

6. Usability of Design Patterns

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



6.1 Using and Writing Patterns in Companies



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 Motorola
 - Coplien ATT
 - Vlissides IBM



Patterns May Be Domain-Specific

- ▶ Telecom domain (Coplien, Meszaros)
 - Process and organizational patterns are very useful in larger teams
- ▶ Business domain
 - Banking
 - Administrative 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 oblivious 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 :-)



The End

