

# Improving Software Delivery and Operational Performance with DORA (DevOps Research and Assessment) Best Practices

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## Introduction

With the world digitalizing at a faster pace than ever before, demands for swift and stable software delivery are rising alongside it. New and refined development methodologies and practices must be implemented in order to keep up. Software development methodologies have been evolving since the 1950s, with the pace only increasing in the last few years. From the rigid waterfall model to the dynamic agile development and introduction of DevOps, there have been many different iterations and attempts at finding the best way of developing software. While there is no universal solution that would perfectly fit all scenarios, there likely exist some practices that can improve the software delivery and operational (SDO) performance in all organizations. This is exactly what a team at the DevOps Research and Assessment (DORA) is looking into (Forsgren et al., 2018).

This thesis aims to introduce the capabilities identified by the DORA initiative to improve the SDO performance of teams in an organization. Through research findings it also explores possible difficulties, drawbacks, and advantages that implementing these best practices might have in a real-life scenario.

## DevOps Research and Assessment

DevOps Research and Assessment (DORA) initiative started when a team of researchers wondered what are the characteristics of development teams that impact software delivery and operational performance. In 2014 Nicole Forsgren, Gene Kim and Jez Humble started working on the annual State of DevOps report. They developed a valid and reliable way to measure SDO performance and surveyed teams from many different companies and industries. Additionally, they looked at which capabilities predicted SDO performance. Today, the DORA initiative is a part of Google Cloud with a

mission to find new insights and help to improve the SDO performance of software development teams all over the world. There are two key tools that DORA framework provides: metrics and capabilities (Humble, 2019).

## DORA metrics

For measuring performance of a software development team the researchers identified four key metrics. They are divided into two categories: throughput and stability. Each metric also has four levels of performance success, from low to elite performer. These metrics are often used by management because they provide an easy-to-understand and comparable way of measuring performance. The key metrics in the throughput category are deployment frequency (how often does the team deploy code to production) and lead time for changes (how long does it take to go from code committed to code successfully running in production). In the stability category the key metrics are time to restore service (how long does it take to restore services when an incident occurs) and change failure rate (what percentage of changes to production result in degraded service) (Forsgren et al., 2019).

## DORA capabilities

However, more crucial for improving the SDO performance are the 27 capabilities that were identified by the researchers as important for every team and organization. The capabilities are divided by content into four categories: technical, process, measurement and cultural. Regardless of the division (within the categories or across them) the capabilities are intertwined with each other and can rarely be looked at in isolation. The list of these capabilities is updated annually with every publication of the State of DevOps report.

Technical capabilities are those that are most closely related to the technological and engineering practices carried out by the team or organization. They are version control, trunk-based development, continuous integration, deployment automation, continuous testing, continuous delivery, loosely coupled architecture, cloud infrastructure, test data management, empowering teams to choose tools, shifting left on security, database change management, and code maintainability.

Process capabilities relate to the organizational practices that affect the processes in the development lifecycle.

They are team experimentation, streamlining change approval, customer feedback, visibility of work in the value stream, and working in small batches.

Measurement capabilities relate to practices that teams and management uses to track activity performance in the organization. They are monitoring and observability, work in process limits, visual management capability, monitoring systems to inform business decisions, and proactive failure notification.

Cultural capabilities relate to the organizational or team-level practices that affect every-day lives of developers. They are transformational leadership, learning culture, Westrum organizational culture, and job satisfaction (DORA, 2022).

### **Research methodologies**

The main part of the thesis research focused on assessing whether and in what way DORA best practices can help to improve the SDO performance of development teams in one of the biggest IT companies in the world. With the use of various research methodologies, such as expert interviews, observations, comparison, and literature review data was gathered and analyzed in a way that yielded the most information regarding the topic. Firstly, the current state of software development practices was observed, and available internal literature and tools used were analyzed and compared. After that, through expert interviews an eagle-eye perspective was established and possible implementation inhibitors were discussed. Finally, all the gathered information was consolidated, and implementation suggestions developed.

### **Implementation considerations**

While the DORA capabilities are likely not revolutionary, their implementation still requires a lot of forethought and planning. Especially, if the initiative comes from the top management and targets the entire organization. Four main areas of consideration came up during research: company's business focus (B2C or B2B, cloud or on-premises), scale of the company, tools and practices already in place, and impact of company culture.

Whether a company focuses on business-to-business (B2B) or business-to-customer (B2C) software has a big impact on the way DORA metrics and capabilities should be approached and understood. While B2C companies do almost exclusively benefit from fast deployment of new software, B2B companies must take other considerations into account. These include contract dates (delivering before the agreed date does not have any additional value), more legal requirements, increased liability (very high cost of failure), user resistance, and so on. Additionally, DORA capabilities focus heavily on developing on the cloud, which means that the usefulness of these best practices is limited in case the company is focusing predominantly on-premises software.

Scale of the company and the IT development platform uses to play an integral part in deciding how to go about introducing these practices. In the case of a relatively

small company, implementation of DORA capabilities is not too demanding. However, when it comes to large corporations a top-down approach is not suitable. Rather, teams must be provided with all the support they require and have to be left on their own to decide the specifics of when and how to go about implementing these practices. This is because a lot of capabilities require cultural and management changes that can only effectively take form if they are developed naturally within the teams. The company as whole should focus on enabling the transformation by providing knowledge to managers and, wherever possible, implement company-wide technical solutions. If the company uses multiple development platforms, this poses an additional challenge and increases the complexity of implementation of some of the technical best practices.

As DORA does not introduce any completely new practices it is likely that the company already has some tools and practices in place to improve development performance. These should not be discarded, but only upgraded using the DORA research. By utilizing already established tools less resistance can be expected from the teams. DORA metrics should also be used with caution since they can be too general and are prone to being gamed. While they can provide excellent and easily graspable insight, they might also discourage teams that already know that they are not performing well and encourage unhealthy competition (Mortimer, 2022).

Perhaps the most significant aspect of a successful implementation is the company culture and management. It is very hard to transform the working process of an organization if the culture there does not support it. DORA research emphasizes technological excellence, which might be something that companies are not too keen on if they do not perceive a direct business benefit. For the company claiming to have undergone a full transformation in accordance with the DORA capabilities it must also have a properly technologically oriented core culture. While in small companies and startups this is rarely an issue, big corporations with established businesses practices and company culture have a harder time with this kind of transformation.

In order to be able to start with the implementation of DORA best practices, the topic must first be introduced to the developer teams (and other interested parties) in the organization. As a part of the thesis work a promotional tool was developed using Microsoft PowerApps. The tool introduces DORA initiative, its metrics, and capabilities as a guided experience that is interactive, visually engaging, and easily understandable. It also enables teams to roughly evaluate their current performance and even compare it with others if they choose to do so. The main objective of the promotional tool was to raise awareness of these best practices and to motivate teams to start their improvement journey.

### **Conclusion and Outlook**

There are a lot of potential benefits for learning about DORA framework and integrating it into an organization. While there are no completely new concepts or practices

introduced, the main advantage of DORA lies in its science-based shortlist of the practices that were shown to actually work. This is valuable, since it provides a good starting point for any team or organization that wants to improve their SDO performance without wasting time on practices that do not work.

Anyone looking to implement DORA best practices should take into consideration the four key areas outlined in the article: company's business focus (B2C or B2B, cloud or on-premises), scale of the company, tools and practices already in place in the company, and company culture. DORA metrics should serve primarily to generate intrinsic motivation for the teams to look into the DORA best practices and secondarily as a control tool for the management. Implementing these best practices takes a lot of planning, time, and patience as people's attitude and behavior should not be expected to change overnight.

As a part of the thesis an assessment of DORA best practices' suitability was delivered to the management of the company and an introductory tool of DORA research was created. The management team now uses these findings to inform their decisions regarding the initiative and the tool as a short introduction to DORA for the interested parties. Whether the initiative will be successful remains to be seen.

On the other hand, DORA research continues in earnest, as the interest in and relevance of the topic grows. Reports with the latest findings are published annually and are freely available (DORA, 2022).

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