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Who are Metrics Team's Stakeholders and What Do They Expect?

Conducting Stakeholder Mapping with Focus on Communication in Agile Software Development Organization

Research-in-progress

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ABSTRACT

As an increasing number of organizations create metrics teams, conducting stakeholder mapping is pivotal for identifying and analyzing metrics stakeholders' expectations for reducing the risks of miscommunication and project failure. Further, though team-stakeholder communication is essential for successful collaboration, few studies focus on it in software measurement context. This case study seeks to identify and analyze metrics team's stakeholders, with a special focus on communication challenges in team-stakeholder contacts. Inspired by Bryson's Basic Stakeholder Analysis Techniques and Mitchell, Agle, and Wood's theoretical model for stakeholder identification, a stakeholder mapping exercise was conducted using interactive workshops and follow-up interviews with 16 metrics team members and their stakeholders. The results illustrate the complexity of identifying stakeholders in agile organizations, the importance of developing a metrics culture, and enhancing transparency in team-stakeholder communication. The study aims to contribute to the development of stakeholder theory and offers insights into communication in software engineering context.

Keywords

Software metrics, stakeholder mapping, metrics team, communication.

INTRODUCTION

In today's increasingly data-driven, demanding, and competitive world, organizations heavily rely on metrics to track and evaluate their performance, aiming at continuous improvement of the quality of their products. In software engineering, metrics provide insights into whether 'we're on the right track' in development processes, leveraging data for complex decision models and algorithms and providing early warnings (Staron and Meding 2018). Software metrics are indispensable for quality assurance, pushing development in a desirable direction, and achieving projected goals and outcomes (Holmstrom et al. 2006; Staron and Meding 2018; Svensson 2005).

Nowadays, an increasing number of organizations introduce metrics teams, which primary purpose is to deliver measurements (set of operations having the object of determining a value of a measure), both process-wise (eliciting metrics, developing measurement systems, deploying information products) and competence-wise, assessing the quality of metrics and indicators, optimizing the number of metrics collected (Staron and Meding 2018). In the process of metrics delivery, the metrics team is continuously interacting with stakeholders, who can be "individuals or organizations having a right, share, claim or interest in a system or in its possession of characteristics that meet their needs and expectations" (ISO/IEC 2007). Metrics team-stakeholder collaboration is pivotal for developing the right measures and indicators, contributing to the long-term maintenance of the measurement knowledge base in the organization.

Though a multitude of studies illustrates the importance of identifying and managing stakeholders to the success of an organization's activities (Mehrizi et al. 2009; Rahman and Ko 2013), research on metrics stakeholders is scarce (Staron and Meding 2015). Further, though communication plays a key role in any organization (Weick 1979), being essential for successful team-stakeholder collaboration (Connor 2020; Matook and Maruping 2014), empirical studies on the human aspects in relation to software metrics in general, and metrics team-stakeholder communication in particular, have not received due attention.

Building on this, this research-in-progress paper shows how a stakeholder mapping exercise, applying Basic Stakeholder Analysis Techniques (Bryson 2004), inspired by Mitchell, Agle, and Wood's theoretical model for stakeholder identification (Mitchell et al. 1997), is conducted in a medium-sized software development company. The mapping exercise helps with identifying, categorizing, and analyzing the metrics team's stakeholders, their expectations, and the communication challenges experienced in metrics team-stakeholder collaboration.

PREVIOUS RESEARCH AND THEORETICAL FRAMEWORK

Research on stakeholders has its roots in the strategic management field, with a focus on defining and identifying stakeholders (Ackermann and Eden 2011; Freeman 2010), their impact, and interests (Johnson et al. 2008; Mendelow 1981; Mitchell et al. 1997). In IS research, the pivotal role of stakeholder commitment to IS development and sustainability (Bauer et al. 2022), IS implementation, survival, and diffusion (Ahmed et al. 2021; Al-Ghaith et al. 2013) have been reported. Though the seminal definition of stakeholder as "an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 2010, p. 46) is commonly used across disciplines, context-specific definitions have also been developed. In the context of software measurement programs, a stakeholder is defined as a "person who has a mandate and resources to act upon the status of the indicators provided by the measurement systems" (ISO/IEC 2007). The role of the stakeholder is thus two-fold – on the one hand, the stakeholder is the person responsible for the definition and follow-up of indicators, and on the other hand, the stakeholder is responsible for his/her product or process (and often for the product and process improvement).

There is a plethora of studies and tools for stakeholder mapping, and Mitchell, Agle, and Wood's theoretical model for stakeholder identification is one of the most widely used (Mitchell et al. 1997). When mapping stakeholders, three main attributes of stakeholders such as "power", "legitimacy", and "urgency" are commonly considered. Based on the combinations of these attributes, the importance of stakeholders is determined, based on which organizations can prioritize them. Though the model is used across disciplines, in recent years, in modern, empowered software development organizations, more roles can be considered as stakeholders, which has spurred the need for less static and rigid methods for identifying stakeholders with multiple roles and developing strategies for managing them in practice (Imre 2016; Jabbari et al. 2016; Pikkariainen et al. 2008; Staron 2012).

Though the body of research on stakeholder mapping is extensive, spreading across disciplines, the field is still dominated by a managerial, pragmatic focus on stakeholders and their management (Pouloudi et al. 2016). Further,

few studies elaborate on relating stakeholder analysis to the development of communication strategies for guiding practitioners in general (Bourne and Walker Derek 2008), and in the agile software development context, in particular (Power 2010).

METHODOLOGY

Context and Participants

This case study was conducted in an agile organization that is a part of a medium-sized software development company in Sweden. The metrics team leader approached the research team seeking to gain insights into better ways of knowing who the metrics team's stakeholders were, and their expectations, also mentioning the team members experiencing communication challenges in collaboration with their stakeholders. At the moment of the initiation of the study, the relatively newly established metrics team included 15 employees. The team was adopting the ISO/IEC/IEEE 15939 standard, as well as other related standards such as the ISO 25000 family and DevOps practices (Jabbari et al. 2016). The team consisted of different functional specialists such as measurement designers, measurement analysts, and measurement librarians.

For our study, we contacted all metrics team members, and 11 out of 15 agreed to participate. Reasons for refusal were lack of time and other commitments. With support from the metrics team leader, we contacted five stakeholders, who had experience working with the metrics team, and all of them agreed to participate in the study.

Stakeholder Mapping Exercise

Inspired by Bryson's Basic Stakeholder Analysis Techniques (2004) based on Mitchell, Agle, and Wood's theoretical model for stakeholder identification (Mitchell et al. 1997), we conducted three 1 ½ hrs interactive workshops with metrics team members and their stakeholders. All 16 respondents participated in all workshops. The workshops were moderated by three researchers and focused on: a) identifying metrics stakeholders; b) analyzing stakeholder expectations, and c) categorization and prioritization of stakeholders. The workshops were conducted between April 2020 -March 2021 via MS Teams and Zoom due to COVID-19 restrictions.

In the first workshop, the respondents were grouped in groups of 3-4 in breakout rooms and asked to freely brainstorm during 30-40 min whom they considered to be the metrics team's key stakeholders. The group discussions were followed by a joint discussion in which the list of key stakeholders was compiled using a whiteboard. During the second workshop, the list of key stakeholders, developed at the first workshop, was presented, and the respondents were asked to discuss stakeholders' expectations in breakout rooms. At the end of the workshop, the list of stakeholder expectations was developed. In the third workshop, we started by showing the list of key stakeholders and the identified expectations. Next, the participants were asked to categorize the identified stakeholders in terms of "power," "legitimacy" and "urgency." In all workshops, the respondents were asked to discuss communication challenges in their contacts with stakeholders.

After the workshops, individual semi-structured interviews, about 45 min each, were conducted with all workshop participants. A triangulation of data from the interviews and workshops provided as complete a picture as possible of participants' perspectives.

The workshops and interviews were audio-recorded and transcribed verbatim. At this moment, they are superficially analyzed, with a focus on the identification of key stakeholders, and their expectations of metrics team, power, and interests. We plan to utilize the three-stage coding approach proposed by Gioia et al. (2013), starting with open coding, to get a more granular data analysis.

PRELIMINARY FINDINGS

A. Identification of Metrics Team's Stakeholders

All metrics team members reported that they found it problematic to identify their stakeholders. They explicitly tied that challenge to the team being relatively new and still in the process of creating its identity and understanding the role of stakeholders in their work:

If someone would ask me who our stakeholders are – this would be difficult for me to answer. A lot of this has to do with us being a new team and so we have not figured that out yet. The team is in a phase between incubation and being formalized. That is why I think it is very important to identify our stakeholders. (Metrics team member).

Another reason for struggling with stakeholder identification appeared to be related to a lack of knowledge and consensus about the purpose and use of metrics in the organization. Both metrics team members and stakeholders were not completely sure what services they should provide to stakeholders and expect from the metrics team, respectively. Further, all respondents considered metrics complexity and lack of consistent metrics terminology to be the factors additionally complicating both stakeholder identification and team-stakeholder communication. The metrics team members were concerned about having to put extra time and effort into asking stakeholders for explanations and specifications, which many stakeholders had problems providing, lacking terminology and knowledge about metrics. All respondents mentioned the urgent need for developing metrics culture in their organization, agreeing on metrics terminology, clarifying metrics' role in product development, and specifying the services that the team could offer.

Still, in the discussions, the following metrics stakeholders were identified: a) developers; b) architects; c) project managers; d) product owners; e) management; f) a broad undefined category including other teams in the organization, e.g., configuration managers, maintenance teams, and customer support. Some respondents commented on the dynamic nature of stakeholders in the organization, which additionally complicated stakeholder identification:

My role is dynamic – for some products, I am a product owner – I am a scrum master and I integrate some of the code. My role varies – and my job varies on who the stakeholder is. In some cases, I have my stakeholders and, in some cases, I am a stakeholder (Stakeholder).

B. Expectations of Metrics Team's Stakeholders

Both metrics team members and stakeholders were asked to brainstorm about stakeholders' expectations. The analysis shows that the respondents primarily focused on discussing the expectations concerning information quality, information products, and team access.

Expectations about information quality and transparency: The stakeholders emphasized the need to know that they could trust the information presented in the information products delivered by the metrics team. To enable trust in metrics team-stakeholder contacts, the stakeholders asked for increased transparency, emphasizing the importance of the team providing them with access to the tools which could enable them to assess all aspects of information products. While the metrics team members signaled a clear understanding of this expectation, they also expressed concerns about differences in expectations concerning transparency among their stakeholders. In general, the project managers and product owners asked for a moderate level of transparency compared to other stakeholder categories, e.g., developers, who expected more details about metrics delivery, e.g., methods used to gather metrics, how data was handled, and how the information products were developed. The team members mentioned that it was not always easy for them to know what level of transparency their stakeholders expected, and how to adapt their communication accordingly.

Expectations about information products: While the team members were able to define and articulate the expectations of some stakeholder types, e.g., developers being primarily interested in core dump analyses and architects in feature dashboards, they also found it quite challenging to identify the needs of other stakeholder types such as project managers and product owners. The spectrum of requests from these two stakeholder types was often quite broad, some requests being confusing and contradicting. For instance, product owners could request additional functionality in the product that was under development. Project managers could request release date extensions, which could conflict with the delivery date to a customer, promised by the product owner. The respondents related that challenge to the limited knowledge about metrics and metrics team's role in the organization as well as the lack of coordination among stakeholders. While the metrics team members emphasized the necessity to handle conflicting demands and learning conflict management skills, the participating stakeholders considered it pivotal to handle the challenges together with the team as soon as they occurred in order to avoid conflict escalation.

Expectations about team access: From the stakeholder perspective, the metrics team should be accessible for handling new requests and maintaining the existing measurement systems. Using multiple communication channels, both

synchronous (on-site meetings, dialogues, demos) and asynchronous (JIRA, e-mail) worked fine, though in some cases caused problems with keeping track of requests. All respondents considered face-to-face communication, which was in general not possible or limited during the pandemic, being an essential prerequisite for effective communication around metrics. Sitting together in front of a computer screen and discussing the metrics to be delivered was perceived as the best way for aligning expectations and reaching a shared understanding:

The only way that works well to communicate around complex metrics is to go and talk to the person, face-to-face. It's a little hard when we are sitting in so many different buildings. If we have no problems or unclarities, then then it's no issue, but when I do have problems, working with metrics remotely is hard. When I need to sit down with a developer and I want to explore the information, then that means this Okay, sit next to me, and then let's go together on the computer. And okay, where do we get this information? (Stakeholder).

C. Categorization and Prioritization of Stakeholders

Concerning categorization, the team members concurred that classifying and describing stakeholders in terms of “power” and “legitimacy” did not add any value to managing metrics projects. The respondents emphasized that working in an agile dynamic environment where team members often had multiple roles further exacerbated problems with classifying stakeholders. Still, the stakeholders who had higher positions in the organization were considered by the team as more “powerful.”

Turning to stakeholder “urgency” and prioritization, the metrics team admitted that they had three criteria for prioritizing stakeholders. Unsurprisingly, the team members prioritized the more “powerful” stakeholders higher up in the organization. Another criterion was the clarity of requests submitted to the team. The team members mentioned prioritizing the stakeholders who could communicate clear and concise requests. In other words, the clearer the request submitted to the metrics team, the higher the chance that the request would be prioritized. Further, the team members mentioned their interests in developing and improving relationships with certain stakeholders, which was also a contributing factor to prioritizing their requests.

Though in most cases the ritual of prioritizing was carried out via Kanban boards, it also took place through informal dialogues. Most metrics team members reported that some stakeholders constantly approached the team members informally, persuading and pushing them to prioritize their requests. Consequently, some stakeholders by-passing formal ways of communicating requests, e.g., through JIRA, created frustration and stress for both metrics team members and other stakeholders, who experienced being underprioritized and treated unfairly. A stakeholder insists on the team following the rule of using JIRA tickets only in handling requests:

If you use the JIRA system, you have to use it fully and prioritize requests. The clarity needs to be on the team's side (Stakeholder).

Another concern raised by the metrics team was balancing the priorities imposed by the management and the requests from their stakeholders. The metrics team commented that though they were working in an agile environment and expected to be a self-organizing team, they still had to follow “delivery roadmaps” imposed by the management. These roadmaps often collided with stakeholders’ requests, which made the team members fit their stakeholders’ requests into the roadmap imposed by the management. The team members acknowledged that the pressure from the management was often hampering them from focusing on their stakeholders’ needs.

DISCUSSION

Defining who the stakeholders are and how they can be engaged in a project is essential for successful collaboration and attaining better project outcomes. As an increasing number of organizations create metrics teams, stakeholder mapping is pivotal for aligning metrics team-stakeholder expectations for successful metrics delivery (Staron and Meding 2018). In this paper, we present a stakeholder mapping exercise inspired by Bryson’s Basic Stakeholder Analysis Techniques (2004) and Mitchell, Agle, and Wood's theoretical model for stakeholder identification (Mitchell et al. 1997), conducted with metrics team members and their stakeholders in interactive workshops and follow up individual semi-structured interviews.

The preliminary findings illustrate the variety of metrics team’s stakeholders, problems with identifying them, and their expectations. While some stakeholders are more easily identified, e.g., architects and developers, others belong

to an undefined group, e.g., other teams/customer support. Our study shows that the challenges of identifying stakeholders not only reside in the metrics team being a newly established and cross-functional, but also in the agile way of working, characterized by the multiplicity of roles (Hoda et al. 2013). The mapping exercise reveals that while the expectations of some stakeholders are easier to identify, classify and limit in scope, other expectations are more complex to grasp. Consequently, the team members are at risk of ending up having to second-guess what these stakeholders may need or expect, which makes it difficult to align expectations, which may result in product delays (Azadegan et al. 2013; Pacheco et al. 2018). One of the reasons mentioned is a lack of knowledge and awareness about the purpose and use of metrics, which complicates specifying and limiting the scope of stakeholders' requests. Thus, raising awareness about metrics and developing metrics culture in the organization are important steps for clarifying the role of the metrics team, defining its stakeholders, and consequently aligning team-stakeholder expectations.

The expectations concerning "information quality and transparency," "information products," and "team access" were brought up in the workshops. As the metrics team's stakeholders represent quite a mixed group, their expectations about "information quality and transparency" and "information products" differ. Concerning transparency in terms of getting access to data, the methods used to gather metrics, and the levels of detail in communicating about the information products delivered by the team vary among stakeholder types. Though challenges with transparency are common in the software engineering context (Chazette 2019; Tu et al. 2014), and the metrics team members signaled to be aware of it, they also expressed uncertainty about how to estimate the level of transparency their stakeholders expected and how to adapt their communication accordingly. Further, the scope of expectations about information products differed among stakeholders, being quite broad and even contradicting, creating confusion and conflicts in team-stakeholder communication. In relation to conflict handling, the stakeholders mentioned expecting the metrics team to be accessible, considering face-to-face communication to be the best choice in case of conflicts and misunderstandings as soon as possible.

Concerning prioritizing, the findings indicate that both informal and formal factors influence prioritizing stakeholders. While a stakeholder's position in the organization ("power") influences prioritizing, informal relationships and clarity in communicating requests also determine whose request is prioritized (Berbyuk Lindström et al. 2021; Boehm et al. 1995; Pikkariainen et al. 2008). This finding shows the complexity of stakeholder prioritization in practice and the impact of successful communication on it, calling for a more nuanced approach to analyzing stakeholder prioritization in practice.

The findings also indicate the crucial role of management in team-stakeholder communication. Though the team in our study adopted agile principles and was expected to self-organize (Beck K et al. 2001), the team members still experienced managerial control, which impeded their collaboration with stakeholders. This finding illustrates the consequence of the clash of agile and waterfall cultures (Kruchten 2010) on team-stakeholder contacts and collaboration.

As such, this empirical study provides an initial basis for analyzing the challenges as well as opportunities that metrics team members and managers may encounter to satisfy the information need of stakeholders, which is one of the biggest challenges in agile projects (Raharjo and Purwandari 2020). We hope that our findings contribute to a more nuanced discussion of metrics adoption, in particular in terms of appreciating the role of aligning expectations and how this alignment entails collaboration between metrics teams and their stakeholders. A misalignment can lead to a low impact of the measurement program.

CONCLUSIONS, IMPLICATIONS FOR THEORY AND PRACTICE

Software development measurement programs are important for modern software organizations in general, but especially for accelerating process and product improvement initiatives. What remains challenging, yet still underpins a successful measurement program, is the metric team's ability to identify the right stakeholders and apply the appropriate communication strategy. Upon finishing this study, we contribute three-fold. First, we expect to contribute to the development of stakeholder theory, stakeholder mapping techniques, and communication research in the software engineering context, more specifically to research on software metrics and stakeholder management. Second, by better understanding the project stakeholders' perceptions, expectations, and interrelationships, we provide insights on how to align and manage stakeholder diversity in software development projects and beyond. Third, as metrics team is a new phenomenon for many organizations, the study shows the importance for management to support creating a culture around metrics, clarifying, and informing about the purpose of metrics team, its role and tasks in the organization.

LIMITATIONS AND FURTHER RESEARCH

In this work, until recently, we focused primarily on the metrics team members' perspectives. Our next step is to involve line management and executives, project managers, and product owners in stakeholder mapping, as it will provide a more comprehensive lens and elucidate broader perspectives in stakeholder mapping. The findings from this study pave the way for further investigations in stakeholder mapping and analysis within the context of software development. In line with this, we aim to undertake a further in-depth analysis of the data to stimulate a more nuanced appreciation of stakeholder identification in agile project environments.

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