Software Process Improvement

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Software Process Improvement

- There is a constant demand from industry for a cheaper, better software
  - With budget and schedule constraints
- Many software companies have turned to software process improvement (SPI)
  - Goals: improve their processes, reduce costs, accelerate development, and improve software quality

Short History

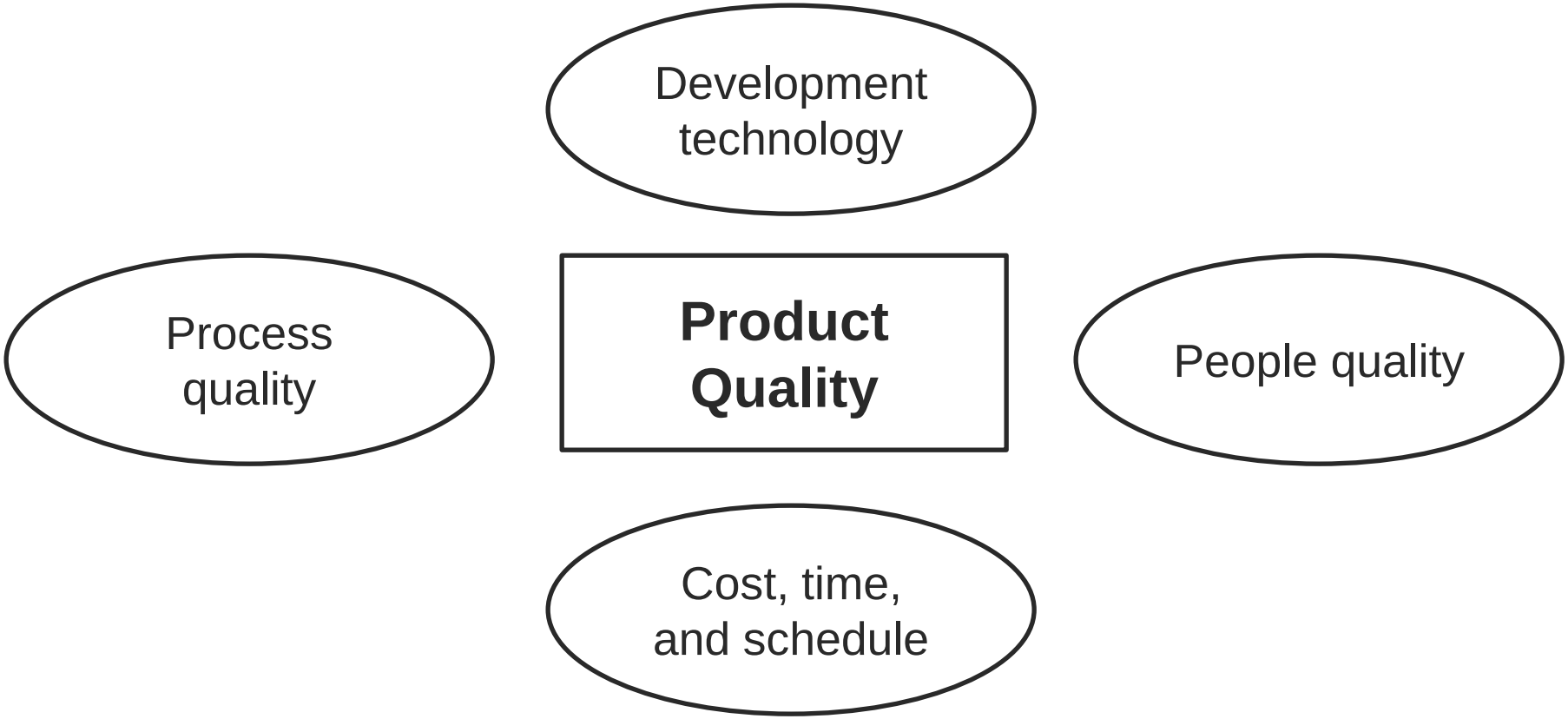
- W.E. Deming worked with Japanese industry to improve software process
  - Japanese industry is known for quality of processes and resulting products
- He introduced the idea of statistical quality control (80’s)
  - The goal is to reduce defects by statistically analysing the process

Process-based Software Quality

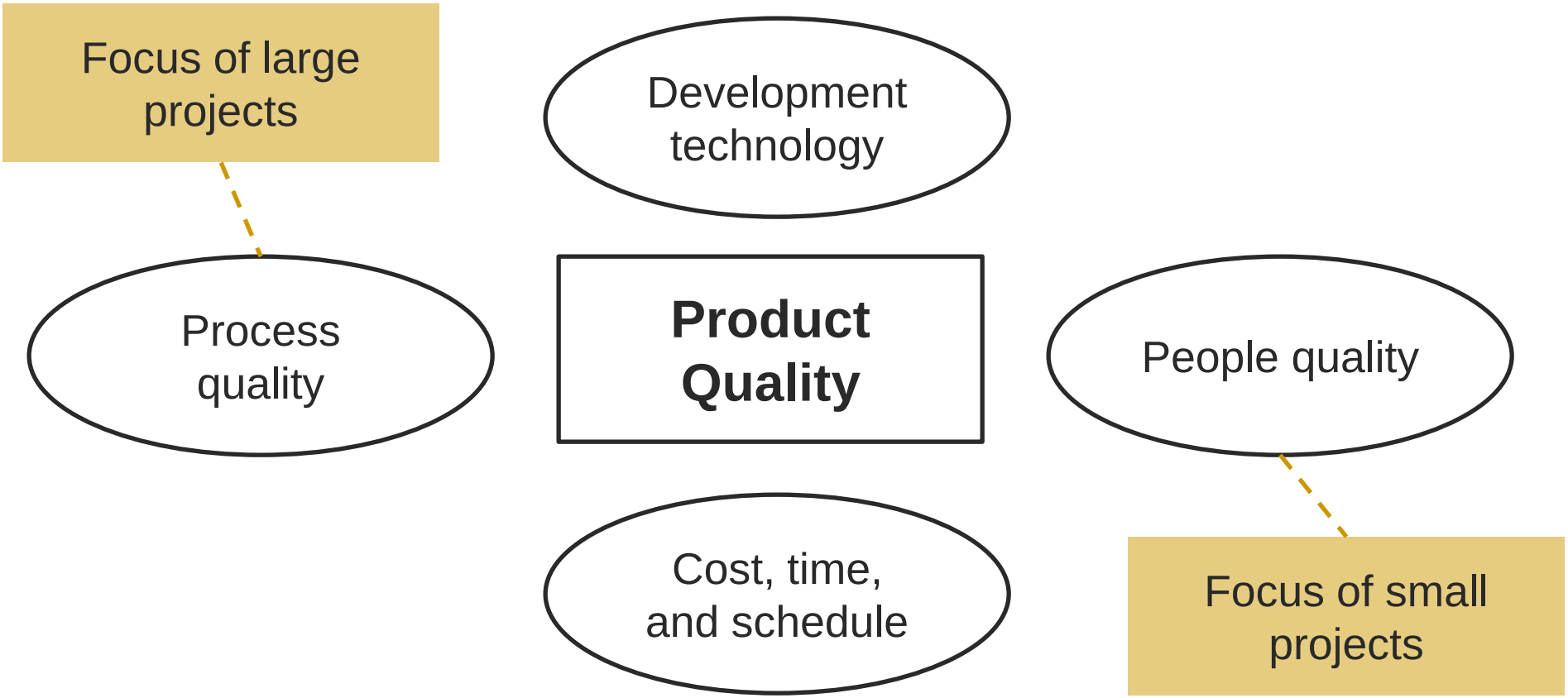
Quality of Process and Product

- In general, the quality of a product is influenced by the quality of the process
- However, there is a very complex and poorly understood relationship between software processes and product quality
  - Individual skills and experience are important in software development
  - External factors, such as novelty of an application, may impact on product quality

Software Product Quality



Software Product Quality



Large and Small Projects

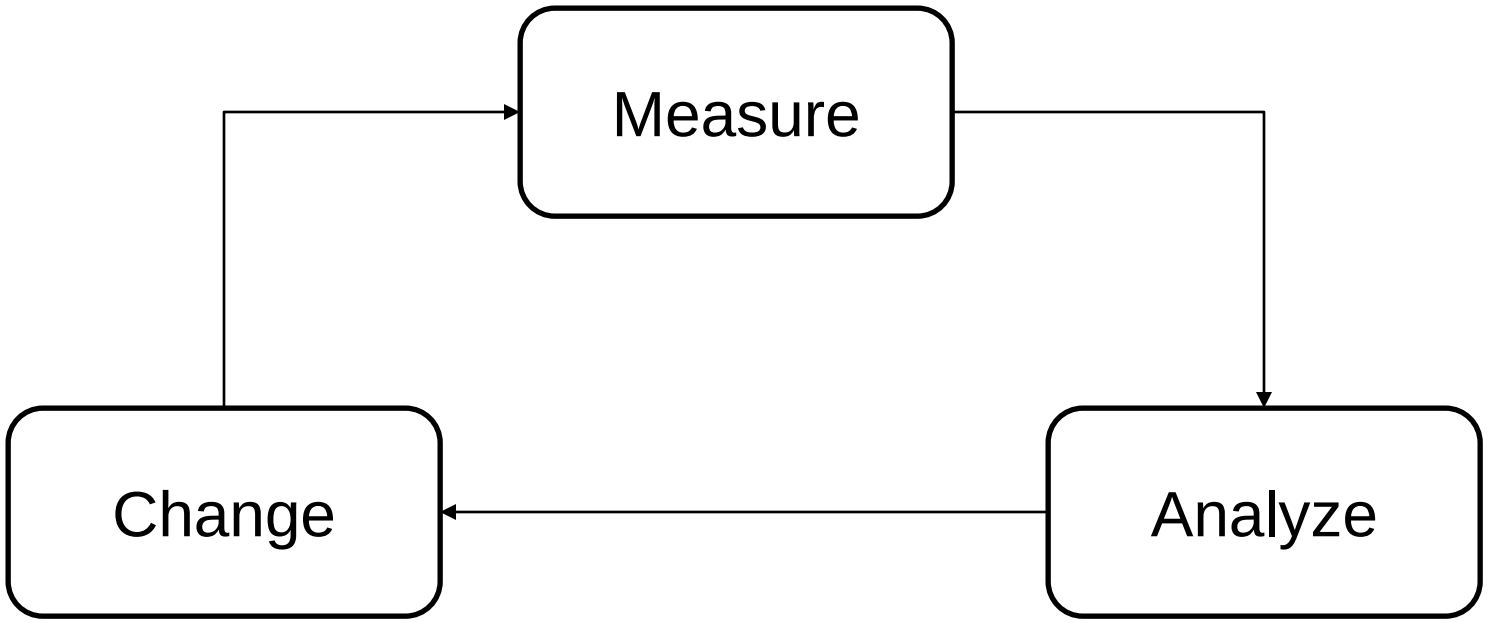
- Large Projects
  - Distributed and volatile teams
  - Major problems with integration and communication
- Small Projects
  - Easier to have a small and high skilled team
  - People are more important than the software process (agile manifesto)

General Improvement Stages

General Stages

- Three cyclical stages define a general process improvement framework
  - *Process measurement*: measure one or more attributes of the process
  - *Process analysis*: based on measurement, identify the process weaknesses
  - *Process change*: propose changes to address the identified weaknesses

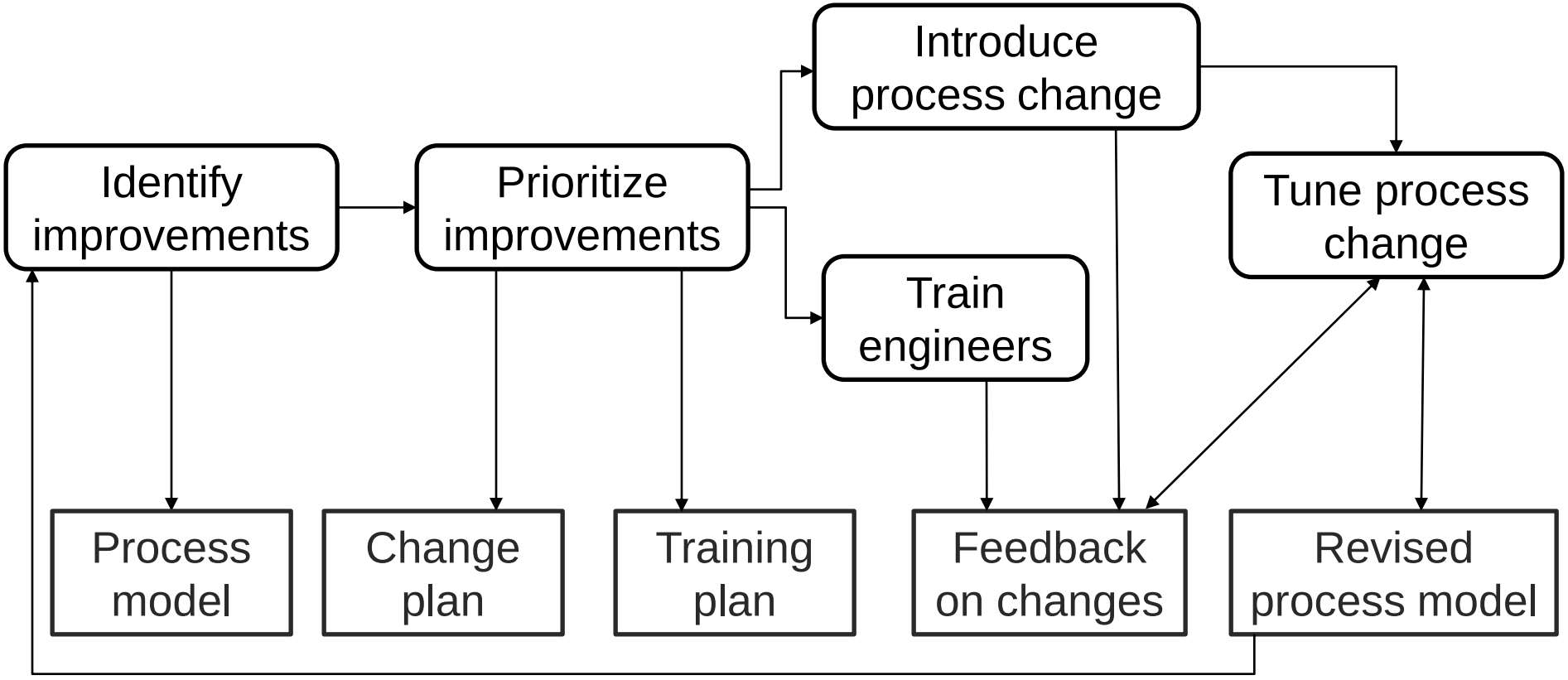
Process Improvement Stages



Process Change

- Modifications in the process include
  - Introducing new practices
  - New methods or tools
  - Changing ordering of activities
  - Creating new roles and responsibilities
  - Improving communication, etc.
- After changes have been implemented, you have to assess their effectiveness

Process Change Activities



Identify Improvements

- It requires analyzing the results of the Process Analysis stage
- This activity aims to identify
  - Product quality problems
  - Schedule bottlenecks
  - Cost inefficiencies

Prioritization and Change

- Prioritize Improvements
  - Many possible changes may have been identified
  - You have to consider the cost and impact of each change
- Introduce Process Changes
  - Introducing new procedures, methods, tools, etc.

Training and Tuning

- Train Engineers
  - Engineers need to understand the changes
  - Discuss the value of the process changes
- Tune Process Change
  - Changes may not be completely effective
  - You need to discover and address minor problems

Bibliography

- Ian Sommerville. **Software Engineering**, 10th Edition. Pearson Education, 2016.
  - Chapter 2: Section 2.4
  - Chapter 26 (online)