



 Tallinn, Estonia – Research Lab

Garage48

Hackathons and their
dynamic role in the creative
and cultural industries

Hackathons as an Innovation Tool within the Creative and Cultural Industries

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About Tallinn's Research Lab

[Garage48](#) has over a decade of experience organizing hackathons, workshops, design sprints, and other open innovation programs worldwide.

During that time, we have cultivated a vast community of hackathon enthusiasts - mentors, participants, and partners who keep coming back. Our hackathons pride themselves on having interdisciplinary teams and encouraging social, economic, and professional diversity. Hackathons are also one of the most valuable places for networking— serving as a platform to connect with potential co-founders, team members, and mentors.

All Garage48 events, spanning diverse topics, unite stakeholders from public and private sectors, ensuring optimal outcomes and a holistic approach to post-event support for teams— the organization champions combining traditional fields like woodwork and agriculture with cutting-edge technology, fostering innovative solutions. With 12 years of experience organizing hackathons, Garage48 has evolved from a hackathon organizer to a true ambassador and spokesperson for open-innovation-style events. Along with organizing hackathons and boosting entrepreneurship in different industries on a grassroots level, we are dedicated to sharing the holistic approach of organizing inclusive and nurturing events and educating various stakeholders about the tangible and intangible outcomes of the hackathon.

Since 2020, Garage48 has also worked with researchers from numerous sectors to learn more about the underlying mechanisms that make hackathons work.

CIRCE opened a rare door of collaboration between Garage48's team of professional hackathon organizers with more than a decade of experience and seasoned researchers and their students from Tartu University and Copenhagen University.

We wanted to understand more about the underlying mechanisms of hackathons and their role in CCIs. We believe that the strategic use of hackathons can support the development of entrepreneurship within the CCIs,

The whole research part of our Lab was led by Associate Professor Alexander Nolte (University of Tartu). The technology was developed by Associate Professor Daniel Spikol (University of Copenhagen) and his team of researchers. Connecting the research to the hackathons was led by Mari Hanikat (Garage48) and supported by Kadri Tiisvelt (Garage48) and Kadi Agurauja (Garage48). The research students who helped the whole process were Zaibei Li and Ayano Ohsaki (University of Copenhagen, Denmark, and Karl Rapur (University of Tartu, Estonia).



Photo: Our core team from left to right- Daniel Spikol, Mari Hanikat, Alexander Nolte, Karl Rapur, Ayano Ohsaki, Kadri Tiisvelt, Kadi Agurauja, Zaibei (Eric) Li

Background of the problem development

Since cultural and creative industries (CCIs) use diverse, innovative, and flexible approaches and skills at different levels, they are also well-equipped to adapt to all sorts of new forms of entrepreneurship. CCIs play a vital role in the structural change in Europe – from traditional industry to an economy of knowledge – and are an engine of growth, strategically generating spill-over effects – from innovation to other sectors of the economy. The cultural and creative industries (CCIs) are pivotal in fostering employment opportunities for young people and contribute significantly to job creation across various sectors. These industries cover many different types of jobs and fields that are diverse and unique. Within CCIs, young individuals often find a fertile ground for employment, utilizing their skills and talents across areas such as art, design, music, film, fashion, and technology. The dynamism of these industries allows for the engagement of diverse talents and skill sets, providing a platform for young people to explore and contribute to areas that align with their interests and expertise. Moreover, the interconnected nature of CCIs ensures that job opportunities extend beyond traditional boundaries. From traditional arts and crafts to cutting-edge digital technologies, CCIs bridge the gap between seemingly disparate sectors, fostering a collaborative environment that encourages innovation and cross-disciplinary collaboration.

In recent years, hackathons have surged in popularity, emerging as vibrant platforms for innovation and collaboration. Similar to the collaborative nature of Creative and Cultural Industries (CCIs), these events foster cross-disciplinary teams, uniting individuals with diverse skill sets. Much like the synergistic collaboration within CCIs, hackathons are catalysts for building bridges between disparate sectors, facilitating the convergence of ideas from various domains. Hackathons have become a common place to test new ideas and brainstorm

solutions. Notably, the study conducted by HackerEarth revealed that over 80% of Fortune 100 companies utilize hackathons to drive innovation, with more than 50% organizing recurring events, underscoring their reliability as tools for sustained innovation (HackerEarth, 2017).

The hackathon approach and technology can also be used for better training and education, which can impact the creative industries. Most creative industries involve group work around wicked problems that lack an inherent logic that signals when they are solved (Coyne, R., 2005). The approaches of structuring strategies to solve these problems, like hackathons (e.g., “Empowering Women Ukraine”) coupled with tech, can provide insights and tools to help train people to work with these complex problems.

Our research aimed to understand the science behind hackathons, explore collaboration dynamics, identify unique qualities, and establish best practice guidelines through a blend of experimental and traditional research practices. This experimental collaboration aimed to provide comprehensive insights into the impact of hackathons on entrepreneurship within CCIs.

The sudden surge in the popularity of hackathons

Hackathons have become increasingly popular over the past decade. The Devpost data alone (hackathons organized on the Devpost platform) shows that the number of hackathons grew from 56 in 2013 to 831 in 2020 (Smirnova & Nolte, 2022). During the worldwide lockdown due to the COVID-19 pandemic in March 2020, hackathons faced a sudden surge in popularity and became even more well-known among a wider audience. The rise in the popularity of the hackathons was attributed to several key factors.

The increased interest in digital activities due to pandemic restrictions and a sudden undesired free time that people had prompted a significant shift towards online platforms, including collaborative endeavors. This transition was evident in internet search trends and reflected a growing curiosity about hackathons. Strategic Search Engine Optimization (SEO) techniques ensured hackathons featured prominently in search engine results. Hackathons emerged as relevant and engaging options as people sought information about innovative solutions and collaborative initiatives during the pandemic.

The *#hackthecrisis* movement initiated by Garage48 and AccelerateEstonia in Estonia (Reila, 2020) was pivotal in this trend. This movement, driven by a strong urge to fight against the unique challenges posed by the COVID-19 pandemic, catalyzed widespread engagement in hackathons. More active citizens, who were now locked up in their homes, actively searching for ways to contribute to solutions or participate in creative endeavors, found hackathons attractive platforms for collective problem-solving.

Utilizing social media platforms plays a significant role in disseminating information. Media coverage and the presence of hackathons on online platforms amplified hackathons' visibility even further. News articles, blog posts, and features on reputable channels (CNN Zakaria,

2020; Forbes, Wolcott, 2020, etc.) and publications brought hackathons into mainstream conversations, making them more accessible to a broader audience.

In short, the increased popularity of hackathons in 2020 can be attributed to a combination of factors: the widespread shift towards digital platforms globally, the start of movements like *#hackthecrisis* that encouraged citizen engagement across borders, intelligent marketing strategies and additional free time that people had at their hands. This heightened sense of purpose and collective action further propelled the visibility and appeal of hackathons during this complex period. All these elements worked together to make hackathons more visible and appealing to a broader audience – **the growing popularity of online hackathons became a positive side effect of a worldwide pandemic.**

Problem and our take on it

The rise of the popularity of hackathons during the pandemic introduced several challenges that impacted various aspects of the hackathon landscape. **Below are some of the critical issues that have popped up in recent years and that we find relevant to the CCIs in one way or another.** During our time as Tallinn’s Research Lab within CIRCE, we touched up on all the issues, with the overall mission of understanding the role and impact of the hackathons in boosting entrepreneurship in cultural and creative industries.

#1: Misalignment of Expectations

Background: As a result of some notable success stories, hackathons quickly earned the trust of the public sector and started to be designed into larger, public-sector-funded projects. The public sector was attracted to the premises of fast solutions some of these success stories created. Keywords like “hackathons” started appearing in the titles of the public funding calls—something that rarely took place before 2020. While it was refreshing to see this openness towards crowdsourced innovation, the expectations of the funding partners ‘differed significantly from the actual outcomes that most hackathons produce. This led to funders’ disappointment in hackathons and hackathon organizers and to an overall tarnishing of the reputation of the hackathons. Funding partners anticipate fast and tangible outcomes, such as hackathon teams solving real-life problems within one weekend of hacking and transitioning their projects into real startups after the hackathon. While this can happen, it is more of an exception than the usual case.

Our take: There should be more awareness-creating information and campaigns on why one should organize hackathons and what they are suitable for. More research-based information should support the possible outcomes of the hackathons – both tangible and intangible ones.

#2: Over-emphasis on “tangible outcomes”

Background: Strongly connected to the previous issue of the misalignment of expectations is how different stakeholders measure or perceive the success of the hackathons. The success of the hackathons is often measured by tangible outcomes (Tollerud, Gum Lee, Dillman,

Chounta, & Hanikat, 2023), overlooking the holistic value of hackathons. The strong focus on quantifiable metrics (number of participants, teams, ideas, solutions, amount of funding raised by the teams post-hackathon, etc.) may often overshadow less visible but similarly crucial aspects like skill enhancement, network expansion, and societal impact that come from involving citizens in the collective problem-solving and decision making processes (hackathon programs that foster civic engagement like European Citizens 'Hackathon Championship, Digital Country Hackathon series and so on).

Our take: Further research should explore the multifaceted impacts of hackathons beyond the traditional success metrics.

#3: Common guidelines and best practices on how to organize high-quality hackathons are missing

Background: The hackathon experience for participants significantly depends on how the event is put together. With many new organizers with little or no experience designing open innovation events in an inclusive and nurturing way, the events might have the opposite effect. There is also an added layer of complexity to this problem when one central organization is asked to provide guidance and support to coach new organizations in organizing hackathons. It has been the case for many grassroots-level initiatives (like the *#hackthehack* movement) and a few European Commission-funded programs, such as the Digital Education Hackathon (2018-2025), aiming to support the Digital Education Action Plan (Digital Education Action Plan (2021-2027), n.d.) and European Citizenship Hackathon Championship (2022-2024), organized to support the citizens engagement in collective problem-solving and to valorize the research through citizen's engagement (European Commission Directorate-General for Research and Innovation, 2022).

Whether led by seasoned hackathon organizers or consortia with little to no prior experience in organizing hackathons serving as central coordinators, there is a critical need for universally accepted, research-based guidelines for managing and organizing successful hackathons. The absence of standardized guidelines and a clear definition of what constitutes a high-quality hackathon program also poses challenges for funders. They require assistance in making informed decisions about program design and establishing criteria for selecting winning consortia responsible for organizing hackathons and coaching new organizers. Addressing this gap is essential to ensuring hackathon initiatives' overall success, effectiveness, and desired societal impact.

Our take: There should be standardized, research-based guidelines that provide insights for hackathon organizers on how to design interdisciplinary, gender-balanced, diverse, inclusive, cross-functional hackathon environments that boost the creativity and entrepreneurial thinking of the participants. These guidelines would also provide orientation for funding partners regarding program design and choosing the winners of procurement calls related to hackathons. Some open-source guidelines exist, but they are usually based on the subjective experience of a single organizer and need more scientific reasoning behind them.

#4: Failure to recognize hackathons as the catalyst of entrepreneurship and innovation within the CCI's

Background: Utilizing technology and the hackathon approach has a significant impact on creative industries, particularly in enhancing training and education. Many creative industries involve collaborative efforts to tackle intricate problems known as wicked problems, which lack a clear signal of resolution (Coyne, R., 2005). The accessibility of Collaboration Analytics (CA) has increased with the advent of low-cost, high-performance sensors for research purposes (Blikstein and Worsley, 2016). This accessibility is particularly crucial for investigating collaborative learning within group work, a primary goal in research and education.

However, the process of designing, implementing, and evaluating group work remains intricate and challenging (Martinez-Maldonado et al., 2023). In the context of hackathons, where understanding team dynamics is paramount, the concept of "teaming" plays a central role in group creativity (Falk and Young, 2022). Technologies like Sociometric Wearable Devices (SWDs) offer unobtrusive ways to capture interactions and movements during group activities, providing valuable insights into creative practices.

The collaborative technology initiative with G48, the University of Tartu, and the University of Copenhagen explores how Collaboration Analytics can enhance teams' creativity in hackathon events and other group-work settings. As hackathons are becoming increasingly popular for networking, initiating projects, and validating new ideas, insights into boosting team creativity and creating optimal conditions for creative work can significantly impact Creative and Cultural Industries (CCIs).

Our take: In our pursuit of understanding the underlying mechanisms that contribute to the success of hackathons, we embarked on an in-depth exploration of collaboration dynamics using Collaboration Analytics (CA) devices. Having completed the research with the CA devices and currently interpreting the data, we anticipate valuable insights for hackathon organizers, funding partners, and participants. These insights may include less intrusive mentoring approaches, suggestions for optimal team composition, role division within teams, program design, ideal physical space layouts, and more.

How did we do it?

To maintain the spirit of hackathons of learning through testing and experimenting, we handled our research similarly. To gain deeper insights into how hackathons function, we concentrated on analyzing the collaborative aspects of the hackathons and employed a mix of qualitative and quantitative methods. Collaboration and co-creation are the core elements of hackathons, and our research wanted to shed light on how one can enhance collaboration in both work and education settings.

Our current understanding of how small groups work together during hackathon events is mainly based on observations, interviews, and surveys, offering only a limited view of these

dynamic events. Scaling up to cover numerous groups proves challenging. Additionally, the reliance on individual perceptions raises significant concerns regarding interpretation bias, potentially leading to skewed results that do not accurately represent participant behavior across different phases of an event. Moreover, the extensive time and effort required for data analysis contribute to a reliance on subjective perceptions by organizers to make critical event-related decisions rather than grounding these decisions in factual findings from rigorous research.

To navigate these challenges better, we wanted to design, develop, and test a multi-modal analytics toolkit. We used Internet of Things (IoT) technology that allows real-time or near-real-time tracking of participant activities across varying modalities to develop the mBox system. This system captures human interactions, such as people's movement around the hackathon space, who they work with, and patterns of conversations. mBox is built around intelligent badges that people wear, using technology to recognize other badges and capture with whom and where people spend time working. Additionally, conversation patterns, such as how much people speak each time, are tracked. The badges do not invade personal privacy; they analyze patterns, not individuals.

This innovative toolkit has the potential to support the hackathon organizers during the hackathon by providing and analyzing data in real-time. By enabling real-time support for organizers, including alert mechanisms for potential team disruptions, the system stands to be a transformative solution in enhancing organizational strategies. Furthermore, the insights garnered from such comprehensive data analysis are poised to enrich our understanding of the foundational mechanisms that drive the success of hackathons, laying the groundwork for more informed and effective future iterations of these events.

Figure 1 below visually represents the mBox platform's system architecture, highlighting its modular nature and different components to analyze group collaboration levels using multimodal data.

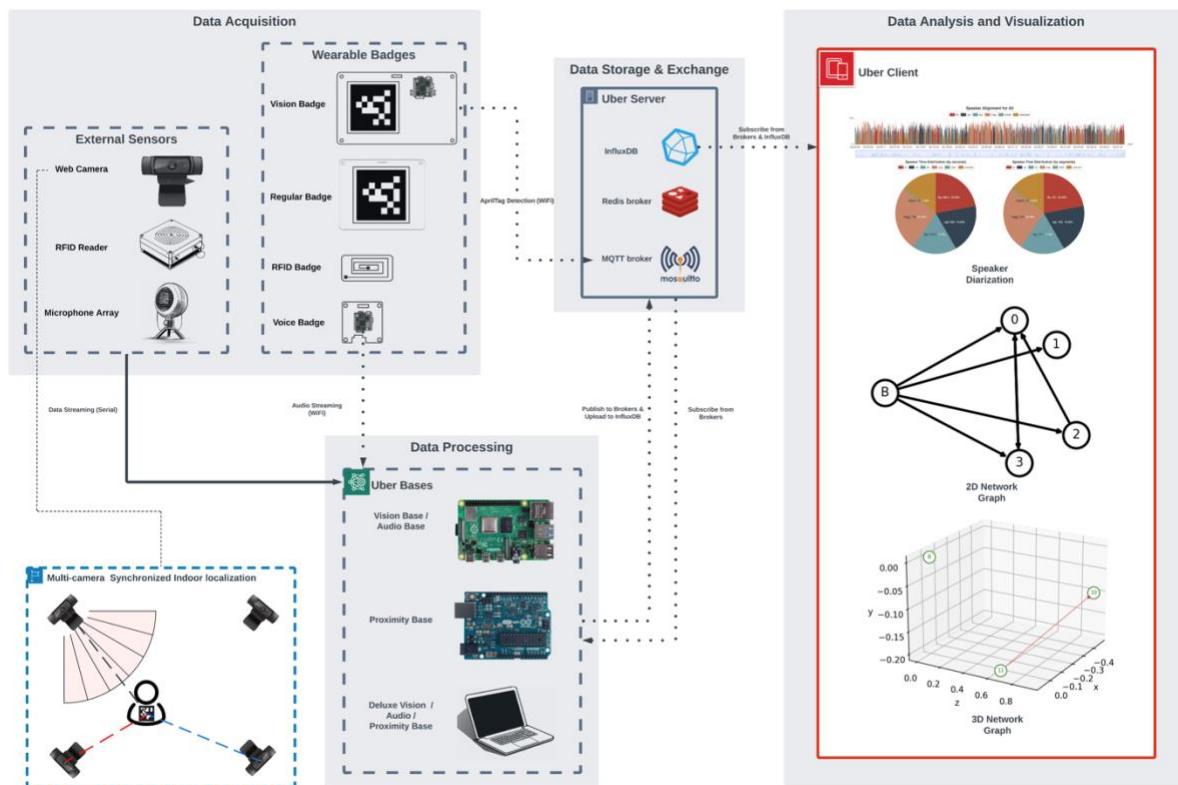


Figure 1: mBox System Architecture. © Daniel Spikol

Individual components of the mBox System are following:

1. Data Acquisition (External Sensors and Wearable Badges)

- The external sensors:

- The web cameras that track the badges through the AprilTags allow the position and the direction of the different people to be captured, plus the unique identity of the badge.
- The RFID system will use passive RFID tags to look at proximity, who is in the space, and where they are located.
- The microphone array allows for audio analysis.

- Wearable Badges

- Vision Badge: Equipped with a Nicla Vision and an AprilTag to do onboard AprilTag detection, aiding in generating the participant network graph.
- Voice Badge: Equipped with a Nicla Vision to stream audio data to the audio base for speaker recognition.
- Regular Badge: Basic badge with AprilTag for location and orientation.
- RFID Badge: Basic badge with RFID tag for proximity.

2. Uber Client (Webpage):

- Depicted as the interface or dashboard of the mBox system.

- Illustrated functionalities include Real-Time Visualization and Post-Time. The visualization shows the system’s capability to offer real-time insights by subscribing to MQTT/Redis topics or InfluxDB and providing retrospective visualization based on archived data.

3. Uber Server:

- Serves as the central backbone for data storage in the system.
- The illustration might denote its functionalities, including Data Storage, utilizing InfluxDB for retaining time-series measurement data, and Data Flow Management, managing data traffic through MQTT and Redis brokers.

4. Data Processing - Base Stations

- The base stations run across different computers, from Raspberry Pi’s to laptops with powerful graphic cards and a single-board microcontroller for the RFID base stations.

We conducted our research using the mBox system on the hackathon “Empowering Women Ukraine. “ In addition, we organized a week-long workshop, Hack the Hackathon Vol 3, that brought together hackathon researchers and organizers from around the globe to gather additional insights on different hackathon-related topics.

[Research during the “Empowering Women Ukraine”](#)

After months of hard work, onboarding the research team, preparing the technology, and getting the research study approved by the University of Tartu Ethics Committee, we were finally ready to kick things off on September 9–10 during the “Empowering Women Ukraine” hackathon. Garage48 has been organizing that program since 2019. The program initially supported the women in eastern Ukraine affected by the Donbas conflict. It evolved into a comprehensive online digitalization support program, extending its reach to internally displaced women in central and eastern Ukraine who are facing vulnerable conditions because of the ongoing war. The event took place at Garage 48 headquarters in the Palo Alto Club in Telliskivi Creative City in Tallinn. Participation in the study was voluntary, i.e., all hackathon participants could choose whether they wanted to participate in the research or not. The Ukrainian research team members (who were there to observe the Ukrainian or Russian-speaking teams), Kateryna and Viktoriia, brought tremendous value to engaging people with the research and collecting consent forms.



Photo: Our team in action – setting up the research for the hackathon weekend. © Andrei Ozdoba

A total of 35 individuals across four teams participated in the research, two of them Russian/Ukrainian-speaking, one English-speaking, and one English/Russian-speaking. Because of the language barrier, researchers were divided into teams according to their language skills. The mentors and the event management team supported the research work throughout the event. The overall goal was to research so that it would not distract or disturb participants in any way.



Photo: Participants at the “Empowering Women Ukraine” wearing the badges. © Andrei Ozdoba

To test out the technology, we researched a team of four people and ran different tests of the technology over five workshops in two days. On the first day, we held three workshops in a space furnished with a rectangular table and stationary chairs. In Workshop 1, both the Vision Badge and Voice Badge were utilized. Workshop 2 involved the Regular Badge and Voice Badge, while Workshop 3 used the Regular Badge and the Microphone Array. Transitioning to day two, we changed the setup to a round table and movable chairs. Workshop 4 incorporated the use of Vision Badges and Audio Badges, and for the final seminar, Regular Badges and Audio Badges were employed.

The technical setup and room setup used on the sessions where the participants were monitored are described in the figure below.

Set Up	Sess. 1	Sess. 2	Sess. 3	Sess. 4	Sess. 5
Devices	5 Vision Badges and 5 Voice Badges	5 Regular Badges and 5 Voice Badges	5 Regular Badges and Jabra Microphone	5 Vision Badges and 5 Voice Badges (no mentor)	5 Regular Badges and 5 Voice Badges
Environment	Square tables, fixed chairs	Square tables, fixed chairs	Square tables, fixed chairs	Round tables, movable chairs	Round tables, movable chairs

Figure 2: The different sessions of group work for the hackathon that show the different equipment setups.

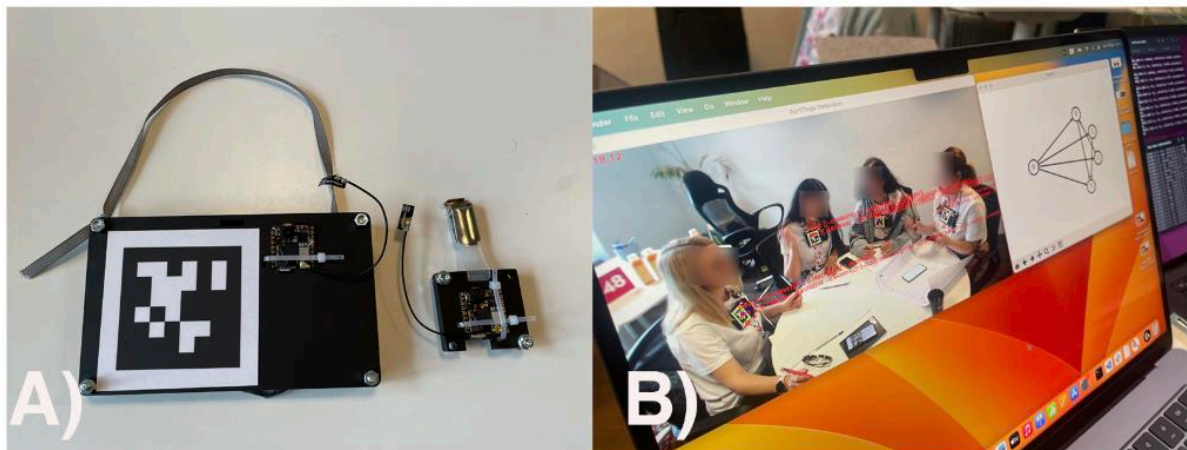


Figure 3: Part A illustrates the vision and audio badges, and Part B shows the participants and the network map of their interactions. © Daniel Spikol

After the hackathon event, interviews were conducted with each research participant to reflect on their personal experiences.

Since the research took place less than two months ago, analysis of the collected data is still ongoing. While a comprehensive presentation of the results in the form of research papers will need more time, some general insights are already emerging:

- **Many details are involved in organizing successful open innovation events.** These details remain unnoticed even by the more experienced hackathon organizers and can be pointed out through external observation. These details might seem small, but they can significantly influence one's hackathon experience (unfortunately, both good and bad). This realization confirmed the need for the "Hackathon Organizers Guidelines" that would collect and share these best practices publicly.
- **Language barriers** during a physical event can interrupt the teamwork and mentoring flow dynamics. If the team cannot communicate with each other, they need a translator who will help them throughout the event. Otherwise, the work might stop entirely when the mentor is not present.
- **Participants like to be in the middle of the buzz.** During the hackathon, there were phases where participants split into smaller groups that worked independently. The participants whose working stations were away from the main area mentioned that they felt isolated and missed out on collaborating seamlessly with other teams.
- **The physical setup of the venue is often more important than we estimate.** The room should be large and open, with some options for secludedness. The best tables for teamwork are round, and chairs should have a swiveling function to allow the participants to communicate with each other more freely. That setup is also better to study the collaboration dynamics with the badges.

- **Mentors act like organizers' ears on the ground.** They are essential in guiding the participants and act as a communication channel between organizers and participants.

- **The mBox system, a multi-modal analytics toolkit, provided a proof of concept for quantitative research on collaboration.** By enabling close to real-time support for organizers through wearable technologies (smart badges) that allow for alert mechanisms for potential team disruptions, the system is a transformative solution for enhancing organizational activities. Furthermore, the insights garnered from data analysis are poised to enrich our understanding of the mechanisms that drive the success of hackathons, laying the groundwork for more informed and effective future iterations of these events. With the research conducted during “Empowering Women Ukraine,” we recognized the potential of the devices, particularly in capturing details that are challenging to discern through mere observation. As hackathon organizers, we believe the system could:
 - o Optimize the mentor’s work and the time they spend on teams, saving the resources of both organizers and mentors and allowing the teams a good balance between the time spent on actual prototyping and the time spent on getting feedback from the mentors.
 - o Help us solve conflicts within teams in real-time before they escalate, and the group splits up or some team members leave the hackathon event feeling unhappy and misunderstood.
 - o Help us distinguish between participants who are serious about participating and those who are chiefly there to have a good time, effectively wasting valuable resources (time, money) that could be spent on motivated participants.
 - o Help us understand which workshops work during the hackathon and which are interrupting.
 - o Help us plan the support activities before the hackathon event better and help us plan the agenda and activities during the hackathon in a way that would benefit the participants most.
 - o Help us understand more about the requirements of the „ideal hackathon venue “and all the details related to the event logistics.
 - o Help us plan the budget for the hackathon program more efficiently by understanding the needs of the participants during the hackathon event.

- **The mBox system is still a prototype and needs further work.** The mBox system is currently in its prototype stage and requires additional refinement. While it effectively captures physical interactions and voice data, several challenges persist, such as data fusion and interpreting the collected data in the context of reality (including people, events, and event intensity). One notable issue is the negative perception of being observed or monitored during events, which the devices must overcome. Further research is essential to unlock the potential of these devices fully for all stakeholders, including students, researchers, participants, hackathon organizers, and funding partners. The device design still requires significant improvement, and the individual

device cost must be lowered for use in more extensive event settings.

Hack the Hackathon Vol3

Expanding on our research undertaken during the “Empowering Women Ukraine,” we recognized the need to address hackathon-related topics by involving a broader spectrum of hackathon organizers and researchers. We wanted to get a variety of perspectives on the challenges we identified in the “*Problem and our take on it*” section, so we organized another round of Hack the Hackathon (HTH).

HTH connects both hackathon organizers and researchers. Many years of experience and research have been put into organizing and studying hackathons, which has led to a lot of helpful information. However, knowledge about motivations and best practices is mainly limited to single domains. A higher-level view of the common motivations, goals, and best practices for hackathons needs to be added.

Understanding hackathons, uncovering their strengths and flaws, and developing means to support organizers, participants, and other stakeholders to successfully prepare, run, and follow up on an event is no task a single community can fulfill.

HTH is the first step in forming a more extensive, cohesive community around hackathons. Its idea is to provide a platform for the exchange and consolidation of best practices, resources for hackathon organizers, and evaluation materials (e.g., surveys and interview scripts). HTH is a hackathon itself, a place where hackathon organizers and researchers can brainstorm on problems and solutions and work on building the prototype. HTH is a highly valued workshop in the hackathon research community. It allows hackathon organizers and researchers to gain valuable insights into best practices and connect with other community members. Ultimately, HTH helps participants improve the quality of the hackathons they organize and participate in.

The third edition of Hack the Hackathon (HTH) took place in Geneva, Switzerland. The previous edition took place in New York, USA, and the first edition was entirely online due to COVID-19 restrictions. HTH started with the rise of the popularity of hackathons and, naturally, with the increased interest in discovering more about these events.

HTH Vol3 was a week-long hybrid event with more than 30 participants on-site and 20 people online from 4 different continents and 12 different countries. It took place in SDG Solution Space, but it had a whole extra day of hacking in the UN Library and topics given by the UN. The teams worked together on the projects tackling rebuilding trust in multilateralism, regaining balance with nature, providing clean energy for all, ensuring the global finance system that delivers for all, digital and data governance, peace, and prevention-enabling equitable, adequate collective security arrangements and anticipatory action-strengthening governance for current and emerging transnational risks. Most projects kept collaboration as the key aspect – like a team planning to hold the UN General Assembly as a hackathon, with designed guidelines for the most effective and democratic decision-making.



Photo: HTH Vol 3 participants hacking away in CERN's Idea Square. ©Mari Hanikat.

HTH's main event produced both brand-new ideas and projects that were the continuation of the previous events. Key projects that were most relevant and contributed to our goals as the Research Lab of Tallinn are described below.

1. [Hackathon Planning Kit](#)

A toolbox for new and experienced hackathon organizers that helps plan a successful event, walking you through the 12 critical fundamental decisions in hackathon design. For each decision, additional information is provided about when the decision should be made, who should be involved in the process, and how to make the choice and implement its result.

The website is a similar take on the "Hackathon Organizers Guidelines" we intended to develop as the Research Lab of Tallinn to tackle issue #4 in the section *Problem and our take on it*. While this is still just a collection of different resources, it could be used as a reference point by different stakeholders on the program design.

2. The Vibe Hive

A platform supporting reflection and slowing down for better hackathons. The team plans to make postcards to create a global community of caring participants & organizers and create surveys to organizers about 'escape spaces' and strategies at their events. While this was a

whole new project, the plan is for the team to continue and test the Vibe Hive out at HTH4 in Fall 2024.

3. [Map of Hackathons](#)

Make a map of hackathons and track the connections between different hackathons. The plans for the future are to put more hackathons on the map and expand the taxonomy to consider nested attributes/more descriptive attributes.

The map could enhance meaningful collaborations between hackathon organizers across the world and, through that, also improve the quality of the hackathons organized. The map could also help to understand the strategic role that the hackathons have on the CCIs once more hackathons from different disciplines are entered into the system (issue #4 in the section *Problem and our take on it*).

4. [Hacktionary](#)

This was a continuing project from the previous edition of HTH, and the overall idea of the project was to collect all the most important terms and phrases about hackathons in one place to create a common language about hackathons that is understandable for practitioners and stakeholders with different backgrounds. That project directly tackled issues #1 and #2 in the section *Problem and our take on it*.

On the one hand, it helps to find a common language that could also be shared with the funding party and describe the possible outcomes of the hackathon and the events that occur before, during, and after it.

On the other hand, it helps to describe hackathons more holistically, softening the emphasis on tangible outcomes and helping to choose words and phrases that are less competitive and aggressive.

5. [Educational Hackathons](#)

The educational hackathon has an intentional educational dimension to amplify learning and the transmission of knowledge. That project tried to shed light on the benefits of using hackathons as an educational tool.

6. [Hack For Everyone](#)

A project keeping diversity in the whole spectrum of the word as a fundamental principle in designing hackathons. The project aims to raise awareness of different groups of people, barriers to entry, and possible solutions for more accessible hackathons.

While not all the hackathon projects continue after the hackathon (one of the biggest stigmas around hackathons!), many still have, creating a long-lasting impact in various domains.

HTH projects have often continued beyond a single event or have been worked on through various events, developing into meaningful applications, websites, or other digital resources researchers and hackathon organizers use globally.

Moreover, every new edition of Hack the Hack is an excellent proof that the hackathon organizers' and researchers' community is growing, showing there is a strong will and incentive to come together and collaborate.

What's in the future?

We still have many exciting things ahead of us as a Research Lab. The first crucial step is to finish analyzing all the data we gathered during the “Empowering Women Ukraine” hackathon. This data comes from multiple sources, including the information collected through badges, observations, and post-hack interviews. We anticipate uncovering more detailed insights and fascinating patterns that align with our mission of educating a broader audience about the fundamental mechanics behind successful hackathons.

We have submitted a research paper about the technology and its development and evaluation, "Field report for PlatformX (blinded): Designing an Open MMLA Platform," for the Learning Analytics and Knowledge 2024 conference (<https://www.solaresearch.org/events/lak/lak24/>).

We have also submitted another paper "Investigating Design Requirements for Collaboration Analytics for Hackathons" to the International Conference on Cooperative and Human Aspects of Software Engineering (CHASE, <https://conf.researchr.org/home/chase-2024>).

One of our research students, Karl Rapur, is finalizing his thesis and plans to turn it into a paper. The goal is to submit it in early 2024 to the Conference on Computer-Supported Cooperative Work and Social Computing (CSCW, <https://cscw.acm.org/2024/>).

Research continues the mBox system's development while we analyze the data collected from the research team. We are putting together the data from the system and the observation team to look for patterns of how people collaborate. This research will enhance our understanding of how people creatively collaborate, allowing for better organization and experience in these events.

We are also happy to share the great news that Alexander Nolte and his team at the University of Tartu have received funding from the Alfred P. Sloan Foundation (USA) to study the sociotechnical preparations for and execution of hybrid hackathons. We expect the insights gained from this work to further enhance participation possibilities in hackathons.

Hack the Hack will continue empowering hackathon organizers and researchers and will be held for the fourth time next year, traveling back to the States. Organizers are currently in the process of putting together the funding proposal for the National Center for Atmospheric Research (NCAR).

Circling back to CIRCE

Within the CIRCE – Creative Impact Research Centre Europe –, we focused on the in-depth study of hackathons with a specific focus on studying collaboration through collective brainstorming and problem-solving to learn more about the processes and conditions that can support creativity. **Hackathons and Creative and Cultural Industries have much in**

common – they foster cross-disciplinary teams and unite individuals with diverse skill sets from different backgrounds. They both work on problems that need creative approaches to be solved. Much like the synergistic collaboration within CCIs, hackathons are catalysts for building bridges between disparate sectors, facilitating the convergence of ideas from various domains. As an organization, on a day-to-day basis, we work with projects from very different backgrounds. Nevertheless, each of them possesses an entrepreneurial spirit, even if the project doesn't necessarily have the potential to evolve into a startup.

Just as we embrace the entrepreneurial dimension, we believe that most projects undertaken by hackathon teams can be categorized as Creative and Cultural Industry (CCI) projects. These projects exhibit a capacity to address complex problems through novel approaches, constructing unconventional solutions that often incorporate highly diverse business models. Consequently, our lab adopts a broad definition of CCIs, encompassing a wide spectrum of businesses and projects characterized by their creativity and novel problem-solving approaches.

With the broad definition and view of CCIs and entrepreneurship, our Lab aimed to gather more insights about the processes and practices that support creativity and collective problem-solving in the cross-disciplinary, collaborative setting. Simply said, **we wanted to find out how hackathons work.**

Research, findings, and further policy suggestions.

Our overall role as a Research Lab focused on studying hackathons and their impact on the Cultural and Creative Industries. It aligned seamlessly with the overarching goals of CIRCE. With its vision to stabilize the CCIs in the long term, the project brought together diverse perspectives and expertise through Research Labs, including our Research Lab in Tallinn.

Even though our time as a Research Lab was too short to finish interpreting the research data results fully, our thematic focus and in-depth approach to understanding the hackathons could have significant importance to the well-being and sustainable future of the creative and cultural industries. Hackathons are already being used as a default tool to find innovative solutions to complex problems, to get diverse perspectives, and to facilitate the creation of cross-disciplinary teams. When used strategically, they could have a much bigger impact. Our policy suggestion:

„The strategic use of hackathons could catalyze entrepreneurship within CCIs, contributing significantly to the structural change in Europe's transition from traditional industries to a knowledge-based economy.“

Conclusion

In conclusion, the collaborative efforts of Garage48 and the research teams from the University of Tartu and the University of Copenhagen, as part of Tallinn's Research Lab, have shed light on the dynamic and impactful role of hackathons in the creative and cultural industries (CCIs). The strategic use of hackathons can catalyze entrepreneurship within CCIs,

contributing significantly to the structural change in Europe's transition from traditional industries to a knowledge-based economy.

The surge in popularity of hackathons, particularly during the COVID-19 pandemic, has brought both opportunities and challenges. Our preliminary research identified key issues such as misalignment of expectations, overemphasizing tangible outcomes, organizational challenges, and the need to recognize hackathons as catalysts for entrepreneurship and innovation within CCIs.

Through a comprehensive approach that combined quantitative and qualitative research practices, including developing the mBox system for Collaboration Analytics (CA), we explored the underlying mechanisms of hackathons. The mBox system, though still a prototype, has shown promising results in capturing collaborative dynamics during hackathon events, providing valuable insights for organizers, participants, and other stakeholders.

Additionally, through organizing events like Hack the Hackathon, we have facilitated the exchange of best practices, resources, and knowledge consolidation among hackathon organizers and researchers globally. The projects initiated during these events, such as the Hackathon Planning Kit, The Vibe Hive, Map of Hackathons, Hacktionary, Educational Hackathons, and Hack for Everyone, demonstrate a commitment to addressing the identified challenges and enhancing the overall quality of hackathons.

We will proceed with further analysis of the data collected during the "Empowering Women Ukraine" hackathon, including the submission of research papers to various conferences. The ongoing development of the mBox system, ongoing collaboration with the research community, and the upcoming fourth edition of Hack the Hackathon highlight our Lab's commitment to advancing understanding and practices related to hackathons.

Through collaboration between seasoned hackathon organizers and experienced researchers, our Lab has contributed to the scientific understanding of hackathons, paving the way for ongoing innovation and improvement within CCIs. We remain dedicated to knowledge-sharing, inclusivity, and fostering creativity in the evolving landscape of open innovation events. We look forward to the future and the continued positive impact we can have in this dynamic field.

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