

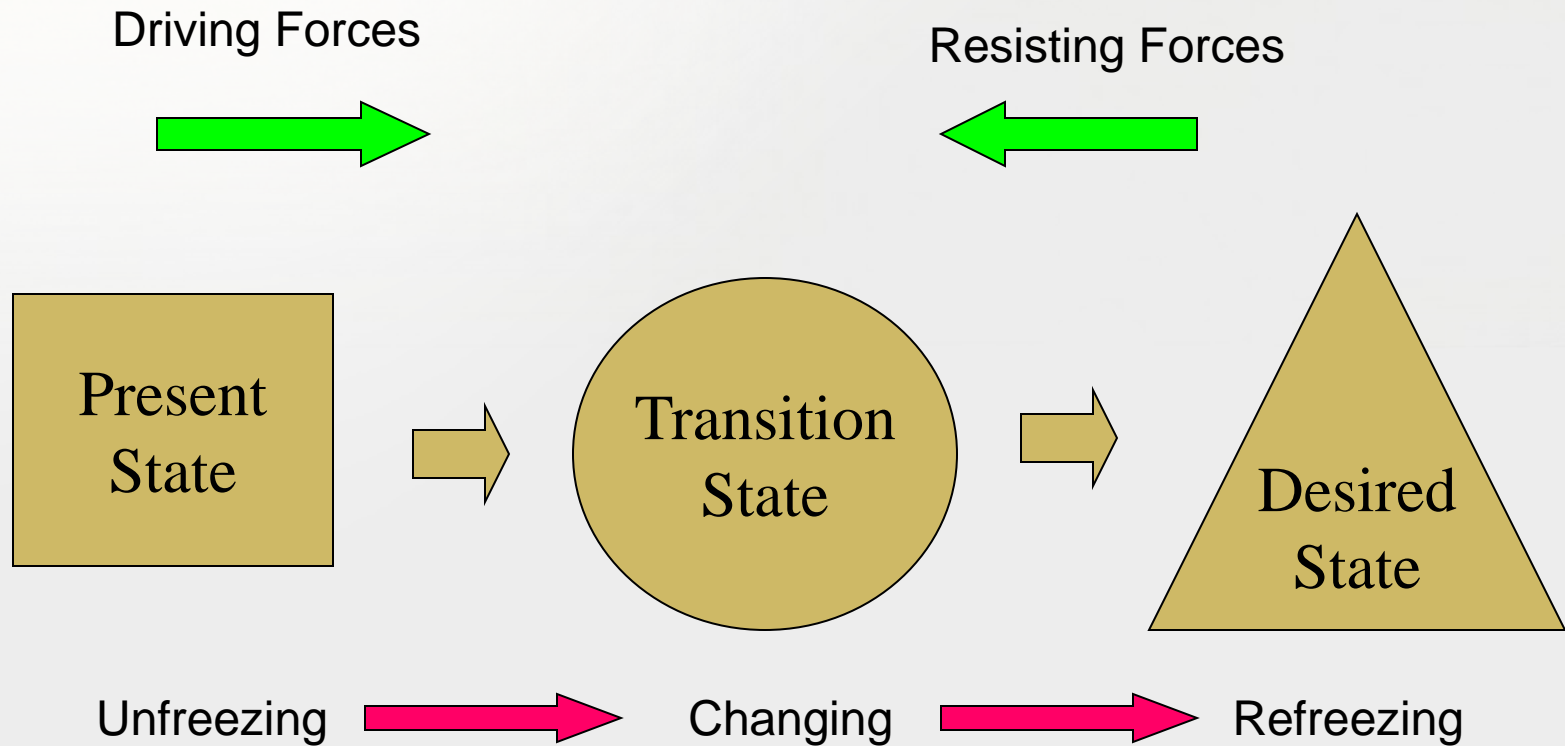
# CHƯƠNG 7. QUẢN LÝ THAY ĐỔI TRONG DỰ ÁN CNTT

1. Các thay đổi trong dự án CNTT
  - a. Bản chất
  - b. Phân loại
  - c. Nguồn gốc
  - d. Hiệu ứng
  - e. Lý do
  - f. Ứng phó
2. Quản lý thay đổi
3. Đánh giá tác động

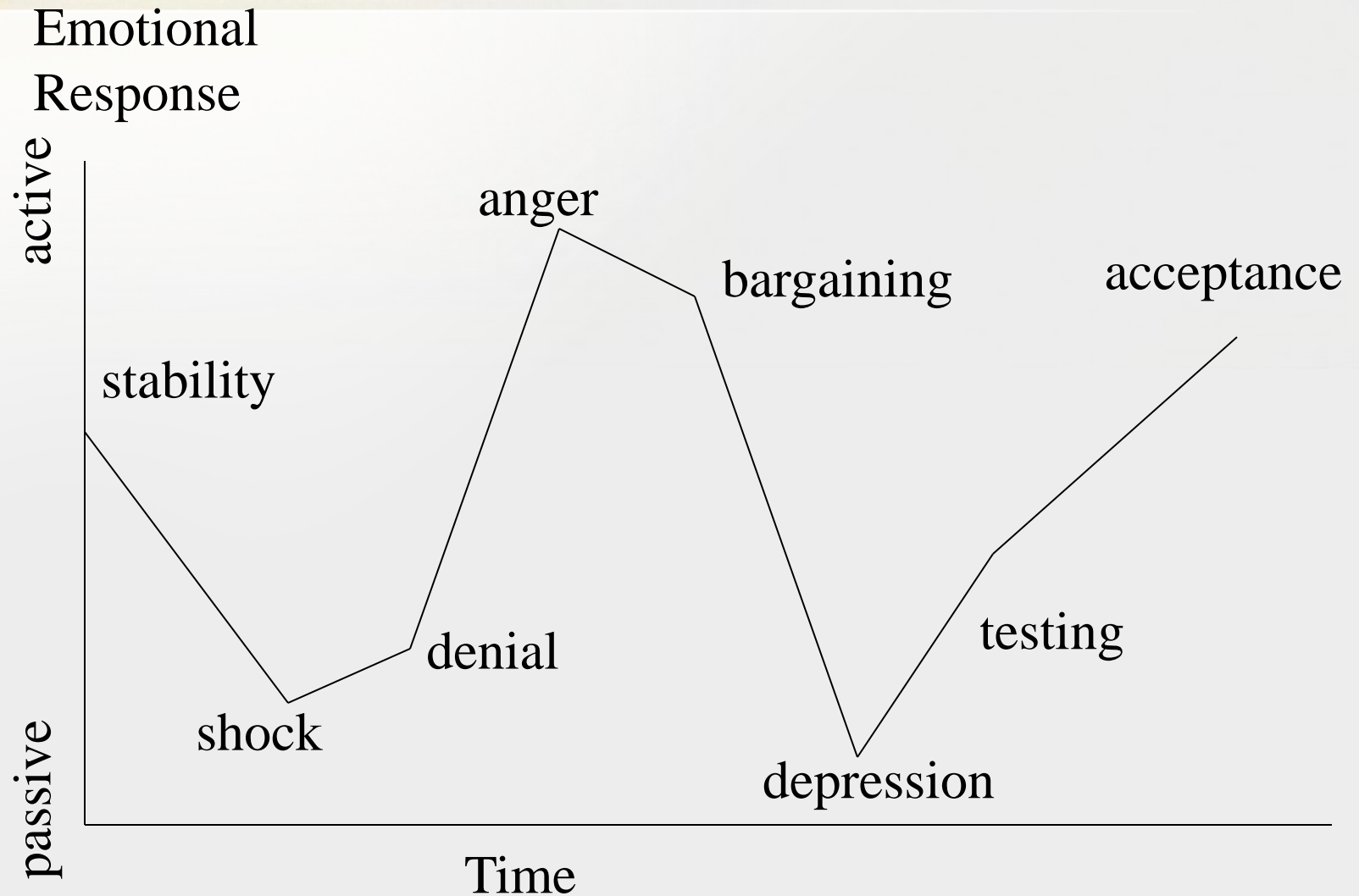
# 1.1. The Nature of Change

- ✿ Whether we view change as positive (anticipation) or negative (dread), there is a certain amount of stress that accompanies each change.
  - ✿ Change is a Process
  - ✿ Change is Emotional
  - ✿ Change has an Impact

# Change is a Process



# Change Can be Emotional



# Change Has an Impact On Different Areas of the Organization

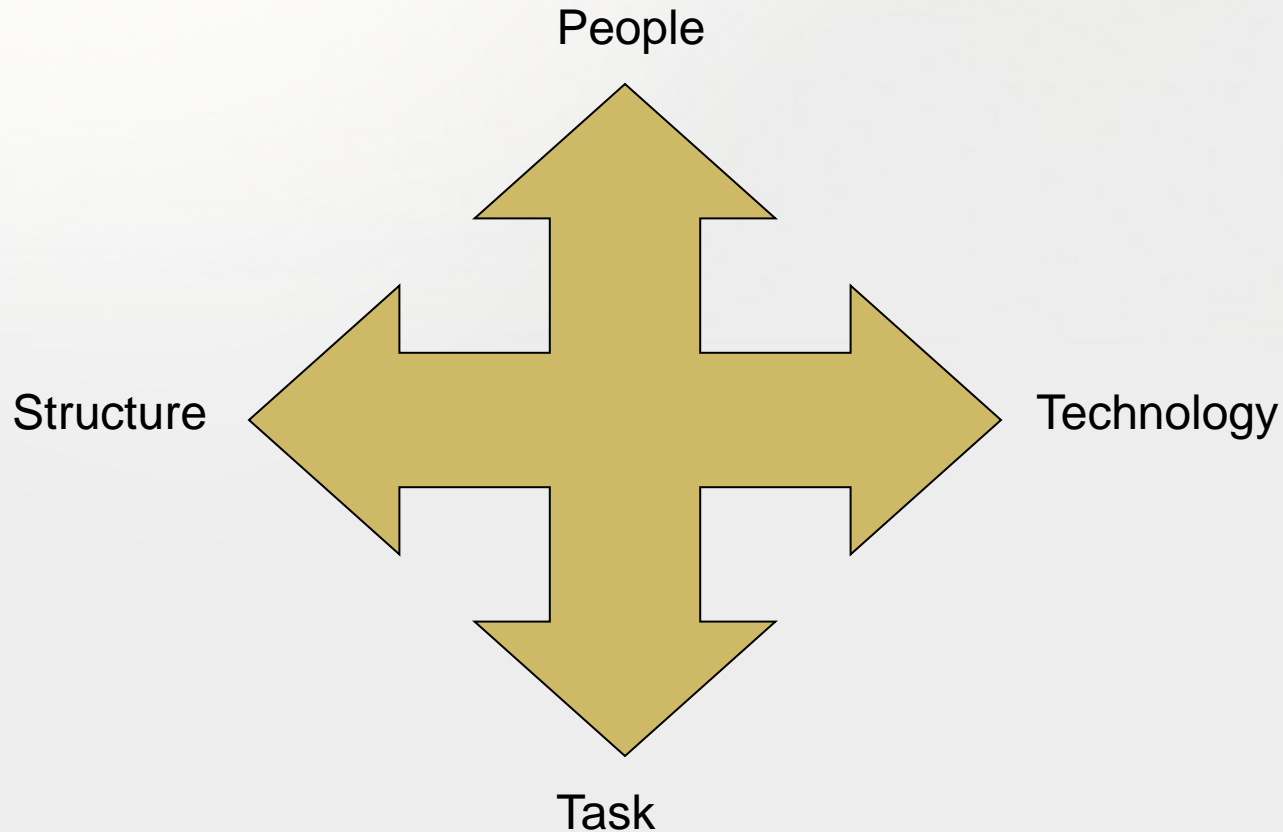


Figure 11.4: Leavitt's Model of Organizational Change

## 1.2. Two Types of Change

- ✿ Changes in scope = addition or subtraction to deliverables – (Change Control)
- ✿ Changes in design of deliverables = Change in specifications – (Configuration Management)

## 1.3. Sources of change

- ✚ Marketing: want to meet customer's check-list
  - ✚ Developers: want to perfect deficiencies
  - ✚ Users: want more functionality or now 'know' what they want
  - ✚ PM:
    - ✚ Error/ omissions (lack of early planning)
    - ✚ Value added opportunities
    - ✚ Competitive pressures
    - ✚ Budget instability
    - ✚ Changing players
- Avg. software project has 25% change in requirements during development
- They will all try to 'insert' these during dev

## 1.4. Effects of change

- ❖ Late changes have a ripple effect on the project's design, code, testing, customer support, training, configuration management, personnel assignments, management and staff communications, planning and tracking and ultimately on the schedule, budget and product quality
- ❖ Changes typically cost anywhere from 50 to 200 times less if they are made at requirements time rather than at during construction or maintenance phases



## 1.5. Reasons for allowing change

- ✿ When customer's don't know what they want
- ✿ When you want to be responsive to the customer
- ✿ When the market is changing rapidly
- ✿ When you want to give latitude to your developers

## 1.6. Reactions to Change

### ✚ Change may

- ✚ be an ending
- ✚ mean giving something up
- ✚ be stressful
- ✚ be easier for those initiating the change
- ✚ provide a basis for resistance and conflict
- ✚ change the “rules for success”

# Unmanaged change versus managed change

- ✚ Time invested in the backend

- ✚ Effort expended in

  - ✚ Rework

  - ✚ Compliance

  - ✚ Supervision

- ✚ Resources used

  - ✚ Senior management and key players

- ✚ Time invested in front end

- ✚ Effort expended in

  - ✚ Education

  - ✚ Communication

  - ✚ Planning

- ✚ Resources Used

  - ✚ Internal stakeholders

  - ✚ Suppliers

  - ✚ Customers

# Mid-Project Feature-Creep

- ✿ The devil is in the details
- ✿ Seemingly trivial feature can have +/- weeks of impact
- ✿ Developers can insert things when you're not looking - gold plating
- ✿ No spec. can cover all details. You must.

# CHƯƠNG 7. QUẢN LÝ THAY ĐỔI TRONG DỰ ÁN CNTT

1. Các thay đổi trong dự án CNTT
- 2. Quản lý thay đổi**
  - a. Định nghĩa
  - b. Quản lý thay đổi dự án
3. Đánh giá tác động

## 2.1. Definitions

- ✿ Change Management: “The transforming of the organization so it is aligned with the execution of a chosen corporate business strategy. It is the management of the human element in a large-scale change project....” [Gartner Group]

## 2.1. Definitions

- ✿ Project Change Management - a general term describing the procedures used to ensure that changes are introduced in a controlled and coordinated manner.
- ✿ Change Request – Requests to expand or reduce the project scope, modify policies, processes, plans or procedures, modify costs or budgets, or revise schedules.
- ✿ Change Order – Used in some companies to identify approved change requests (change request when the request is made and change order once it has been approved)

## 2.2. Project Change Management

- ✚ Project change management encompasses all of the processes necessary to determine where you are at compared to where you planned to be and the activities required to get back on track if those are not aligned





# Why is Project Change Management Important?

- ❁ Projects seldom run exactly according to plan. Project deliverables must be maintained by carefully and continuously managing changes, either by rejecting changes or by approving changes so those approved changes are incorporated into a revised baseline
- ❁ Enables the project team to identify potential problems in a timely manner and take corrective action, when necessary, to control the execution of the project
- ❁ Ensures the project team and stakeholders have an accurate understanding of what has been completed in the project to-date and what will be delivered in total

# Actual vs Planned

- ✚ Determining where you are vs. where you planned to be:
  - ✚ Requires project details be documented and approved
    - Documented scope, cost, time, quality, people, other (eg. Charter)
    - Documented details of product / service functionality (eg. Requirements Document)
  - ✚ Requires processes and tools to assess performance to determine whether any corrective or preventative actions are indicated, and then recommending those actions as necessary
    - Scope and requirements verification throughout the project
    - Budget tracking and forecasting
    - Task duration tracking
    - Overall project timeline tracking & verification

# Getting Back on Track

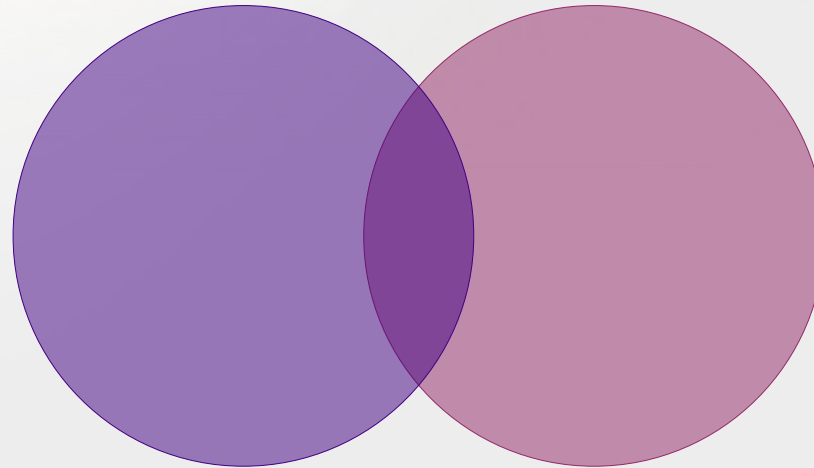
- ✚ How can we get on track again?
  - ✚ Identify that a change needs to occur or has occurred
  - ✚ Document the complete impact of requested changes
  - ✚ Follow approved processes for documenting and approving requested changes
  - ✚ Maintain the integrity of baselines by releasing only approved changes for incorporation into project products or services, and maintaining their related configuration and planning documentation
  - ✚ Control and update the scope, cost, budget, schedule and quality requirements based upon approved changes, by coordinating changes across the entire project
  - ✚ Influence the factors that circumvent integrated change control so that only approved changes are implemented

# Overlapping Systems

**Change Control  
System**

**Configuration  
Management  
System**

**Changes in Scope  
of System**

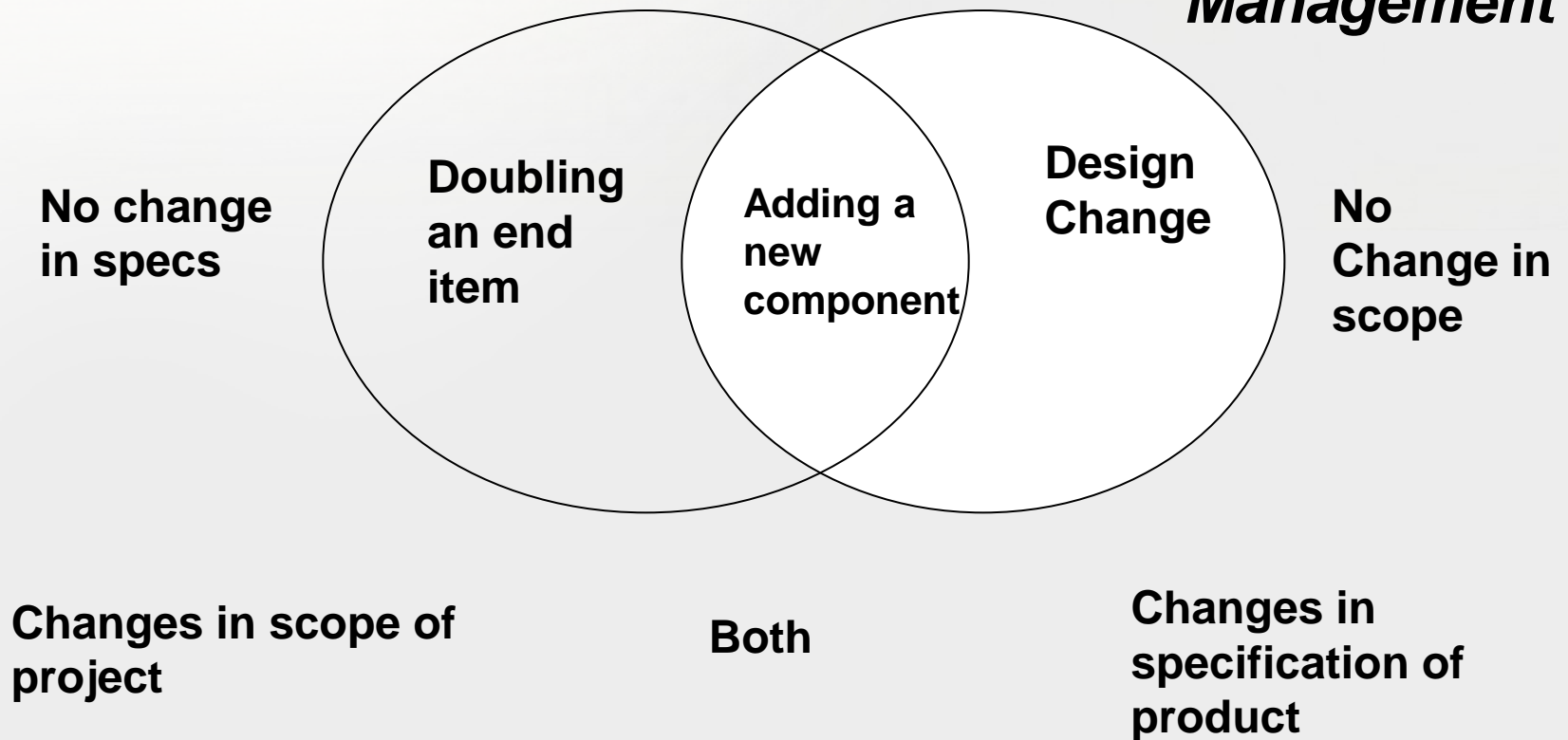


**Changes in specification  
of Product**

# Comparison of Two Systems

***Change control***

***Configuration Management***



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- 3. Đánh giá tác động**
  - a. Thay đổi phạm vi**
  - b. Thay đổi đặc tả**

# 1.1. Scope Changes – Impact Levels

Category	Proposed Action
Low (1-3)	Project teams solves without stakeholder intervention
Medium (4-7)	Impacts stakeholder expectations but does not threaten overall execution. Approval of key stakeholders required.
High (8-10)	Impacts project execution. All key stakeholders involved and meet within three days of receiving change request

# Impact of scope changes

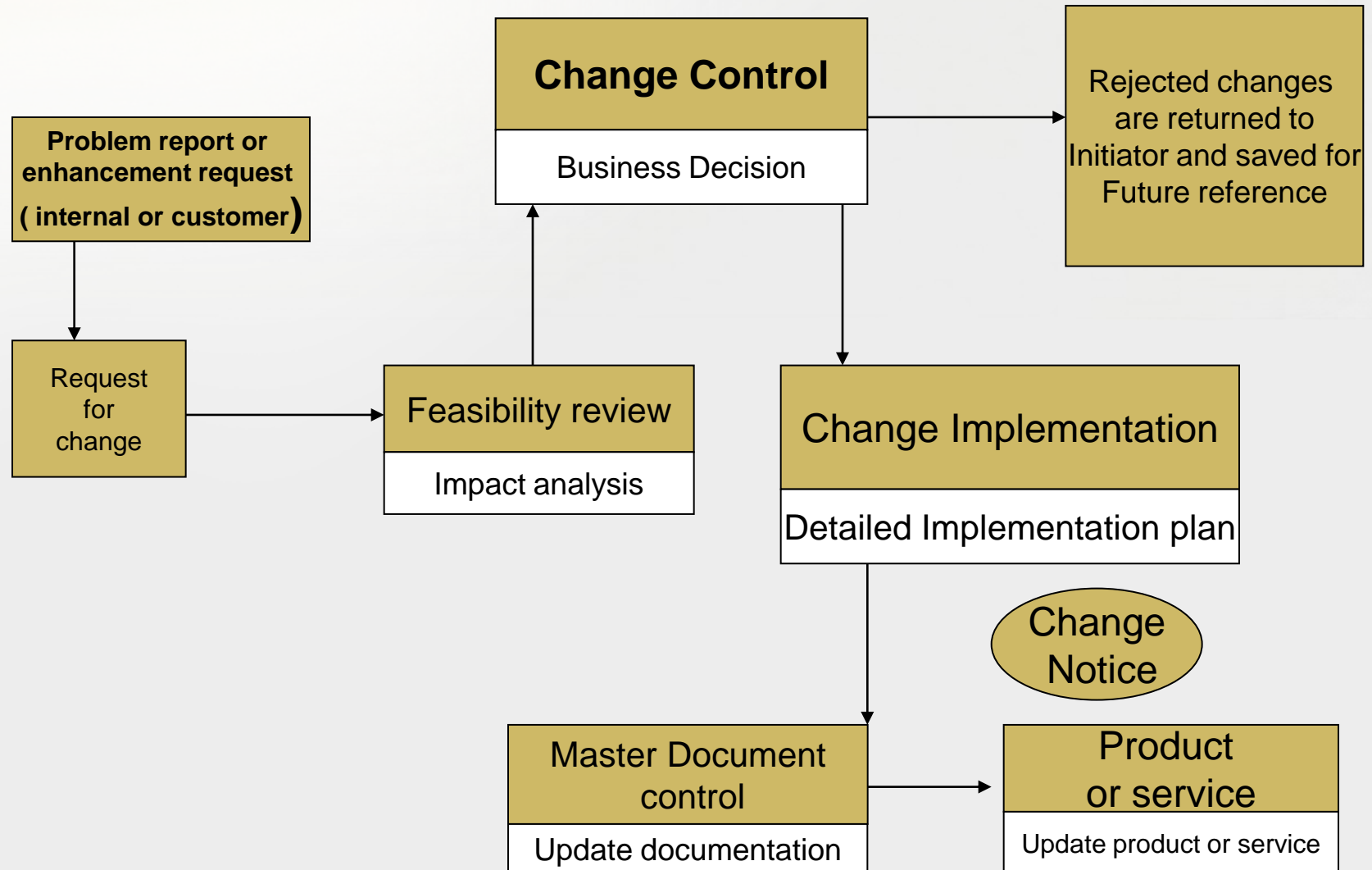
- ✿ It is easier to make changes earlier in the project's life span because the opportunity to add value decreases rapidly as the project progresses
- ✿ Conversely the cost of making a change increase dramatically towards the end of the project typically because of the amount of rework required



# Scope Change Control Systems

- ✚ Scope change will impact
  - ✚ Cost
  - ✚ Schedule
  - ✚ Quality
- ✚ Scope changes must be
  - ✚ Approved
  - ✚ Communicated
  - ✚ Reported

# Change Control Process



# A change control system should include all the following

- ✿ Procedures to handle changes that may be approved without prior review
- ✿ Procedures for automatic approval of defined categories of change
- ✿ Paperwork, tracking systems, and approval levels necessary for authorising changes
- ✿ A description of the powers and responsibilities of the change control board

# Change control and Configuration Management

- ✿ Needed to keep project in control
- ✿ Key responsibility of project manager
- ✿ Requires documentation and management of baseline plan
- ✿ Requires systematic approach to changing the baseline plan

# Controlling change in software projects

- ✿ In software projects problem with creeping requirements, requirements that are added late in the project cycle
- ✿ Projects that fail to control such requirements are susceptible to schedule pressure
- ✿ Creeping requirements are one of the most common sources of cost and schedule overrun
- ✿ They are a major factor in project cancellations- they can destabilize a project to such an extent that it cant be finished

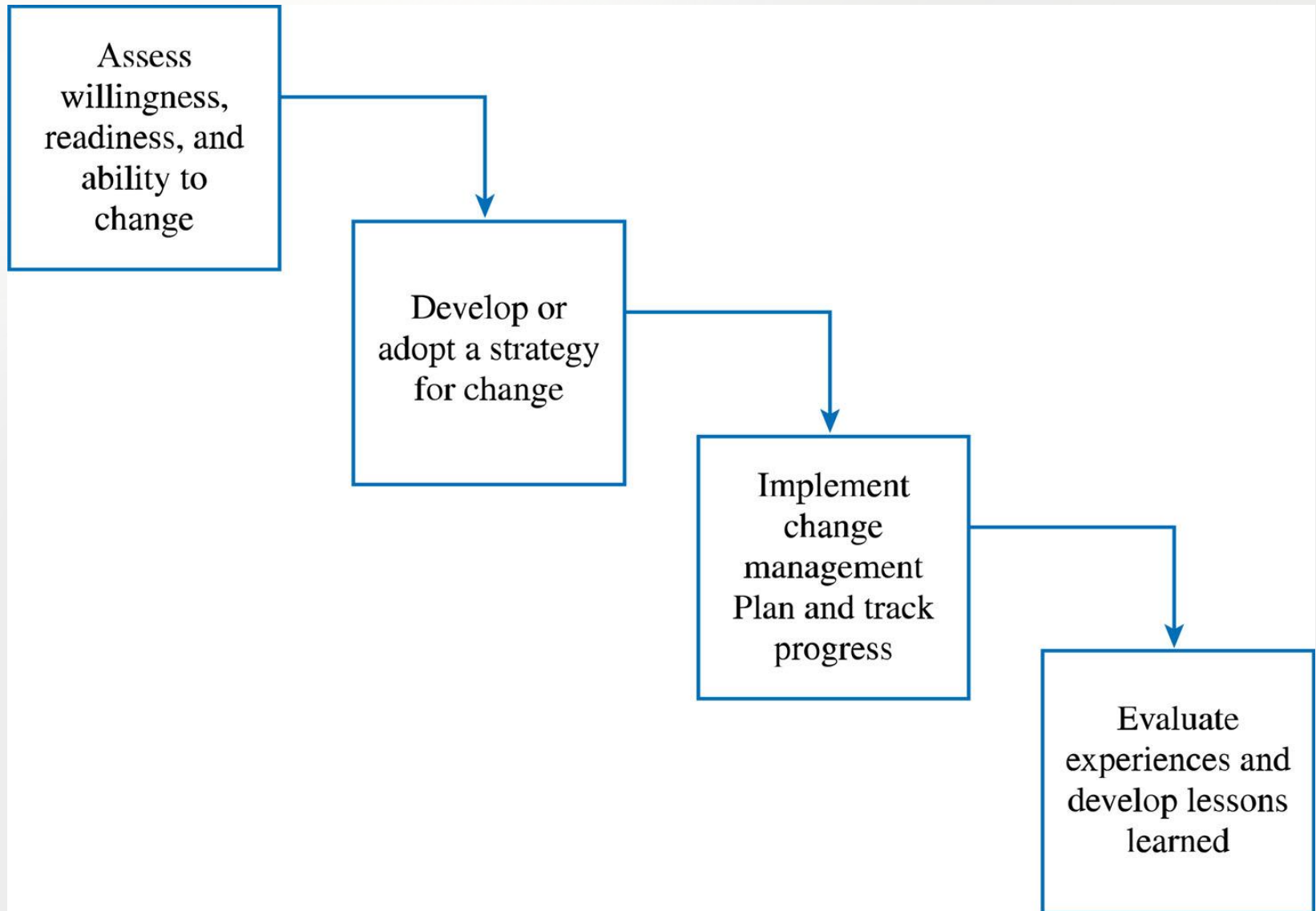
# Controlling software change

- ✿ Late changes in requirements are often the major factor in what are termed “software project disasters”
- ✿ E.g. late delivery of baggage handling software cost Denver airport \$1.1 million a day for months in 1983. Contractor had to deal with \$20 million worth of late changes
- ✿ Although the need to control changes is widely acknowledged the practice can be very different
- ✿ The lack of change control is often not recognised as the problem
- ✿ E.g. “The software was late and far over budget, in fact it almost didn’t make it out the door. And it bore little resemblance to the original plans.....Most software- development planning stinks”

# Aims of change management plan

- ✿ Allow changes that help to produce the best possible product in the time available. Disallow all other changes
- ✿ Allow all parties that would be affected by a proposed change to assess the schedule, resource and product impacts of the change
- ✿ Notify parties on the periphery of the project of each proposed change, its assessed impact and whether it was accepted or rejected
- ✿ Provide an audit trail of decisions related to the product content

# The Change Management Plan





# Assess Willingness, Readiness, and Ability to Change

## ✚ Sponsor

- ✚ Initiating vs. sustaining sponsor

## ✚ Change Agents

- ✚ The project manager and team

## ✚ Targets of Change

- ✚ The users

- ✚ Must understand

- The real impacts of the change
- The breadth of change
- What's over and what's not
- Whether the rules for success have changed

# Develop or Adopt a Strategy for Change

## ✿ Rational–Empirical Approach

- ✿ Picture, Purpose, Part to Play

## ✿ Normative-Reeducation Approach

- ✿ Focus on the core values, beliefs, and established relationships that make up the culture of the group.

## ✿ Power-Coercive Approach

- ✿ Compliance through the exercise of power

## ✿ Environmental-Adaptive Approach

- ✿ Although people may avoid disruption and loss, they can still adapt to change

# Implement the Change Management Plan and Track Progress

## ✿ Communication

- ✿ Watch out for the rumor mill!
- ✿ Media is important
- ✿ Must flow in both directions
- ✿ What you don't say is as important as what you do say!
- ✿ Hit the circle!

# Evaluate Experience and Develop Lessons Learned

- ✿ Experiences should be documented and made available to other project teams
- ✿ Lessons learned provide a foundation for knowledge management and can be used to create new best practices

## 1.2. Specification changes

- ✿ View of software configuration management from various roles
  - ✿ Project manager -> an auditing mechanism
  - ✿ SCM manager -> a controlling, tracking, and policy making mechanism
  - ✿ Software engineer -> a changing, building, and access control mechanism
  - ✿ Customer -> a quality assurance and product identification mechanism

# Software Configuration

- ✚ The Output from the software process makes up the software configuration
  - ✚ Computer programs (both source code files and executable files)
  - ✚ Work products that describe the computer programs (documents targeted at both technical practitioners and users)
  - ✚ Data (contained within the programs themselves or in external files)
- ✚ The major danger to a software configuration is change

# Elements of a Configuration Management System

## ✚ Configuration elements

- ✚ A set of tools coupled with a file management (e.g., database) system that enables access to and management of each software configuration item

## ✚ Process elements

- ✚ A collection of procedures and tasks that define an effective approach to change management for all participants

## ✚ Construction elements

- ✚ A set of tools that automate the construction of software by ensuring that the proper set of valid components (i.e., the correct version) is assembled

## ✚ Human elements

- ✚ A set of tools and process features used by a software team to implement effective SCM

# Baseline

- ✿ Baseline is a specification or product that has been formally reviewed and agreed upon, and that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures
  - ✿ It is a milestone in the development of software and is marked by the delivery of one or more computer software configuration items (CSCIs) that have been approved as a consequence of a formal technical review
  - ✿ A CSCI may be such work products as a document, a test suite, or a software component
- [IEEE]



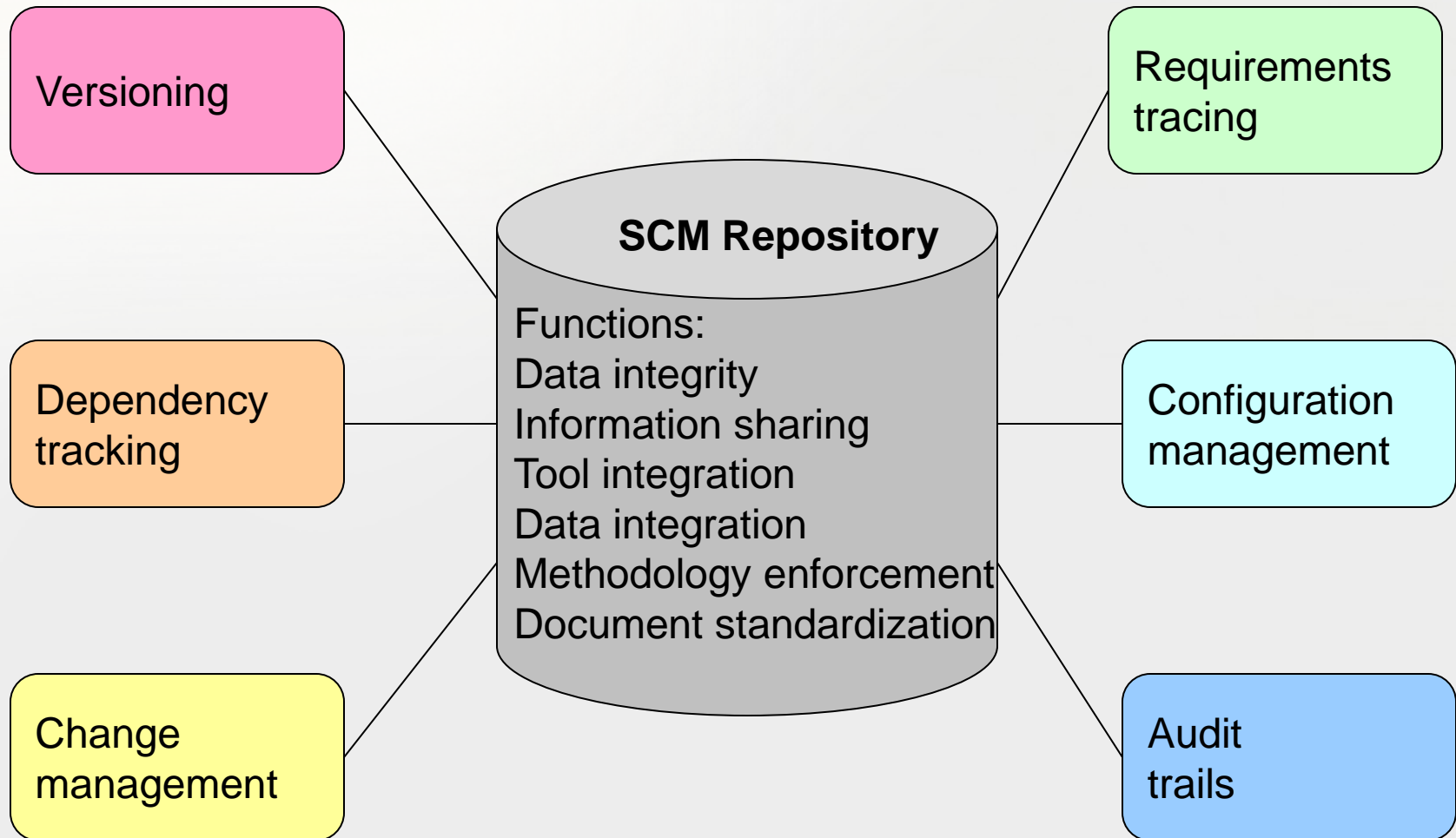
# Baselining Process

- ✿ A series of software engineering tasks produces a CSCI
- ✿ The CSCI is reviewed and possibly approved
- ✿ The approved CSCI is given a new version number and placed in a project database (i.e., software repository)
- ✿ A copy of the CSCI is taken from the project database and examined/modified by a software engineer
- ✿ The baselining of the modified CSCI goes back to Step #2

# Paper-based vs. Automated SCM Repositories

- ✚ Problems with paper-based repositories (i.e., file cabinet containing folders)
  - ✚ Finding a configuration item when it was needed was often difficult
  - ✚ Determining which items were changed, when and by whom was often challenging
  - ✚ Constructing a new version of an existing program was time consuming and error prone
  - ✚ Describing detailed or complex relationships between configuration items was virtually impossible
- ✚ Today's automated SCM repository
  - ✚ It is a set of mechanisms and data structures that allow a software team to manage change in an effective manner
  - ✚ It acts as the center for both accumulation and storage of software engineering information
  - ✚ Software engineers use tools integrated with the repository to interact with it

# Automated SCM Repository (Functions and Tools)

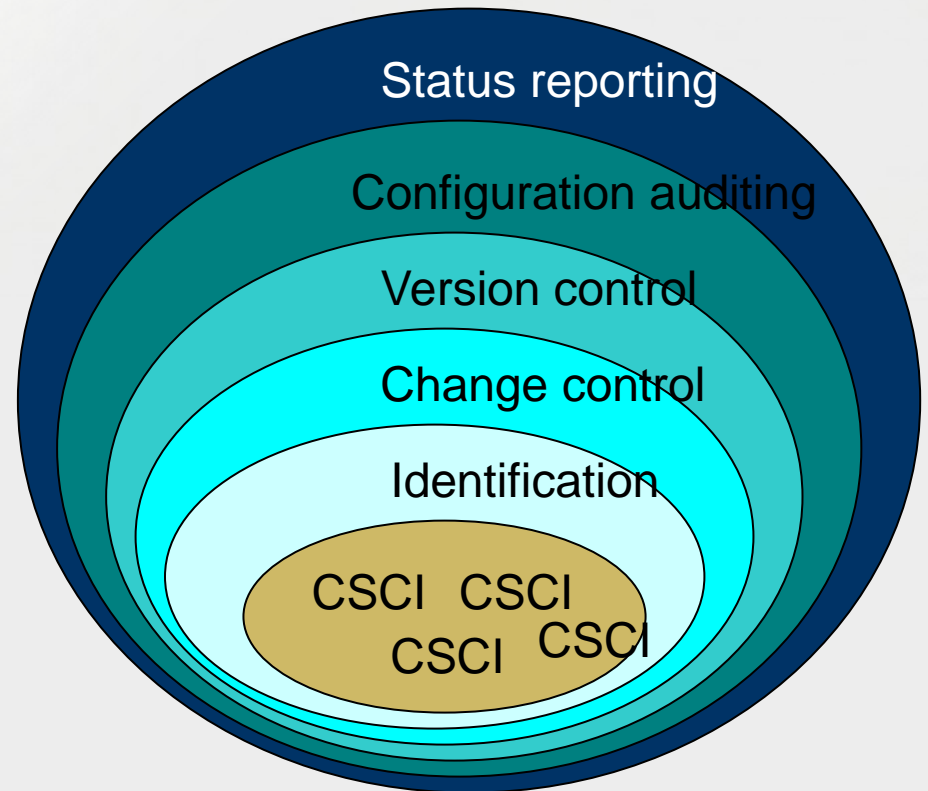


# Summary of CM Tools

- ✿ <http://www.daveeaton.com/scm/CMTools.html>
- ✿ [http://www.laatuk.com/tools/SCM\\_tools.html](http://www.laatuk.com/tools/SCM_tools.html)
- ✿ [http://www.snuffybear.com/ucmcentral\\_new\\_vendorlinks.htm](http://www.snuffybear.com/ucmcentral_new_vendorlinks.htm)
- ✿ [http://www.google.com/Top/Computers/Software/Configuration\\_Management/Tools/](http://www.google.com/Top/Computers/Software/Configuration_Management/Tools/)
- ✿ <http://stason.org/TULARC/business/config-version-management-tools/69-CM-Tools-With-World-Wide-Web-Sites.html>
- ✿ <http://www.cmcrossroads.com/cm-resources/tools/commercial-cm-tools>

# SCM Tasks

- ✿ Identify all items that collectively define the software configuration
- ✿ Manage changes to one or more of these items
- ✿ Facilitate construction of different versions of an application
- ✿ Ensure the software quality is maintained as the configuration evolves over time
- ✿ Provide information on changes that have occurred



# Identification Task

- ✿ Identification separately names each CSCI and then organizes it in the SCM repository using an object-oriented approach
- ✿ Objects start out as basic objects and are then grouped into aggregate objects
- ✿ Each object has a set of distinct features that identify it
  - ✿ A name that is unambiguous to all other objects
  - ✿ A description that contains the CSCI type, a project identifier, and change and/or version information
  - ✿ List of resources needed by the object
  - ✿ The object realization (i.e., the document, the file, the model, etc.)

# Change Control Task

- ✚ Change control is a procedural activity that ensures quality and consistency as changes are made to a configuration object
- ✚ A change request is submitted to a configuration control authority, which is usually a change control board (CCB)
  - ✚ The request is evaluated for technical merit, potential side effects, overall impact on other configuration objects and system functions, and projected cost in terms of money, time, and resources
- ✚ An engineering change order (ECO) is issued for each approved change request
  - ✚ Describes the change to be made, the constraints to follow, and the criteria for review and audit
- ✚ The baselined CSCI is obtained from the SCM repository
  - ✚ Access control governs which software engineers have the authority to access and modify a particular configuration object
  - ✚ Synchronization control helps to ensure that parallel changes performed by two different people don't overwrite one another



# Version Control Task

- ✚ Version control is a set of procedures and tools for managing the creation and use of multiple occurrences of objects in the SCM repository
- ✚ Required version control capabilities
  - ✚ An SCM repository that stores all relevant configuration objects
  - ✚ A version management capability that stores all versions of a configuration object (or enables any version to be constructed using differences from past versions)
  - ✚ A make facility that enables the software engineer to collect all relevant configuration objects and construct a specific version of the software
  - ✚ Issues tracking (bug tracking) capability that enables the team to record and track the status of all outstanding issues associated with each configuration object
- ✚ The SCM repository maintains a change set
  - ✚ Serves as a collection of all changes made to a baseline configuration
  - ✚ Used to create a specific version of the software
  - ✚ Captures all changes to all files in the configuration along with the reason for changes and details of who made the changes and when



# Configuration Auditing Task

- ✿ Configuration auditing is an SQA activity that helps to ensure that quality is maintained as changes are made
- ✿ It complements the formal technical review and is conducted by the SQA group
- ✿ It addresses the following questions
  - ✿ Has the change specified in the ECO been made? Have any additional modifications been incorporated?
  - ✿ Has a formal technical review been conducted to assess technical correctness?
  - ✿ Has the software process been followed, and have software engineering standards been properly applied?
  - ✿ Has the change been "highlighted" and "documented" in the CSCI? Have the change data and change author been specified? Do the attributes of the configuration object reflect the change?
  - ✿ Have SCM procedures for noting the change, recording it, and reporting it been followed?
  - ✿ Have all related CSCIs been properly updated?
- ✿ A configuration audit ensures that
  - ✿ The correct CSCIs (by version) have been incorporated into a specific build
  - ✿ That all documentation is up-to-date and consistent with the version that has been built

# Status Reporting Task

- ✚ Configuration status reporting (CSR) is also called status accounting
- ✚ Provides information about each change to those personnel in an organization with a need to know
- ✚ Answers what happened, who did it, when did it happen, and what else will be affected?
- ✚ Sources of entries for configuration status reporting
  - ✚ Each time a CSCI is assigned new or updated information
  - ✚ Each time a change is approved by the CCB and an ECO is issued
  - ✚ Each time a configuration audit is conducted
- ✚ The configuration status report
  - ✚ Placed in an on-line database or on a website for software developers and maintainers to read
  - ✚ Given to management and practitioners to keep them apprised of important changes to the project CSCIs