NEW PERSPECTIVES IN SOFTWARE ENGINEERING (CIMPS 2021).

Abstract. Context: The addition of patterns to the Conceptual Model of Information Systems would allow to optimize the quality level of computer systems. In spite of the fact that there are several studies on the application of patterns in the different phases of software development, since the beginning, these studies have focused on programming rather than analysis and design. **Objective:** The aim of this study is to carry out a systematic mapping of the field of Software Engineering in an attempt to characterize state-of-the-art patterns that can be applied to Conceptual Modelling, identifying gaps and opportunities for future research. **Method:** A systematic mapping of existing literature on the topic was performed in order to identify the most important studies on the field. These were then classified and analyzed according to different criteria. We also carried out a subjective assessment highlighting the most important ideas and experiences identified. **Results:** As a result of systematic mapping, there were found 26 primary studies of interest published between January 1995 and December 2019. In general, these studies are associated with software modelling methodologies which provide empirical evidence of the impact of the use of patterns. **Conclusions:** In this preliminary study, it was possible to identify the most relevant pattern types that were applied in the Conceptual Modelling of Information Systems. Integrating these types of patterns with existing analysis and design tools is also an important challenge that needs to be addressed in this area.

Keywords: Patterns, Conceptual Modelling, Software Engineering, SML, EBSE.

References

1. I. Sommerville, *Ingeniería de Software*. 2011.
2. C. Wohlin, Fr. Runeson, M. Host, M. Ohlsson, B. Mr. Regnell, *Experimentation in software engineering.* 2012.
3. M. Genero Bocco, M., J.A. Cross-Lemus., M.G. Piattini Velthuis, *Métodos de*

investigación en ingeniería de software. 2014.

4. B. Kitchenham, D. Budgen, Fr. Brereton, *Using mapping studies as the basis for further research - A participant-observer case study*.2011.

5. C. Alexander, S. Ishikawa, M. Silverstein, M. Jacobson, I. Fiksdahl-King, and S. Angel, *A Pattern Language*. 1977.

6. C. Alexander, *The Timeless Way of Building*. 1979.

7. E. Gamma, R. Helm, R. Johnson, and J. Vlissides, *Design Patterns – Elements of Reusable Object-Oriented Software*. 1994.

8. B. Boehm and V. R. Basili, "Software Defect Reduction Top 10 List," *Computer*. 2001.

9. R. Pressman, "Ingeniería del Software. Un enfoque práctico," en *Ingeniería del Software.*, 2005.

10. K. Beck *et al.*, "Industrial experience with design patterns," in *Proceedings of the 18th International Conference on Software Engineering*, 1996.

11. J. O. Coplien and N. B. Harrison, "Organizational Patterns of Agile Software Development - Obsah," *Incose*, 2004.

12. M. Mahemoff and L. J. Johnston, "Usability pattern languages: The 'Language' aspect," in *Human-computer interaction: INTERACT'01: IFIP TC. 13 International Conference on Human-Computer Interaction, 9th-13th July 2001, Tokyo, Japan*, 2001.

13. D. Martin and I. Sommerville, "Patterns of Cooperative Interaction: Linking Ethnomethodology and Design," *ACM Trans. Comput. Interact.*, 2004.

14. S. P. Berczuk and B. Appleton, *Software Configuration Management Patterns: Effective Teamwork, Practical Integration*. 2003.

15. M. Shaw and D. Garlan, *Software Architecture: Perspectives on an Emerging Discipline*. 1996.

16. F. Buschmann, R. Meunier, H. Rohnert, P. Sommerlad, and P. Stal, *Pattern-oriented software architecture: A system of patterns*. 1996.

17. F. Buschmann, K. Henney, and D. C. Schmidt, *Pattern Oriented Software Architecture Volume 5: On Patterns and Pattern Languages*. 2007.

18. H.E. Eriksson & M. Penker, *Business Modeling with UML: Business Patterns at Work*. 2000.

19. C. Potts, *Using Schematic Scenarios to Understand User Needs*. 1995.

20. M. Fowler, *Analysis Patterns: Reusable Object Models*. 1995.

21. F. Moscato, N. Mazzocca, V. Vittorini, M. Magaldi, *Workflow Pattern Analysis in Web Services Orchestration: The BPEL4WS Example*. 2005.

22. G. Grossmann, M. Scherfl, M. Stumptner, *Exploiting Semantics of Inter-Process Dependencies to Instantiate Predefined Integration Patterns.* 2006.

23. S. Alamro, H. Dogan, K. Phalp, *Forming Enterprise Recruitment Pattern Based on Problem-Oriented Conceptual Model*. 2015.

24. M.M. Marciszack, J.C. Moreno, C.E. Sánchez, O.C. Medina, A.F. Delgado, C.S. Castro, *Patrones en la construcción del Modelo Conceptual para sistemas de información*. 2018.

25. O.C. Medina, M.M. Marciszack, M.A. Groppo, *Aproximación Descriptiva a las Buenas Prácticas de Gobierno Electrónico y a su incorporación en el Modelado Conceptual de Sitios Web Públicos de Argentina*. 2018.

26. O.C. Medina, M.M. Marciszack, M.A. Groppo, *Un Modelo de Análisis para aplicación de patrones de Buenas Prácticas en el Modelado Conceptual de Gobierno Electrónico*. 2018.

27. O.C. Medina, M.M. Marciszack, M.A. Groppo, P*roposal for the patterns definition based on good practices for the electronic government systems development*. 2018.

28. CIDS Centro de Investigación, Desarrollo y Transferencia de Sistemas de Información. Retrieved June 1, 2021, from http://www.cid.frc.utn.edu.ar.