



EVIDENCES OF BENEFITS AND LIMITATIONS OF AGILE SOFTWARE DEVELOPMENT

This briefing reports evidence on what is currently known about the benefits and limitations of agile software development based on scientific evidence from a systematic review.

MAIN FINDINGS

INTRODUCTION AND ADOPTION OF AGILE METHODS

- XP was found to be difficult to introduce in a complex organization, yet seemingly easy in other types of organizations.
- It is likely that the ease with which XP can be introduced will depend on how interwoven software development is with the other functions of the organization.
- Benefits were reported in the following areas: customer collaboration, work processes for handling defects, learning in pair programming, thinking ahead for management, focusing on current work for engineers, and estimation.
- The lean development technique did not work well for one of the teams trying it out, pair programming was seen as inefficient, and some claimed that XP works best with experienced development teams.
- A further limitation of agile methods that was reported by one of the studies, as the lack of attention to design and architectural issues.

HUMAN AND SOCIAL FACTORS OF AGILE METHODS

- A benefit of XP was that it thrived in radically different environments; in organizations that varied from having a hierarchical structure to little or no central control.
- Customer involvement and physical settings varied greatly for the successful XP teams studied. It seems to be possible to adopt XP in various organizational settings.
- Studies of XP indicate that successful teams manage to balance a high level of individual autonomy with a high level of team autonomy and corporate responsibility.
- They have faith in their own abilities and preserve the quality of their working lives.
- Good interpersonal skills and trust were found to be important characteristic for a successful XP team.

PERCEPTIONS ON AGILE METHODS

- Studies report that customers are satisfied with the opportunities for feedback and responding to changes that agile methods promote.

- However, the role of onsite customer was reported to be stressful and cannot be sustained for a long period.
- Developers are mostly satisfied with agile methods.
- Companies that use XP have reported that their employees are more satisfied with their job and that they are more satisfied with the product they work with.
- There were mixed findings regarding the effectiveness of pair programming and several developers regard it as an exhausting practice, because it requires heavy concentration.
- University students perceive agile methods as providing them with relevant training for their future work and believe that these methods improve the productivity in teams. However, they reported that pair programming was difficult when there was a large skill differential between the members of the pairs. In addition, testfirst development was reported to be difficult for many students.

COMPARISONS BETWEEN AGILE METHODS AND ALTERNATIVES

- Some studies suggest benefits in projects that use agile methods because changes are incorporated more easily and business value is demonstrated more efficiently.
- Results show that it is also possible to combine agile project management with overall traditional principles, such as the stagegate project management model.
- A limitation that was mentioned is that team members are less interchangeable in agile teams, which has consequences for how projects are managed.
- With respect to the productivity of agile and traditional teams, three of the four comparative studies that address this issue found that using XP results in increased productivity in terms of LOC/h.
- However, none of these studies had an appropriate recruitment strategy to ensure an unbiased comparison.
- There are also findings from several of the noncomparative studies that indicate that the subjects themselves believe that the productivity increases with the use of agile methods.
- Most studies report increased code quality when agile methods are used, but, again, none of these studies had an appropriate recruitment strategy to ensure an unbiased comparison.
- The size of the end product seems not to be correlated with the method of development used. Different studies have reported larger, smaller, and equal sizes of end product for traditional versus agile methods.
- The effect on work practices and job satisfaction of using agile and traditional methods has not been established conclusively.

Keywords:

Agile software development
XP
Extreme programming
Scrum

Who is this briefing for?

Software engineers practitioners who want to make decisions about agile software development based on scientific evidence.

Where the findings come from?

All findings of this briefing were extracted from the systematic review conducted by Dyba and Dingsøyr.

What is a systematic review?

cin.ufpe.br/eseg/slrs

What is included in this briefing?

The main findings of the original systematic review.

What is not included in this briefing?

Additional information not presented in the original systematic review.

Detailed descriptions about the studies analysed in the original systematic review.

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ORIGINAL SYSTEMATIC REVIEW REFERENCE

Tore Dybå and Torgeir Dingsøyr. 2008. Empirical studies of agile software development: A systematic review. Inf. Softw. Technol. 50, 910 (August 2008), 833859. DOI=<http://dx.doi.org/10.1016/j.infsof.2008.01.006>