

Towards Defining a Microservice Migration Framework

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ABSTRACT

Microservices are more and more popular. As a result, some companies started to believe that microservices are the solution to all of their problems and rush to adopt microservices without sufficient knowledge about the impacts. Most of the time they expect to decrease their maintenance effort or to ease the deployment process. However, re-architecting a system to microservices is not always beneficial. In this work we propose a work-plan to identify a decision framework that supports practitioners in the understanding of possible migration based benefits and issues. This will lead to more reasoned decisions and mitigate the risk of migration.

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1 INTRODUCTION

Microservice is currently a popular architectural solution [1], [2]. Several benefits of it are claimed, like a lower maintenance effort, delegation of responsibilities between teams or separation of concerns. Companies even state to migrate simply because other companies are doing it [3]. However, several companies are not aware of the possible consequences of such an expensive migration and often start to re-architect their systems to solve some issues that can not be solved with microservices.

One of the main issue is the unknown migration costs, due to several factors such as the need of changing the company structure or the development process applying different communication and team composition [7][8]. Moreover, also the lack of knowledge of the most appropriate architectural pattern [4] brings developers to choose the pattern they have more knowledge about, instead of the most suitable for their needs [3], [6].

The main reason responsible for such issues is the wrong assessment of possible migration benefits in the respective case [3].

In this work we propose a work-plan toward the definition of a decision system to support practitioners in the identification of potential benefits and issues that may result from the migration to

microservices. Therefore, the decision system considers characteristics of the current software systems that should be migrated.

At the best of our knowledge, there are no frameworks or decision systems that help practitioners to understand whether the migration can be beneficial or not.

The framework will be based on a wizard where practitioners are asked to enter relevant data of their systems and the results are the potential benefits and drawbacks of the migration. Consider for example a company where one team develops the whole system. It will experience different benefits than another company with two independent teams that develop a similar system.

2 THE APPROACH

In our recent work, we investigated motivations and issues that developers faced when they migrated to microservices [3]. We interviewed 21 experienced developers that migrated because they expected increased system maintainability, scalability and delegation of responsibilities. However, half of the practitioners reported that the expected benefits have never been obtained and that maintenance effort was still higher than for the monolithic systems. During the XP2017 Workshop on Microservices (WMSA17) [6] we collected success and failure cases of companies that migrated to microservices. Thereafter, we identified the migration patterns, architectural patterns, anti-patterns and “bad smells” of the migrations [5]. In addition, we also mapped in which context the different patterns could be beneficial or not.

The definition of this framework will be based on a mixed research method, composed of five steps, as reported in Figure 1:

- (Step 1) **Literature Analysis.** We perform a literature review with the goal of characterizing which characteristics (information or measures) have been adopted in empirical studies to evaluate the migration to monolithic systems.
- (Step 2) **Survey.** We survey practitioners to understand which information they actually considered for the decision whether to migrate or not to migrate. Furthermore, we ask if they considered any of the characteristics identified by the previous literature analysis.
- (Step 3) **Framework Draft.** Based on the results of the survey, we identify the initial draft of the framework. This version of the framework is composed by the characteristics that practitioners actually used during the evaluation and on the characteristics adopted in the empirical studies.
- (Step 4) **Multiple Case Studies.** We will apply the framework to a set of companies that migrated to microservices, in order to understand its usefulness and to refine it further.
- (Step 5) **Large-scale survey.** We test the usefulness and make the last refinement of framework characteristics based

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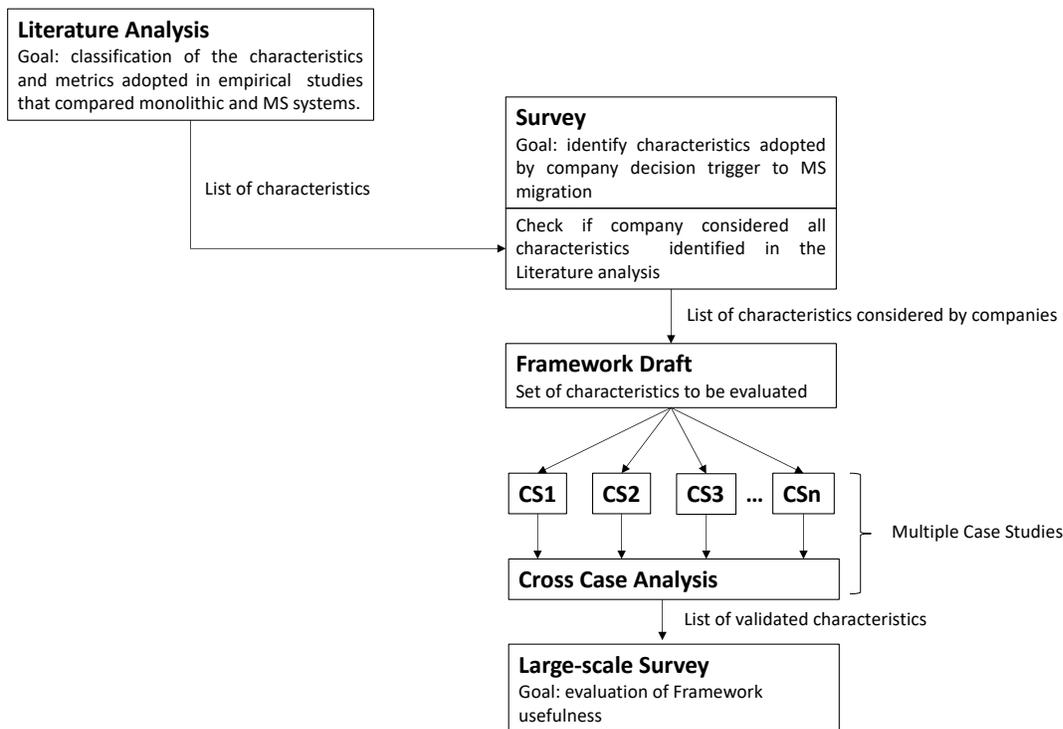


Figure 1: The Approach

on a large-scale online survey. In this case, the survey is composed of closed ended questions, which allow to collect a large number of useful information on each proposed characteristic.

3 CURRENT STATUS

We already performed a systematic mapping study of the relevant literature. The analyzed papers indicate an increasing interest on the research topic of migration from monolithic to microservices since 2015. In addition, the publications were discussed on ten different conferences, which reveals an interest on the topic across research communities.

The systematic mapping study further found that all papers use metrics in their discussion. A total of 18 different metrics are used in the studied papers. These metrics could be further classified into six characteristics. Thereof, performance was by far the most investigated characteristic. Two third of all papers focused during their empirical discussion on at least one of the five measures of this characteristic. The other identified characteristics are scalability, availability, maintenance, personnel costs and infrastructure costs.

Based on the literature review, we design the first steps of the practitioners survey (Step 2). Therefore, we already identified potential participants and currently work on the questionnaire.

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