Gregor Engels, Regina Hebig, Matthias Tichy (Hrsg.): SE 2023,
Lecture Notes in Informatics (LNI), Gesellschaft für Informatik, Bonn 2023 127

Preventing technical debt with the TAP framework for Technical Debt Aware Management

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Abstract:

The talk is based on an article published in the Information and Software Technology journal in 2022 [Wi22].

Technical Debt (TD) is a metaphor for technical problems that are not visible to users and customers but hinder developers in their work, making future changes more difficult. TD is often incurred due to tight project deadlines. Furthermore, project management usually focuses on customer benefits and pays less attention to their IT systems' internal quality. We present a framework focusing on TD prevention and repayment in agile-managed projects. The framework was developed and applied in an IT unit of a publishing house. It includes a feasible method for TD prevention despite tight timelines by making TD repayment part of project management. We evaluated this framework in a comparative case study based on ticket statistics and two structured surveys targeting team members and IT managers. In the observed IT unit, the TAP framework raises awareness for the incurrence of TD. Decisions to incur TD are intentional, and TD is repaid timelier. Unintentional TD incurred by unconscious decisions is prevented. Furthermore, better communication and better planning of the project pipeline can be observed.

Keywords: Technical Debt; Project Management; Technical Debt Awareness; Technical Debt Repayment; Technical Debt Prevention; Technical Debt Backlog

1 Summary

Technical Debt (TD) is "*a collection of design or implementation constructs that are expedient in the short term, but set up a technical context that can make future changes more costly or impossible*" [Av16]. In a technical metaphor for financial debt, a sub-optimal implementation or design is interpreted as debt. The initially named cause for TD incurrence is tight project deadlines, as described in the paper of Cunningham [Cu92]. TD is a serious problem in practice, often caused by tight deadlines due to fast-changing requirements in the age of digitalization.

TD prevention is stated as the preferable option for TD management by many practitioners. In frequent situations, however, a sub-optimal solution that can be implemented more

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quickly must be chosen. To avoid unnecessary TD, a developing team should consciously and intentionally choose the optimal or sub-optimal solution.

In our paper, we present and evaluate the TAP framework for **T**echnical debt **A**ware **P**roject management, which was developed by an IT unit of a German publishing company. The TAP framework divides all tasks that are not visible to the customer into four categories: maintenance tasks, maintenance projects, deconstruction, and technical debt. The developers create corresponding backlog tickets. Particularly the TD tickets are a novel approach. TD tickets comprise only intentional TD, the incurrence of which is discussed and consciously accepted during an estimation meeting. TD tickets are associated with the project they were incurred in and must be repaid as part of the project after meeting the set deadline. This makes the project managers and their team responsible for the TD accumulated during their project, which should decrease their willingness to incur TD.

To evaluate the success of this approach, we analyzed ticket statistics and conducted two surveys addressing team members and IT managers, respectively. To enhance the validity of the results, the surveys were filled out by the observed team and a comparison team that did not use the framework. The research questions targeted the practicality of the framework's application and the TAP framework's perceived effects, benefits, and drawbacks. The evaluation shows that (1) the communication between different stakeholders is optimized, (2) the overall awareness for TD is raised, (3) the decisions on TD incurrence are made consciously and intentionally, (4) TD incurred by unintentional and unconscious decisions can be prevented, and (5) TD incurred by intentional and conscious decisions due to tight deadlines are repaid timely. Finally, the survey of IT managers points to optimized project pipeline planning and improved customer communication and understanding.

2 Data Availability

The additional material is publicly available at Zenodo (`https://doi.org/10.5281/zenodo.5788222`) and includes the survey results, a list of analyzed tickets, calculation details, and a case study protocol.

References

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[Wi22] Wiese, M.; Rachow, P.; Riebisch, M.; Schwarze, J.: Preventing technical debt with the TAP framework for Technical Debt Aware Management. Information and Software Technology 148/106926, 2022, ISSN: 0950-5849, URL: `https://doi.org/10.1016/j.infsof.2022.106926`.