

Using Key Performance Indicators to Compare Software-Development Processes

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Abstract: Extended abstract of our paper published at the Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE) 2020 [Sü20].

Keywords: Key performance indicators; Quality assurance; Monitoring; Experience report

Large software-developing organizations are often structured around various organizational units that cooperate in software-development processes. While the specialization of such units yields advantages, it can be challenging to keep an overview of complex development processes, to maintain transparency, comparability as well as traceability, and to steer business decisions—especially, when the units use varying metrics to measure and monitor a specific part of the whole development process. To tackle such challenges, key performance indicators are measured to compare an organization’s performance with respect to specified objectives throughout whole development processes. Still, the structure of large organizations and the corresponding challenges also pose difficulties while introducing key performance indicators.

In our paper, we describe an experience report on establishing key performance indicators at Volkswagen Financial Services AG (VWFS), a large international organization in the finance sector with over 16 000 employees. We report how we introduced and use key performance indicators at VWFS to facilitate end-to-end analyses of software-development processes, pointing out their value, challenges we faced, and recommendations for other organizations. For this purpose, we present our light-weight, technology-independent methodology that allowed us to receive fast feedback from our stakeholders. While applying this methodology, we customized one existing, defined three new, and built on seven established key performance indicators to address the requirements of VWFS. To define the scope of our methodology and the key performance indicators we used, we closely collaborated with our stakeholders to define six criteria we aimed to improve: transparency, intelligibility, coverage, quantification, comparability, and communication. For each criterion, we report the impact we experienced from establishing the key performance indicators, and

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demonstrate five examples for concrete improvements we derived. Finally, we share six lessons learned to help other organizations and practitioners: (1) choose proper tooling and understand the limitations of using off-the-shelf solutions; (2) define and customize the key performance indicators they need to measure; (3) to get feedback from stakeholders, communicate benefits, and, thereby, facilitate acceptance; (4) understand why and how to incorporate stakeholders to create benefits for different target groups; (5) evaluate the value and usability of their key performance indicators; and (6) to be aware of, as well as control, costs and benefits of key performance indicators in a business case. By establishing our defined set of key performance indicators, we successfully improved with respect to the criteria defined. The success of these improvements has been underpinned by our ability to better compare the quality of software releases as well as affirmative feedback from users, managers, and other stakeholders.

Building on our experiences, we recently intensified our use of key performance indicators to compare different software-development processes, methods, and technologies during a shift to a more agile paradigm—aiming to measure and assess the benefits of this transformation. In this context, we have transformed the teamwork for developing special-business software from the predominant distributed, interacting organizational units to multidisciplinary, cross-functional agile teams. Up until now, we have measured and reported our defined set of key performance indicators across all relevant organizational units for more than one year, covering multiple software releases that provide a reliable data basis for comparing conventional waterfall and mixed-method development to the newly established agile paradigm. We focus particularly on comparing timely requirements, test progress, as well as software quality before (i.e., defect analysis of internal deliverables) and after (i.e., incident analysis and delivery speed of external deliverables on productive systems) releases. By investigating our data on the agile transformation, we conclude that we have to measure additional properties that help us capture agile-specific practices and values, such as multidisciplinary, cross-functional teamwork with fast feedback. For this purpose, we are currently analyzing what properties we need to measure, how to translate these into key performance indicators, and how to make them comparable between different software-development processes. Consequently, we argue that valuable future work is to study what key performance indicators we established are relevant for agile processes, how to adjust and introduce new key performance indicators for agile processes, how to ensure comparability, and what differences we experience between measuring as well as using different software-development processes, methods, and technologies.

Bibliography

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