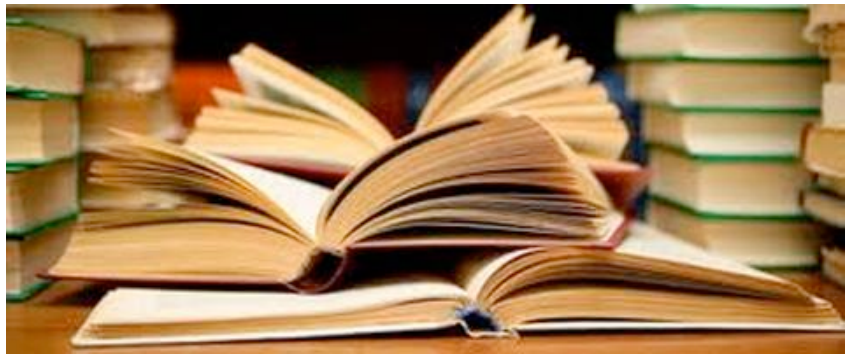




Literature reviews

Empirical Studies of Agile Software Development: A Systematic Review

Topics in IT - 22 March 2017

Torgeir Dingsøyr
Chief Scientist, SINTEF Digital
Adjunct Professor, IDI, NTNU

My background

- PhD: Knowledge management in software consulting companies
- Done action research, case studies, literature review, systematic reviews, experiments as researcher at SINTEF
- Taught introductory course for PhD candidates at IDI, research methods in computer science
- Now: Project course for Bachelor students

NTNU
Norwegian University of Science and Technology

Agenda

- The literature review
- My literature reviews
- Review of Empirical Studies on Agile Software Development
- The resulting review
- The process of writing the review
- What to consider when starting a review project

NTNU
Norwegian University of Science and Technology

Literature review

"A review of prior, relevant literature is an essential feature of any academic project. An effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed"

— Webster and Watson, "Analyzing the past to prepare for the future: Writing a literature review", MIS Quarterly vol. 26, no. 2, 2002.

My literature reviews

Dingsøyr, T., Fægri, T. E., Dybå, T., Haugset, B., & Lindsjørn, Y. (2016). Team Performance in Software Development: Research Results versus Agile Principles. *IEEE Software, 33*(4), 106-110. doi: 10.1109/MS.2016.100

Dybå, T. and Dingsøyr, T., "What Do We Know about Agile Software Development?," *IEEE Software,* vol. 26, pp. 6-9, 2009.

Dingsøyr, T., Bjørnson, F. O., and Schull, F., "What Do We Know about Knowledge Management? Practical Implications for Software Engineering," *IEEE Software,* vol. 26, pp. 100-103, 2009.

Dybå, T. and Dingsøyr, T., "Empirical Studies of Agile Software Development: A Systematic Review," *Information and Software Technology,* vol. 50, pp. 833-859, 2008.

Bjørnson, F. O. and Dingsøyr, T., "Knowledge Management in Software Engineering: A Systematic Review of Studied Concepts and Research Methods Used," *Information and Software Technology,* vol. 50, pp. 1055-1168, 2008.

Dingsøyr, T. and Conradi, R., "A Survey of Case Studies of the Use of Knowledge Management in Software Engineering," *International Journal of Software Engineering and Knowledge Engineering,* vol. 12, pp. 391 - 414, 2002.

Reviews on Agile Software Development; Status 2005

Erickson, J., Lyytinen, K., and Siau, K., "Agile Modeling, Agile Software Development, and Extreme Programming: The State of Research," *Journal of Database Management,* vol. 16, pp. 88 - 100, 2005.

Cohen, D., Lindvall, M., and Costa, P., "An Introduction to Agile Methods," in *Advances in Computers, Advances in Software Engineering*. vol. 62, M. V. Zelkowitz, Ed., ed Amsterdam: Elsevier, 2004.

Abrahamsson, P., Salo, O., Ronkainen, J., and Warsta, J., "Agile software development methods: Review and analysis," VTT Technical report2002.

Available online at www.sciencedirect.com
ScienceDirect
Information and Software Technology 50 (2008) 833–859
INFORMATION AND SOFTWARE TECHNOLOGY
www.elsevier.com/locate/infsof

Empirical studies of agile software development: A systematic review

Tore Dybå *, Torgeir Dingsøyr

SINTEF ICT, S.P. Andersens. 15B, NO-7465 Trondheim, Norway

Received 22 October 2007; received in revised form 22 January 2008; accepted 24 January 2008
Available online 2 February 2008

Abstract

Agile software development represents a major departure from traditional, plan-based approaches to software engineering. A systematic review of empirical studies of agile software development up to and including 2005 was conducted. The search strategy identified 1996 studies, of which 36 were identified as empirical studies. The studies were grouped into four themes: introduction and adoption, human and social factors, perceptions on agile methods, and comparative studies. The review investigates what is currently known about the benefits and limitations of, and the strength of evidence for, agile methods. Implications for research and practice are presented. The main implication for research is a need for more and better empirical studies of agile software development within a common research agenda. For the industrial readership, the review provides a map of findings, according to topic, that can be compared for relevance to their own settings and situations.

Keywords: Empirical software engineering; Evidence-based software engineering; Systematic review; Research synthesis; Agile software development; XP; Extreme programming; Scrum

Contents

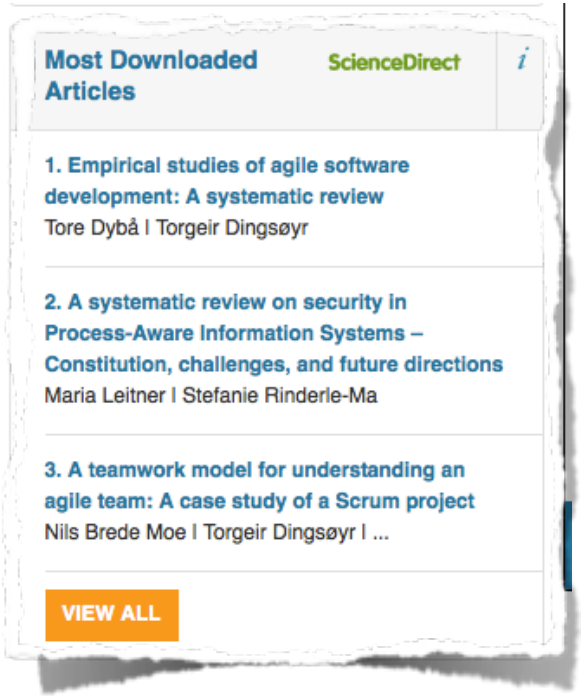
* Corresponding author. Tel.: +47 73 59 29 47; fax: +47 73 59 29 77.
E-mail addresses: tore.dyba@sintef.no (T. Dybå), torgeir.dingsoyr@sintef.no (T. Dingsøyr).

0950-5849/$ - see front matter © 2008 Elsevier B.V. All rights reserved.
doi:10.1016/j.infsof.2008.01.006

Review: Agile Software development

- The most cited article on agile software development [1]
- About 1200 citations on Google Scholar
- Most cited article in *Information and Software Technology* (ever)
- 7th most cited article in software engineering (of 70.000 publications) [2]
- Most downloaded article in journal almost all months since 2008

- Why?
  - Emerging research field
  - Good timing
  - Thorough review
  - Early systematic review
  - Published in top-tier journal



[1] Chuang, S.-W., Luor, T., and Lu, H.-P., "Assessment of institutions, scholars, and contributions on agile software development (2001–2012)," *Journal of Systems and Software,* vol. 93, pp. 84-101, 2014.
[2] Garousi, V. and Fernandes, J. M., "Highly-cited papers in software engineering: The top-100," *Information and Software Technology*, vol. 71, pp. 108-128, 3// 2016.

The Review: Structure

- Introduction
- Background
- Review method
- Results
  - Overview of studies
  - Research methods
  - Methodological quality
  - Introduction and adoption of agile development methods
  - Human and social factors
  - Perceptions on agile methods
  - Comparative studies
- Discussion
- Conclusion
- References

The Review: Process

- Identifying the theme
- Setting scope
- Conducting the review
  - Literature search
  - Inclusion and exclusion
  - Quality assessment
  - Analysis of articles
    - Qualitative studies
    - Quantitative studies
  - What has not been researched? Gaps?
    - Implications for theory
    - Implications for practice
  - Reporting the findings
  - Proofreading
  - Submitting to a journal
  - Writing for different audiences
- After acceptance

What to consider

- Available resources
- Previous reviews; the need; potential contribution
- Overlap in studies?
- An up-to-date review?
- Critique; of field and own work
- Level; journal, conference paper or for thesis?
- Single author or larger project?
- Type of review: “Normal” review versus “Systematic review”