

## Process Improvement

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## Process improvement

- Understanding existing processes and introducing process changes
  - To improve product quality, reduce costs or accelerate schedules
- Most process improvement work so far has focused on **defect reduction**
  - This reflects the increasing attention paid by industry to quality
- However, other **positive** process attributes can also be the focus of improvement

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## Process attributes

Process characteristic	Description
Understandability	To what extent is the process explicitly defined and how easy is it to understand the process definition?
Visibility	Do the process activities culminate in clear results so that the progress of the process is externally visible?
Supportability	To what extent can CASE tools be used to support the process activities?
Acceptability	Is the defined process acceptable to and usable by the engineers responsible for producing the software product?
Reliability	Is the process designed in such a way that process errors are avoided or trapped before they result in product errors?
Robustness	Can the process continue in spite of unexpected problems?
Maintainability	Can the process evolve to reflect changing organisational requirements or identified process improvements?
Rapidity	How fast can the process of delivering a system from a given specification be completed?

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## Process improvement stages

- **Process measurement**
  - Attributes of the process are measured
    - These are a baseline for assessing improvements
- **Process analysis**
  - The process is assessed
  - Bottlenecks and weaknesses are identified
- **Process change**
  - Changes to the process that have been identified during the analysis are introduced

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## Quality factors

- For large projects with 'average' capabilities, the **development process** determines product quality
- For small projects, the **capabilities of the developers** form the main determinant
- The **development technology** is particularly significant for small projects
- In all cases, if an unrealistic **schedule** is imposed then product quality will suffer

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## Process choice

- Process used should depend on the **type of product** which is being developed
  - For large systems, management is usually the principal problem so you need a strictly managed process;
  - For smaller systems, more informality is possible
- There is no uniformly applicable process which should be standardised within an organisation
  - High costs may be incurred if you force an inappropriate process on a development team
  - Inappropriate methods can also increase costs and lead to reduced quality



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## Process measurement

- Wherever possible, **quantitative process data** should be collected
  - However, where organisations do not have clearly defined process standards this is very difficult as you don't know what to measure
    - A process may have to be defined before any measurement is possible
- **Process measurements** should be used to assess **process improvements**
  - But it is **not** process measurements that should drive the improvements
    - The improvement driver should be the **organizational objectives**



## Classes of process measurement

- **Time** taken for process activities to be completed
  - E.g.: Calendar time or effort to complete an activity or process
- **Resources** required for processes or activities
  - E.g.: Total effort in person-days
- **Number of occurrences** of a particular event
  - E.g.: Number of defects discovered

## Goal-Question-Metric paradigm

- **Goals**
  - What is the organisation trying to achieve?
    - The objective of process improvement is to satisfy these goals
- **Questions**
  - Questions about areas of uncertainty related to the goals
    - You need process knowledge to derive these
- **Metrics**
  - Measurements to be collected to answer the questions

## Process analysis and modelling – 1

- **Process analysis**
  - The **study** of existing processes to understand the relationships between parts of the process and to compare them with other processes
- **Process modelling**
  - The **documentation** of a process which records the tasks, the roles and the entities used;
  - Process models may be presented from different perspectives

## Process analysis and modelling – 2

- Study an existing process to understand its activities
- Produce an abstract model of the process
  - You should normally represent this graphically
  - Several different views may be required
    - E.g.: activities, deliverables, etc.
- Analyse model to uncover process problems
  - This involves discussing process activities with stakeholders and discovering problems and possible process changes

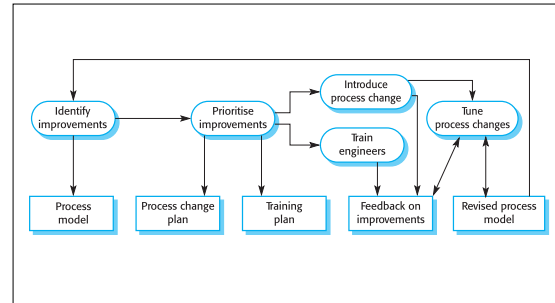
## Process analysis techniques

- Reference to published process models and process standards
  - Always best to start process analysis with an existing model
    - People then may extend and change this
- Questionnaires and interviews
  - Must be carefully designed
    - Participants may tell you what they think you want to hear
- Ethnographic analysis
  - Involves assimilating process knowledge by observation
  - Best for in-depth analysis of process fragments rather than for whole-process understanding

## Process change

- Involves making modifications to existing processes
- This may involve
  - Introducing new practices, methods or processes
  - Changing the ordering of process activities
  - Introducing or removing deliverables
  - Introducing new roles or responsibilities
- Change should be driven by **measurable goals**

## The process change process



## Process change stages

- Improvement identification
- Improvement prioritization
- Process change introduction
- Process change training
- Change tuning

## Key points

- Process improvement involves process analysis, standardisation, measurement and change
- Processes can be classified as informal, managed, methodical and improving
  - This classification can be used to identify process tool support
- The process improvement cycle involves process measurement, process analysis and process change
- Process measurement should be used to answer specific process questions, based on organisational improvement goals