Software Configuration Management: Overview

- Changes are inevitable when software is built. A primary goal of software engineering is to improve the ease with which changes can be made to software. Configuration management is all about change control. Every software engineer has to be concerned with how changes made to work products are tracked and propagated throughout a project. To ensure that quality is maintained the change process must be audited.

Software Configuration Items

- Computer programs (both source and executable)
- Documentation (both technical and user)
- Data (contained within the program or external to it)

Fundamental Sources of Change

- New business or market conditions dictate changes to product requirements or business rules
- New customer needs demand modification of data, functionality, or services
- Business reorganization causes changes in project priorities or software engineering team structure
- Budgetary or scheduling constraints cause system to be redefined

Baselines

- A work product becomes a baseline only after it is reviewed and approved.
- A baseline is a milestone in software development that is marked by the delivery of one or more configuration items.
- Once a baseline is established each change request must be evaluated and verified by a formal procedure before it is processed.

Software Configuration Management Tasks

- Identification (tracking multiple versions to enable efficient changes)
- Version control (control changes before and after release to customer)
- Change control (authority to approve and prioritize changes)
- Configuration auditing (ensure changes made properly)
- Reporting (tell others about changes made)

Software Configuration Objects

- To control and manage configuration items, each must be named and managed using an object-oriented approach
- Basic objects are created by software engineers during analysis, design, coding, or testing
- Aggregate objects are collections of basic objects and other aggregate objects
- Configuration object attributes: unique name, description, list of resources, and a realization (a pointer to a work product for a basic object or null for an aggregate object)
- An entity-relationship (E-R) diagram can be used to show the interrelationships among the objects

Version Control

- Combines procedures and tools to manage the different versions of configuration objects created during the software process
- An entity is composed of objects at the same revision level

- A variant is a different set of objects at the same revision level and coexists with other variants
- A new version is defined when major changes have been made to one or more objects

Change Control

- Change request is submitted and evaluated to assess technical merit and impact on the other configuration objects and budget
- Change report contains the results of the evaluation
- Change control authority (CCA) makes the final decision on the status and priority of the change based on the change report
- Engineering change order (ECO) is generated for each change approved (describes change, lists the constraints, and criteria for review and audit)
- Object to be changed is checked-out of the project database subject to access control parameters for the object
- Modified object is subjected to appropriate SQA and testing procedures
- Modified object is checked-in to the project database and version control mechanisms are used to create the next version of the software
- Synchronization control is used to ensure that parallel changes made by different people don't overwrite one another

Software Configuration Audit Questions

- Has the change specified by the ECO been made without modifications?
- Has an FTR been conducted to assess technical correctness?
- Was the software process followed and software engineering standards applied?
- Do the attributes of the configuration object reflect the change?
- Have the SCM standards for recording and reporting the change been followed?
- Were all related SCI's properly updated?

Configuration Status Reporting Questions

- What happened?
- Who did it?
- When did it happen?
- What else will be affected by the change?

SCM Standards: (Refer to section 9.8)

REFER TO CHAPTER 9 OF ***"Pressman. R. S., Software Engineering a practitioners Approach. 5th Edition"*** ACCORDINGLY.