Software Re-Engineering

Lecture: 01

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Software Maintenance:

- Software maintenance is a continuous process that occurs throughout the entire life cycle of the software system.
- The goal of software maintenance is to keep the software system working correctly, efficiently, and securely, and to ensure that it continues to meet the needs of the users.
- This can include fixing bugs, adding new features, improving performance, or updating the software to work with new hardware or software systems.

Reasons of Software Maintenance

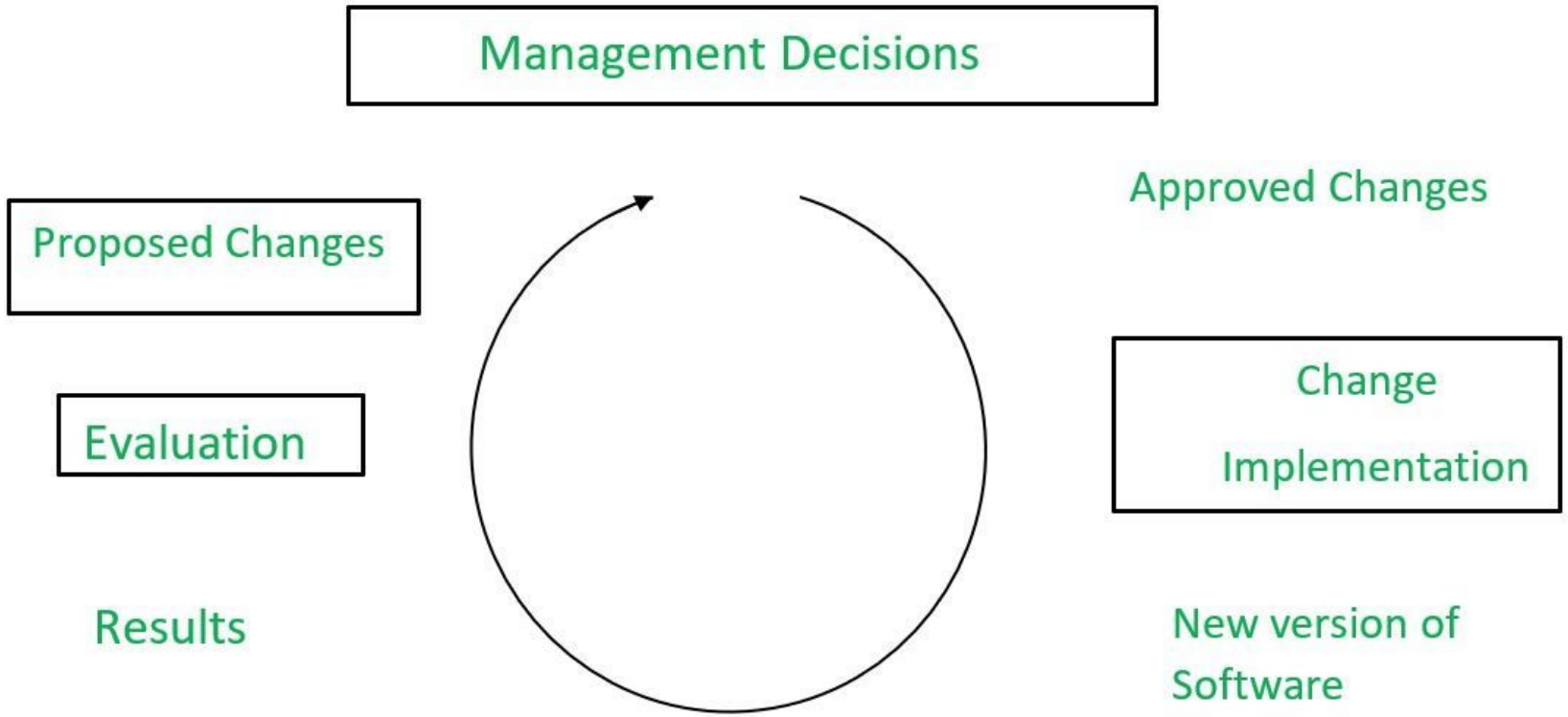
- Bug Fixing
- Enhancements
- Performance Optimization
- Porting and Migration
- Re-Engineering
- Documentation

Types of Software Maintenance

- Corrective Maintenance: Fixing errors and bugs
- Patching: Emergency fix from management, for corrective maintenance, can rise future errors due to lack of proper impact analysis
- Adaptive Maintenance: Modifying the system to adapt changes in the environment, may be in hardware or software, government policies, and business rules.
- Perfective Maintenance: Improving functionality, performance, and reliability, and restructuring the software system to improve changeability.
- Preventive Maintenance: Involves taking measures to prevent future errors, such as optimization, updating documentation, reviewing and testing system, and implementing preventive measures (E.g. backups).

Boehm’s Software Maintenance Model:

- Boehm's theory is models and principles of economics can not only improve maintenance productivity but also helps to understand the maintenance process.
- It represents the maintenance process in a closed-loop cycle, wherein changes are suggested and approved first and then are executed.


Management Decisions
Proposed Changes
Approved Changes
Evaluation
Change
Implementation
Results
New version of
Software

- Boehm proposed a formula for calculating the maintenance cost as it is a part of the COCOMO Model.
- All the collected data from the various projects, the formula was formed in terms of effort.

- Boehm used a quantity called Annual Charge Traffic (ACT), which is defined as:
- The fraction of a software product's source instruction which changes during a year either through add, delete or modify.

The ACT is related to the number of change request:

$$ACT = \frac{KLOC_{added} + KLOC_{deleted}}{KLOC_{total}}$$

- The annual maintenance effort (AME) in person-months is measured as:

$$AME = ACT * SDE$$

Where:

ACT = Annual change traffic
SDE = Software Development effort in person-months

Example:

- Secureware's Annual change traffic (ACT) for its system is 30% per year. The development effort needed is 600 PMs. Compute an estimate the annual maintenance effort (AME). If the lifetime of project is 14 years, what should be the total effort of project ?

$$AME = ACT * SDE$$
$$= 0.3 * 600$$
$$= 180\ PM$$

Maintenance effort for 14 years:

$$= 14 * 180$$
$$= 2520\ PM$$

Total Effort:

$$= 600 + 2520$$
$$= 3120\ PM$$

- Maintenance is for running the system till age of system.
- Reengineering make system new to work for another life span. Scope of reengineering is vast and challenging as compared to maintenance.