Software Maintenance: A Tutorial

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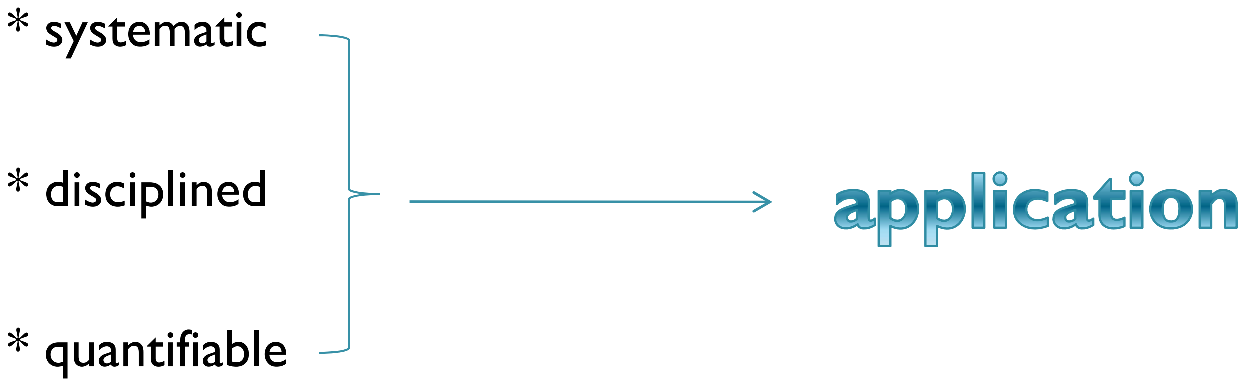
2. Overview of the tutorial

1. Introduction to the **field of software engineering**

2. **Software maintenance**

3. The Software Engineering Field

Software Engineering – IEEE's definition



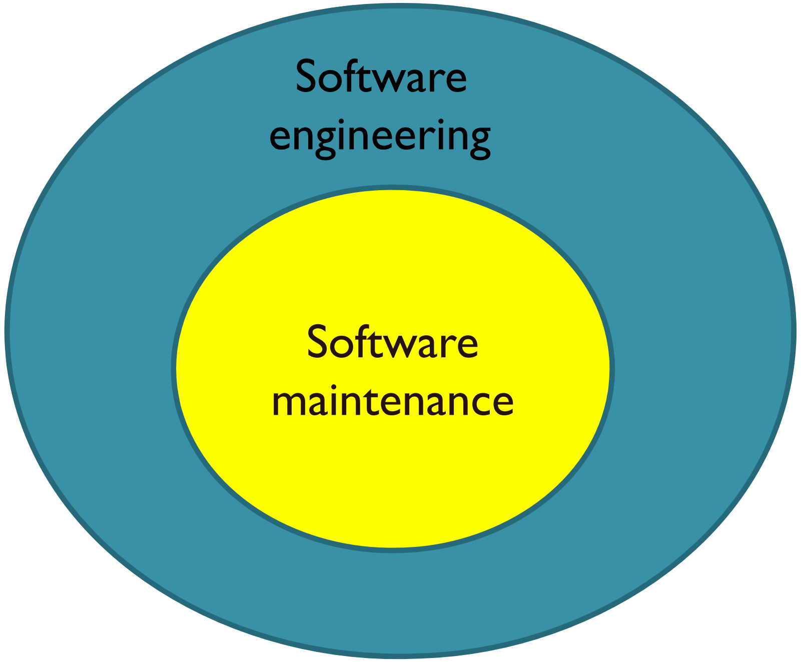
* systematic

* disciplined

* quantifiable

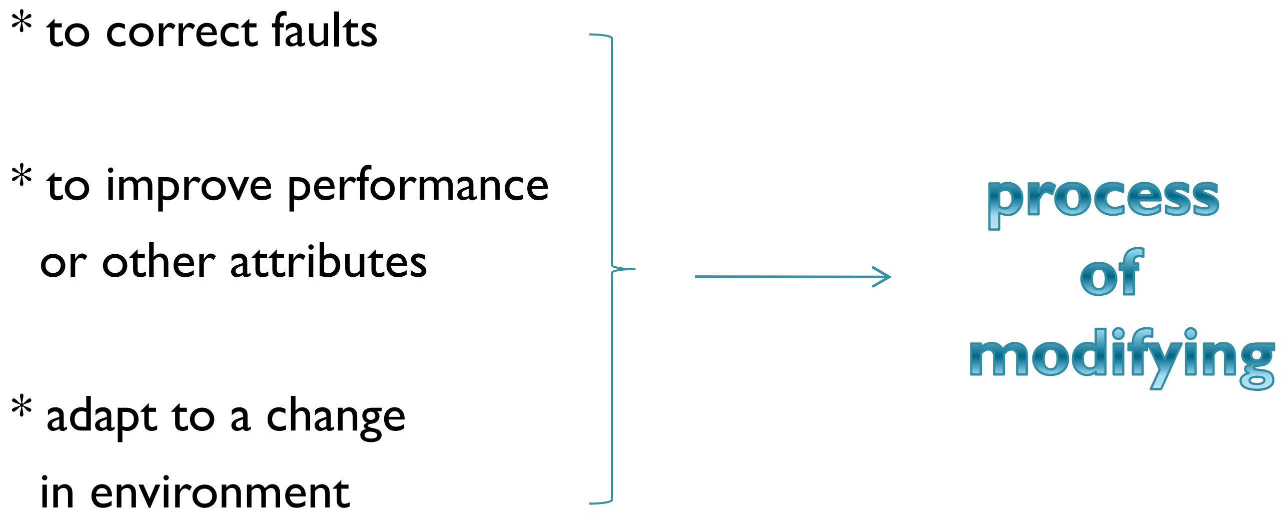
application

The relationship between Software Engineering and Software Maintenance



4. Software Maintenance

Software Maintenance – IEEE's definition



* to correct faults

* to improve performance
or other attributes

* adapt to a change
in environment

process
of
modifying

4. Software Maintenance

The History of Software Maintenance

* Early decades – Writing new programs

* In 1960s and 1970s – Significant activity

* In 1980s – Constraining new design

* In 1990s – Satisfying a large part of the business needs

5. Types of Software Maintenance

* **Perfective maintenance** – user requests

* **Adaptive maintenance** – OS, hardware, DMBS

* **Corrective maintenance** – identification and remove of faults

* **Preventative maintenance** – make software more maintainable

5. Types of Software Maintenance

* User-requested changes

* Reliability

* Maintainability

More **expensive** to carry out

5. Types of Software Maintenance

Lehman’s expression

1. Continuing change

2. Increasing complexity

6. Problems of Software Maintenance

Three Problems

1.The alignment with organizational objectives

: the view at senior management level

6. Problems of Software Maintenance

Three Problems

2. Process issues

: Requiring many additional activities

(ex) – help desk

Assessing cost of making the change

Impact analysis(software and organization)

Associated need for system comprehension

Regression test

6. Problems of Software Maintenance

Three Problems

3. Technical issues

: a number of technical challenges

(ex) – full test suite

Regression test

6. Problems of Software Maintenance

Other Problems

- lower status compared with software development

6. Problems of Software Maintenance

Next..

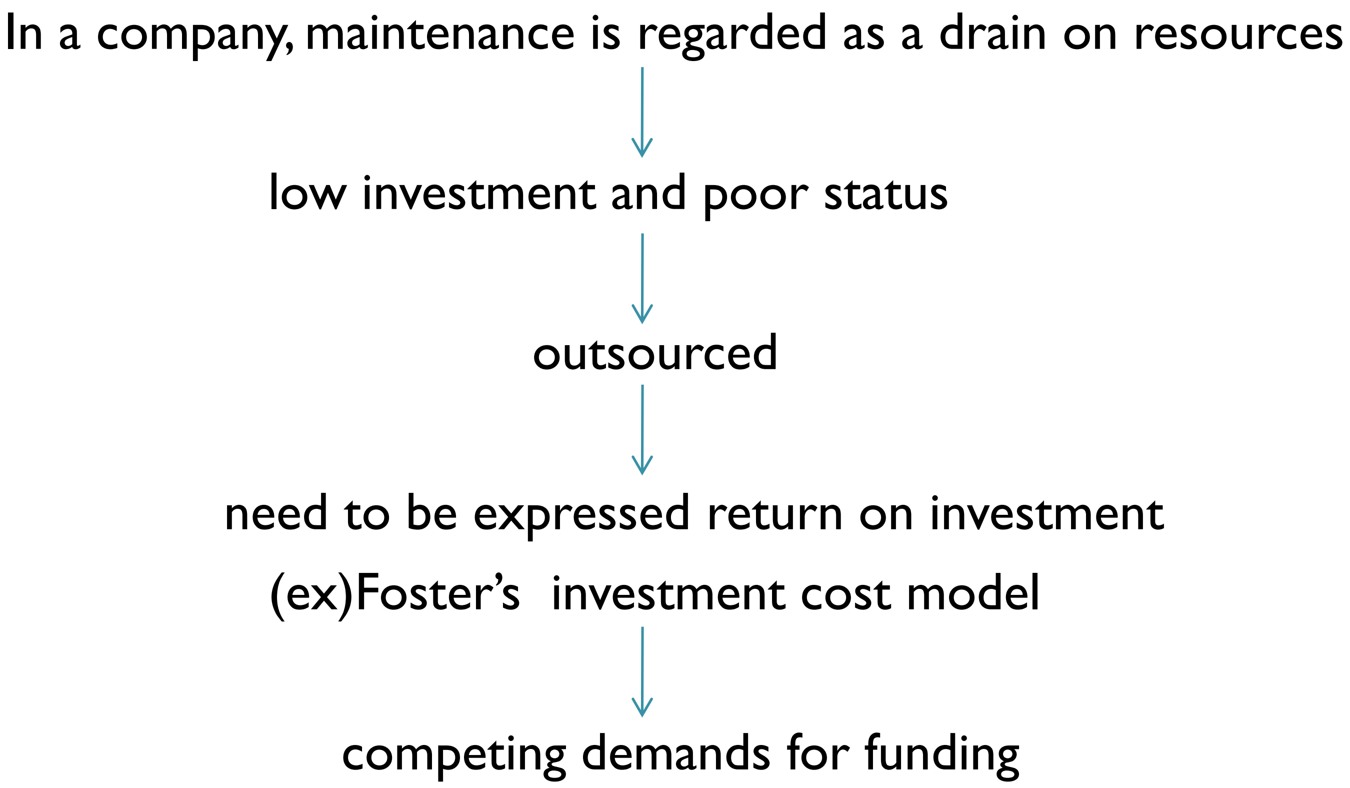
- Focusing on **solutions** rather than **problems**

- 1. Software maintenance and the organization
  2. Process models
  3. Technical Issues

successful maintenance

IEEE
Standard
for software
maintenance
process

7. Organizational Aspects of Maintenance



In a company, maintenance is regarded as a drain on resources

↓

low investment and poor status

↓

outsourced

↓

need to be expressed return on investment

(ex)Foster's investment cost model

↓

competing demands for funding

8. Process Models

To promote the establishment of better understood process

↓

Standard for software maintenance

8. Process Models

The model based on standard

* Approach of accepting change requests

* Implementing the changes

* Testing

* Forming new software releases

Like
software maintenance

10. Technical Aspects of Software Maintenance

Technique for software maintenance

* Similar to that needed for initial development

(ex) configuration management, version control

* **CASE tools**

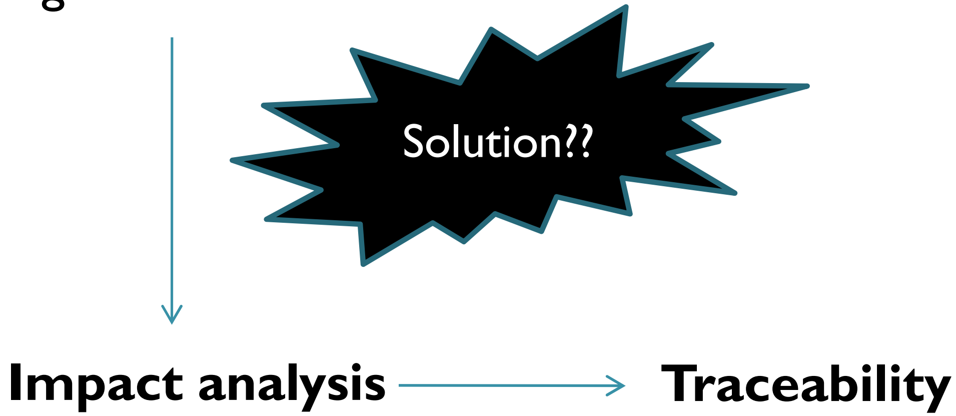
* **Impact analysis**

10. Technical Aspects of Software Maintenance

Software maintenance's major difficulty

* **Ripple effect**(Domino phenomenon)

: must be investigated



Solution??

Impact analysis → **Traceability**

11. Legacy Systems

Legacy Systems' Problems

* very **old**

* heavily **modified**

Core of the business!

* very **large**

* based on old **technology** and **languages**

* and so on..

11. Legacy Systems

Reverse Engineering’s definition

* to identify the system’s component, relationships

* to create representations of the system

11. Legacy Systems

Reversing Engineering's Properties

* Most fruitful approach to **legacy systems**

* doesn't change the system or result in a new one
(ex) – call graphs, control flow graphs

* help in program comprehension
(ex) – procedure structures, control flow