Process Improvements

Success Factors for the Company

- ◆ Highest productivity
  - ❏ Produce most value (optimal level)
  - ❏ Full throttle (no need to wait)
- ◆ Optimal quality (quality/cost balance)
- ◆ Hitting the market window
- ◆ Fulfilling the users needs
  - ❏ Understanding
  - ❏ Foreseeing
- ◆ Good solutions
  - ❏ Functional
  - ❏ Trustworthy
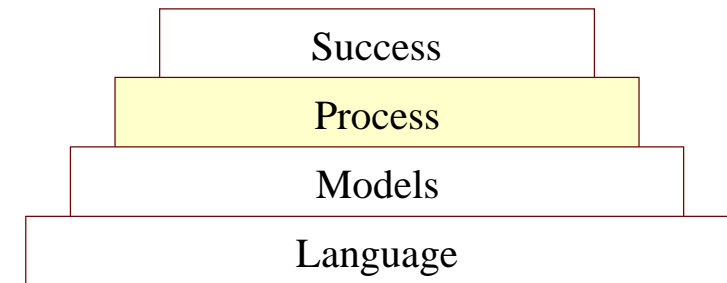 - ❏ Hype factor

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The Company's Capability

- ◆ The success factors are what we compete with.
- ◆ Competition increases 20% per year.
- ◆ We must get 20% better per year to survive.

How?

To be best...

| Success |
| Process |
| Models |
| Language |

… we must continuously improve our ways of working.

Improve by….

◆ … better adherence to the process
◆ … better processes

The Process

A way to transform an input to an output.
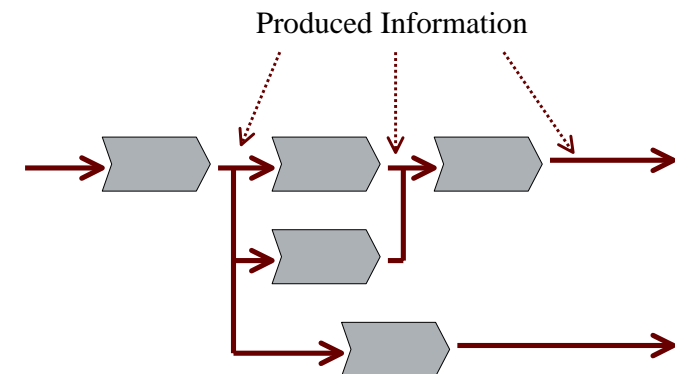
Input   Output

$$Process = \frac{Output}{Input}$$

Processes

◆ Are we following a established processes?
◆ Do everyone know how the process works?
◆ Have we defined it anywhere. (E.g. written in a document.)

Process Architecture

Produced Information

Produced Information

- Which information do we choose to produce?
- Why?
- Can we know that this is the best choice?
- Can we know that we use the best way to produce it?

Improvement

Organized approaches to improve the ways we work.

- PSP
- CMM
- ISO9000
- Cleanroom engineering
- ...

PSP

- A process for individual developers
  - ❑ Well-defined process steps (*scripts*)
  - ❑ Forms
  - ❑ Instruction for filling in the forms
  - ❑ Standards
- Framework for analysis
- Tool for individual process improvements
  - Developers find more errors
  - Developers improve their estimations
  - Developers improve productivity
- ➤ Improvements at "no" costs

PSP Levels

PSP3
Cyclic development

PSP2
Code reviews
Design reviews

PSP2.1
Design templates

PSP1
Size estimating
Test report

PSP1.1
Task planning
Schedule planning

PSP0
Current process
Time recording
Defect recording
Defect type standard

PSP0.1
Coding standard
Size measurement
Process improvement
proposal (PIP)
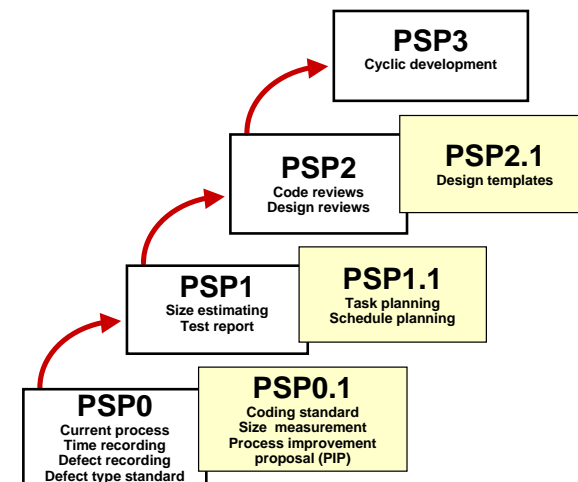
CMM

- **C**apability **M**aturity **M**odel
- Developed by SEI 1986 (for the DoD)
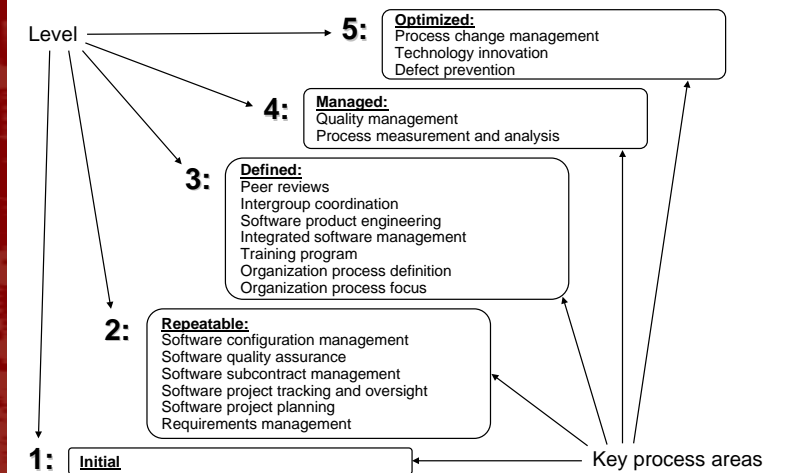- Five maturity levels
  - Initial (ad-hoc process)
  - Repeatable (repeatable process)
  - Defined (well-defined, documented process)
  - Managed (predictable process)
  - Optimised (continuous process improvements)
- ➡ The DoD requires level 3 from all contractors

CMM Overview

Level

5: Optimized:
Process change management
Technology innovation
Defect prevention

4: Managed:
Quality management
Process measurement and analysis

3: Defined:
Peer reviews
Intergroup coordination
Software product engineering
Integrated software management
Training program
Organization process definition
Organization process focus

2: Repeatable:
Software configuration management
Software quality assurance
Software subcontract management
Software project tracking and oversight
Software project planning
Requirements management

1: Initial

Key process areas

CMM Level 2, simplified

- Keep track of requirements and their changes.
- Have a plan on how to go ahead, all the way.
- Keep track of where you are and what is left.
- The big boss decides if quality is good enough.
- Make sure you don't mess up your files.

CMM Level 3, simplified

- The company is aware of its processes characteristics and works to improve them.
- The processes are described somewhere and known by the employees. Deviations are recorded.
- The company makes sure employees get proper training in everything they need.
- Projects actually use the defined processes.
- Employees agree on project goals and cooperate to achieve them.
- Project makes sure that employees review each others work to get rid of faults.

CMM Level 4, simplified

- ◆ The company measures objectively how well the processes works.
- ◆ Quality is measured and activities makes sure that quality goals are reached.

CMM Level 5, simplified

- ◆ The company learns how to avoid faults.
- ◆ The company evaluates and introduces new technology in a planned way to improve quality and productivity.
- ◆ All employees take part in continuous improvement of the processes.

CMM Results

CMM level	Development time	Person months	Faults detected during dev.	Faults delivered and installed	Total dev. costs in US$
1	29,8	593,5	1.348	61	5.440.000
2	18,5	143,0	328	12	1.311.000
3	15,2	79,5	182	7	728.000
4	12,5	42,8	97	5	392.000
5	9,0	16,0	37	1	146.000

Model predictions for the development of a 200.000 LOC data processing product (1993), see [Schach 97].

People CMM Overview

Level

5: Optimized:
Continuous workforce innovation
Coaching
Personal competency development

4: Managed:
Organizational performance alignment
Organizational competency management
Team-based practices
Mentoring

3: Defined:
Participatory culture
Competency-based-practices
Career development
Competency development
Workforce planning
Knowledge and skill analysis

2: Repeatable:
Compensation
Training
Performance management
Staffing
Communication
Work environment

1: Initial

Key process areas