Open innovations and the role of hackathons

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Abstract— The beginning of 21st century marked a paradigm switch in regards to Research and Development (R&D) programs conducted in companies, internally. Generating new ideas and developing new products "behind closed doors" was considered "the right-way", where companies could control product development from the idea to the point of commercialization. With the emergence of start-ups, this closed-innovation approach was replaced with open-innovation model. This model allowed companies to commercialize their ideas and outsource innovations from other firms, partners, individuals, etc. One popular way of outsourcing are hackathons. Hackathons have made a significant impact in the world of digital innovation – starting out as student indoor hang-outs to worldwide organized events. This study researches the topic of open innovation focusing on the role of hackathons. Main goal is to provide a comprehensive overview of the open innovation model and hackathons. Further, research will be focus on analyzing data and discussion about hackathon events that happened in the last decade at the Faculty of organizational sciences, University of Belgrade.

Keywords - open innovation, hackathon, research and development

I. INTRODUCTION

Research and Development (R&D) used to be considered a valuable strategic asset [1] for any company that wanted to make competitive product on the market. Generating new ideas and developing new products "behind closed doors" was considered "the right-way", where companies could control product development from the idea to the point of commercialization[1][2]. The beginning of 21st century marked a paradigm switch in regards to R&D [2]–[4]. With the emergence of start-ups, this closed-innovation approach was replaced with open-innovation model [1][5]. This model allowed companies to commercialize their ideas and outsource innovations from other firms, partners, individuals, etc.[1].

One popular way of outsourcing are hackathons. Hackathons are organized as time-bounded (typically 24 hours) intense competitions, where multidisciplinary teams generate innovative solutions to a given problem [6]. Hackathons have made a significant impact in the world of digital innovation – starting out as student indoor hang-outs to worldwide organized events[7].

This study researches the topic of open innovation focusing on the role of hackathons. Main goal is to provide a comprehensive overview of the open innovation model and hackathons. Further, research will be focus on analyzing data and discussion about hackathon events that happened in the last decade at the Faculty of organizational sciences, University of Belgrade.

II. RESEARCH METHODOLOGY

This research is based on systematic literature review of the key topics, such as open innovations and hackathons, and data analysis of hackathons held at Faculty of organizational sciences, University of Belgrade, from year 2013 to present.

The literature review follows five-stage process defined by [8]:

1. Definition of search criteria
2. Literature search
3. Literature refinement and article selection
4. Analysis of selected articles
5. Presentation of findings

Data analysis was conducted in several steps:

1. Collecting available data
2. Sorting and "cleaning" data
3. Systematization
4. Analysis
5. Visual representation

III. LITERATURE OVERVIEW

A. Open innovations

The term open innovation emerged in early 2000s and was promoted by the prof. Henry Chesbrough [1], [2], [4], [9]. It was used to describe a paradigm-shift where an organization seeks for innovation outside of their own internal R&D centers, knowledge base, sources and resources, using various external sources (such as customer feedback, published patents, competitors, external agencies, the public etc.) to drive innovation [2][10].

The old model of generating new ideas can be described as closed innovation model [1], [2]. Companies and organizations would firmly rely on their internal resources and R&D centers to create ideas, develop product or services and bring them to the market, believing that successful innovation requires control [1]. Investing more in internal R&D, hiring top-of-the-class graduates and experts and aggressively controlling their intellectual property, was the right way – formula that will inevitably bring profit [1], [10].

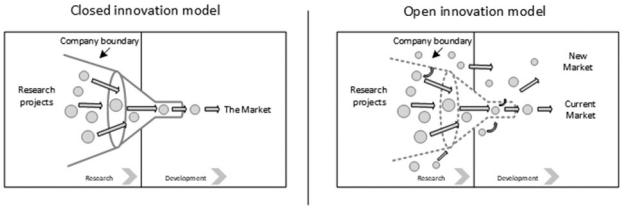

Figure 1 Closed vs Open innovation model [1]

The open innovation model arose as a consequence of changes in society and industry – mobility of knowledge workers and the rise of new form of financial structure - venture capital [1], [10], [11]. These changes opened company boundaries of innovation processes and a new research paradigm was created allowing the creation of projects from internal or external sources and allowing new technology to enter at any stage (research, development, placement, etc.) [11]. This model, allows company to attack the cost side of the traditional R&D method, utilizing external R&D resources to save time and money and up the ante on the revenue side by licensing out internal technologies [11].

B. Hackatons

Hackathons are organized as time-bounded (typically 24 hours) intense competitions, where multidisciplinary teams generate innovative solutions to a given problem [6]. Hackathons have made a significant impact in the world of digital innovation – starting out as student indoor hang-outs to worldwide organized events [7]. Gaining popularity over the years, hackathons evolved from geek student competitions to an event that many software companies, organizations, even government agencies organize with the purpose of encouraging digital innovation with their assets and resources [7].

In early 2000s, hackathons became prominent and were seen by companies and venture capitalists as a mean of rapid software and technologies development and discovery of new areas for innovation and financing [7].

Briscoe and Mulligan [7] classified hackathons in two major groups:

1. *Tech-centric* which focus on software development using specific technology or developing a specific application
2. *Focus-centric* which target social issues and/or business objectives through software development.

Although, hackathons can be great way for participants to self-improve, learn, network [7][12] and for companies, organizations and other organizers to generate new ideas [6], [13]–[15], the question about the future of those projects still remains [14], [16], [17]

Majority of the conducted research focuses on the hackathon event itself and not the outcomes. Authors in [17] point out that there is limited research done on corporate hackathons, which comes as a surprise knowing companies increasingly invest in hackathons to encourage internal innovation [18], [19].

Study [16] has shown that only 5% of all hackathon projects are continued for more that 5 months. The same study also differentiates between short- and long-term continuation, where [16]:

- short-term continuation is dependent on the number of technologies a team uses to create a project and winning a prize at a large event, while
- long-term continuation is dependent on skill diversity and skill matching among team members and their intention to expand their project's reach.

Study [17] focused their research on five teams from Microsoft's OneWeek hackathon in summer 2017, aiming to identify how attitudes and activities before, during and after a hackathon can foster or hinder potential outcomes related to projects and individuals. Their work identified several aspects of a theory on the continuation of hackathon projects in a corporate setting:

- Career oriented leadership
- Expertise focused learning
- Project-focused preparation
- Matching skills and tasks
- Hit the ground running and freeze the project before the end
- Find a home
- Evolution not revolution

IV. DATA ANALISYS

The data that's the focus of this analysis is gathered from the Association of Students of Information Science FONIS at the Faculty of organizational sciences. This association has been the main organizer of student hackathons at the faculty since 2001. This study covers the data gather from year 2013. to present of the FON Hackathon event.

Research was focused on growing interest for hackathon participation by students and companies' involvement in hackathon organization.

A. Hackathon themes

When first organized, hackathon was an internal event for FONIS members who wanted to test their skills in competitive setting.

In 2010 hackathon became an open event for students of the Faculty of organizational sciences, and since 2015 event has been opened for all students in Serbia. Hackathon themes varied through years and show the rising interest of companies' involvement in the events.

Table 1. Hackathon themes

	Theme	Who set the topic	Year
1	System of scheduling appointments and ordering student service certificates	FOS[a]	2013
2	FOS alumni management system	FOS[a]	2014
3	Open data	MESTD[b]	2015
4	Development of applications with use in the field of environmental sustainability	SBB[c]	2016
5	Development of applications for business improvement during the EXIT festival based on data from base stations	Telekom Srbija	2017
6	Application of ICT to improve security in large cities	SAGA[d]	2019
7	Development of applications to encourage sustainable development in cities	FONIS	2020
8	Proactive and/or reactive action in emergency situations	Raiffeisen bank	2021
9	Development of ecological awareness and application of environmental protection principles	Levi9	2022

[a] Faculty of organizational sciences
[b] Ministry of education, science and technological development
[c] Serbia Broadband
[d] Saga New Frontier Group

B. Hackathon applicants and participants

Number of applicants and participants also varied through the years showing the increased popularization of hackathon events.

In the first year, number of applicants was 23, compared to year 2022, where that number was ten times the size, counting 240 applicants. The Fig 2. clearly shows the continuous increase in interest for participation in hackathon events.

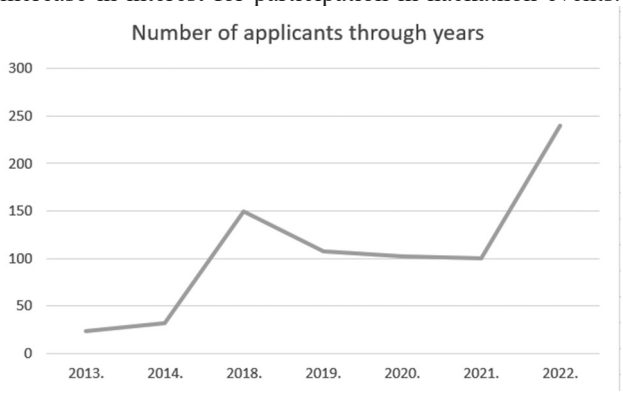

Figure 2 Number of applicants through the years

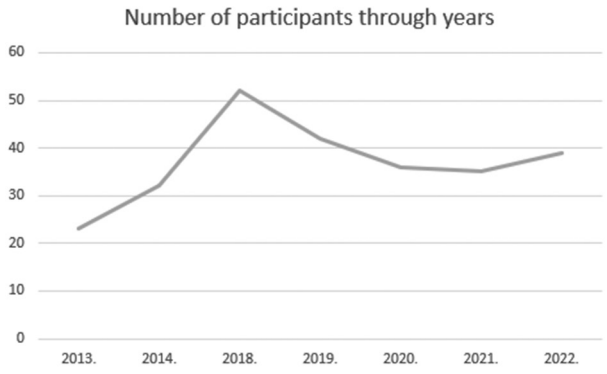

Figure 3 Number of participants through the years

Number of actual participants didn't vary much in quantity as the organizing capacity of the FONIS organization didn't change through years. Number of teams was constantly between 8 and 10.

Following charts show the diversity of participants studying origin for the last three years (Figure 4).

It is interesting to see the increase of the number of employed participants.

As mentioned before, FON Hackathon became open for all students in Serbia in 2015, but it is interesting to see that 5 high-school students participated in university level hackathon in year 2022 (Fig. 5), even though high-school level hackathons were organized as well.

V. CONCLUSION

This paper gives a literature overview of the open innovation concept and the role of hackathon in its implementation. The question that will be further pursued through future research will focus on the continuation of the hackathon projects and its utilization in corporate setting.

The data analysis showed us a rising interest in hackathon participation by students and companies' involvement in organization of the hackathon. This lays the foundation for future research that will have a twofold focus:

- on participants: reasons for participation, expectations, hackathon impact on further development, future/current employment, etc.
- on companies: reasons for involvement, continuation of the hackathon projects, impact of generated ideas, etc.

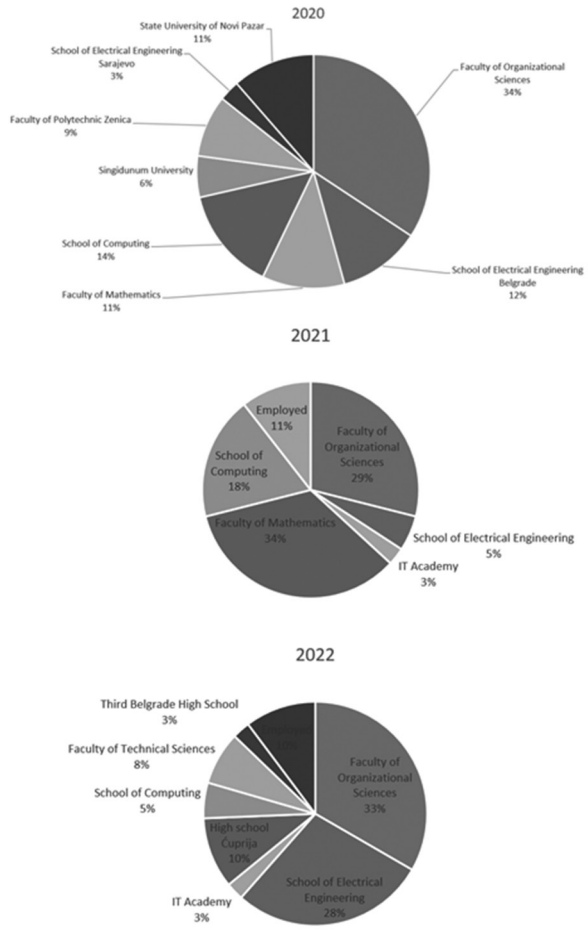

Figure 4 Participants' alma mater for years 2020-2022

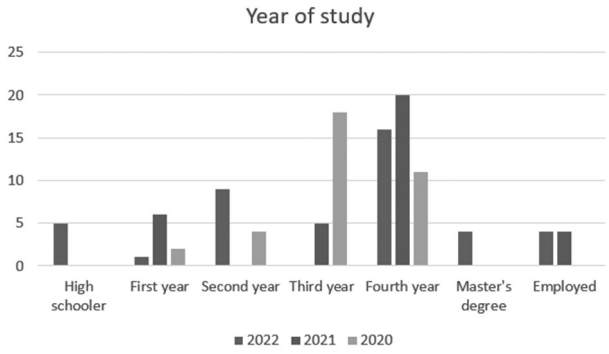

Figure 5 Participants' year of study

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