refined as one unit in the new system.


Thank You!