
Hackathon design in radical and virtual collocations: a descriptive comparative case study in a municipal organization

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Abstract: This paper addresses the hackathon design in radical and virtual collocation. Specifically, it focuses on the differences the radical and virtual collocations poses for hackathon design in a municipal innovation management context. Although used in a variety of contexts for idea management, hackathons particularly examined in the municipal context, and as a comparative study regarding their different collocations has not yet been the focus of hackathon research. Therefore, this paper presents a case study research in a Swedish municipality with future demands due to growth, carrying out intra-organizational hackathons both in radical and virtual collocations. As a result, the paper reveals the differences in terms of the design choices. The paper contributes to the literature on hackathon as an innovation contest in a municipal organization context and presents practical implications.

Keywords: hackathon; radical collocation; virtual collocation; organizational innovation; innovation management; municipality; descriptive case study; comparative case study; action research; innovation contest

1 Introduction

Hackathon as an innovation management method has spread from its origins within the Information Technology industry to other sectors (Leckart, 2012; Zukin and Papadantonakis, 2017). Hackathons, i.e. one type of innovation contests, have been arranged both in radical (Pe-Than et al., 2019; Teasley et al., 2000) and virtual collocations (Jussila et al., 2021). Radical collocation signifies a situation where the team members located in the same physical space for the duration of the project (Pe-Than et al., 2019; Pe-Than and Herbsleb, 2019; Teasley et al., 2000). In virtual collocation, the integration between the members and teams is usually carried out via information and communication technology (ICT) (Jussila et al., 2021). Both radical and virtual collocations have their benefits and challenges for communication and thus innovation activities. Hackathon has been defined as “A *hackathon* is one type of organized, goal-driven innovation contest, a short time-bounded event with a challenge to be solved creatively in cooperation and collocation of teams, whose results are presented and recognized in a ceremony at the end of the event.” (Halvari et al., 2020) As concept hackathon contains nine necessary and sufficient attributes of 1) organization, 2) short time bounded event, 3) collocation, 4) challenge, 5) ceremony process 6) team, 7) goal, 8) collaboration, and 9) creation process. (Halvari et al., 2020) Due to its attributes a hackathon event has particular design choices (Pe-Than et al., 2019), or design aspects (Medina Angarita and Nolte, 2020), such as duration, goal or theme, focus, which can be dual, e.g. urban-educational, task setting, participants, team formation, and specialized participant tools (Medina Angarita and Nolte, 2020; Pe-Than et al., 2019; Suominen et al., 2019). Medina Angarita and Nolte (2020) discovered that there are research gaps particularly in the hackathon outcome sustainability and in the connections between outcomes and design aspects. Pe-Than et al. (2020) highlight, that hackathons presented in the literature typically exist outside any stable organizational context and bring together people who generally have not worked together or even met each other before. However, there are no descriptive comparative case studies of the design challenges these different collocation types pose for the target organization when hackathons are used for intra-organizational innovation. Particularly, the prolonged Covid-19-situation has demanded organizations to run, not only their daily processes but also development programs in virtual settings. Thus, there is a need to understand which of the proofed benefits of hackathon methodology can be utilized in virtual collocation. Furthermore, there is a demand to realize the modifications hackathon methodology requires when it is carried out in radical versus virtual collocation.

To fill in the research gaps and shortages of comparative descriptive studies, the goal of this paper is to describe and compare the differences in terms of the design elements in hackathons carried out in radical and virtual collocation in an intra-organizational context. Our research question is: “*How does the hackathon design differ in radical collocation compared to a virtual collocation?*”

The article is formulated as follows: First, in the introduction, we give background regarding our research problem and present the research question, second, we briefly describe the aspects of hackathons as methodology, as well as the two collocation types of radical and virtual. Third, we portray the methodological choices we have done for our research. Fourth, we illustrate our research results and fifth we present the conclusions and practical implications together with further research suggestions.

2 Hackathon in radical and virtual collocation

Hackathons in radical and virtual collocation

Hackathons are innovation management methods, more specifically

“hackathon is one type of organized, goal-driven innovation contest, a short time-bounded event with a challenge to be solved creatively in cooperation and collocation of teams, whose results are presented and recognized in a ceremony at the end of the event.” (Halvari et al., 2020)

Hackathons include three main processes: pre-hackathon, event and post-hackathon processes (Pe-Than et al., 2019; Pe-Than and Herbsleb, 2019) (Figure 1). The event itself includes the creation process and celebration process (Halvari et al., 2020). The hackathon creation process includes some of the innovation processes e.g. Identify opportunities, Create concepts, and Validate concepts (ISO, 2020).

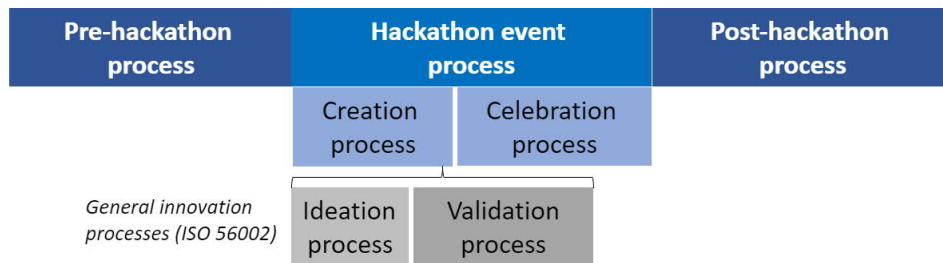


Figure 1 The three-phased hackathon process with its sub-processes

Besides its root domain, i.e. Information Technology, hackathons have been used in multiple domains and other uses besides prototype coding, e.g. education, Smart City development, corporate development etc. (e.g. Jussila et al., 2020; Medina Angarita and Nolte, 2020; Pe-Than et al., 2020; Suominen et al., 2019).

According to Granados and Pareja-Eastaway (2019), theorizing and framing the contributions of hackathons has been minuscule in innovation literature, and hackathons are under-researched in terms of preconditions for innovation. Therefore, they have provided theoretical explanations using two innovation approaches: hackathons are 1) practices that enhance especially exploration activities for innovation purposes, i.e. idea, new knowledge or resource search; 2) a way to enhance some preconditions to innovation, such as attract scarce talent, build on-demand expert communities, and improve motivation or instil a sense of achievement. Pe-Than et al. (2020) highlight, that hackathons presented in the literature typically exist outside any stable organizational context and bring together people who generally have not worked together or even met each other before. Therefore, they have specified a distinct type of hackathon, a corporate hackathon, comprising of people from a specific organization. Thus, the participants share culture, norms, and overall purpose, and may or may not know each other. Hence, the intra-organizational context may influence the participant collaboration both in the hackathon event and post-hackathon phases. Corporate hackathons as intra-organizational hackathons differ from digital innovation contests or open data hackathons both in purpose and activities since corporate hackathons are embedded in an organization.

Halvari et al. (2020) noticed that hackathons are carried out both in radical collocation (i.e. same physical space) as well as in virtual collocation. However, collaborating in physical and virtual spaces create different demands concerning hackathon design, in terms of collaboration via technology, for example. There are only a few case studies regarding intra-organizational or corporate hackathons in virtual collocation. In their study of a virtual educational hackathon in university-industry collaboration, Jussila et al. (2021) emphasized the similarities of hackathons carried out in radical and virtual collocation, yet also the different design aspects, such as technology and facilitation in terms of the success of virtual hackathon. In their literature review of 91 journal and conference papers of hackathons, Medina Angarita and Nolte (2020) discovered that there are research gaps particularly in the hackathon outcome sustainability and in the connections between outcomes and design aspects. The hackathon design aspects include, for example, the duration, goal or theme, team formation, and specialized participant tools. Radical collocation has benefits, such as easy coordination, problem-solving and learning (Teasley et al., 2000). In virtual collocation, the members and teams are usually integrated via information and communication technology (ICT), such as personalized ICT tools, e.g. instant messaging, or collective ICT tools, e.g. shared cloud documents. (Lohikoski et al., 2015; Pawar and Sharifi, 2018)

Communication and collaboration in different collocation types

Inherent to the hackathons creation phase is the aim to benefit from interactive communication and concentrated team collaboration (Halvari et al., 2020), regardless of the method of creation, such as ideation, concept development, coding, piloting etc. Therefore, both communication and collaboration ought to be enabled and supported despite the collocation type. Furthermore, the ceremony phase entails communication of results via pitching and social interaction while announcing and celebrating the contest winners (Halvari et al., 2020).

Communicating and collaborating in virtual collocation requires digital competences from hackathon participants of various roles hackers, coaches, organizers, and audience at diverse levels. Digital competences include a variety of skills (Ilomäki et al., 2016), such as problem-solving, communication and collaboration, and following copyright and licensing rules (Carretero et al., 2017). Thus, developing digital competences also enhances at least some cognitive and non-cognitive skills. Furthermore, digital competences involve the skill of knowledge creation, particularly co-creation (e.g. in the form of digital content creation) (Carretero et al., 2017). As a concept, digital competence is still emerging. It is frequently defined in an unclear manner with meanings that vary depending on different user approaches. (Ilomäki et al., 2016; Spante et al., 2018). In the first version of the Digital Competence Framework, DigComp, Ferrari (2013) defined the concept as follows:

Digital Competence can be broadly defined as the confident, critical and creative use of ICT to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society. Digital competence is a transversal key competence which, as such, enables us to acquire other key competences (e.g. language, mathematics, learning to learn, cultural awareness). It is related to many of the 21st Century skills which should be acquired by all citizens, to ensure their active participation in society and the economy. (Ferrari, 2013, p. 2).

The DigComp framework aimed to provide a tool through which to improve individuals' digital competence (Ferrari et al., 2012). Currently, the basic areas of DigComp include five areas (Table 1): information, communication, content creation, safety, and problem-solving with 21 competences. From a virtual hackathon viewpoint, especially for hackers and coaches, the essential competences for the participants are those from the Competence area 2. Communication and collaboration, especially 2.1 Interacting, 2.2 Sharing, and 2.4. Collaborating through digital technologies. Furthermore, solving technical problems have to be supported through the virtual hackathon process. However, the 1.3. Managing data, information and digital content is also a basic digital competence, that is required while working in virtual collocation. Moreover, for organizers also other digital competences are needed to build an environment with digital technology that supports the various phases of hackathons, such as 3.1 developing digital content, and all Competence area 5 Problem-solving -competences.

Table 1 Summary of DigComp 2.1 Competence areas and competences in two dimensions (Carretero et al., 2017)

<i>Competence areas, Dimension 1</i>	<i>Competences, Dimension 2</i>
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content 1.2 Evaluating data, information and digital content 1.3 Managing data, information and digital content
2. Communication and collaboration	2.1 Interacting through digital technologies 2.2 Sharing through digital technologies 2.3 Engaging in citizenship through digital technologies 2.4 Collaborating through digital technologies To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge 2.5 Netiquette 2.6 Managing digital identity
3. Digital content creation	3.1 Developing digital content 3.2 Integrating and re-elaborating digital content 3.3 Copyright and licences 3.4 Programming
4. Safety	4.1 Protecting devices 4.2 Protecting personal data and privacy 4.3 Protecting health and well-being 4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems 5.2 Identifying needs and technological responses 5.3 Creatively using digital technologies 5.4 Identifying digital competence gaps

Source: DigComp 2.1.

3 Methodology

Systematic innovation management and particularly hackathons as methodology are novel phenomena within organization theory, the principal nature of their studies and therefore nature of this research is exploratory and descriptive (Saunders et al., 2008). That is, that the aim is to discover what a hackathon as a method is and describe how it can be applied in the organization in various situations. Innovation management is part of social science research; therefore, our chosen philosophical program of this study is pragmatism, since as a philosophical program it allows the researcher to use a variety of methods: qualitative, quantitative or mixed methods (Morgan, 2014). Regarding the research approach, this study is a single case study with systematic combining, which is a non-linear, non-positivist, abductive approach to case research (Dubois and Gadde, 2014). The abductive approach is particularly suited for this case study, which is a development process with an unpredictable outcome in the beginning.

Our study aims to further clarify the similarities and differences of hackathon design in terms of the collocation, particularly in the intra-organizational context. The research strategy of the study draws from a combination of intensive case study approach and action research (Eriksson and Kovalainen, 2008). The study is carried out in the case organization (e.g. Siggelkow, 2007) with multiple data collection methods such as surveys, hackathon pre-, event and post-process planning and execution, and with participant team interviews (Eriksson and Kovalainen, 2008) with both physical and virtual participation. As action research, this study is conducted in constant collaboration with the leadership team of the municipality, particularly with its representative member.

Case of Knivsta municipality, Sweden

The case organization under research is a municipal organization in Sweden with a longitudinal three-year project that aims to develop the organization's innovation culture. Project Mosaic stands for "Method for public sector approach for Innovation Culture", which ultimately aims to improve municipal organizations innovation culture by applying hackathon methodology. Mosaic is financed by Sweden's innovation agency Vinnova, The Swedish Energy Agency and The Swedish Research Council Formas. (Smart Built Environment, strategic innovation program). Knivsta municipality situated close to the Stockholm region has been the second-fastest-growing municipalities in Sweden during the 2010s (Sveriges Radio, 2019), and the growth rate will persist for the foreseeable future. Thus, Knivsta has been selected as a case due to its idiosyncrasy (van Maanen et al., 2007): that is its aim to meet the challenges of growth with, for example, innovation management. In this paper, we report as a descriptive comparative study the two intra-organizational hackathon events for employees of multiple municipal services in February and November 2020. Both events, one in radical and one in virtual collocation, have included pre-and post-hackathon phase activities for participants. Furthermore, the case study analysis has been both descriptive and comparative with data and researcher triangulation. To improve the validity of this research, the multidisciplinary research group entails both innovation management and the subject matter experts from the public sector.

4 Results

Both examined hackathons included three hackathon phases of pre-, hackathon event, and post-hackathon (Table 2) with designed activities. The collocation of two hackathons was different: one in radical collocation and another with virtual collocation. The rationale for the virtual collocation of the second hackathon was due to the COVID-19 pandemic in 2020. The participant recruiting and selection was carried out amongst one municipal organization in Sweden, thus the hackathons were national and intra-organizational. The hackathon aimed at utilizing multiple competences and forming multi-disciplinary teams, thus the participants were recruited from all eight municipal offices. Virtual collocation in this context means working in a virtual environment built particularly for hackathon use, i.e. enabling communication and collaboration with the help of digital technology. Hybrid in this context means that some of the participants are in radical collocation, i.e. in the same physical space and others communicating and collaborating in the virtual environment. Mostly the physical space in this context is in municipal house premises.

Table 2 Hackathon activities in each hackathon phase in both case hackathons

<i>Hackathon processes phase</i>	<i>Utilized activities</i>
Pre-hackathon	<ul style="list-style-type: none"> • Theme and criteria.-workshop with MDMG • Half-day training in small (n=8-10) inter-organizational groups for hackers, coaches and jury • 2 Team and ideation -workshop/s
Hackathon event	1-day Hackathon event with creation and ceremony processes
Post-hackathon	<ul style="list-style-type: none"> • Post-Hackathon interviews in teams (1h 45 min – 2 h) • Supported (voluntary) Post-hackathon work on R&D-project in teams

Pre-hackathon phase

The pre-hackathon phase included all the design choices before the event as well as three types of pre-event workshops (Table 3). The design of hackathons was carried out by the Mosaic-project group that included 1–3 municipality employees, two innovation management consultants and one innovation researcher from the university.

The fundamental design choice of a hackathon is the goals. The goals of both Mosaic-hackathon events were defined according to the funder's interest. The hackathon goals, both tangible and intangible, were formulated in the Mosaic-projects project plan by the project group that was created to fit the goals of the funders of innovation capability building in Sweden's municipalities, the target municipality's strategy, and the consulting and research partners' research agenda. The intangible goals were defined as learning, networking, collaboration, and community building of Knivsta municipality internally and with its stakeholders. The first pre-hackathon workshop 'Theme and criteria'-workshop, was carried out for the Knivsta Municipal directors' management group (MDMG). In that workshop, the MDMG formulated two predefined themes: one broad and one focused that fit municipality's strategy. Those themes aimed at tangible goals of

conceptualized ideas that enhance municipal service provision and municipal employees working environment, which both ultimately benefit the municipality’s inhabitants. The Mosaic-project group formulated the innovation evaluation criterion for both hackathons according to MDMG’s workshop input. The participator recruiting was a manager-lead process, where managers suggested potential hacker-participants, yet participation was voluntary. With the first hackathon, the aim was to recruit people with a positive attitude towards unknown processes, and with the second virtual hackathon, the aim was to involve participants that had digital competences, or abilities to acquire them in a short amount of time.

Table 3 Hackathon activities in Pre-hackathon phase

<i>Pre-Hackathon Design</i>	<i>Utilized activities</i>	
	Radical collocation hackathon	Virtual collocation hackathon
Funding	Mosaic-project funding Free of charge for participants	
Organization	Mosaic-project Mosaic-project group of 4	Mosaic-project Mosaic-project group of 6
Goal-setting	Mosaic-project goals: Innovation culture enhancement with hackathon methodology with Tangible and Intangible goals	
Theme and criteria WS	1 with MDMG 9 participants F2F meeting The output of 2 Themes: Broad and focused for contest challenge Contest criteria Go-No Go-criteria	1 with MDMG 9 participants Hybrid, all creation virtual. The output of 2 Themes: Broad and focused for contest challenge Contest criteria Go-No Go-criteria
Participant recruiting	Intra-organizational from 8 municipal offices Manager-led process	Intra-organizational from 8 municipal offices Manager-led process
Training	Length and themes: 4 pcs Hackers, 3h 45 min 1 pcs Coaches, 3h 45 min Jury 2 h	Length and themes: 4 pcs Hackers, 6h 1 pcs Coaches, 6h Jury 115 min
Team and ideation - workshops	2 pcs with • 37 participants (21 pitches) • 30 participants (7 new pitches)	2 pcs with • 21 participants (9 pitches) • 24 participants (13 pitches)

Hackathon training was carried out in small groups for various hackathon roles of hackers, coaches and jury. The training was adjusted for each role group for both hackathon types. With the radical collocation the training were carried out in conference rooms, and with virtual collocation with the combination of Zoom for interaction and Teams with document co-creation. The training included an introduction in the purpose of establishing a common goal for the event, information on innovation and types of innovation, creative methods, hackathon as a method, and information for the upcoming events of ‘Team and ideation’-workshop, as well as hackathon event day. In addition to

the information, the participants practised a few creative thinking methods, such as SCAMPER and Six Thinking Hats. With the virtual hackathon, the training also included digital competence building and exercising the use of the hackathon in an environment built with digital technology in Zoom (2021), an enterprise video communication system, with a cloud platform for video and audio conferencing, chat, and webinars, and Teams (2021), a collaboration app with document organization and interaction. This environment built with digital technology for virtual collocation, i.e. communication, collaboration and co-creation is in this paper referred to as 'virtual environment'. This virtual environment had also stand-by technical support. The training of coaches focused on their coaching role, and training of the MDMG that acted as the jury was directed towards their role as innovation evaluating jury member.

The two 'Team and ideation'-workshops were carried out before the hackathon event for all participants, especially focused on hackers, yet also coaches participated. In other words, the participants were able to meet with other participants before the event and form a level of acquaintance. In those two workshops, the preliminary ideas for the hackathon event were pitched by the hacker participants. The team formation was put into practice by allowing people to enrol to work with their favourite idea. The team formation took a couple of rounds before the teams had the predefined number of hackers of four to six people. In other words, the team formation was carried out organically, thus the multi-disciplinarity of teams was coincidental. The pitching was observed to be a bit easier in radical collocation as people very spontaneously pitched their ideas, seemingly energized by the fellow hackers. However, also the pitches carried out via virtual environment were very proficient. Yet, it might be easier to stay silent while participating in a virtual setting.

Although the numbers of hours put to design and execution of hackathon events are guiding, the design and execution of a virtual hackathon are more time-consuming than one of radical collocation. This likely due to the setting up the virtual environment and training the required digital competence to the participants.

Hackathon event phase

The design choices of the two hackathon events in both radical and virtual collocation are presented in Table 4a,b. There were no drop-offs during the events. Those participants that dropped off, did it after the training or before the event for either medical or workload reasons.

At the core of the hackathon is the communication and collaboration of the hackers during an intense creation process in an innovation contest. The creation process of the hackathon event was guided towards using the creative method of ideation and concept development of ideas, with the preconception that those ideas are potentially further developed in the post-hackathon phase. The MDMG operated also as the jury of the hackathon contest.

Table 4a Hackathon activities in Hackathon Event phase

<i>Hackathon event Design</i>	<i>Utilized activities</i>	
	Radical collocation hackathon	Virtual collocation hackathon
Short time-bounded	1-day Hackathon event from 8-18	1-day virtual Hackathon event from 8-18
Participants	<p><i>40 Intra-organizational participants from 8 municipal offices</i></p> <p>22 Hackers (26 Enrolled), 8 Coaches, 9 Jury members</p> <p>1 external coach (IT-supplier)</p>	<p><i>40 Intra-organizational participants from 8 municipal offices</i></p> <p>21 Hackers (27 Enrolled), 11 Coaches (10 Enrolled), 9 Jury members</p> <p>1 external coach (IT supplier) 1 intra-organizational IT-support</p>
Teams	<p><i>5 teams with 22 Hackers</i></p> <p>4 Teams of 4; 1 Team of 6</p>	<p><i>4 teams with 21 Hackers</i></p> <p>3 Teams of 5; 1 Team of 6</p>
Location	<p><i>Radical collocation</i></p> <p>Municipal house with 6 Meeting rooms and the main meeting hall</p>	<p><i>Virtual collocation</i></p> <p>in Hackathon-specific Zoom with Breakout rooms and Teams with team channels</p>
Challenge by MDMG	<p><i>2 Themes:</i></p> <p><i>Broad:</i> Value creation through digitalization realizing the Vision 2025 work</p> <p><i>Focused:</i> How do we solve the work environment problems in our IT environment?</p>	<p><i>2 Themes:</i></p> <p><i>Broad:</i> Agenda 2030 – municipality and residents together: Strive to involve civil society and volunteer forces in our core missions as part to strengthening the social sustainability</p> <p><i>Focused:</i> Pandemic today – what will it look like tomorrow? Develop Knivsta municipality for tomorrow with lessons learned from the implemented changes, visible challenges, and identified opportunities.</p>
Communication	<p><i>Verbal interaction:</i> F2F</p> <p><i>Written interaction:</i> concrete materials, e.g. paper, post-its, whiteboards, and pens</p>	<p><i>Verbal interaction:</i> Virtual in Zoom with stand-by technical support in place</p> <p><i>Written interaction:</i> Virtual in Teams with documents e.g. Powerpoint, Word, Excel</p>

Table 4b Hackathon activities in Hackathon Event phase

<i>Hackathon event Design</i>	<i>Utilized activities</i>	
	Radical collocation hackathon	Virtual collocation hackathon
Collaboration	<i>Synchronous, continuous</i> collaboration of all participants during the event hours	<i>Synchronous, continuous</i> collaboration of all participants during the event hours
	Support of pre-defined 1 st -hour materials and material package	Support of pre-defined 1 st -hour materials and material package uploaded in Teams
Creation process	<i>Free team creation</i> with scheduled coaching sessions for support	<i>Free team creation</i> with scheduled coaching sessions in Zoom for support
	1st-hour predefined set Material package	1st-hour predefined set Material package in Teams
	Coaches and Scheduled coaching sessions	Coaches and Scheduled coaching sessions in Zoom
Ceremony process	Output 5 Pitches of 180 seconds Social event: Mingle in the municipal house in the main meeting hall Audience	Output 4 Pitches of 180 seconds Social event: Mingle in Zoom General room and Breakout rooms Audience
Contest element	The jury of 9 members Prizes: Not revealed before the event. Jury award: Diploma, Flowers, Non-Alcoholic sparkling wine, participation at “Great day of inspiration”- inspirational conference and dinner together with participants from MDMG Peoples choice: Diploma and flowers	The jury of 9 members Prizes: Not revealed before the event. Jury award: Diploma, Flowers, participation at “Great day of inspiration”-inspirational conference together with participants from MDMG Peoples choice: Diploma and flowers
Hack-ambiance	Food and Coffee breaks Mingle with non-alcoholic beverage and finger food, popcorn Decorations in the municipal house: balloons Swag: Badges with code colours for different participant groups	Pre-delivered snacks Virtual decorations: Digital backgrounds Swag: Badges with code colours for different participant groups Logo Water bottle, Logo pen, Logo lanyard

The communication and collaboration in the first hackathon in radical collocation was carried out in a face-to-face environment. Whereas in the virtual hackathon, the communication was operated in Zoom-application in Breakout rooms and participants were using cameras to enhance their interaction. The collaboration in the virtual environment was set up in Teams by providing team channels for documentation and prepared document formats, such as first-hour task list, and excel-sheets for SCAMPER, thus the participants needed their digital competence to be able to function in the virtual environment. Although the radical collocation was carried out in the municipal house, the participants were advised to disengage themselves from daily routines and colleagues. In the virtual hackathon, the collocation was created via the Zoom general space, team spaces and coaching spaces in Breakout rooms, where the participants were allowed to move according to their desires and schedules. The feeling of synchronic progress was created by scheduled event with times for luncheon, coaching sessions and in the end the collective ceremony process. Particularly in the virtual event when people are in intensive team collaboration constantly online in their “hack-bubble”, the ability to change the virtual location maybe give a mental break, similarly as separate coaching rooms allow people to change the physical space and gear themselves for interaction with other people besides their team.

The hackathon culminates in the ceremony process at the end of the hackathon. In the ceremony, the hacked outcomes are presented i.e. pitched to the other hackers, coaches, audience and of course, for the jury. Pitches in both collocations were impressive, so in that sense, they did not differ much. In the ceremony of radical collocation, the teams were encouraged to pitch without any presentation, although presentations were not forbidden. In the virtual collocation purely speaking is not the most effective way, but there is more need for presentation to support the convey of the pitch message. We noticed that with the virtual event, there was much more audience listening to the pitches online, as the access to the event it easier. However, the mingle at the end of the event is much easier to build festive and celebratory in radical collocation. In a virtual setting, the mingling part is rather a challenge, since people cannot speak effortlessly with multiple people or wander around casually. Yet, in the virtual event various groups did carry out inspiring discussions in their Breakout rooms, but the overall vision of the mingle is not so transparent as it is in radical collocation.

Post-Hackathon phase

The Post-hackathon phase had several pre-determined activities (Table 5). All the participant teams are interviewed and their readiness to continue the development work after the hackathon was inquired. Only one team of the first radical collocation hackathon declined the opportunity for future work. In Go-No Go -meeting the MDMG evaluated all the hackathon outcomes. Both hackathon outcomes were evaluated to be according to the given themes, thus being conforming with the municipality’s strategy. Thus all the team outcome were given a “Go”-evaluation. In addition to the interviews, there was also a survey regarding the hackathon after the event. The survey was directed to participants, but also those colleagues they named being affected by their participation in the hackathon.

Table 5 Hackathon activities in Post-hackathon phase

<i>Post-Hackathon Design</i>	Utilized activities	
	Radical collocation hackathon	Virtual collocation hackathon
Interviews	Post-Hackathon interviews in teams (1h 45 min – 2 h) 7 Hacker Interviews 1 Coach interview	Post-Hackathon interviews in teams (1h 45 min – 2 h) 6 Hacker interviews 2 Coach interviews
Go-No Go-process	MDMG meeting	MDMG meeting
Post-Hackathon Survey	ES-Maker Organization – participants and those colleagues participants named 96/198 (48,5%) respondents	ES-Maker Organization – participants and those colleagues participants named 80/246 (32,5%) respondents
Continuation plan	4 out of 5 teams	4 out of 4 teams
R&D-project	Supported (voluntary) Post-hackathon work on R&D-project in teams Support: • Research project template • Team meetings – virtual since March 2020	Supported (voluntary) Post-hackathon work on R&D-project in teams Support: • Research project template • Team meetings – virtual

Feedback from the participants in post-hackathon interviews

In the post-hackathon interviews, the teams did portray similar types of positive reactions regardless of their collocation type. They illustrated how the event had been exhausting, yet inspiring. Experience for participants and coaches was “a special day”: fun, festive, exceptional, and the participants wanted to be there. The managers recalled an energy boost that the event brought to the participants, which they conveyed to their working environment.

Output: Innovations

Intra-organizational hackathons arranged both collocations: radical and virtual were able to yield the set goals. First, in both hackathons, the teams were able to create and pitch their innovations during the hackathon event. Thus, they comprehended the co-creation of innovation within the hackathon context and were able to communicate to the audience. Therefore, the tangible outcome of ideas was accomplished in both hackathon collocations. Moreover, the training of hackathon yielded also the learning regarding innovation, thus that intangible goal was also accomplished. Moreover, particularly in the virtual hackathon, which requires digital competence, as the participants were able to communicate, collaborate and co-created in the virtual environment, they either possessed the needed digital competences, or they were able to learn them during the hackathon process. Second, the innovations were evaluated by the MDMG mature

enough to get the “GO”-evaluation for further development work. That signifies that the innovations were fit to the given themes, as well as the municipality’s strategy, thus mature enough for development for the municipality’s use. Third, the team building was carried out organically, however, the teams were built multi-disciplinary, which indicates that there were new intra-organizational networks built amongst the eight offices. To sum up, both the hackathons were goal-achieving. However, the virtual hackathon had the demand of certain digital competences for both organizers and participants.

5 Discussion

The results of this paper fill a prominent research gap in hackathon design elements, particularly regarding the two collocation types of radical and virtual. By answering our research question “*How does the hackathon design differ in radical collocation compared to a virtual collocation?*”, this paper makes several contributions to the innovation management theory, particularly regarding hackathons as one type of innovation contests. First, it contributes to the conceptualization of hackathons (cf. (Halvari et al., 2020) by describing the hackathon collocation types of radical and virtual in more detail with a comparative study. Secondly, it contributes to the design elements of intra-organizational hackathons (Medina Angarita and Nolte, 2020; Pe-Than et al., 2020) by bringing new information especially on virtual hackathon design (cf. Jussila et al., 2021). Third, it contributes to the hackathon studies in the municipal organization context since most of the hackathon studies have been conducted outside any stable organizational context. Moreover, most of the intra-organizational hackathon studies and descriptions have been in the corporate context (e.g. Granados and Pareja-Eastaway, 2019; Pe-Than et al., 2020). Yet, public sector organizations have an increasing need to utilize innovation management methods, such as hackathon methodology for their innovation practice and culture development needs.

As the main results of the descriptive comparative study of the design elements of the two intra-organizational hackathon events carried out with 5 (22 participants) and 4 (21 participants) in multi-disciplinary employee teams illustrate, that hackathon with both radical and virtual collocation can be designed quite similarly in intra-organizational setting from the hackathon process viewpoint. However, as in virtual collocation, particularly in the focal creation phase, the communication and collaboration rely on information technology, two fundamental perspectives must be ensued. First, that the virtual environment is functional for all the communication and collaboration participants require to co-create. Second, that the participants possess the digital competences needed to co-create in the virtual environment. The needed digital competence can be accomplished either by recruiting already digitally competent participants or training the participants with the needed digital competences for virtual communication and collaboration. Furthermore, in the virtual environment, technical support must be available.

Particularly communication in virtual collocation is always a challenge, however, using the cameras does enhance the interaction experience. Onboarding the participants is always important in creative processes, yet extremely vital to the outcome of the hackathon event. That is because, dropping off especially in the virtual environment is just one click away, therefore enabling the commitment to the team and organization and engagement in the event by meeting the other participants before the event – even online,

is essential. Moreover, virtual collocation creates challenges for grasping the common view, thus the understanding of the requirements for communication and collaboration should be paid extra attention to while designing virtual events. Even though virtual collocation creates higher complexity, the experiences from the first hackathon event did prepare the project group to pay attention to the communication and collaboration requirements when setting up the environment for the virtual event. Information technology provides possibilities for various communication and collaboration solutions, therefore central is to analyse beforehand what is needed for various types of co-creation in the hackathon.

Our two hackathons in two different collocations did result in similar types of outcomes: both delivered similarly high-quality outcome of innovations that were pitched. The pitching itself was impressive in both types of collocations. However, pitching in the virtual environment may need the presentation to enforce the message to come across just in 180 seconds. The MDMG gave Go-result to all pitched innovation proposals since the outcomes were according to municipal strategy. The experience for participants in both hackathons was that it felt “a special day”: fun, festive, exceptional, participants wanted to be there. There was also high involvement and commitment to both team and organization in the event since there were no drop-offs during the event. The rationale for low drop-off could be due to intra-organizational setting and work-related subjects. Moreover, onboarding with innovation training and in a virtual hackathon with digital competence training was successful. Also, the teams had contact already before the event, which might build solidarity amongst the multi-disciplinary teams. Furthermore, the collocation created a “hack-bubble” in both collocation types as the teams collaborated in the own team room or Breakout room. However, a possibility to have a mental break is also advisable in hackathon design, that is that the hackers can move space during e.g. coaching sessions regardless of the collocation type. The mingle in the ceremony is the high point in physical events, where people can discuss the day in a festive and celebratory manner, yet it is very challenging in virtual collocation. However, having an audience in the virtual event in the evening is much easier, thus that is the forte of virtual hackathons.

Innovation is the key element in any organizational renewal. From the innovation management standpoint, having a clear understanding of the innovation methods, such as the hackathon, is the foundation for innovation output creation. Therefore, the outcome of this research will benefit both academics researching innovation management methods and practitioners organizing and facilitating hackathons. The innovation management theory will benefit from an in-depth analysis of the hackathon concept, its design elements and clarified connections to the sustainability of innovation outputs in different organizational contexts. Additionally, practitioners aiming to enhance the organized innovation processes in their events will gain from this study that presents more detailed hackathon design descriptions of “what works”, especially in different collocation and organization contexts, in e.g. public sector. Specifically, the described case in the public sector context will portray the usefulness of hackathon methodology in municipal administration usage, which is lacking in the literature. All this together will support the development of hackathon methodology, highlighting its potential, which eventually affects the success of the phenomenon and provides the big picture for practitioners that are using or considering touse the hackathon methodology.

References and Notes

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