

LOG6306 : Patrons pour la compréhension de programme

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1 Identification

Student's name -

Date of the reading note: -

First, last name(s) of the author(s): Cheng Zhang and David Budgen

Title of the article: What Do We Know about the Effectiveness of Software Design Pattern?

Publication: IEEE Transactions on Software Engineering, Vol. 38, no. 5, pp. 1213-31, Oct 2012

2 Article

Keywords: Pattern, Software Design Patterns, Evidence-based, Mapping Study, Empirical Study

Concepts and definitions:

- Design Pattern: Patterns explain a problem that occurs repeatedly in the environment and the solution of that problem in a way that you are able to use it many more times.
- Empirical Study: Conducting a research experience or observation to produce knowledge and understanding on a subject, which is often supported by statistical analysis.
- Systematic Literature Review (SLR): This is the core tool of the evidence-based paradigm which arrange a framework to extract data, executing analysis and systematically searching the literature.
- Mapping Study: Provide an overview for the research area to see whether or not a research evidence is on a topic then arranging an indication for evidence quality.

- Evidence-based Paradigm: Finding and collecting all of the accessible empirical data on a topic in which the results of this secondary study can reduce any bias that may happen in the results from a primary studies.
- Knowledge Schema: It integrates a pattern that describes the problem characteristics and also the form of the equivalent solution, hence consists of the concept of labels for plans.

Summary: This paper have performed a mapping study to help recognizing primary studies that evaluate different aspects of design patterns to settle which issues and forms have been studied along with for which reasons.

Software design patterns might be consider as classifying expert knowledge schemas collect from software design practice.The primitive idea of this work was searching studies that examined the use of design patterns. Authors followed 3 steps to find the evidence, Selecting all papers about design pattern, then categorized them by their goal and selecting papers that arrange empirical data about pattern usage.

By conducting the three rounds of searching(electronic search, manual search and snowball search), the total of 611 papers were determined then a scheme of classifying was adopted by using the themes to explain their focus. Theses themes then assigned on the categories explained on patterns web site. In the empirical category 219 papers formed the core set of review process then the inclusion/exclusion phase(on the basis of title,abstract and reading full paper) was performed following SLR guidelines. Finally the 13 experiment reports contained a scope of experimental form for the formal studies(FS) coding from FS1 to FS13.

To examine whether other forms of empirical study may describe different conclusions about individual patterns, they reviewed papers that had noted "experience" throughout inclusion/exclusion. The form contains 3 questions. If specific codes were produced for categorizing an element, then it is mentioned, otherwise, entries were a text. The main limitation impacting all the papers was the scarcity of a clear connection between the experiences and conclusions shown by the authors, hence the only papers with enough information producing about the link between cause and effect were retained. To distinguish this set of papers, they were referred as O1 to O7 (observational)to describe different characteristics in the experience papers.

The main goal was to identifying any patterns that were studied utilizing more than one form and the results illustrated that three patterns have the most mix of study type,namely, Composite, Visitor and Observer.

Research contributions: This mapping study has indicated that design patterns, in spite of their significant role in software engineering, have been restricted empirical evaluation and much of it has just been studying patterns indirectly.

The obtained result shows that patterns do not help novices learn about design but it has some qualitative support as a help to maintenance. Design patterns can effectively produce "Knowledge schema" role, still the different form and scope that provides shows that blind usage of patterns is senseless.

3 Analysis

Quality:

General organization:	Language and style:	Technique:	Bibliography:
<input type="checkbox"/> Very good;	<input type="checkbox"/> Very good;	<input type="checkbox"/> Very good;	<input type="checkbox"/> Very good;
<input checked="" type="checkbox"/> Good;	<input checked="" type="checkbox"/> Good;	<input checked="" type="checkbox"/> Good;	<input checked="" type="checkbox"/> Good;
<input type="checkbox"/> Medium;	<input type="checkbox"/> Medium;	<input type="checkbox"/> Medium;	<input type="checkbox"/> Medium;
<input type="checkbox"/> Bad;	<input type="checkbox"/> Bad;	<input type="checkbox"/> Bad;	<input type="checkbox"/> Bad;
<input type="checkbox"/> Very bad.	<input type="checkbox"/> Very bad.	<input type="checkbox"/> Very bad;	<input type="checkbox"/> Very bad;
		<input type="checkbox"/> N/A.	

Forces of the message:

- Authors conduct a mapping study searching the literature to clarify appropriate primary studies for the use of 23 patterns catalogued by the GoF.
- This work perform some researches that found 611 candidate papers and by assigning inclusion/exclusion criteria just a set of 10 papers remained which explained 11 cases of formal experimental studies for OO design patterns. The authors then augmented their analysis with using 7 experience reports which explain the usage of patterns with less observational forms.
- This work identify a small group of experience reports that arranged rationally well-documented observations for individual patterns that may utilize to enlarge the analysis.

Weaknesses of the message:

- Only two research groups provided most of the experimental papers. First group in Karlsruhe preferred within-subject studies and the second one in Hong Kong with preference for between-subject studies.
- The impact of patterns on development has just learned for a few patterns, because the experimental studies of object oriented patterns required both variation and perception, rather

than development of a novel structure.

- For both selection and classification goals, they should consider that the abstract arranged were really inadequate because of improperly excluded any material.
- The quality of the present studies turned out inadequate to be able to recognize any compact guidelines for utilizing or not utilizing particular patterns, hence more design-centric evidence is required.

Future directions: In this paper a set of empirical studies arrange a valuable contribution to us for being aware of when and how design pattern can best be used, as well as exhibiting important limitations.

For future studies by performing a set of case studies with experienced practitioners and covering development to maintenance and prioritize a small number of more complicated patterns such as chiefly Visitor, the gap between present experimental and reviewed studies can be most efficiently spanned.

This study shows that currently the required knowledge for having evidence-based opinion of the time of applying individual patterns is out of hand, hence future work should recommend a useful framework. Producing a baseline against that further work can be placed to best effect is a key task for mapping study.

Other important articles:

- Using a follow-on survey to investigate why use of the visitor, singleton and facade patterns is controversial
Proceedings of the ACM-IEEE international symposium on Empirical software engineering and measurement
pp. 79-88, 2012
- Assessment of design patterns during software re engineering: lessons learned from a large commercial project
Fifth European Conference on Software Maintenance and Reengineering
pp. 77-84, 2001
- A Controlled Experiment Comparing the Maintainability of Programs Designed with and without Design PatternsA Replication in a Real Programming Environment
Journal of Empirical Software Engineering
no. 3, pp. 149-95, 2004