6. Usability of Design Patterns

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11-0.1, 11/12/11

1)Using and writing patterns in companies
2)Successes of patterns

Literature (To Be Read)

- K. Beck, J. Coplien, R. Crocker, L. Dominick, G. Meszaros, F. Paulisch, J. Vlissides. Industrial Experience with Design Patterns Int. Conference on Software Engineering (ICSE) 1996
  - Beck First Class Software (consultancy)
  - G. Meszaros, BNR/NorTel (telecom)
  - Paulish & Dominick, Siemens
  - Crocker Mottorola
  - Coplien ATT
  - Vlissides IBM

6.1 Using and Writing Patterns in Companies

Patterns May Be Domain-Specific

- Telecom domain (Coplien, Meszeros)
  - Process and organizational patterns are very useful in larger teams
- Business domain
  - Banking
  - Adminstrative systems
- Problem domain vs solution domain
  - Patterns can be written for both of them
- How to come to these domain-specific patterns?
  - Solution: **Experience Factory**
    - Write them yourself, for your own company
    - Building a catalogue of domain-specific or company-specific design patterns
    - And record them in an Experience Factory

Pattern Writing is Hard

- Mesczeros identified three groups of pattern users in his company
  - People who are able to describe them (**pattern gurus**)
  - People who can recognize but not describe them (**pattern users**)
  - People who are oblivous about patterns (**pattern ignorants**)
- He observed that only a small percentage of people can write patterns
  - The distinction may arise from people focussing on different things:
  - On similarities as opposed to differences between things
- Pattern writing is an iterative process and should be *pattern mining*

Pattern Mining

- Patterns should be mined in interviews of domain specialists (Paulisch, Coplien)
- The **pattern miner** (pattern writer) should refine and polish the pattern
  - And then go out to the domain experts again
  - About 3 interviews are necessary (Paulisch)
- Sanity check:
  - The prototypical patterns should be presented to other groups that have not been involved in the process
- Paulisch used hypertext to publish the pattern catalogue

Pattern Miners

- Pattern miners *consult* product groups, i.e., are company-internal consultants
- It can be quite useful if pattern miners are not involved in the product groups,
  - since unconscious knowledge might exist in the group that can better be reflected from an outsider
  - They often do not *know* what they have done or cannot explain it
  - They often contradict each other in their assertions
  - Product group members are often so busy with their day-to-day work, that pattern mining does not work for them
  - They also need to learn how to write patterns
- Pattern miners must *ask*, *listen* and *abstract*
- Often, they reengineer the design decisions and their rationale, because they have been forgotten

Good Questions for Pattern Mining (Vlissides)

- Why did you design this way? [Rationale, Motivation]
- Is what seems to be complexity here really worthwhile? [Consequences]
- What are your assumptions? [Rationale]
- Why are your assumptions realistic?
- What happens 6 months from now when I need new feature F? [extensibility, variability]

- Hint: Ask these questions yourself, if you write a pattern

Success Criteria for Pattern Catalogues

- Domain-specific pattern catalogues seem to be successful if
  - they consist of a small catalogue of low-level patterns (may be idioms)
    - If the catalogue has more than 30 entries, tool support is desired
    - (The GOF catalogue has about 30 entries!)
  - there is a single architectural (coarse-grain) pattern that describes the structure of the products
    - Such as pipe-and-filter style
- A pattern catalogue needs a *pattern mentor*
  - That promotes the patterns within an organization
  - A master of the Experience Factory
  - This helps the organization to accept patterns

Success Criteria for Single Patterns

- They must be compact
- They must be mined from working designs
- They must be mined from “best practice”
- They need not be object-oriented

6.2 Successes of Design Patterns

Design Patterns Improve Communication

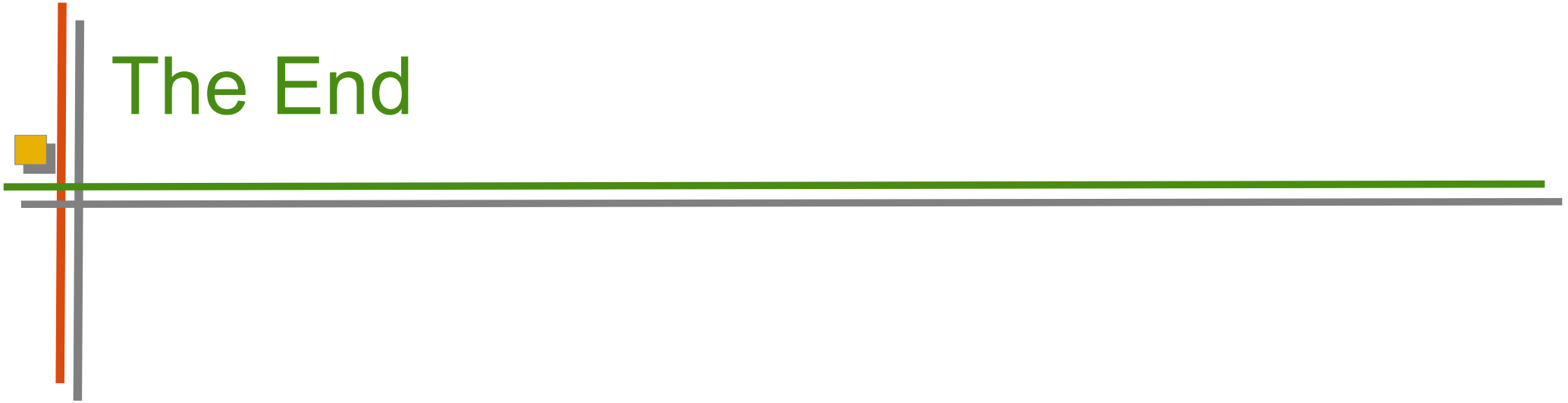
- .... everyone experiences....

... But Measuring Impact is Hard

- Communication is clearly simplified
- Programmers can master more complex designs
- Vlissides reports that he started to require that consulted groups read GOF
  - After this, the groups had a much better understanding of what was going on
- Engineers forget that they talk in patterns, after they have learned about them
  - Write me an email in 2 years from now, if you remember this statement
  - I will put you up on the courses home page
  - ... and may be invite you as a guest lecturer

Mining Forgotten Requirements

- A pattern can help to discover *forgotten requirements*
  - A design has a rationale from the requirements
  - If a pattern can be matched only partially in a design, this may indicate that some requirements were uncovered
  - Hence, reiterate on the requirements document
- Example:
  - A Mediator is discovered in a design
  - Usually, a Mediator enables dynamic reconfiguration of communication
  - If this requirement has not been fixed, discuss with the client whether he needs it
  - If not, you may simplify the design
  - If yes, you argue for more money :-)



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