Using Knowledge Exchange Workshops to analyze the DLR Software Engineering Community

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***Abstract*—Software development plays an increasing role in research. Therefore the German Aerospace Center (DLR) early started different activities to support researchers. A good understanding of the DLR software engineering community is the basis to improve these activities. For initial insights, we analyzed the participation of the annual knowledge exchange workshops. The results indicate that the community consists of a growing core group and that new participants regularly join in each workshop. The main workshop topic seems to play an important role for the attendance behavior.**

***Index Terms*—research software engineering, community, analysis**

I. Introduction

Software development increasingly became part of the daily work of many scientists. Researchers are faced with software engineering challenges for which they are not trained [1]. In 2005, the German Aerospace Center (DLR) started the *DLR software engineering initiative* [1] to support their researchers addressing these challenges. A core element of the initiative is the creation of an active software engineering community.

Improving the activities of the DLR software engineering initiative is an on-going challenge. For this purpose, a good understanding of the DLR software engineering community is required. In this paper, we want to start this process by analyzing the participants of the annual software engineering knowledge exchange workshops. These workshops can be considered as the annual DLR software engineering community event and offer therefore a good starting point to analyze the community.

The remaining paper is structured as follows:

- We characterize software development at DLR to illustrate the context (Sect. II) and introduce the concept of the knowledge exchange workshops (Sect. III).
- We describe the specific research questions and explain our analysis approach (Sect. IV).
- We present and discuss the results (Sect. V) as well as indicate future directions (Sect. VI).

II. Software Development at DLR

DLR is a large research organization with over 8.000 employees, conducting research in aeronautics, space, energy, transportation, and security. Software development plays an increasing role in DLR's research activities. Over 25% of DLR's personnel costs are spent on this topic. Software development within DLR does not only vary in the domain, but in many other aspects such as programming technologies, maturity, or team size as well [2].

III. Concept of Knowledge Exchange Workshops

Since 2013, *knowledge exchange workshops* have been established at DLR. These workshop series are interdisciplinary and focus on long-term exchange of knowledge and experiences on overlapping topics. The goal is to establish professional networks at DLR [2].

The knowledge exchange workshop series on software engineering started in 2014. Each year the workshop focuses on a different software engineering related topic. The workshops are organized by members of the community and are highly interactive to create an active network and a living community. A workshop consists of networking elements and group discussions for community building, social event and multiple breaks for networking, experience reports and technical presentations for knowledge transfer and lightning talks to give opportunities for presentation of new ideas or current challenges.

IV. Research Questions and Approach

Good insights into the DLR software engineering community are essential to steer our support activities. In this paper, we analyze the attendance behavior of participants of the knowledge exchange workshop series on software engineering regarding the following questions:

- How stable is our community?
- Is the focus of a workshop relevant for attendance?

Both aspects shall give us a better understanding of the current status of the community as well as a basis for designing future workshops of the series.

We analyzed the attendance lists of every workshop to answer these questions. The resulting anonymized participation data and the Jupyter notebook containing the analysis details have been published separately [3].

V. Results and Discussion

Table I provides an overview about all workshops including information about topic, workshop date, location, and number

of participants. The maximum participant number has been 60 for all workshops due to organizational constraints.

The kick-off workshop has been used to select the topics of interest for the DLR software engineering community. Those topics have been addressed in the following workshops by focusing on the top priority topics first. This approach resulted in an ongoing specialization of the topics.

TABLE I
OVERVIEW OF THE KNOWLEDGE EXCHANGE WORKSHOPS SERIES ON SOFTWARE ENGINEERING SINCE 2014.

#	Topic	Date	Location	Participants
1	Kick-Off	11/14	Braunschweig	57
2	Tools & Processes	04/15	Cologne	56
3	Open & Inner Source	04/16	Oberpfaffenhofen	53
4	Software Architecture	04/17	Berlin	52
5	Embedded Systems	05/18	Bremen	47

In total, 265 persons attended the workshop series, among them 189 unique participants [3]. The workshops have 53 participants in average with a slight decrease in participants over time. This decrease might be a result of the ongoing topic specialization. This assumption is supported by the attendance drop of the workshop on embedded systems, a topic only relevant for a DLR subgroup.

Figure 1 shows the attendance rates of the core group and one-time participants for every workshop.

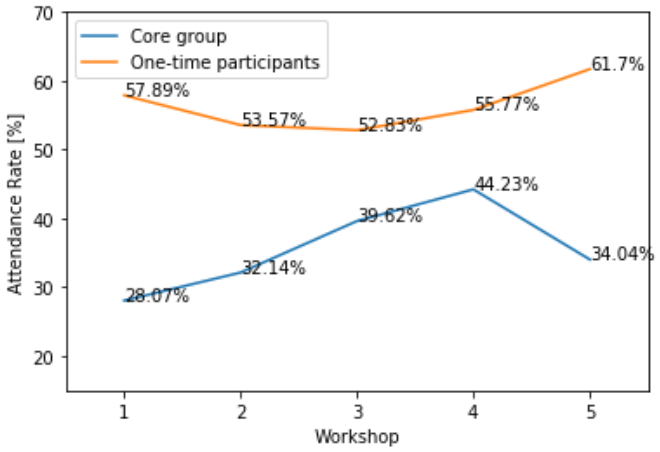

Fig. 1. Participant attendance rates of the two main groups for each workshop. The core group consists of participants attending at least two workshops and not dropping out while still working at DLR. One-time participants are participants attending only one workshop.

We consider participants that continually attend the workshops as part of the core group because they show constant interest and therefore contribute to the annual DLR software engineering community event. Overall, we identified 30 participants as members of the core group, that is about 16% of the unique participants. We included participants into this group, if they attended more than one workshop (40 participants) and did not skip more than one workshop in a row while still working at DLR (30 participants) [3]. Finally, there are 29 participants of the last workshop who can potentially become part of the core group [3].

Overall, the trend of the attendance rate of the core group illustrates its steady growth over the workshops. The rate drop of the last workshop indicates that the topic did not resonate well with our core group. In addition, the low participant return rate between the fourth and the fifth workshop (25%) [3] seems to further support this assumption.

One-time participants are participants attending only one workshop. The rate of 58% for the initial workshop means that 58% of the participants of the first workshop only attended this workshop. The one-time attendance rate of each workshop is between 53 and 62%. The last (62%) and the first (58%) workshop show the highest one-time attendance rates. Again, the very specific topic of the last workshop can be seen as a reason for this peak. The second highest one-time attendance rate shows the kick-off workshop. We can only assume that maybe the initial high expectation of some participants could not be fully fulfilled due the ”overview” character of this workshop.

VI. CONCLUSIONS AND OUTLOOK

We analyzed the participation of the DLR knowledge exchange workshop series on software engineering to get insights into the DLR software engineering community. The results show that the community consists of a small, stable core group, some non-regular visitors, and one-time participants. The workshops are in average attended by 36% community core members and 56% one-time visitors.

The main workshop topic seems to influence the participant attendance. The ongoing topic specialization results in a slowly decreasing number of participants and an increasing rate of one-time participants. Particularly, the last workshop on embedded systems makes this development quite obvious. This workshop was even skipped by members of the core group. In future, we will take this aspect into account when selecting the main workshop topic and try to further involve our community. However, we need to consider further influences on the attendance behavior as well.

In a next step, we want to complement this initial analysis by including further data sources, for example, the location of the workshops and participants as well as feedback received for the workshops. In addition, we plan to do interviews and surveys among the previous participants.

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