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The Impact of Modern Code Reviews on Human Aspects

This briefing reports scientific evidence of 7 studies that investigate the impact of modern code reviews on *teams' understanding of the code, peer impression, knowledge dissemination, motivation to contribute and developers' attitude*.

FINDINGS

The impact of code reviews on teams' understanding of the code under review.

An interview study [IH1], found that code reviews help to improve the team's understanding of the code under review. The results indicate that code review may be particularly useful for new teams that often have a high degree of specialization, but have not yet developed the associated meta-knowledge. In addition, code review may be a valuable addition to pair programming particularly for newly established teams [IH1].

Similarly, a survey of Microsoft developers and study of email threads found that developers find code review dialogs useful for understanding design rationales [IH3].

Another survey of Microsoft developers and open source developers [IH4] found code reviews to help in knowledge dissemination. This was also found in a survey of reviewers that code review promotes collective code ownership [IH2].

What we think: The evidence is based on interviews and surveys of developers. In general, developers perceive code reviews to be useful in improving the understanding of the code and the design rationales. Code reviews can be used as a mentoring tool to make the onboarding of new team members into the team. It can also help in spreading the knowledge to more people so that the knowledge is not lost when someone is unavailable. The dialogue in the code reviews can be used as an explanation for changes in the code and design.

The impact of code reviews on peer impression in terms of trust, reliability, perception of expertise, and friendship.

A survey of open source contributors [IH7] found that there is a high level of trust, reliability, and friendship between open source software projects' peers who have participated in code review for some time. Peer code review helped most in building a perception of expertise between code review partners [IH7]. Similarly another survey of Microsoft developers and open source developers [IH4] found that the quality of the code submitted for review helps reviewers form impressions about their teammates, which can influence future collaborations. The survey also indicated that there was a large amount of similarity between the Microsoft and open source software projects' respondents. However, open source software projects' respondents view code review as a more important method of impression formation than the Microsoft respondents because they lack traditional interactions such as face-to-face work and social interactions.

What we think: There is evidence from open source projects and Microsoft projects on forming peer impressions from code reviews. Peer impression formation might be necessary when the developers are unknown, which is the case mostly in open source projects. When negative impressions are formed, it is important to take actions to improve the reliability and trustworthiness.

The impact of code reviews on developers's attitude and motivation to contribute.

An analysis of two years of code reviews in QT projects showed that review feedback has an impact on contributors becoming long-term contributors [IH5]. Specific feedback such as "Incomplete fix" and "Suboptimal solution" might encourage contributors to continue to work in open source sofwtare projects [IH5].

Similarly, a very large study of 100 open source projects found that negative feedback has a significant impact on developers' attitude [IH6]. Developers might not contribute again after receiving negative feedback and this impact increases with the size of the project [IH6].

What we think: This evidence is more applicable to an open source environment where contributions are voluntary. However, providing constructive feedback is important to keep the developers motivated in all types of projects.

Who is this briefing for?

Software engineering practitioners who want to make decisions about code reviews based on scientific evidence.

Where the findings come from?

All findings of this briefing were extracted from the research studies identified through a literature review.

What is included in this briefing?

Summaries of research papers in the form of takeaways for the practitioners.

To access other evidence briefings on code reviews:

https://rethought.se/modern-code-reviews/

For additional information about code review research contact -

deepika.badampudi@bth.se
michael.unterkalmsteiner@bth.se
ricardo.britto@bth.se

References

ID	Title	Link
IH1	Peer-Based Quality Assurance In Information Systems Development: A Transactive Memory Perspective	http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.690.9209&rep=rep1&type=pdf
IH2	On The Understanding Of Programs With Continuous Code Reviews	Please contact one of the authors of this evidence briefing to receive a copy of this paper.
IH3	Can Peer Code Reviews Be Exploited For Later Information Needs?	https://www.researchgate.net/profile/Andrew_Sutherland7/publication/224503798_Can_Peer_Code_Reviews_be_Exploited_for_Later_Information_Needs/links/0c96052cb455b27399000000/Can-Peer-Code-Reviews-be-Exploited-for-Later-Information-Needs.pdf
IH4	Process Aspects And Social Dynamics Of Contemporary Code Review: Insights From Open Source Development And Industrial Practice At Microsoft	Please contact one of the authors of this evidence briefing to receive a copy of this paper.
IH5	Do Review Feedbacks Influence To A Contributor'S Time Spent On Oss Projects?	Please contact one of the authors of this evidence briefing to receive a copy of this paper.
IH6	Analyzing The Impact Of Feedback In Github On The Software Developer'S Mood	https://www.researchgate.net/profile/Mateus_Santos11/publication/326295010_Analyzing_The_Impact_Of_Feedback_In_GitHub_On_The_Software_Developer's_Mood/links/5bc9dc21299bf17a1c5ff634/Analyzing-The-Impact-Of-Feedback-In-GitHub-On-The-Software-Developers-Mood.pdf
IH7	Impact Of Peer Code Review On Peer Impression Formation: A Survey	http://amiangshu.com/papers/Bosu-ESEM-2013.pdf