Change Control Management

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Total Number of slides = 40

Module Objective and Outline

At the end of this module, you would be able to :

- Explain the what and why of change control
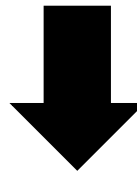- Apply a change control process

Outline

- What is Change?
- Definition of Change Control
- Purpose of Change Control
- Consequences of Informality
- Sources of Change
- The Change Process
- The Change Control Board
- Summary

What is 'Change'

Change is defined as a <u>variation</u> from a previously <u>established</u> <u>baseline</u>

What forms the baseline?

Change Effect

USER REQUIREMENTS   **DATA GATHERING**

Changing Requirements   **Analysis**

Change   **Design**

Change   **Build**

Change   **Install**

Change   **Test**

Change   **Train**

Change   **Acceptance**

Time

Divergence

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What is Change Control

- **A set of formal procedures which provide for the**
  - recognition,
  - evaluation, and
  - orderly control of change in a dynamic business environment

Need for Change Control

- **The purpose of Change Control is to ensure that the project maintains its :**

Business Integrity
by being on schedule and within its resource and cost plans
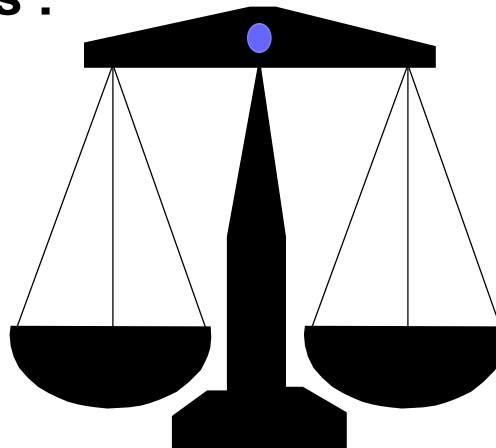
Technical Integrity
with all the deliverables meeting their specific requirements and quality criteria

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Types of Change

- **New needs**
  - changes to business requirement
- **Desired enhancements**
  - 'nice to have'
  - improvements
  - mandated policy changes
- **Service requests**
  - data patching or updating
- **Problems**
  - program bugs
  - technical problems

Sources of Changes

- **User/Client**
- **IT Development team**
- **Systems support**
- **Management**
- **Government**
- **New technology**
- **etc...**

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Consequences of Informality

- **Misunderstanding**
- **No clear audit trail**
- **Lack of design integrity**
- **Problems at acceptance time**
- **Overruns**
- **Unhappy management**
- **Unhappy users**
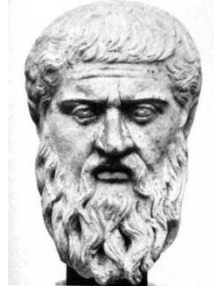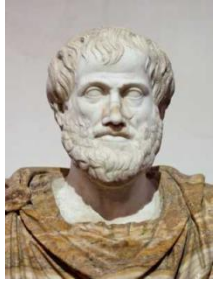- **Unhappy project team members**

Objectives of Change Control

- **Provide a record of changes to the baseline**
- **Facilitate communication & increase awareness of change**
- **Ensure appropriate management of the change**
- **Keep disruption caused by changes at an acceptable level**

It is not a plan to inhibit or prohibit change

Change Control Philosophy

- **Every change must be**
    - documented
    - evaluated
    - Approved/rejected on business need
- **Approved changes must have**
    - an associated action plan
    - tracked for completion
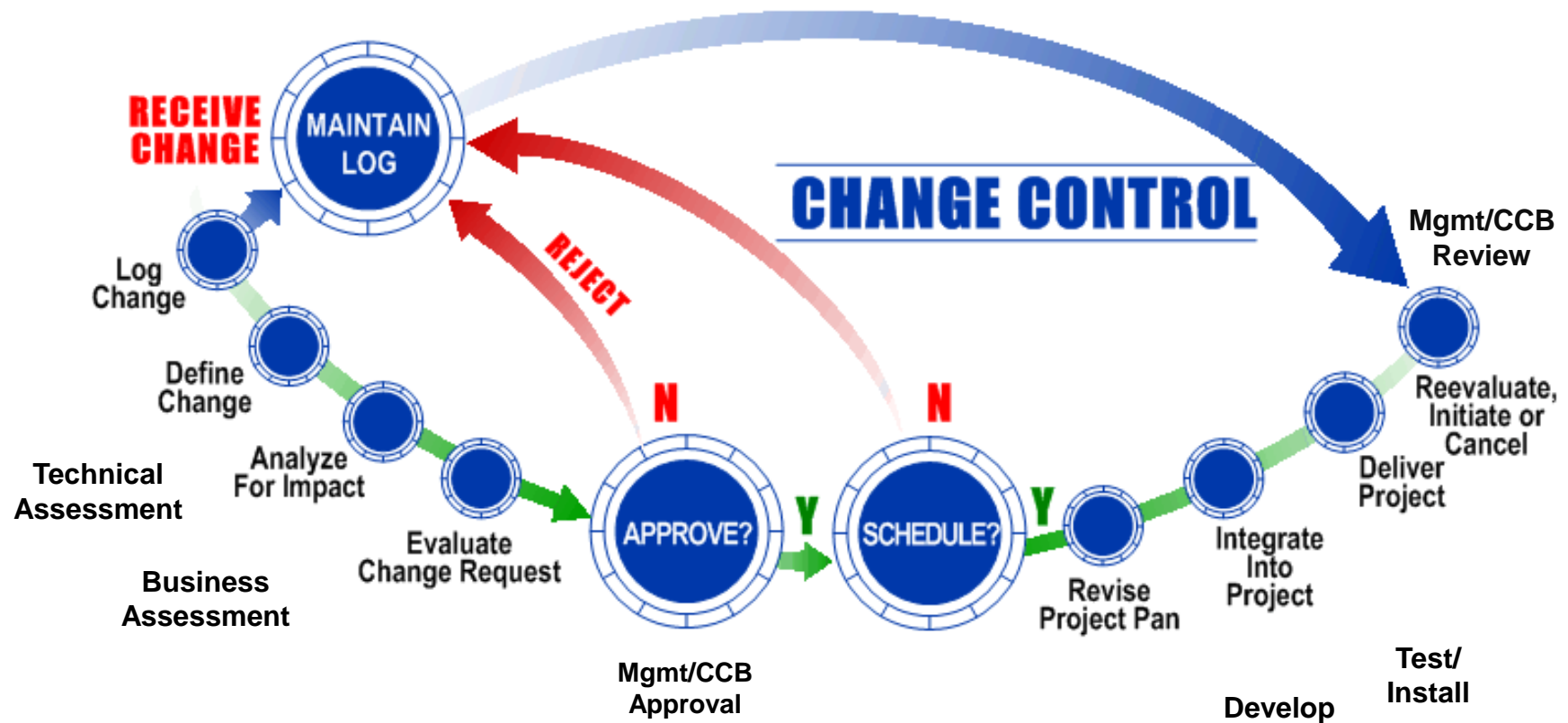
Change Control Committee/Board

- **Role**
  - Responsible for the review & approval of changes
- **Multiple levels**
- **Managers**
  - Development
  - Operations
  - User project manager
  - User functional areas
  - Systems assurance
  - Internal audit
  - Others as required
- **Meet regularly**
- **May have multi-levels**

The Change Control Process

- Always assume change **will** happen.
- Before we start work we should have a *change control process* established
- It states the way we shall manage change
- *A project should never baseline a document without identifying a change control process for that document.*

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Slide 12

The Change Control Process

The Change Control Process

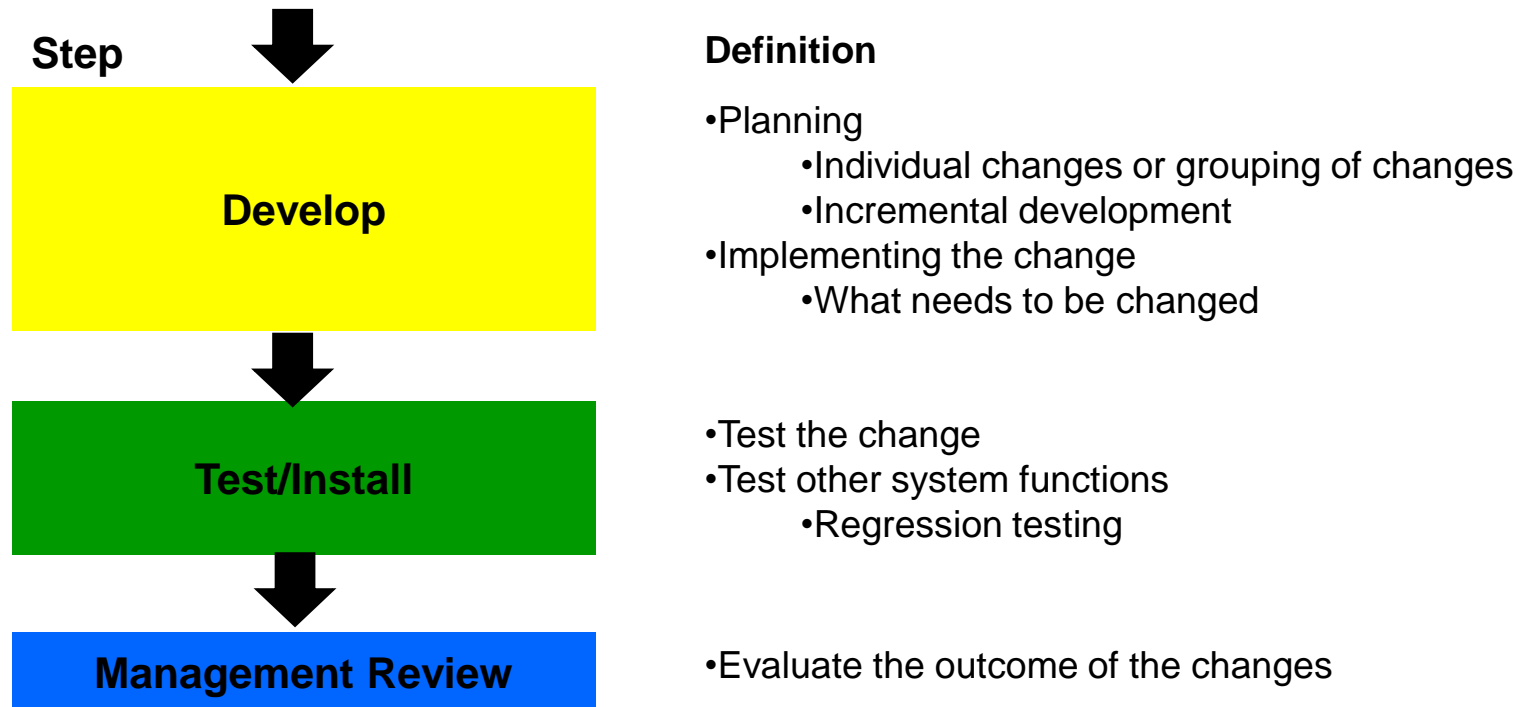| **Step**	**Definition**
Change Request	•A change request is a request to modify an already agreed situation or base-lined plan due to Change in customer requirements, change in technology, change in date of product deployment *change requests ought to have a legitimate cause.*
Technical Assessment	•Evaluate the feasibility , risks, impact and completeness of the change request. •Includes man-effort, cost and schedule •Technical recommendation to approve, reject, defer or modify
Business Assessment	•Evaluate the business need, risk, impact, timing, cost •Recommendation to approve, reject, defer or modify
Management Approval	•Evaluate the priorities, resources, schedule

Change Control Process

Step

Definition

Develop

Test/Install

Management Review

- Planning
  - Individual changes or grouping of changes
  - Incremental development
- Implementing the change
  - What needs to be changed

- Test the change
- Test other system functions
  - Regression testing

- Evaluate the outcome of the changes

The Change Control Process

- **Terms**
  - Change Impact
  - Classification
  - Localization
  - Direct impact analysis
  - Indirect impact analysis
  - Priority assignment
  - Agreement or rejection (or deferment)
 - Re-planning
  - Rescheduling

Change Impact

- **A seemingly small change in scope can have a large impact on the project.**

- **For example,**

  – A new work item may require a skilled resource already committed to other, parallel tasks.

  $\Rightarrow$ Those tasks must be rescheduled; and then so must any dependent tasks, and so on.

  $\Rightarrow$ That rescheduling affects the availability of other skilled resources, thereby disrupting more parallel tasks...

  $\Rightarrow$ and so on.

Classification

- **A change request usually refers to a function, assumption, or constraint,**

- **Examples**
  - "The product must also warn employees that their leave will expire if not taken"
    - » *A functional change*
  - "The product can no longer access the employee data base, but must maintain the relevant data itself"
    - » *An assumption*
  - "We have been tasked to demo the product at SEARCC '15 and hence now require a pilot version by 1 October, ahead of the agreed delivery date"
    - » *A constraint*
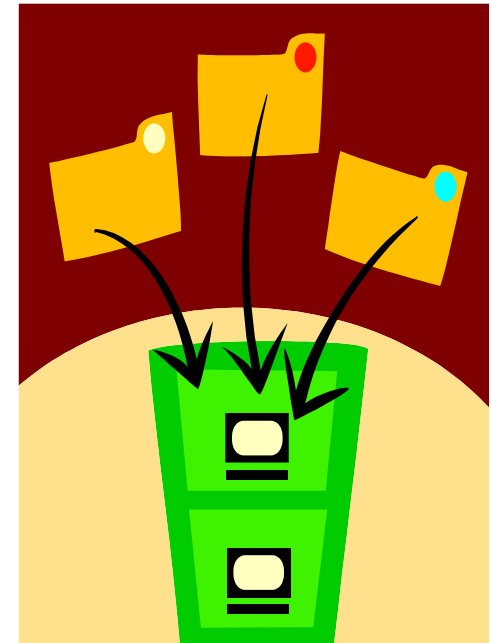
Localization

- **Involves**
  - Identifying the parts of the system,
  - Identifying the parts of the WBS/schedule that will be affected by the change.

- **A functional change is usually easy to localize.**

- **A change in assumptions or constraints may however affect many product components, and hence many parts of the WBS/schedule.**

- **Consider for instance a change request that asks for a *Bahasa Malaysia* version of the application - every dialogue will be affected.**

Example of localization

Suppose that our product can no longer access the employee data base.

- We need to add functionality to determine leave entitlement and other employee data.

- But we also need to modify our data base design.

- And now we need more functions to insert, review, and update that new data.

- And revise the user interface to invoke them.

- And, of course, we need to design, code, test, and *integrate* all that new functionality

Impact Analysis – Direct Impact

- **The first stage is *direct* impact analysis: what new work will be required to implement the change.**

- **We usually need to generate**
  - The new tasks that must be performed
  - Estimate the effort and costs for these tasks.

- **This gives us, once more, an estimate of resources, cost, and time.**

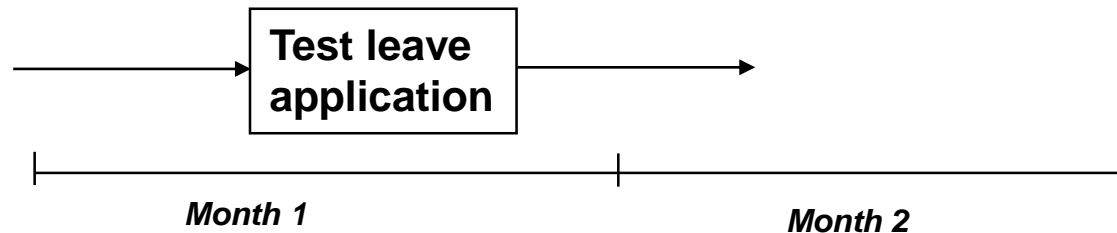# Impact Analysis- Modification of Existing Work Products

- **What additional work needs to be done on updating existing work products?**

- **Example**
  - You are developing a software product using the RUP
  - You are in the design phase, and have just completed the Design model
  - Your customer now wants to modify existing product features and/or new product features
  - What already produced project artifacts would need to be changed?
  - How would it depend on
    - » The nature of the changes?
    - » The nature of your project process e.g.
      - **Waterfall**
      - **Incremental**
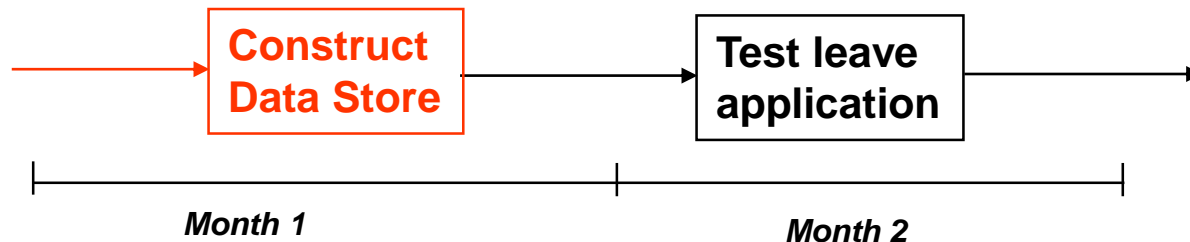
Impact Analysis – Indirect Impact

- **The effect on tasks logically distinct but linked to the changes because of shared resources, inter-task links, and so on?**

- **The second part of our impact analysis must generate estimates of these impacts.**

- **That will normally change much more of the project plan, with revised resource and effort allocations**

- **In general indirect impact is usually larger - sometimes much larger - than direct.**

Example -1

- **Our original test plan for the *leave application* function assumed the prior availability of the employee data base.**

```
                    ┌──────────────┐
    ──────────────▶ │ Test leave   │ ──────────────▶
                    │ application  │
                    └──────────────┘
    ├──────────────────────┼──────────────────────┤
          *Month 1*                  *Month 2*
```

- **That assumption is now false.**

- **Instead, the test activity has a new prerequisite:**
  - *Completion of the data store that will now hold the employee data.*

```
    ┌──────────────┐      ┌──────────────┐
──▶ │ Construct    │ ───▶ │ Test leave   │ ──────────▶
    │ Data Store   │      │ application  │
    └──────────────┘      └──────────────┘
    ├──────────────────────┼──────────────────────┤
        *Month 1*                 *Month 2*
```

- **This implies a new precedence analysis network, a reschedule of the testing, and perhaps even a new critical path.**

Example -2

- **Direct impact estimation tells us we must delay the test by one month (the time needed to build the new component).**

- **That means we will have a staff idle for that month, and possibly double booked for the next month.**

- **Potentially, that is a major indirect impact.**

- **To minimize the impact, we may have to re-plan and reschedule many tasks.**

Priority Assignment

- **It is possible to prioritize change requests, based on**
  - Value (estimated by customer)
  - Impact (estimated by project management)

- **The simplest approach is to accept first the changes with highest value to impact ratio.**

- **This is complicated by two issues**
  - Some changes depend on other changes
  - It is cheaper to implement changes in bunches

- **The result is an ordered set of *amendments* to the original plan.**
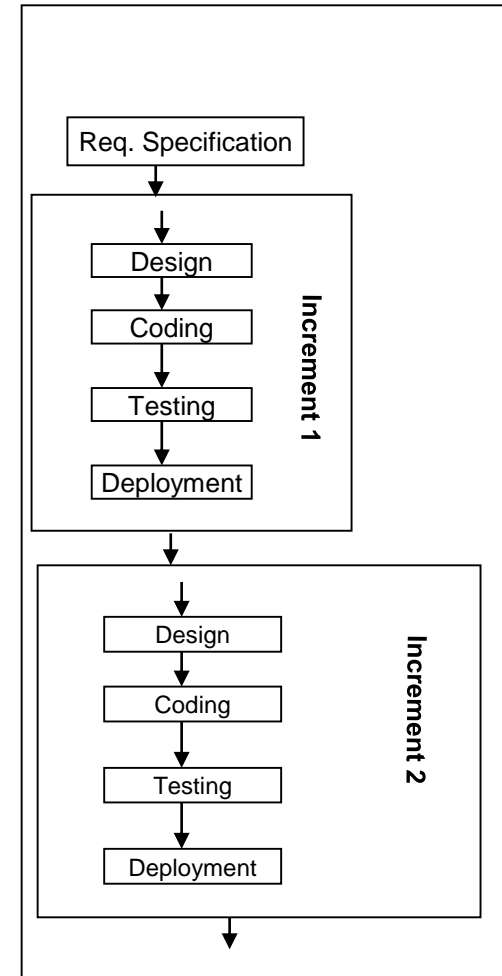
Prioritisation Process

- **Benefits**
  - Tangible
  - Intangible
- **Impact**
  - New products & services
  - New channels for distribution
  - Organisation/people
- **Risk**
  - Loss of business opportunities
  - Technologies
  - Capabilities
  - Structure
  - Size & complexity
  - Duration

- **Data pre-requisites**
- **General importance**
  - **Business requires it**
  - **Direct order**
  - **Political issues**
- **Trade-offs**

Prioritization for Incremental Development

- **With an incremental development project, the prioritization of change requests is different and a little more elaborate.**

- **In general, every proposed change will be assigned to a specific increment or *build* of the product.**

- **This will be based initially on the urgency of the change - how soon it is required.**
  - With a waterfall development, this is not important, because everything is delivered at the same time

Req. Specification

Design

Coding

Testing

Deployment

Increment 1

Design

Coding

Testing

Deployment

Increment 2

Urgency

- **Typically, the customer gives us three levels of urgency**
  - Critical - the change must be incorporated into the *current* increment, the one we are now building - clearly, highest cost

  - Urgent - the change must be added to the task list for the *next* increment

  - Normal - the change should be added to the increment where it will have the least *indirect impact*, and so lowest cost

- **In each case, we produce a cost estimate.**

Agreement

- **In order to agree a change request, we must be satisfied that**
  - If we are the Customer
    - » the cost/benefit ratio exceeds a specific threshold
      - **Typically, that the change does not reduce the overall cost/benefit ratio of the product**
    - » Its cost is within our contingency reserve (if one is assigned)
  - If we are the Vendor, then the customer is willing (or able) to pay for the change

Rejection

- **A change request *should* be rejected if**
  - It has an inadequate cost/benefit ratio
  - Its cost exceeds our budget
  - Or the customer is unable or unwilling to pay for it
  - Its indirect impact reduces the value of the product - for example by delaying its deployment date

- **This rejection must be agreed between customer and project manager/developer management**
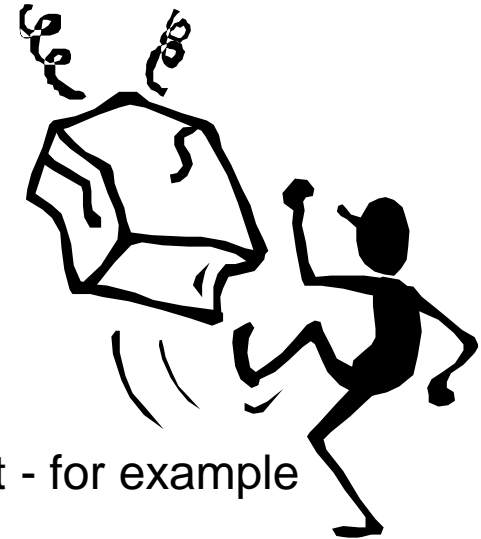
Negotiation

- Often we cannot reject change requests outright, but we need to *negotiate* with the customer.

- Typically, the organization responds to a change request by giving a *cost and impact analysis*, and the customer then has the final decision whether to proceed.

- The cost of the change then comes out of the existing *contingency* budget, or is paid separately as an additional fee.

Re-planning

- **Once a change has been agreed, you must *re-plan* the remainder of the project.**

- **This is done by**
  - Amending the work breakdown structure to reflect the new work.
  - Modifying the resource assignment
  - Estimating the effort and costs of
    - » New tasks
    - » Modification of existing tasks
  - Revisit and modify precedence analysis
 - Rescheduling project tasks

Outputs

- **The major outputs from the process are :**
  - Change records
  - Project Plan revisions

- **However, it is often very useful to the organization to provide more information about the changes, in the form of**
  - Change analysis

Change Records

- A change record is simply a document or set of documents describing how each change was processed, from initiation to closure.

- It is a standard part of project history.

- It is important because it provides the rationale for the associated changes to the WBS, schedule, and work packet assignments.

- Efficient and effective handling of change requests is a measure of process quality, so change records help us improve our process.
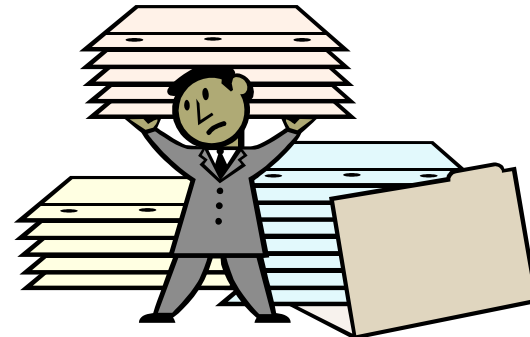
Plan Revisions

- When we accept a change request, we usually have to revise our project plan, and sometimes we must revise our processes.

- These plan revisions should also be reviewed by staff and higher management, and formally approved.

- If they affect delivery dates, they should also be reviewed and approved by customers.

Change Analysis

- A *change analysis* is a formal account of the

  – Cause

  – Impact

  – Implications

  of each specific scope change

- It is used as a guide by future projects, that may experience similar changes because of similar causes.

- It may help them mitigate the impact and cope with the implications.

> Example
>
> 1. New functionality - warning of leave expiry - was added to our product by a scope change.
>
> 2. The probable cause was *the original product did not implement the entire functionality required to support effective leave planning*.
>
> 3. The implication is that future projects should include a *use case analysis* step, to ensure that their scope includes all reasonable user interactions implied by the customer organization's business processes.

Summary

- **Unmanaged change is a major cause of project failure**
- **Changes come from all functions involved**
- **Change is inevitable and must be accommodated**
- **A change control system must be measured, reviewed and tuned**
- **MANAGE YOUR CUSTOMER EXPECTATIONS**
  - Agree upfront with customers what the change management process will be.
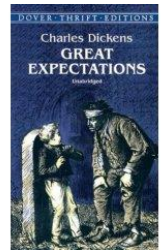
Sample Change Request

CHANGE REQUEST FORM　　Change Request No: [   ]

Part I: To Be Completed By Person Requesting Change

Project Name: Application Name:	Product: Product Reference: Version:	Reference: Date:

Type of Request: Problem / Change/ Others*.　　Priority : Crit/Urg/Norm

Description of Changes: (Add attachment if necessary):

Justification/Benefits:　　Date Required: _____

Name	Signature	Tel No.	Dept

Part II: To be filled by Head of Requesting Department/User Manager

Assessment & Recommendation:

Name	Signature	Tel No.	Dept

* Circle the inappropriate one

Part III: Technical Evaluation

Assessment & Recommendation:

Category: Major/Minor　　Priority: 0 / 1 / 2 / 3

Estimated Man-Effort Required: _____ man-days　　Estimated Costs: $_____
Expected Start Date: _____　　Expected End Date: _____
Name of Evaluator: _____

Part IV: Decision by Project Manager or Change Control Board

Accepted ☐　　Modify ☐　　Rejected ☐　　Deferred ☐

Reason:

Assigned To:

Name	Signature	Date

Part V: To Be Completed By Personnel Effecting Changes

Action Taken/Summary of Changes Made:

Total Man-Effort Taken ☐ Man-days	Name	Appointment	Signature/Date

Part VI: To Be Completed by Project Manager To Close Change Request

Comments:

Product Reference and Released Version (if applicable)	Signature/Date

Change Request Log

CR#	Change Summary	Status	Date Rasied	Date Received	Person Assigned	Required Completion Date	Est Man Effort	Man Effort Taken	Actual Completion Date	Release Date	Acceptance Date