CHAIN Project
Cooperation for Holistic Agriculture Innovation Nests in Sub-Saharan Africa. Erasmus+ CBHE Project CHAIN – 101082963

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e-Manual on organizing student hackathons

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Cooperation for Holistic Agriculture Innovation Nests in Sub-Saharan Africa

Content

Preface

This e-Manual is a collection of educational materials for teachers who would like to learn how to organize hackathons as a way of important informal entrepreneurial learning and stimulating employment activity for their students. Additionally, the e-Manual helps to find a way to link the organization of hackathons with didactic courses led by academic staff. Particular attention is paid to helping on leading didactic courses for students related to the Food Value Chain (FVC). The e-Manual will cover the following topics: the concept of hackathons, the role of organizers, the role of the jury, the role of competitors, tips, recommendations, useful tools and other issues related to the organization of student hackathons.

This e-Manual is one of the results of CHAIN project carried out under the ERASMUS+ programme and co-financed by the European Union. In detail it is the deliverable (No. D4.10) of Task T4.11 “Creation of e-Manual on organizing student hackatons as a non-formal entrepreneurial learning and employability activity” which is a part of Work Package 4 entitled “Creation of C(ollaborative) H(olistic) A(griculture) I(nnovation) N(ests)” of the CHAIN project.

1. Introduction

The evolving landscape of higher education creates a new space for the integration of innovative teaching methods, such as hackathons, in high school curricula in order to help the transformation into direction of sustainable economy. The Hackathons, traditionally associated with IT experts, are being reimagined to ignite the entrepreneurial spirit within university environment. By embedding the ethos of innovation and collaboration into the higher education institutions, the emergence of a new generation of problem-solvers and innovators is observed.

The hackathons provide various opportunities and significant potential of knowledge increase (Figure 1), amongst them are:

- **Interdisciplinary learning** – the Hackathons encompass a range of subjects from science to art. The challenge might involve designing a sustainable community, requiring students to apply knowledge from environmental science, technology, mathematics, art or social studies.
- **Skill development** – these events are incubators for skills far beyond the academic border. Critical thinking, teamwork, and resilience are honed as students navigate the pressures and challenges of bringing a project to the end within a tight deadline.
- **Inclusivity and diversity** – a conscious effort to include diverse themes and challenges ensures that students from all backgrounds feel needed and represented. An example is a hackathon where students develop games that teach players about different cultures or the view the same thing, but from different perspective.
- **Technology and ethics** – with technology at their fingertips, students learn to balance innovation with ethical considerations. A hackathon focused on creating apps might also address data privacy or prompting discussions on the responsible use of technology, like artificial intelligence (AI).
- **Mentorship and community engagement** – bringing in mentors from various industries enriches the experience, providing students with insights into real-world applications of their projects. A local entrepreneur might guide students through the process of turning a hackathon idea into a viable product.

- **Future-proofing education** – as the digital landscape evolves, so must education. Hackathons prepare students for future careers by exposing them to emerging technologies like AI and machine learning through practical, hands-on projects.

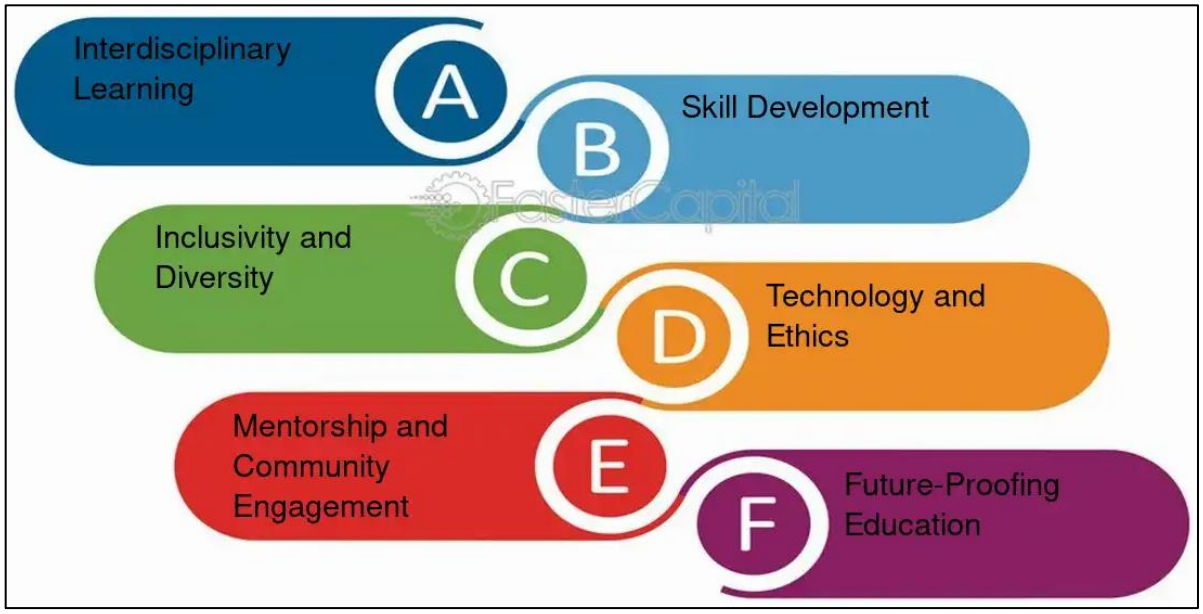

Figure 1. Potential of Hackathons in education system
(based on Fastercapital.com, 2024[1])

Through these multi-faceted experiences, students don't just learn to code or build projects; they become agile thinkers who can adapt to an ever-changing world. This is the potential that underlies the integration of hackathons with education to shape the future of science and entrepreneurship.

[1] Fastercapital.com (2024): Education Hackathons: Driving Growth Through Education Hackathons: Lessons for Startups. Fastercapital.com, updated: 16 Jun 2024. https://fastercapital.com/content/Education-Hackathons--Driving-Growth-Through-Education-Hackathons--Lessons-for-Startups.html#Introduction-to-Education-Hackathons (accessed 24.10.2024).

2. Fundamentals of Hackathon

The term "hackathon" is derived from the phrases "hack" and "marathon," where hack refers to exploratory, creative issue solving with a playful attitude and marathon refers to the event's timeframe.

The concept of a hackathon, or a competition to produce software or a project in a set amount of time, is not new. Hackathons are now widely regarded as one of the most effective ways for developers to hone their abilities, display their expertise, work on a project they care about, and win the hearts of organizations involved in exchange for cash and rewards.

Figure 2. Idea of Hackathon

A hackathon is a one-day event that lasts at least 24 hours and up to 3-4 days. The hackathons have recently grown in popularity. When obtaining appropriate software solutions becomes a top focus, they are highly effective. Hackathon projects can also help to boost professional creativity and self-expression by utilizing the most cutting-edge and cutting-edge technology solutions.

Researchers, professionals, and specialists with technical backgrounds collaborate to produce a unique approach or solution when an idea or an issue arises. Robots, smartphone apps, and web pages are all examples of this technique in action. All students are welcome to participate in the hackathons, particularly those from underserved communities who are more likely to miss out on training and knowledge. Annually, over 1000 hackathons are held all around the world, with private firms hosting ca. 50% of them.

Practical experience and problem-solving are two of the most significant qualities for any engineering graduate to thrive in a career path. Hackathons give a venue for young aspiring engineers to nurture their skills. This is a one-of-a-kind competition in which students work on their creative ideas while also solving real-world industrial difficulties (Figure 2).

A hackathon's intensity and ambiance will not only get your imagination going, but the hands-on approach will also help you learn quicker. There are different types of activities that can help you get involved in the hackathon process (for example see Figure 3). Doing is the best way to understand and learn. What better approach to solve an issue with a group in a defined amount of time (or just do something entertaining) than to work together as a team in a certain period of time?

Figure 3. Activities during the Hackathon

Top hackathon project entries frequently demand the talents of designers, engineers, and people who can plan the business/financial side of things, so it's an excellent location for many people from various disciplines with a common focus on technology to put their expertise into action. Such expertise can, of course, be beneficial to your resume.

Hackathons allow us to easily participate in more risky undertakings. Developers have more leeway to apply alternative ideas and tools/techniques to a problem than they have in the real world. If things don't go well, you have nothing to lose but the reward money.

2.1. Importance of Hackathons

Hackathons are a well-known concept that has evolved to be extremely popular with students, professionals, experts, and other computer enthusiasts for a variety of purposes. Hackathons have numerous advantages, which is why they are so important. The major advantages of such events are as follow:

- healthy work environment,
- add up to your CV,
- interesting way of learning,
- interactions with the developer community,
- develops new technical skills and enhances soft skills,
- experience in turning concepts into actions,
- exposure to various verticals and industries,
- recognition and recommendation,
- improved critical thinking and problem-solving skills,
- igniting the entrepreneurial spirit.

The goal of a hackathon is often to build a working prototype, or proof-of-concept, of a product or feature in a short amount of time, and to have fun, improve skill sets, and network while its realisation.

Hackathons can be focused on a particular theme, technology, or programming language, and can be open to anyone interested in participating, often including developers, designers, product managers, entrepreneurs, intrapreneurs, and project managers, collaborating towards a common goal. Many hackathons are competitive events where teams compete to create the best solution to a problem or set of problems in a fast paced environment.

Typically, mentorship is available for teams as they experiment and iterate towards a viable solution. Each team then presents their solution to a panel of judges for prizes, recognition, and a chance for implementation by the sponsoring company. This can be a fun and exciting way to motivate participants and encourage them to push their limits.

2.2. Types of Hackatons

Many organizations (private and public companies, scientific institutions etc.) may decide to hold the hackathon internally (internal hackathon) or keep it open to the general public or focused participants depending on their goals (external hackathon). Apart from them, a hackathon can be conducted offline (in-person) or online (virtually) (Figure 4).

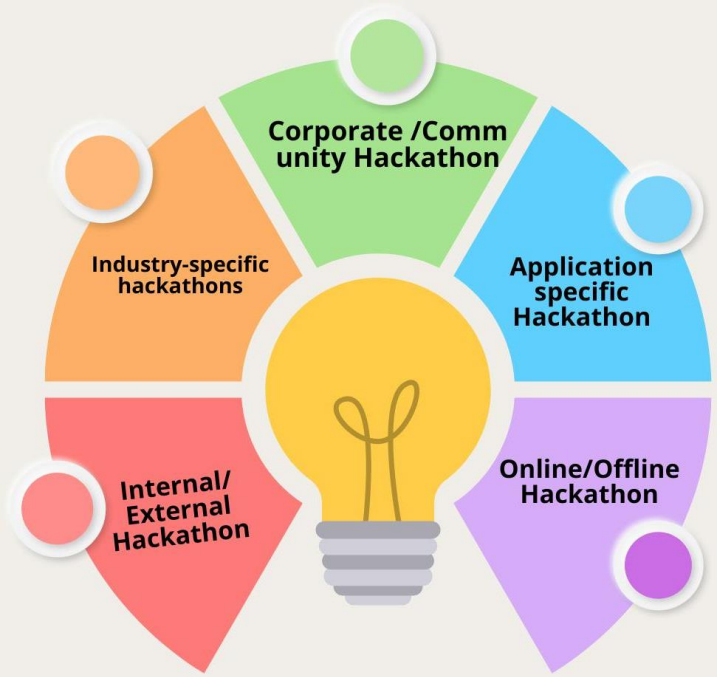

Figure 4. Types of Hackathons (source: Riya Aggarwal, Hack2skill Station, 2022[2])

Internal Hackathon it is an event conducted only for employees. It is an opportunity to engage employees in a time-bound competitive event that drives innovation, promotes skill development, imparts corporate culture, and delivers crowdsourced solutions. Technological leaders like Google, Whirlpool, or Facebook hold internal hackathons to boost new product innovation by their employees. There are many benefits of internal Hackathons, like:

- embrace a creative and innovative environment,
- promote internal networking,
- inclusion and diversity,
- establish a process of unique ideation,
- collaborative innovation,
- foster innovation within your organization.

[2] Riya Aggarwal (2022): What is a Hackathon? A complete guide about Hackathon. Hack2skill Station. Updated Jul 29, 2022: Access online: https://blog.hack2skill.com/what-is-a-hackathon-a-complete-guide-about-hackathon (accessed 19.03.2025).

External hackathons offer a fantastic environment for enlisting the help of outside talent, engaging with a community, and launching open innovation. External hackathon challenges are frequently used to attract new employees, garner media attention, and engage IT communities. External hackathons might need more organization and attention, but they also open up a larger network of communication and interaction with the outside world of innovation-minded people. It helps companies engage with an external audience like a developer community, data scientist community, or even the general/local society. Benefits of external Hackathons include:

- investigating novel technologies,
- promoting commercial innovation,
- procurement of incubator programs,
- potential startup creation,
- brand building for businesses or products,
- developing remedies for societal issues,
- data analysis and prediction,
- rewarding original thought.

Community hackathons are open to anybody with the same vision and a goal of carrying out solutions that can help mitigate the solution of a particular problem statement. It can be held between different communities, organizations etc. Advantages of community Hackathons are as follow:

- networking with people having the same interest as you have,
- got to know more about community work culture,
- helps in learning many interpersonal skills,
- helps in job seeking.

Corporate Hackathon are a fantastic method to motivate teams and foster innovation, teamwork, and creativity. There are over one thousand hackathons organized every year around the world and ca. 50% of them are conducted by private companies. However, a hackathon is still an underutilized tool when it comes to corporate innovation. Benefits of corporate Hackathons are:

- experience with working with other talented people,
- potential breakthrough,
- healthy work environment.

On-line hackathons are used by companies to engage staff concurrently across time zones and geographic boundaries in order to solve problems or spur innovation, as well as to engage a larger number of external audience. They are also employed for coding tasks with a limited scope, which gauge knowledge and proficiency of participants. There are following advantages of on-line Hackathon:

- less overhead costs (venue, transportation, staff),
- larger and more diverse audience (no geographical constraints),
- better quality deliverables, which are more complete, when the challenges run for a longer duration,
- improved chances of success via social media (sharing, reach),
- community creation.

The offline or onsite hackathon invites participants to a real-world location where teams sit down together to brainstorm solutions during the duration of the event. Of all the types of participation, the onsite hackathon challenge obviously requires the greatest preparation and organization. Onsite hackathons need months of organization and flawless execution, from renting a large space to providing meals for every participant, to fostering an environment that fosters ideation and invention.

The majority of the tasks required in setting up an offline hackathon and an online hackathon are identical, although certain organizational activities, including registration, regulations, and advertising, will also have a few distinct subtasks. Participants may be simpler to lead with online than at in-person events.

Industry-specific hackathons are held to promote innovation in sectors with proven technologies and products. Organizations may choose to hold several sorts of hackathons depending on their goals and intended audience. Companies may engage the developer community, foster creativity, create new products, and improve existing products through hackathons.

Finally, there are also application-based hackathons that are focused on certain development platforms, such as operating systems for mobile and desktop devices, game development, etc.

2.3. Results of Hackathon

Depending on the defined goal of the Hackathon, which is subject to thorough evaluation by the jury, the final results may vary (Figure 5). The most common solutions are:

- **APPLICATION SOFTWARE** – it is a type of computer program that performs a specific personal, educational, and business function. Each application is designed to assist end-users in accomplishing a variety of tasks, which may be related to productivity, creativity, or communication.
- **WEBSITE** – it is a place on the internet where you can keep information for others to see. This can be information about yourself, your business, or even topics of your interest. Based on the website category, people can also use them to shop, chat, study, and get entertained.

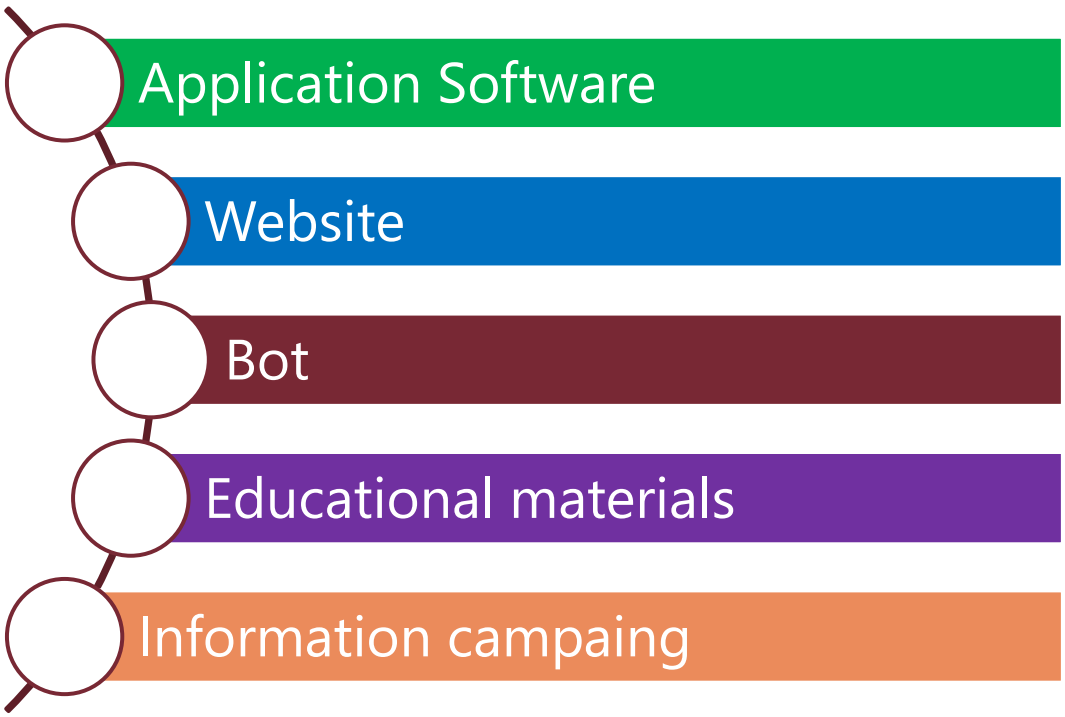

Figure 5. Typical results of hackathon

- **BOT** - it is a software application that is programmed to do certain tasks. Bots are automated, which means they run according to their instructions without a human user needing to manually start them up every time. Bots often imitate or replace a human user's behaviour. Typically they do repetitive tasks, and they can do them much faster than human users could.

- **EDUCATIONAL MATERIALS** can replace or supplement a textbook, enabling the implementation of a curriculum. Educational materials can be in paper or electronic form and are, for example, guides, books, resources shared on the web (e.g. text, infographics, blog, vlog, MOOC).
- **INFORMATION CAMPAIGN** consists of informing a specific group of people about a certain problem (social, ethical, environmental, technical, economic or other) and gaining the support of these people through information, not persuasion. An information campaign helps to notice and publicize, increase awareness of it and gain public support.
- **OTHER PRODUCT** which may be a game, a specific device, the development of a specific instruction manual, etc.

3. Organization of the Hackathon Event

A hackathon typically takes up to several months of planning and several days or weeks after the event to bring it to a close. There are several key stages related to its implementation (Figure 6) that can ultimately decide on the success or failure of the event. Some of the stages may overlap seamlessly in terms of their execution timeline.

Figure 6. The general concept of stages in Hackathon (source: Charvat et al., 2021[3])

3.1. Planning of Hackathon

This stage requires formation of a team that will work on Hackathon throughout its whole process. Having this team it is important to:

- set a goals/challenges of Hackathon (it is crucial in terms of expected results),
- identify key stakeholders (who will contribute to or benefit from the event),
- create a detailed plan (including theme, logistics, location, participant engagement, mentors and judges, sponsors etc.),
- develop a communication plan (issues related to promoting the event, regular updates, and post-hackathon communications to keep stakeholders informed and engaged).

[3] Charvat, K, Bye, BL, Kubickova, H, Zampati, F, Löytty, T, Odhiambo, K, Kamau, K, Anand, S, Kasoma, P, Houël, M, Cherenet, E, Obot, A, Kariuki, F, Kantiza, A, Ssembajwe, R, Njogo, S and Kamau, W. (2021): Capacity Development and Collaboration for Sustainable African Agriculture: Amplification of Impact Through Hackathons. Data Science Journal, 20: 23, pp. 1–12. DOI: https://doi.org/10.5334/dsj-2021-023

A comprehensive plan requires a lot of effort but ensures smooth execution and addresses potential challenges. Different supporting tools can be used to facilitate this stage. During the preparation stage of Hackathon a canvas model (Figure 7) can be used as a guideline to help in organizing and sharing of the task (Figure 8).

Figure 7. The use of canvas in Hackathon organization (source: Hackathoncanvas[4])

[4]The Hackathon Canvas: Hackathons made simple. Your visual tool to organize your hackathons easily. The Hackathon Canvas official website. Access online: www.hackathoncanvas.co (accessed 19.03.2025).

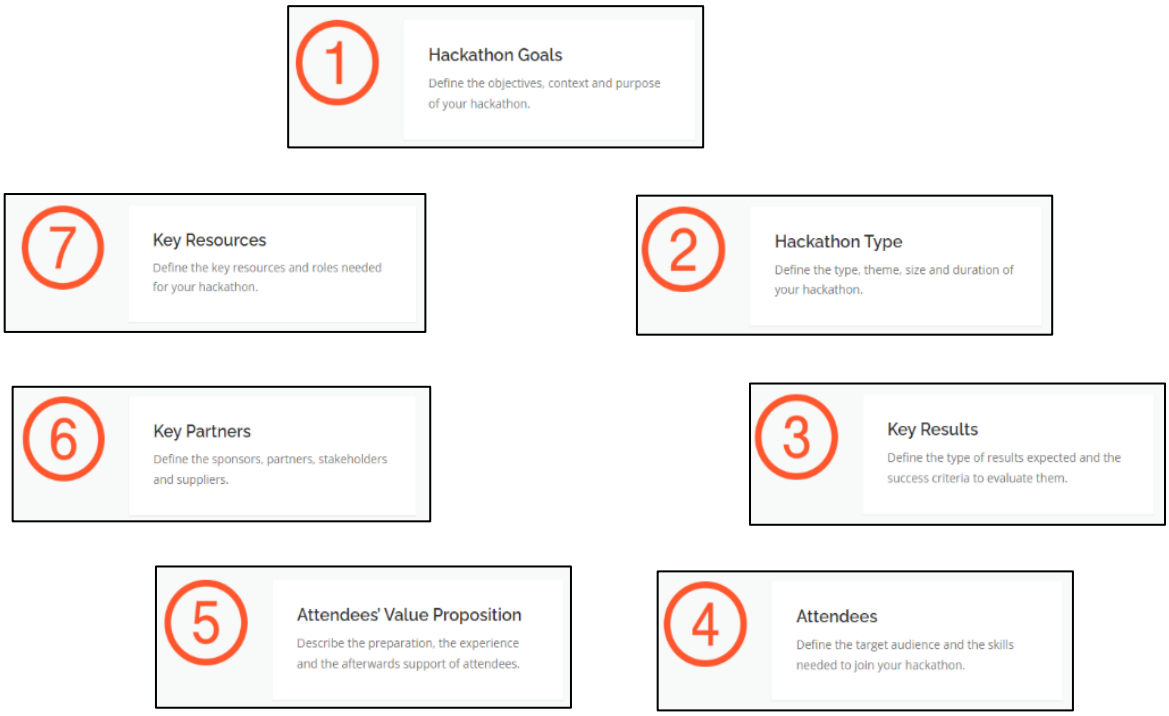

Figure 8. Organizational issues in Hackathon preparation

3.2. Pre-launch of Hackathon

During this stage some activities to announce the hackathon and attract the right participants are required. Participant engagement is good strategy to build excitement and commitment. The attention should be paid on legal compliances, all legal requirements must be met (especially participant agreements, intellectual property considerations, consent form etc.). The participant should be provided with presentation formats and expectations. Finally, the registration process and the agenda need to be solved. The general example of agenda is shown in table 1.

Table 1. The example of agenda for Hackathon

Hackathon AGENDA		
Time	**Activity**	**Leader**
DAY 1		
09.00 – 09.15	Welcome	Organizer
09.15 – 10.00	Hackathon - Introduction	Organizer
10.00 – 10.20	Challenge/topics presentation	Sponsor
10.20 – 10.45	Let's start Hackathon – Teams formation	Participants
10.45 – 11.15	Coffee break	All
11.15 – 13.30	Work in Teams	Participants/Teams
13.30 – 14.15	Lunch	All
14.15 – 16.30	Work in Teams	Participants/Teams
16.30 – 16.45	Coffee break	All
16.45 – 18.30	Work in Teams	Participants/Teams
19.00 - ……..	Dinner	All
DAY 2		
09.00 – 09.15	Welcome	Organizer
09.15 – 11.15	Work in Teams	Participants/Teams
11.15 – 11.30	Coffee break	All
11.30 – 13.30	Work in Teams	Participants/Teams
13.30 – 14.15	Lunch	All
14.15 – 15.45	Work in Teams	Participants/Teams
15.45 – 16.00	Coffee break	All
16.00 – 17.15	Jury – results presentation	Organizer/Jury
17.15 – 18.00	Award ceremony	All
18.00 – 18.30	Closing of the event	Organizer
18.30 – ……	Informal meeting/discussion	Open to all

3.3. Hosting of Hackathon

It is essential to fully supervise the logistical aspects of the event to ensure its smooth running. It is necessary to provide adequate support to participants through the necessary human resources (mentors, specialists, experts, judges) and material resources (event aids).

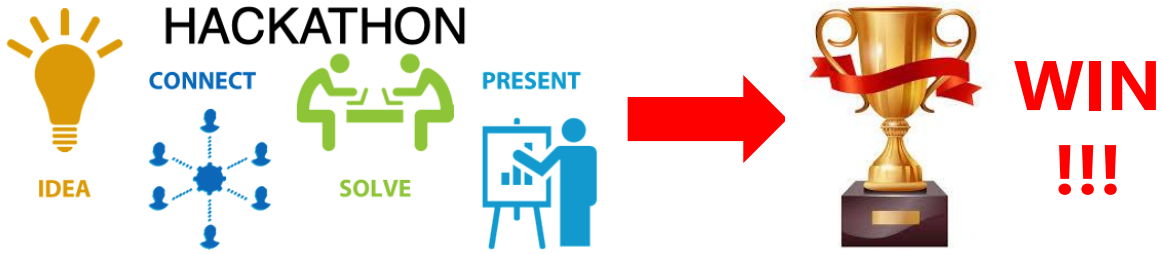

Figure 9. Smooth execution and success of a hackathon

In this stage all main activities taking place: teams formation by participants (often with a mix of skills and expertise), brainstorm and idea generation/pitching, mentorship (mentors and experts provide guidance and support), selection of the best solution via building and refining their ideas, final development of the project, presentation and judging (based on the set evaluating criteria), awards and feedback (winners are announced, and first feedback is provided to all participants) (Figure 9).

3.4. Closing of Hackathon

In general, the stage of "Closing" in a hackathon consists of the following elements:

- showcase implementations,
- awarding winners,
- closing the event,
- sharing and disseminating results,
- conduct a retrospective of an event.

After the hosting part there still some work that have to be done. First of all, the outcomes should be shared (publicize the results and success stories from the hackathon using various communication channels: www, FB, platform X, radio, television, etc.). For future, the performance of some retrospective is recommended. The review of the event to identify successes and areas for improvement will bring more benefits during followed Hackathon.

4. Supporting tools for participants during Hackathon

Participating in a hackathon can be thrilling yet challenging experience, especially for individuals who may not have extensive expertise in digital technologies or coding. The competitive and time-bound nature of hackathons often demands rapid learning and efficient use of resources to create solutions, ranging from simple prototypes to fully functional applications (Figure 10).

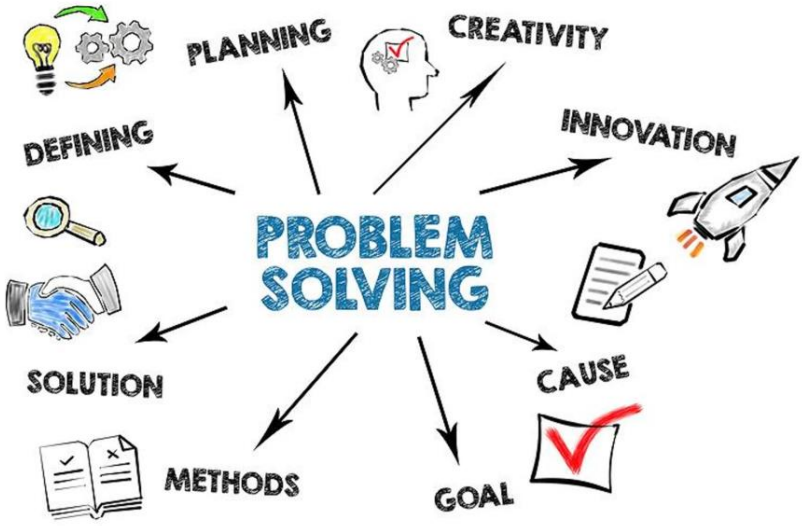

Figure 10. Steps to problem-solving and project development in hackathon
(source: Rutuja Khedekar, 2023)[5]

To bridge this gap, a wide array of tools and methodologies are available to support participants in brainstorming, designing, and developing their projects. These tools are essential for fostering creativity, managing projects effectively, and overcoming technical obstacles. This chapter introduces key supporting tools and approaches that can empower participants to confidently tackle their chosen problem statements, irrespective of their technical skill levels. By leveraging these resources, participants can focus on innovation and problem-solving without being overwhelmed by technical complexities.

[5] Khedekar R. (2023): Problem Solving skills. LinkedIn, 24 March 2023. Access online: https://www.linkedin.com/pulse/problem-solving-skills-rutuja-khedekar/ (accessed 18.03.2025).

4.1. Approaches to Problem-Solving in Hackathon

The journey from identifying a problem to presenting a well-crafted solution in a hackathon involves a series of structured yet creative steps. Each stage plays a crucial role in ensuring that participants move closer to delivering an innovative and impactful prototype or product. The following approaches outline the step-by-step process that teams can adopt to maximize their potential and navigate the hackathon successfully:

1) ***Understanding the problem statement*** before jumping into brainstorming or solution development, participants must first thoroughly understand the problem they are tackling. This involves:
   - breaking down the challenge into smaller components to identify core issues,
   - conducting quick research to gather background information or relevant data,
   - using tools like Miro to map out the problem visually, helping all team members gain clarity.

2) ***Team formation and role allocation*** effective teamwork is at the heart of any successful hackathon project. Teams are typically formed by blending diverse skills and expertise, including coding, design, business strategy, and presentation skills. Key activities in this stage include:
   - assessing the strengths and interests of each member,
   - assigning roles such as developer, designer, researcher, or presenter,
   - setting clear goals and expectations to streamline collaboration and accountability.

3) ***Brainstorming and idea generation*** once the problem is well-understood and the team is ready, brainstorming sessions commence. This is a highly creative phase where participants generate multiple ideas. Key aspects include:
   - encouraging open discussion and recording all ideas using digital whiteboards,
   - evaluating ideas based on feasibility, innovation, and alignment with the problem statement,
   - narrowing down to one or two promising concepts to pursue further.

4) ***Ideation refinement and planning*** with a core idea in hand, the team refines their concept into a detailed plan. This involves:

- identifying the primary objectives and desired outcomes of the solution,
- outlining the functionalities or features of the proposed prototype,
- developing a step-by-step action plan, dividing tasks among team members,
- using tools like Trello for project management to track progress effectively.

5) ***Prototyping and development*** this is the most critical phase where ideas begin to take a tangible shape. Teams create their first prototype or working model using tools like:

- **Figma** for designing user interfaces or mockups,
- **Thunkable** for building mobile app prototypes without extensive coding knowledge,
- iterating and improving the prototype based on immediate testing or feedback. Participants focus on delivering a Minimum Viable Product (MVP) that demonstrates the core functionality of their solution.

6) ***Testing and iteration***, prototypes are tested to identify bugs, inefficiencies, or areas for improvement. This iterative process includes:

- collecting feedback from team members or mentors,
- refining the solution by addressing technical and usability issues,
- enhancing the user experience and ensuring that the solution aligns with the initial problem statement.

7) ***Final presentation preparation***, as the hackathon draws to a close, teams prepare to present their projects to judges. A compelling presentation can make a significant difference in how the solution is received. Key activities include:

- using **Canva** or **Prezi** to create visually engaging slides,
- crafting a concise pitch that highlights the problem, solution, impact, and future scope,
- practicing the presentation to ensure clarity and confidence.

By following these structured approaches, hackathon participants can transform their raw ideas into impactful solutions. The process fosters teamwork, critical thinking, and technical creativity, ensuring that every participant walks away with valuable skills and experiences.

4.2. Tools useful for Hackathon Participants

Key tools useful for hackathon participants can be divided into the following groups:

1) design and prototyping tools,
2) brainstorming and collaboration tools,
3) app development and prototyping tools,
4) research and knowledge tools,
5) presentation tools,
6) project management tools

These all groups are described in more detail below.

Design and prototyping tools are essential for bringing ideas to life during a hackathon. These tools enable participants to visualize their concepts, create user-friendly interfaces, and test the functionality of their solutions without extensive coding. Whether crafting a sleek app design or mapping out user workflows, these resources make it possible to iterate quickly and effectively, ensuring that the end product aligns with the initial vision. By exploiting intuitive platforms, even participants with minimal technical expertise can contribute to the creative and technical aspects of a project. Key tools for hackathon participants for design and prototyping tools are:

a) **Canva**[6]: this software simplifies the creation of visually appealing graphics, presentations, and marketing materials. Ideal for creating presentation slides, infographics, or mockups for showcasing solutions.
b) **Figma**[7]: this software offers collaborative design and prototyping for user interfaces. Suitable for creating app or web interfaces with team collaboration features.

Canva and Figma are powerful tools tailored to different design and prototyping needs. **Canva** simplifies the creation of **visually appealing graphics, presentations, and marketing materials** with an intuitive drag-and-drop interface, making it ideal for beginners or those focusing on quick designs such as infographics, mockups, or presentation slides. **Figma**, on the other hand, is designed specifically for **collaborative design and prototyping**, offering advanced features for creating **app or web interfaces** with real-time teamwork capabilities. **Figma's focus on interactive prototypes and UI/UX design sets it apart**, while

[6] More about CANVA tool on websites: https://www.canva.com/en/ ; https://www.canva.com/fr_fr/ (accessed 20.03.2025).
[7] More about FIGMA tool on the website: https://www.figma.com/ (accessed 20.03.2025).

Canva is more accessible for non-designers needing visually polished outputs. Depending on your requirements, Canva is perfect for simple and impactful visuals, while Figma is essential for detailed, team-oriented interface design projects.

Useful **tools for brainstorming and collaboration** are:

a) **Miro[8]:** a digital whiteboard for brainstorming, mind mapping, and planning. Great for ideation sessions, creating workflows, and organizing team tasks.

b) **FigJam[9]:** a digital whiteboard tool that supports team collaboration and brainstorming. Great for ideation sessions, creating workflows, and organizing team tasks. Additional features: sticky notes, drawing tools, and the ability to share boards in real-time.

Miro and FigJam are digital whiteboard tools designed for brainstorming, planning, and team collaboration. Both are excellent for ideation sessions, workflow creation, and task organization. While **Miro** offers **extensive features for diverse planning needs**, **FigJam** adds **sticky notes, drawing tools, and the ability to share boards in real-time**, making it particularly intuitive for collaborative use. These differences allow teams to choose a tool based on their specific collaboration and brainstorming requirements.

It is worth mentioning that FigJam is one of the alternative tools recommended for people who previously used Jamboard by Google[10], which has been discontinued and is no longer supported by Google.

Examples of **tools for app development and prototyping** are:

a) **Thunkable[11]**: a visual coding platform for building mobile apps without extensive coding knowledge. Perfect for beginners to prototype mobile apps using drag-and-drop coding blocks.

b) **Adalo[12]**: a drag-and-drop platform for building mobile and web apps with interactive features and database integration. Perfect for beginners to prototype mobile and web apps.

c) **Glide[13]**: a webtool which enable creation of mobile apps from spreadsheets like Google Sheets. Instant app creation from data, customization options, and easy sharing.

[8] More about MIRO tool on the official website: https://miro.com/ (accessed 20.03.2025).
[9] More about FigJam tool on the official website: https://www.figma.com/figjam/ (accessed 20.03.2025).
[10] For more on the easy transition from Jamboard to FigJam, visit: https://www.figma.com/figjam/jamboard-alternative/ (accessed 20.03.2025).
[11] More about THUNKABLE tool on the official website: https://thunkable.com/ (accessed 20.03.2025).
[12] More about ADALO tool on the official website: https://www.adalo.com (accessed 20.03.2025).

Thunkable, Adalo, and Glide offer versatile solutions for app development and prototyping, catering to participants with varying levels of technical expertise. **Thunkable** excels in simplifying mobile app creation with its intuitive drag-and-drop coding blocks, making it ideal for beginners. **Adalo** provides more flexibility for building both mobile and web apps, especially for projects requiring database integration. **Glide**, on the other hand, is perfect for creating data-driven mobile apps directly from spreadsheets, offering instant deployment and easy sharing. Choosing the right tool depends on the scope and complexity of your app idea, as well as your team's familiarity with coding and data management.

Research and knowledge tools useful for hackathon participants can be:

a) **Google Scholar**[14]: provides access to scholarly articles and research papers. Helps participants gather insights or validate problem statements with existing research.
b) **PubMed**[15]: a free resource for accessing biomedical and life sciences research articles. Useful for teams working on healthcare-related solutions to gather medical data and research insights.
c) **ResearchGate**[16]: a platform to connect with researchers and access millions of research publications. Great for exploring niche academic studies or collaborating with researchers.

Choosing the right tool depends on the domain of your hackathon project and the type of resources or collaboration you need. Use these tools strategically to support data-driven innovation and robust problem-solving.

Presentation tools useful for hackathon participants can be:

a) **Prezi**[17]: enables the creation of dynamic and visually engaging presentations. Suitable for pitching project ideas to judges in a compelling way.
b) **Canva**[18]**:** simplifies the creation of visually appealing designs, including presentations, social media posts, posters, and infographics. Perfect for creating polished presentation slides, team branding, and visual storytelling to impress judges.
c) **Microsoft PowerPoint**[19]: a versatile tool for creating structured and professional presentations with robust design, animation, and formatting options. Ideal for delivering formal project pitches with detailed layouts and advanced media integration.

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[13] More about GLIDE tool on the official website: https://www.glideapps.com (accessed 20.03.2025).
[14] Google Scholar search engine available at: https://scholar.google.com/ (accessed 20.03.2025).
[15] PubMed search engine available at: https://pubmed.ncbi.nlm.nih.gov/ (accessed 20.03.2025).
[16] Research Gate available at: https://www.researchgate.net/ (accessed 20.03.2025).
[17] Prezi available at: https://prezi.com/ (accessed 20.03.2025).
[18] Canva available at: https://www.canva.com/en/ ; https://www.canva.com/fr_fr/ (accessed 20.03.2025).

Canva, PowerPoint, and Prezi each offer unique features catering to different presentation needs. **Canva** is ideal for creating visually engaging and quick designs, including presentations, posters, and infographics, with an intuitive drag-and-drop interface suitable for beginners. **PowerPoint** excels in **creating structured, detail-oriented presentations** with advanced functionalities like animations, transitions, and multimedia integration, making it better suited for formal and feature-rich pitches. **Prezi**, on the other hand, focuses on **dynamic, non-linear presentations**, allowing users to create **interactive, zoomable storytelling experiences** that captivate audiences. **Prezi's simplicity** in creating **engaging**, free-flowing narratives sets it apart, though it requires a slight learning curve compared to Canva's straightforward design process. Depending on your hackathon needs, Canva is the go-to for impactful visuals, PowerPoint for formal professional presentations, and Prezi for innovative, story-driven pitches.

Project Management Tools for hackathon participants:

a) **Trello[20]:** a webtool that organizes tasks using boards, lists, and cards. Helps teams track progress, assign roles, and stay on schedule.
b) **Asana[21]**: enables organizing tasks, tracking progress, and facilitating collaboration. Helps teams plan workflows, set deadlines, and ensure accountability.
c) **Airtable[22]**: a spreadsheet-database hybrid tool that allows for task tracking, collaboration, and data organization. Ideal for managing tasks with a data-centric approach, such as timelines and resource allocation.

Trello is perfect for **visual simplicity**, making it great for straightforward task management. **Asana** provides **structured workflows** and is ideal for **detailed project tracking** and team collaboration. **Airtable** offers **advanced data organization** and is suited for projects that require **resource management and custom data handling**. Teams should choose based on the complexity and nature of their hackathon tasks.

[19] More about Microsoft PowerPoint at: https://www.microsoft.com/en/microsoft-365/powerpoint?market=af (accessed 20.03.2025).
[20] Trello available at: https://trello.com/en (in English) or https://trello.com/fr (in French) (accessed 20.03.2025).
[21] Asana available at: https://asana.com (in English) or https://asana.com/fr (in French) (accessed 20.03.2025).
[22] Airtable available at: https://www.airtable.com/ (accessed 20.03.2025).

Table 2. Summary about tools for Hackathon success

Category	Tool	Features	Best for	Access (Free/ Paid)	Direct Link
Brainstorming & Collaboration	Miro	Digital whiteboard for brainstorming, mind mapping, and planning. Extensive features for diverse planning needs.	Teams requiring advanced planning tools for ideation and workflows.	Free with premium features.	https://miro.com
Brainstorming & Collaboration	FigJam	Digital whiteboard with sticky notes, drawing tools, and real-time sharing for intuitive collaboration.	Simple, real-time collaboration and brainstorming sessions.	Free with a Google account.	https://www.figma.com/figjam/
App Development & Prototyping	Thunkable	Visual coding platform for building mobile apps using drag-and-drop blocks.	Beginners needing an easy-to-use tool for mobile app prototyping.	Free with optional paid plans.	https://www.thunkable.com
App Development & Prototyping	Adalo	Drag-and-drop tool for mobile and web app creation with database integration.	Teams requiring flexible mobile and web app development.	Free with optional premium plans.	https://www.adalo.com
App Development & Prototyping	Glide	Instantly creates data-driven mobile apps from spreadsheets like Google Sheets.	Projects needing quick, data-centric mobile app development.	Free with optional premium features.	https://www.gliideapps.com
Research & Knowledge	Google Scholar	Provides access to scholarly articles and research papers.	Validating problem statements and gaining general research insights.	Free.	https://scholar.google.com
Research & Knowledge	PubMed	Free resource for biomedical and life sciences research articles.	Healthcare-related solutions needing reliable medical data.	Free.	https://pubmed.ncbi.nlm.nih.gov/
Research & Knowledge	ResearchGate	Connects researchers and provides access to niche academic studies.	Exploring specific fields and collaborating with researchers.	Free with optional premium features.	https://www.researchgate.net

Category	Tool	Features	Best for	Access (Free/ Paid)	Direct Link
Presentation	Prezi	Enables dynamic, non-linear presentations with interactive, zoomable storytelling.	Innovative, story-driven project pitches.	Free basic plan with premium options.	https://prezi.com
Presentation	Canva	Simplifies visually appealing designs for presentations, posters, and infographics.	Quick, polished visuals for impactful storytelling.	Free with optional premium features.	https://www.canva.com
Presentation	PowerPoint	Offers structured, professional presentations with advanced animation and multimedia features.	Formal and feature-rich project presentations.	Part of Microsoft Office (free online version available).	https://www.microsoft.com/en-us/microsoft-365/powerpoint
Project Management	Trello	Organizes tasks using boards, lists, and cards for visual simplicity.	Simple, straightforward task management.	Free with optional premium features.	https://trello.com
Project Management	Asana	Enables structured workflows, task tracking, and collaboration with deadlines and progress insights.	Teams needing detailed project tracking and collaboration.	Free basic plan; premium features available.	https://asana.com
Project Management	Airtable	Combines task tracking with database-style functionality for resource management and custom data handling.	Complex, resource-heavy projects requiring advanced data organization.	Free plan; premium features available.	https://airtable.com

By integrating these tools and approaches (see Table 2) into the hackathon workflow, participants can navigate challenges effectively, unlock their creative potential, and bring their ideas to life. These resources are designed to democratize innovation, ensuring that every participant, regardless of technical expertise, has the opportunity to contribute meaningfully to the competition.

5. Mentors and Judges in Hackathon

Hackathon can be focused on a particular theme, technology, or programming language, and can be open to anyone interested in participating and collaborating towards a common goal. Many hackathons are competitive events where teams compete to create the best solution to a problem or set of problems in a fast paced environment.

The presence of experienced mentors and sharp judges is crucial. They bring the essential knowledge and critical perspective needed to guide teams toward innovations that are not only imaginative but also feasible and market-ready. Mentors act as navigators, guiding participants through different areas of creativity and practicality. They are the people who help analyze the collected ideas, providing feedback that shapes emerging concepts into refined prototypes.

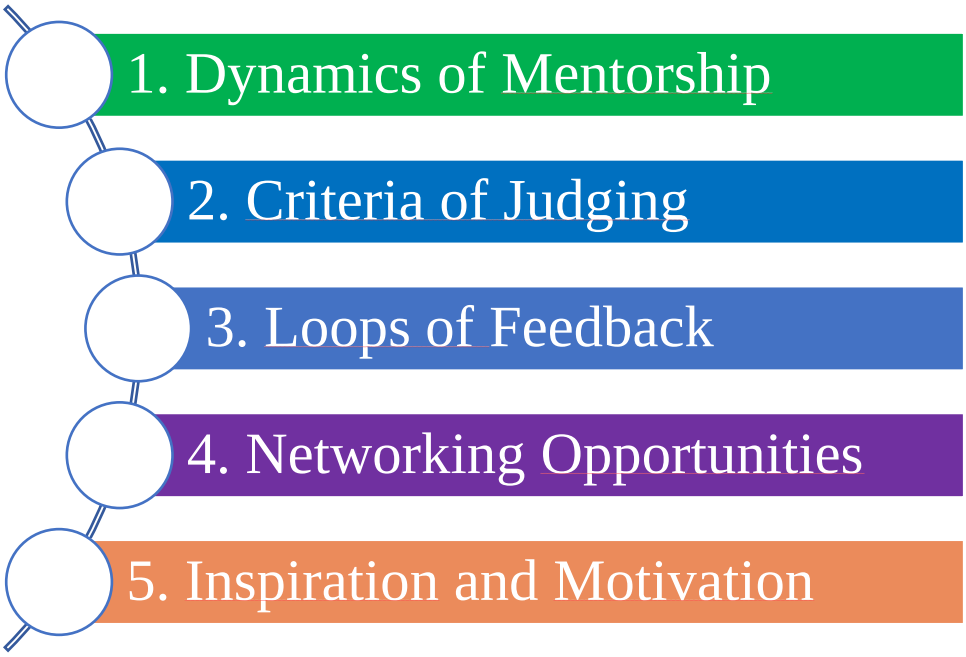

Figure 11. The engagement of mentors and judge during Hackathon

During a hackathon, teams can benefit from mentoring (if necessary), specific types of assistance to keep them focused on their idea and defined problem as they experiment and iterate toward a viable solution. The mentors can huddle around the team tables, rotate through the schedule, or stand at the hot-desk to answer any questions during live events. They are the glue that keeps teams together and focused, and can make a big difference between completing a project or failing. The primary responsibility of mentors is to motivate and help participants come up with new ideas and take new actions (Figure 11).

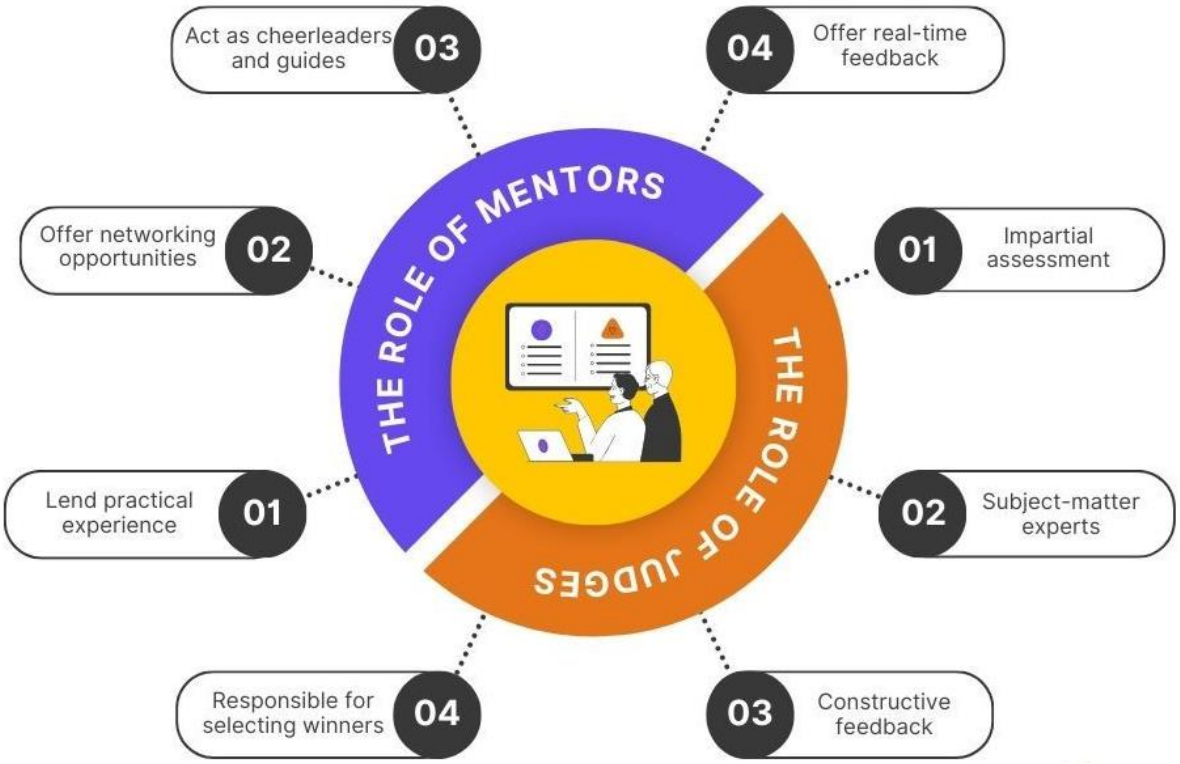

Figure 12. The role of mentors and judges in the Hackathon (source: Unstop[23])

Each team then presents their solution to a panel of judges for prizes, recognition, and a chance for implementation by the sponsoring company. The judges are responsible for an evaluation of the solution and indication of the winner (Figure 12). This can be a fun and exciting way to motivate participants and encourage them to push their limits.

5.1. The role and tasks of Mentors

A mentor is a person with some authority, experience, and wisdom that participants can rely on to develop their hackathon ideas. Depending on the structure and purpose of the event, mentoring can be vertical and/or horizontal. If a mentor is assigned to individual teams (one mentor works with only one team), this relationship is called vertical mentoring. This technique is usually used when all mentors have similar skills and experience. This model is also particularly effective for managing large-scale hackathons with ample mentor resources. In the case of the mentor being able to work with all teams, when any team at any time during the hackathon can contact him, this is horizontal mentoring. This model is used when mentors

[23] Unstop: How To Judge A Hackathon? It Needs More Than Just Technical Expertise. Unstop.com Blog. Access online: https://unstop.com/blog/how-to-judge-a-hackathon (accessed 26.03.2025).

have multidisciplinary and heterogeneous skills. To ensure effective utilization of their expertise, clear guidelines should outline each mentor's skills and how teams can connect with them. In both cases, hackathon mentors are tasked with leading the team towards victory. Their role is to mentor the team to improve their ideas, increase their skills, and help solve potential problems (if any). Mixed mentoring is also possible, it is a combination of vertical and horizontal mentoring. Mentors are both assigned to a specific team (or teams) and can also be available for the rest of the participants. Furthermore, the mentors can help to connect the participant to additional resources (tutorials, blogs, documents, etc.) that they can read on their own time if there is a specific problem or interest area. A mentor can usually be:

- senior tech professionals,
- managers,
- chief technology,
- information officers,
- founders of startup companies,
- business strategists.

Based on the expertise field of the mentors, they can provide valuable insights on either technical or non-technical skills. Mentors who are experts in business strategy can assist teams in tweaking their products to become more appealing to the business sector. Tech professionals can aid teams in solving technical problems in their projects. The IT officer can improve the functioning of the app designed by a team during the event. Startup founders can help teams improve their originality and design to gain the interest of potential investors and consumers.

Mentors participating in the Hackathon can be selected from:

- Internal resources (usually directly brought by the company organizing the hackathon, these are people in middle management positions),
- External resources (usually experts in the same fields of the proposed hackathon challenges, for example: scientists, senior software developers, or professors).

Finding the right hackathon mentor for your team is very important, as it can help you achieve a better solution and increase your chances of winning. **The most important qualities that the hackathon mentor should have are**[24]:

1) **To be an expert in their field**. Mentors must be able to provide their teams with the best advice and help. In addition, the mentor should be aligned with the team's vision (the project goal, target group, etc.). The mentor's vast experience can help the team gain knowledge that is not acquired by reading only textbooks or scientific and industry publications. Similarly, mentors can help teams generate more ideas to help the project. They can draw solutions from their experience in the field and help teams effectively delegate their tasks before, during and after the hackathon event. Most importantly, mentors are able to see the bigger picture. When teams go off track, mentors must be able to turn the situation around and help them refocus on the goal.
2) **Communicativeness**. Communication is key during a hackathon. Communication both between team members and between the team and mentors leads to better working relationships. Although mentors usually go around hackathon events leading several teams, your team must have a channel of communication with mentors. Apart from having an open channel of communication, mentors should also know how to communicate with the team. This is an essential quality of a mentor. There should be an easy flow of information and exchange of ideas between team members and mentors. Fluent communication will help convey the message quickly and clearly and is one of the best foundations for teamwork and collaboration.
3) **Encouraging and motivating attitude**. An important quality that a mentor should have is the ability to encourage the team. Mentoring is not only about passing on knowledge and experience. The ability to encourage and build the team's confidence in their skills is also key. The best mentors should know what their team is capable of and confirm their confidence in difficult moments of doubt.
4) **The ability to lead**. Mentors lead teams to improve their projects. Good mentors have the ability to lead their team without crossing boundaries. They are aligned with the team's purpose while also being aware that it is a team project and they are there only to lead them. In the case of horizontal mentoring, teams should communicate with several mentors to lead them throughout the event. Mentors must have the sensitivity and sense to step back when they are not needed. Teams will receive advice and suggestions from

[24] Hanni M.R.: The Role Of Mentors At A Hackathon. Eventornado Blog. Access online: https://eventornado.com/ (accessed 20.11.2024).

each mentor and will need a lot of time to process the information and apply it to their project. The best mentors lead their teams but also know their boundaries within the project. It is also worth emphasizing that mentors (experienced educators and industry professionals) are not only guides, but also catalysts transforming often raw ideas into innovative solutions or strong foundations for establishing startups. Their role goes beyond traditional teaching, becoming a bridge connecting academic concepts with real-world applications. Hence, their role during the Hackathon is important and often contributes to (figure 13):

- **facilitating idea generation**. Educators and professionals stimulate creativity of participants by introducing them to brainstorming techniques. For example, a mentor can use the PBL (Problem Based Learning), DT (Design Thinking) or SCAMPER (Substitute, Combine, Adapt, Modify, Put to another use, Eliminate, Reverse) method to help teams reformulate problems and discover innovative solutions.
- **development of technical skills**. Professionals bring practical knowledge, developing necessary skills in the team, such as coding, design thinking and project management. An example is a software developer who supports and teaches participants how to use professional tools (Scratch, Tynker, etc.) to turn ideas into a usable and functional product.

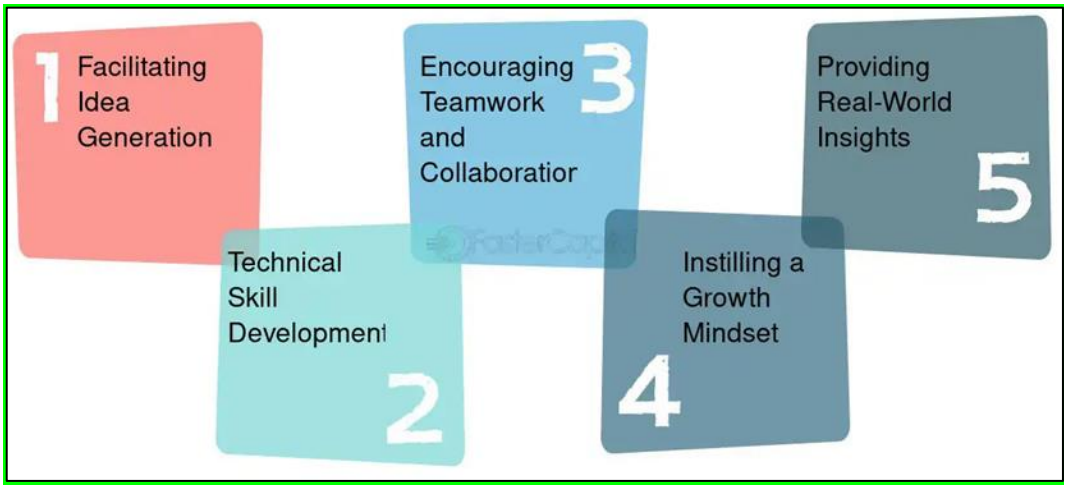

Figure 13. The role of mentors, professionals and educators (source: Fastercapital.com[25])

- **encouraging teamwork and collaboration**. Mentors emphasize the importance of teamwork, showing students how different perspectives lead to better and more mature ideas. They can organize group activities that encourage collaboration, such as a mini-challenge where teams must combine their ideas to solve a complex problem.

[25] Fastercapital.com. Access online: www.fastercapital.com (accessed 30.10.2024).

- **instilling a growth mindset**. By sharing their own experiences of trial and error, mentors help students understand that failure is part of the learning and improvement process. For example, an entrepreneur can share the story of how their startup/company was founded, highlighting the setbacks and difficulties they had to face and overcome on the way to success.
- **providing insights from the functioning of the business in practice**. Industry professionals help understand the entrepreneur's realism or real needs that allow them to turn an idea into a business. They can lead a session on understanding the market, customer needs, and the product iteration process based on feedback. Through these multi-faceted roles, mentors set the stage for students to grow from enthusiastic participants to young entrepreneurs equipped with the skills and mindset needed to address market challenges.

Some selected tips on good mentoring that can be taken into account, are as follow:

- check in on teams regularly (at least twice a day). Participants feel more connected and noticed when they get social communications. But don't be too present and micromanage. It's ok to not be needed too. In events where concepts are generated from scratch, technical or specialized assistance may not be requested until the event's final hours.
- encourage the teams, encourage their enthusiasm, and don't squash their ideas, no matter how bizarre they may appear. And don't push your own ideas on them. Try to lift their spirits when they're short on energy or otherwise stuck. With them, celebrate both great and little victories.
- offer to put their prototype to the test. If they're willing, do it a lot. But don't put pressure on them to interrupt development and create a build to test.
- instead of forcing feedback on a team, ask if they want to meet at a specified time.
- saying they have a poor idea is never a good idea. If they have one poor idea and the mentor suggests it is awful, they will have a hard time bringing new ideas forward. First, a mentor should inquire as to how they came up with the concept, and then compliment the portions they enjoy.

Effective mentoring is what motivates teams to transform ideas into real-world solutions. However, mentoring can be complex, therefore in some case it is a good idea to give the mentors a guide that includes questions to ask the teams, how to troubleshoot, and beneficial

starter tools/resources to boost the quality of the mentors. Some helpful hints are presented in table 3.

Table 3. Hints to improve mentoring during Hackathon

Issue	Comment
Do some prep work	A good practise is to do some prep work before Hackathon. Mentors might be very skilled with very good knowledge in their field but not in the particular business sector of the topic of the Hackathon. It happens that teams get trapped in their heads. In such cases mentor helps them get unstuck by showing them how other organizations handle comparable difficulties. Although the teams should undertake the work themselves, they don't always know what to look for or where to search. Similarly, a well prepared mentor should come with handy help.
Make sure everyone is working together	Sometimes teams might need help in distribution of roles. Members of teams have very often different backgrounds, own set of skills, expertise, and goals. A mentor can be the one to help participants find the right roles for themselves and make sure everyone is on the same page.
Do not do the work of the team	Even if a mentor is an expert in what they do, they can only understand the situation from their perspective. But when it comes to mentoring, the most important talent they can have is the ability to ask the right questions. Because the mentor is an expert, many teams want their mentors to provide them with ready-made answers. It’s important to remember, however, that the role of a mentor is not to provide solutions, but to help the team develop them. So, a mentor should avoid offering them rigid answers at all costs, instead, assist them in coming up with their own solutions. The mentor's ultimate purpose is to assist the team in making their internal judgments.
Be present	Mentors should be present as much as possible and check in on teams regularly as they might be too shy to ask themselves. But make sure you are not disrupting their work when you're not really needed. If a mentor can't be present all the time then it's a good practice to let the teams know how and when they can be contacted. Alternatively, the event organizers can set a time frame when teams are being mentored during the day.
Encourage and praise	Teams can feel confused, disoriented, and unsure of their abilities when they’re looking for answers to problems. The mentor’s job is to help move teams out of ambiguity and uncertainty by offering them new perspectives on how to handle difficult situations. A big part of mentoring is providing constructive and useful feedback in a stimulating way. Things move faster and more smoothly when teams feel guided and supported. This helps keep morale high.
Expertise does matter	Mentors often come from different sectors of the industry, offering both broad and deep insights. For example, a mentor with a background in software development can help the team optimize their code, while a marketing expert can advise on user acquisition strategies.

5.2. The role and tasks of Judges in Hackathon

Hackathon judges play a critical role in the success of any hackathon event. It is essential to ensure that the judges are selected based on their expertise and experience and that they are provided with the necessary guidance and support to make informed evaluations. Even more, judges with the right competences ensure fair and informed evaluations. When selecting judges, it is important to consider their professional background, technical expertise, educational qualifications, such as a scientific degree and experience in the specific domain or industry that the Hackathon is focused on. For example, if your Hackathon is focused on agriculture innovation, you may want to consider judges with expertise in agro sector, food value chain domain, agricultural devices, sustainable agriculture or agro IT. It is also important to ensure that judges are diverse and represent a variety of perspectives. This can help to mitigate unconscious bias and ensure that evaluations are fair and inclusive. Finally, according to the Hackathon idea and rules, the final result/product of Hackathon should be usually characterized by:

- a large impact,
- an implementation plan,
- a visible output,
- solution to the existing problem.

With the judges on board, the next important step is to develop appropriate criteria for evaluating the projects. Here are some **examples of hackathon goals and objectives that organisers could use as a starting point for crafting judging criteria:**

- **Encourage innovation and creativity**. Judging criteria could focus on the originality and creativity of the project, the potential for disruption in the market, and the level of risk taken in developing the idea.
- **Foster collaboration**. Judging criteria could consider the level of collaboration between team members, the quality of the team's communication, and the degree to which the team incorporated feedback from mentors and other participants.
- **Potential impact**. Evidence of addressing a real-world problem or need, potential to make a meaningful difference in people's lives, potential to disrupt the status quo.
- **Support entrepreneurship**. Judging criteria could focus on the potential for commercial viability, the feasibility of the business model, and the potential for scalability.

- **Promote education and learning**. Judging criteria could consider the level of learning demonstrated by the participants, the application of new technologies, and the ability of the project to inspire and educate others.
- **Address social or environmental challenges**. Judging criteria could focus on the impact of the project on the community or environment, the degree to which the project addresses a pressing social or environmental challenge, and the potential for scalability and sustainability.
- **Execution**. Quality of the user interface (or other result of the Hackathon), design and aesthetics, functionality and ease of use.
- **Presentation**. Quality of the pitch, clarity of the presentation, effective use of visual aids and storytelling.

In figure 14 there are some indicators that should be taken into account considering the evaluation criteria for judges.

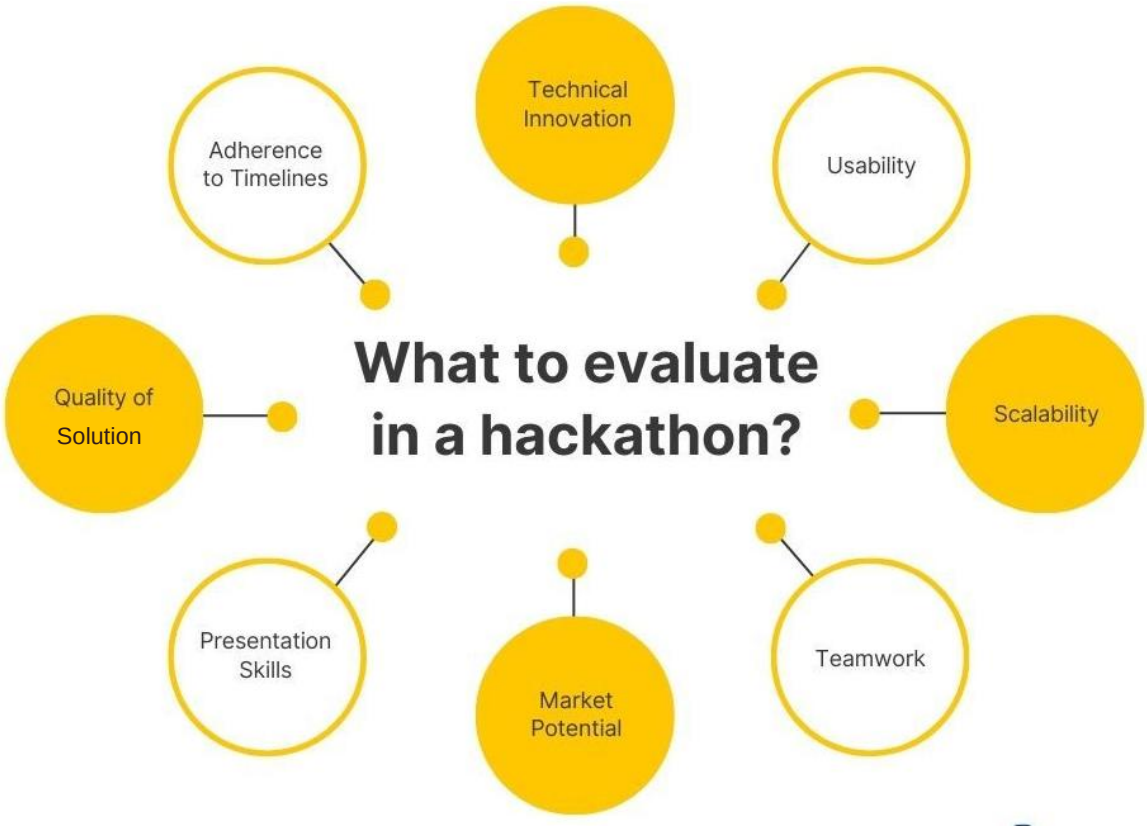

Figure 14. The issues evaluated in the Hackathon (source: Unstop.com[26])

[26] Unstop.com. Access online: www.unstop.com (accessed 30.10.2024).

Hackathons often involve teams working on projects in different stages of development. Some teams may have fully functional prototypes, while others may only have a rough idea. Judges should not penalize teams for not having a fully functional prototype. Judges should look for potential in the idea and the team's ability to execute the project. This may present a challenge for judges, who must evaluate projects that may be in vastly different stages of development.

One approach to addressing this challenge is to break down the evaluation criteria into stages, with different criteria being used for projects at different stages of development. For example, projects in the ideation stage may be evaluated based on the creativity and potential impact of their ideas, while projects with prototypes may be evaluated on technical complexity and functionality.

Another approach is to have different categories or tracks for projects at different stages of development. For instance, a hackathon might have a category for early-stage ideas and a separate category for more developed prototypes. This ensures that projects are evaluated against similar criteria and have an equal chance of winning based on their stage of development.

By developing appropriate evaluation criteria and categories for each stage, judges can ensure that all teams have an equal opportunity to win, regardless of the stage of development of their project.

5.3. Evaluation Criteria in Hackathon

Identifying the goals and objectives of the event is the first step in crafting effective judging criteria that are relevant and meaningful to the participants, judges, and organisers. When judging criteria are in line with the goals and objectives of the Hackathon, it is easier to evaluate the success of the event and determine the winners. Moreover, aligning judging criteria with event goals and objectives also promotes transparency and fairness in the judging process.

When developing criteria, attention should also be paid to the weight or significance of a given indicator in the assessment of the entire solution. Depending on the final goal, the weight of individual criteria may be the same (Figure 15), or different (Table 4).

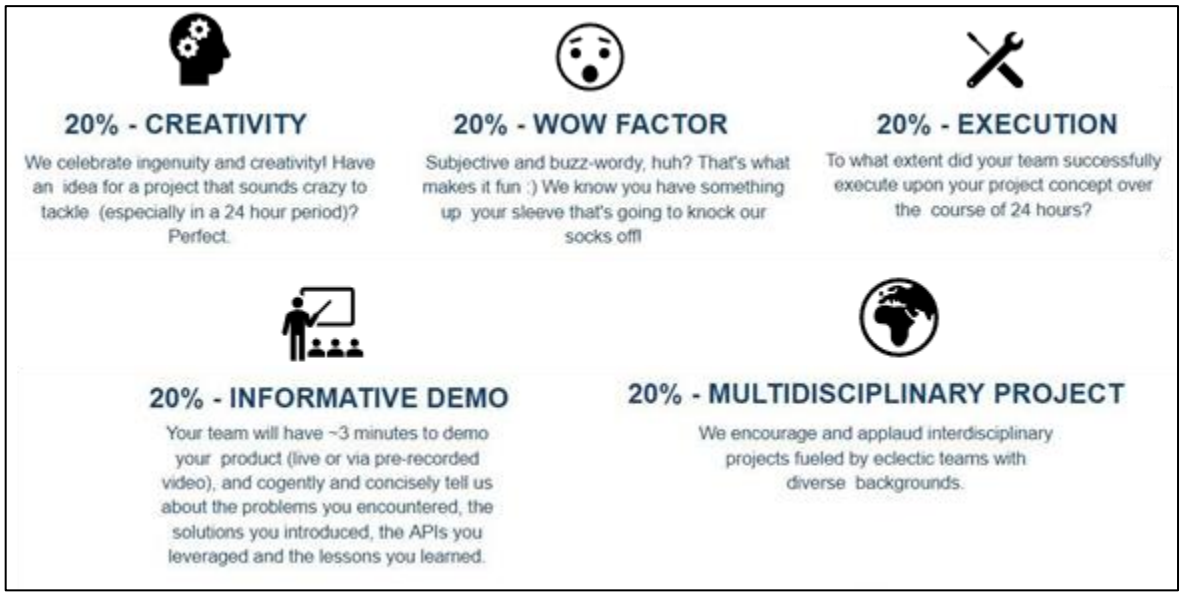

Figure 15. Example of the impact of a given criterion on the final assessment of the project (source: based on HVTechFest[27] and GitHub[28])

Table 4. Examples of hackathons with different weighted evaluation criteria

Hackathon	Criteria used during evaluation
www.hackny.org	Technical Achievement (40%): The complexity and quality of the code, as well as the use of relevant technologies. Creativity (30%): The originality and inventiveness of the project. Practicality (30%): The usefulness and potential impact of the project.
www.healthtech-hackathon.devpost.com	Significance (40%): The potential impact of the project on healthcare. Feasibility (30%): The likelihood of the project being successfully implemented in the real world. Innovation (20%): The originality and inventiveness of the project. Technical Quality (10%): The quality of the code and technical implementation.
www.techcrunch.com/events/tc-disrupt-2024	Potential (40%): The commercial potential of the project. Execution (30%): The quality of the implementation and user experience. Creativity (20%): The originality and inventiveness of the project. Impact (10%): The potential impact of the project on society.

[27] HVTechFest,com. HVTechFest, Tech-Driven Economic Development. Access online: www.hvtechfest.com (accessed 29.10.2024).
[28] GitHub, Center for Global Data Visualisation. Access online: www.cgdv.github.io (accessed 29.10.2024).

Selected criteria can also be evaluated using a point scale (Table 5), which is added up at the end to determine the winner.

Table 5. Project evaluation point scale (source: CSUS[29])

Key Attributes		Score
Idea	Did the proposal address the problem statement and theme?	/ 10
	Was the idea innovative?	/ 10
Implementation	Does the solution work? Did the team achieve everything they wanted?	/ 10
	How technically challenging/impressive was the implementation?	/ 10
Design	Did the team put thought into the user experience? How well designed is the interface?	/ 10
Presentation	Does the presentation clearly define and address the problem statement?	/ 10
Total		/ 60

The evaluation criteria can be placed in a elaborated table (printed later on paper), accessed on tablet or in any other electronic form. The example is shown in Table 6.

Table 6. Evaluation criteria for a jury (each category rated from 1 to 5 points)

Evaluation criteria	Team 1	Team 2	Team 3	Team 4
1. Food waste prevention potential				
2. Adequacy of the solution to the existing problem				
3. Chances for implementation in practice (costs, effort, impact range)				
4. Impact range (local, national, global)				
5. Importance for the user (client, quest, inhabitant etc.)				
6. Presentation and appearance				
7. Overall impression				
Total				

[29] CSUS, CalgaryHacks. The University of Calgary's Computer Science Undergraduate Societies (CSUS) website Access online: www.calgaryhacks.ca (accessed 30.10.2024).

There are many different rating scales that organizers can use for hackathon judging. The examples of more general and descriptive criteria are presented in Table 7.

Table 7. Examples of descriptive criteria

Indicator	Description of note
Example 1: Technical Complexity	**Excellent**: The project demonstrates a high level of technical complexity and sophistication, and it is likely to be very difficult to replicate or improve upon. **Good**: The project demonstrates a moderate level of technical complexity and sophistication, and it is likely to be moderately difficult to replicate or improve upon. **Average**: The project demonstrates a basic level of technical complexity and sophistication, and it is likely to be relatively easy to replicate or improve upon. **Poor**: The project demonstrates little or no technical complexity or sophistication, and it is likely to be very easy to replicate or improve upon.
Example 2: User-Centered Design	**Excellent**: The project demonstrates a deep understanding of user needs and preferences, and it has been designed to meet those needs in a user-friendly and intuitive way. **Good**: The project demonstrates a basic understanding of user needs and preferences, and it has been designed to meet those needs in a generally user-friendly way. **Average**: The project demonstrates some consideration of user needs and preferences, but it may not be particularly user-friendly or intuitive. **Poor**: The project does not appear to have considered user needs or preferences, or it is poorly designed and difficult to use.
Example 3: Social Impact	**Excellent**: The project has the potential to make a significant positive impact on a particular social issue or population, and it is likely to be sustainable and scalable. **Good**: The project has the potential to make a moderate positive impact on a particular social issue or population, and it may be sustainable and scalable. **Average**: The project has the potential to make a small positive impact on a particular social issue

One of the biggest challenges in developing hackathon judging criteria is balancing technical skills with innovation and creativity. While technical skill is important, hackathons are often focused on creating new and innovative solutions to problems. Therefore, the

judging criteria must take into account both the technical skill of the participants and the innovation and creativity of their solutions. Moreover, Hackathons often focus on specific topics or themes, such as social impact, education, agriculture, energy or health. Judging criteria for these events must take into account the specific focus of the hackathon. For example, a hackathon focused on social impact may prioritise solutions that have the potential to make a significant positive impact on society, while a hackathon focused on education may prioritise solutions that are designed to improve the learning experience for students.

Developing a rating scale is important because it helps ensure that judging is fair and consistent. Without a proper rating scale, judges may use different criteria to evaluate projects, or they may have different interpretations of the same criteria. This can lead to inconsistent evaluations, unfortunate mistakes, and it may result in some projects being unfairly disadvantaged or advantaged. Moreover, a rating scale also helps ensure all projects are evaluated using the same standard. This is important because Hackathon projects can vary widely in terms of complexity, creativity, and potential impact. By providing judges with a rating scale, organizers can ensure that all projects are evaluated based on the same criteria and that no project is unfairly advantaged or disadvantaged due to its particular strengths or weaknesses. Examples of such criteria are shown in Table 8.

Table 8. Examples of rating criteria (source: AIGOLEARNING[30])

	Underachieving	Average	Proficient	Exceptional
Creativity	The program seems boring and basic. It doesn't fit the theme at all	The project has minimal designs and fits the theme.	The project has 3-5 special features and fits the theme in multiple ways	The project has an interesting design and fits the theme in an unexpected way
Code	The project doesn't work and there are critical errors with the project	The project works and the design is decent. There are lots of bugs but no major errors	The project works smoothly. There are some bugs but they don't affect the project	The project works smoothly. Everything is well designed and there are little to no bugs
Presentation	The group only shows how the project without explaining the coding logic	The group can explain the project and coding logic using simple phrases	The group provides a small introduction and explains the code in paragraph form	The group drafts an eloquent introduction and methodically explains the process of coding
Q&A session	The group cannot answer the questions posed by the judge	The group responds to all questions using simple phrases	The group sometimes responds to all questions with paragraph explanations and examples	The group always respond to all questions with paragraph explanations, examples, and references to the code

[30] AIGOLEARNING. Access online: www.aigolearning.org (accessed 30.10.2024).

When developing a rating scale for Hackathon judging, there are several tips that organizers should keep in mind:

- Clearly define the different levels of performance: A rating scale should clearly define what constitutes excellent, good, average, and poor performance. This will help ensure that judges have a clear understanding of what they are looking for when evaluating projects.
- Use simple and understandable language: The rating scale should use simple and understandable language to ensure that judges can easily understand and apply it.
- Be specific: The rating scale should be specific and provide clear examples of what constitutes each level of performance. This will help ensure that judges have a clear understanding of what they are looking for when evaluating projects.
- Align with the event goals and objectives: The rating scale should align with the goals and objectives of the hackathon. For example, if the hackathon is focused on social impact, the rating scale should include criteria related to the potential social impact of each project.

Other tips related to evaluation process of the Hackathon results, that the organizers can consider, are:

- Providing feedback to Hackathon participants: it is an important part of the evaluation process. Feedback can help teams understand where they succeeded and where they can improve, which can be valuable for their future development. It is important to provide constructive feedback that is specific, actionable, and supportive. This can help teams feel more engaged and motivated to continue developing their ideas.
- Avoiding unconscious bias in judging: it can influence evaluations and undermine the fairness and objectivity of the judging process. To mitigate it, some training on unconscious bias are recommended, other strategy include application of blind evaluations, where judges do not have access to identifying information about the teams or individuals behind the projects and diversifying the judging panel to ensure a variety of perspectives and experiences.
- Addressing potential conflicts of interest among judges: conflicts of interest can arise when judges have personal or professional relationships with some of the participants or teams. It is important to identify potential conflicts of interest before the event and develop a plan to manage these situations. This can include recusing judges who have

conflicts of interest from evaluating certain projects or providing guidance on how to evaluate projects objectively despite the potential conflict.

- Handling tiebreaker situations and disagreements among judges: It happens that multiple projects may be closely matched in terms of judging criteria, resulting in a tiebreaker situation. In such cases, it is important to have a clear process for determining the winner. This can include providing judges with additional information or assigning a separate judge or panel of judges to evaluate the tied projects. Disagreements among judges over the ranking of different projects can also occur. It is important to have a process in place for handling these situations, which can include providing judges with additional guidance, revisiting the criteria or rating scale, or assigning a separate judge or panel of judges to review the projects in question.

Once you have developed your judging criteria and rating scale, it is important to effectively explain them to your judges to ensure they understand the expectations and goals of the Hackathon. Unclear communication may lead to different interpretations of the criteria and rating scale, causing inconsistent and unfair evaluations. In Table 9 there are some tips for effective communication of criteria to judges.

Table 9. Tips improving communicating of criteria to judges

Issue	Comment
Provide clear instructions	Clearly explain the purpose and goals of the hackathon, the judging criteria, and the rating scale in the instructions provided to judges. Make sure the instructions are concise, easy to understand, and leave no room for ambiguity.
Provide examples	Add examples of successful projects from past hackathons that align with your judging criteria. These examples can help judges understand how the criteria should be applied in practice and what a successful project looks like.
Host a briefing for judges	Briefing session for judges before the hackathon begins to ensure they fully understand the criteria and rating scale. This session can also be an opportunity to answer any questions judges may have and to encourage discussion and collaboration among the judges.
Use visual aids	Try to use visual aids such as presentations, diagrams, online flowcharts, charts, and infographics to illustrate the judging criteria and rating scale. This can help judges visualize the different levels of performance and ensure they have a clear understanding of what each level represents.
Provide feedback forms	Consider feedback forms for judges to fill out after the evaluation of each project. These forms can be used to collect feedback on the judging criteria and rating scale, as well as feedback on the overall judging process. This information can be used to improve future Hackathons.

6. Hints for the Organizer of Hackathon Event

Clearly defining the theme and challenge will help you focus your efforts and make sure that everyone is on the same page. Therefore it is important to know clearly, what is expected to achieve with the hackathon. Some Hackathons are focused on a specific technology, some on more particular problem or challenge.

Be aware, that if you do not frame the hackathon correctly, it is unlikely that you will attract your desired participants and yield the results you are looking for. These goals should be reflected on the hackathon scorecard.

Figure 16. The characteristics of smart goals

Another issue is to set smart goals (what are you trying to achieve?) (Figure 16). Goals are critical in providing guidance and direction to your Hackathon and will help focus the efforts for all involved. Finally, the idea about the strategy of results/success evaluation should be elaborated (how will you measure progress or success?). When organizing a hackathon, it is also worth using hints related to the following issues:

- Timeframe
- Theme
- Skill Sets
- Outcomes
- Atmosphere
- Promotion
- Demos
- Internet
- Equipment
- Mentoring

Table 10 contains recommended and non-recommended actions by organizers in relation to all the issues mentioned above and related with organization of hackathon.

Table 10. Hints related with Hackathon organization (source: based on H2S Station[31])

Issue	Recommended	Not recommended
Timeframe	Do limit the event to 24-48 hours to encourage focus and minimize distractions.	Do not run a longer event which makes it harder for attendees to maintain concentration or participation in the event.
Theme	Do make it practical and related to solving practical problems or real-world challenges.	Do not make it too specific or too abstract. The topics should be feasible.
Skill Sets	Do make it clear if participants need to know certain skills or languages.	Do not assume that attendees will have the appropriate skills or experience.
Outcomes	Do expect functional prototypes or realistic solutions.	Do not expect polished products and ready to use solutions.
Atmosphere	Take care of a friendly environment, be helpful and empathetic.	Do not cause nervousness, tension or arguments.
Promotion	Take the marketing of the event seriously - partner with a hackathon planning company.	Do not assume large numbers of developers will show up magically.
Demos	Do keep it short and sweet (5-15 minutes maximum).	Do not drone about your products for 45 minutes.
Internet	Do make sure the internet and Wi-Fi in the venue can handle heavy hackathon activity.	Do not order minimum bandwidths and hope for the best performance.
Equipment	Do provide enough flip charts, whiteboards, markers, and electrical outlets for all participants.	Do not assume attendees will bring their own supplies and extension cords.
Mentoring	Do have experts available during the event for questions and provide starter kits and skeleton code.	Do not expect developers to become experts in your technology within 24 hours.
Food and Beverages	Do have a variety of nourishing options available throughout the event. Ask about dietary restrictions.	Do not provide just pizza, energy drinks, and water.

[31] H2S Station. Series Hackathon Blogs. Hack2Skill Station, www.blog.hack2skill.com (accessed 28.10.2024).

7. Hackathon success metrics

The success of a hackathon is not only about the jury's assessment of the results of the work done by the participating teams (completed prototypes or generated ideas), but also about the tangible and intangible benefits. A multi-faceted approach to assessing the effectiveness of such events can be based on various metrics, including (Figure 17):

- **Innovation efficiency**: assesses the number of viable product ideas that emerge from the hackathon. For example, a hackathon aimed at improving cybersecurity might produce a new authentication protocol that could be patented and integrated into the company's product suite.

- **Participant engagement**: measured by active participation, session attendance, and feedback scores, this KPI reflects the hackathon's ability to attract and retain the interest of its participants. High levels of engagement indicate a stimulating environment that can foster creativity and collaboration. In case of internal Hackathon this a rate of participation and interest from existing employees.

- **Skill development**: post-event surveys and assessments can help quantify the degree to which participants have developed technical and collaborative skills. An example would be increased proficiency in a new programming language, as evidenced by coding tests before and after the hackathon.

- **Adoption rate**: The percentage of projects that progress from the hackathon concept to the next stage of development (this can be considered a critical indicator of the success of the event). A successful case might involve a prototype developed during the hackathon that later becomes a full-fledged feature in the company's main product line.

- **Return on investment (ROI)**: Calculating the financial impact relative to the cost of the event includes analyzing the potential market value of prototypes developed, cost savings from process improvements, and revenue from new business initiated.

- **Cultural impact**: This can be difficult to quantify, although its impact on the work environment is significant. Examples of qualitative assessments of this issue include surveys measuring changes in employee morale, collaboration, and innovation mindset before and after the hackathon.

- **External recognition**: achievements such as patents filed, utility models filed, awards and distinctions won, media coverage after the hackathon, interest in the hackathon results by the external environment, the number of visits to the website presenting the hackathon results can serve as confirmation of the event's success and innovation capabilities.

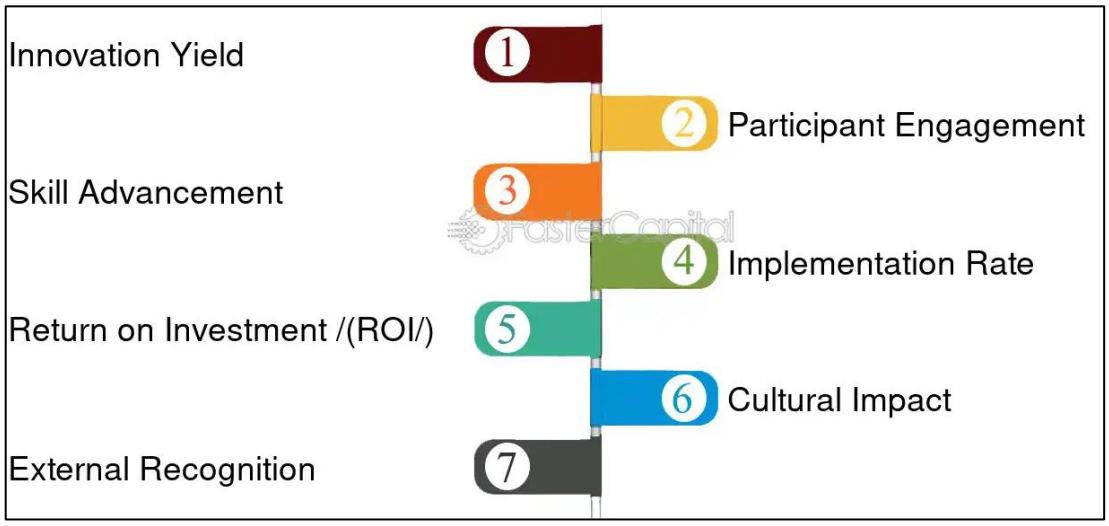

Figure 17. Examples of Hackathon success metrics

(source: based on Fastercapital.com[32])

It should be added that the analysis of such indicators can be used to improve future innovation initiatives or subsequent hackathons.

[32] Fastercapital.com. Access online: www.fastercapital.com (accessed 28.10.2024).

8. Selected Examples of Hackathons

Hackathon is such a universal educational tool that it can be done on different topics, in different disciplines and for different groups of people. This fact is confirmed by three different examples of hackathons presented in Chapter 9. The first one (HackArt) is an example of using a hackathon in the sphere of art. The second one (VanHacks Hacathon) is an example of using a hackathon by a non-profit organization in the educational sector. The third (It's Just Too Good to Waste – FOOD WASTE HACKATHON) is an example of a hackathon used in the Agro-Food sector.

8.1. The Art Engaging the Youth – HACK-ART Hackathon

Purpose of the project

The theme of the competition was the application of new technologies to culture and art. Application developers and programmers were invited to the competition to show how much technology and art combine. This event was a social initiative. Without undermining the importance of online media, which dominates what we read, watch and listen to in today's world, it must be outlined that more traditional forms of expression are being displaced. While technology is an extremely important and valuable part of life, it is also important to unplug from time to time, to appreciate art in its pure form, as it has been done for centuries.

Figure 18. Competition logo – 1st edition of HackArt hackathon for cultural institutions (source: Kadłubowska A., Challenge Rocket[33])

[33] Kadłubowska A. (2018): The art of engaging the youth – HackArt online hackathon case study. Challenge Rocket website. https://challengerocket.com/hr-blog/hackart-online-hackathon-case-study (accessed 9.12.2024).

Competition stages

1) Create an app or its refined prototype that achieves at least one of the exemplary goals:
    - encourages young people aged 16-25 to actively participate in events organized by cultural institutions (museums, theaters, philharmonics),
    - enables or facilitates online purchase of tickets for cultural events,
    - fulfills an educational and informational role in the field of culture and art,
    - is a tool that in any way allows you to combine new technologies with culture and art.
2) Prepare a maximum 2-minute video or screencast presenting your application.
3) Submit your entry by May 31, 2016 using the contest website.
4) Submitted projects took part in the nationwide voting from 02.06.2016 - 10.06.2016. Internet users decided which creator will receive the People's Choice Award.
5) The finalists were announced on 15.06.2016 after deliberations of the Jury. The creators of the best projects received valuable prizes and were invited to implement full versions of the application with selected cultural institutions.

Criteria for evaluation of works

Participants themselves decided on the shape of the project, and the solution could be made in any technology (e.g. Android, iOS, web application) using any tools. It was possible to submit applications already created by themselves, as long as they met the conditions of the competition. In particular, the following requirements were taken into account:

- innovation and ingenuity of the proposed solutions,
- usefulness and aesthetics,
- social potential,
- development, cultural and business potential of the application - including the possibility of using the project in other cultural centers,
- compliance with the indicated guiding categories of the hackathon.

Winning Projects of HackArt hackathon

The event lasted from March 1 to July 4, 2016, with its final stage in Warsaw (Poland). The participants were competing for their chance to win a prize from the pool of 25.000 PLN. **The winning project was called Art Ambassador**. It's a mobile app (Figure 19) that creates a bridge between cultural facilities, like theatres, and volunteers willing to help in promotion of events. The system is based on a simple premise that, in exchange for help towards the facilities, volunteers are given entrance tickets to events of their choice.

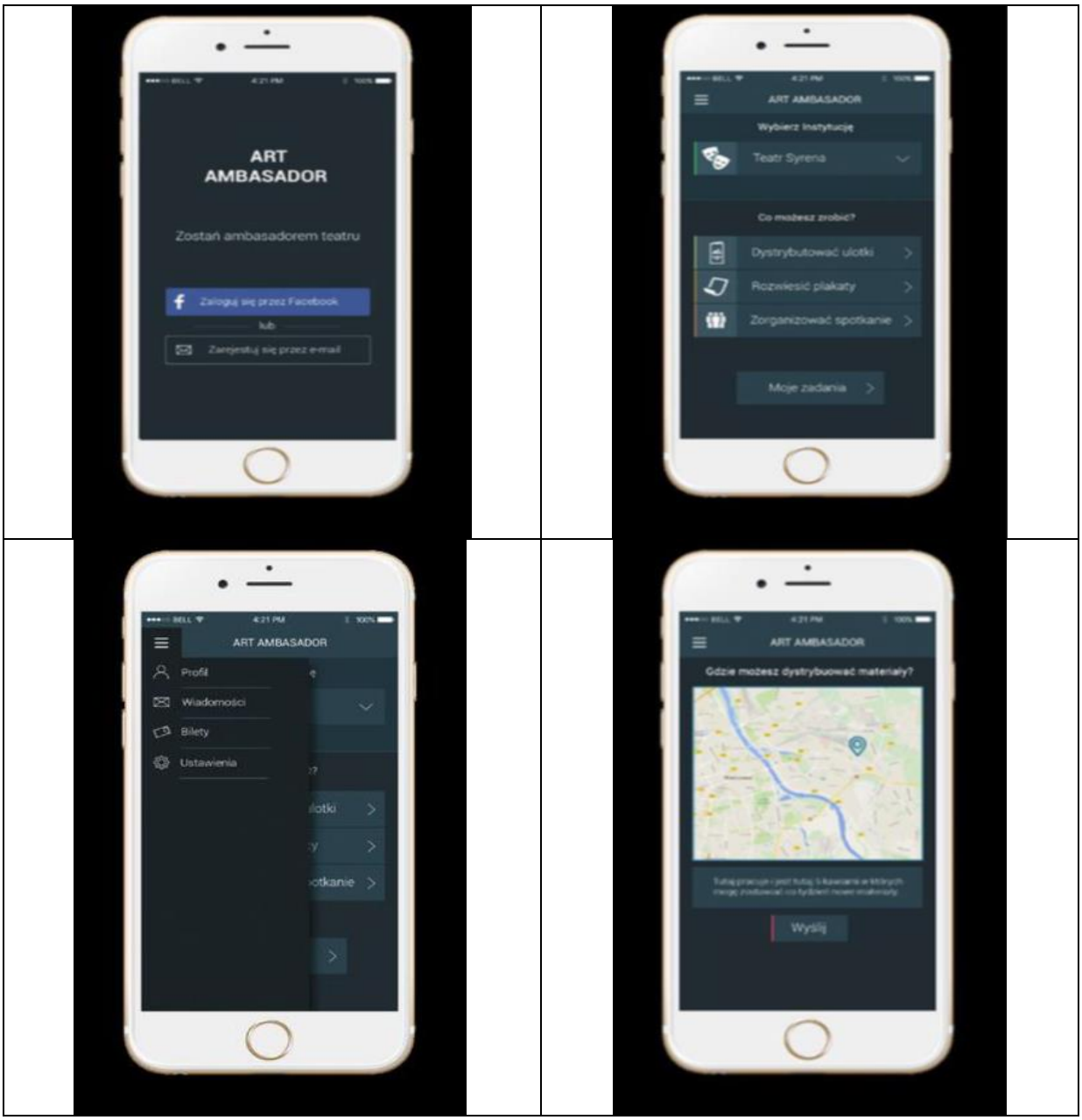

Figure 19. The winning project of HackArt – Art Ambassador app
(source: Challenge Rocket[34])

[34] Challenge Rocket: Art Ambassador. Access online: https://challengerocket.com/hackart/works/art-ambasador_772a10 (accessed 10.12.2024).

In order to effectively encourage young people to participate in the art world, we need to reach them directly where they are. For this we need people and resources. The app **Art Ambassador** will allow cultural institutions to build a network of volunteers around their institutions to assist in this work and will allow them to monitor the status of implementation. On the other hand, the app will provide an opportunity for individuals to engage in volunteer actions and promotional activities for theatre performances. In return, these individuals can receive free tickets to selected performances. The user, using the application **Art Ambassador**, can browse the requests made by the theatre or propose a feasible promotional action on their own. In the second step, the user specifies all the details and on the basis of these details a full database of volunteers and their proposals for actions is built. The system administrator on the theatre's side (probably an employee of the promotion department) can review and accept or reject the proposals.

The second place of HackArt was awarded to Art Charity (Figure 20), another mobile app-based project. It takes the concept of "paying it forward" to the realm of artistic world. The app promotes buying an extra ticket to a show a person is attending. Instead of using said ticked outright, the next attendee receives it for free. The gifter is then notified about the person who received it. By promoting random acts of kindness people are expected to frequent facilities like theatres and museums more often.

A user logging into the application **Art Charity** sees a list of ongoing social actions that he can join by purchasing a ticket. Each social action is dedicated to a specific institution (orphanage, social organization) and is limited in time. Selecting a specific performance, the user has the opportunity to read a detailed description of the performance, and can view a photo gallery and video. In the description he also receives information for which social institution the pool of tickets will be donated. After the purchase is made, he receives a thank-you note and incredible gratitude from the people to whom he made it possible to see the performance.

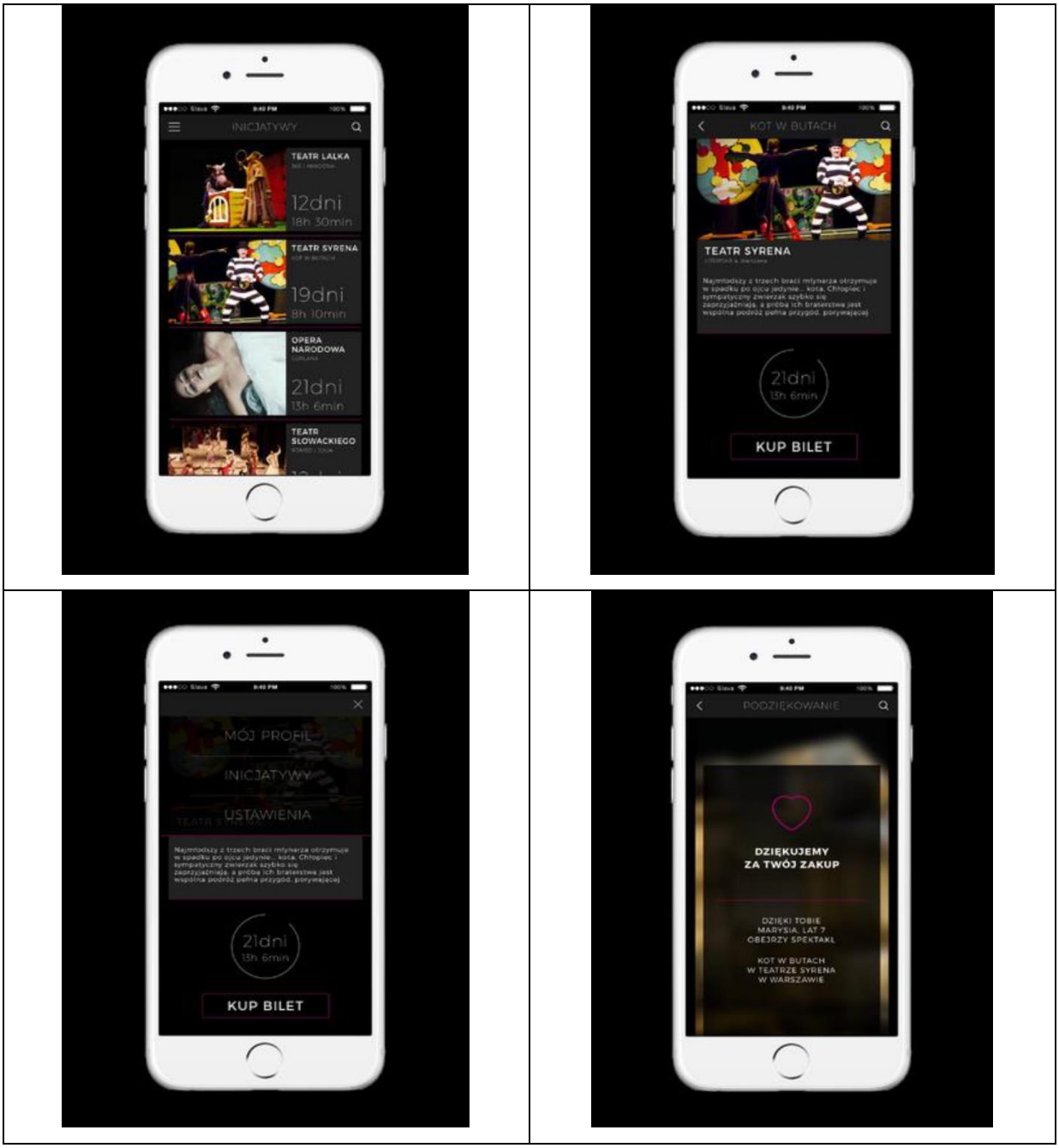

Figure 20. The second place of HackArt – Art Charity app
(source: Challenge Rocket[35])

We Recommend Good Art (original name: "Polecamy dobrą sztukę") **is the project awarded third place in HackArt** (Figure 21). Can a computer system predict what art you will like based on an examination of your general preferences in other areas? The system being designed will learn your preferences and, based on the ratings it gives to various plays and your answers to questions about your preferences, it will suggest a theatrical or musical

[35] Challenge Rocket: Art Charity. https://challengerocket.com/hackart/works/art-charity_64b905 (accessed 10.12.2024).

performance that you are very likely to like. Depending on your mood, company and different types of preferences, whether you're in company, whether you're in the mood for an outdoor event, and how you've rated previous performances, this system recommends a performance tailored to you.

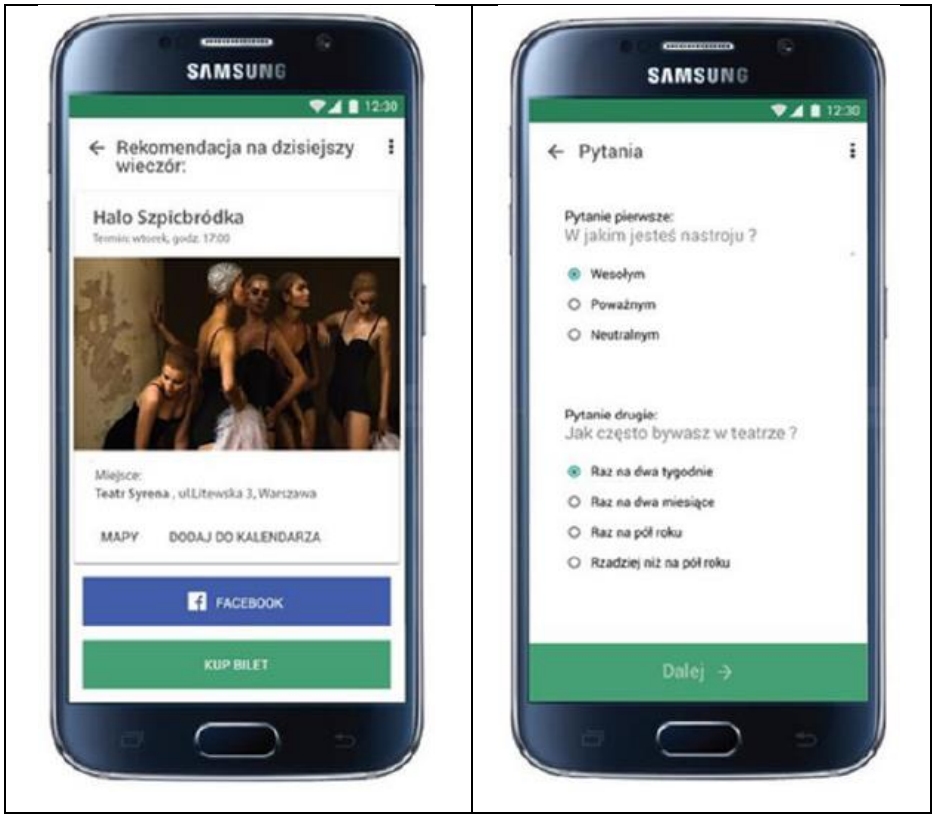

Figure 21. The third place of HackArt – project Polecamy dobrą sztukę (*We Recommend Good Art)* (source: Challenge Rocket[36])

Two sample screenshots of the system “Polecamy dobrą sztukę” (We Recommend Good Art) are provided in Figure 21. The recommendation system is based on the Collaborative Filtering algorithm. The basic premise of this technique is that if users X and Y have rated n performances similarly, or have similar interests (e.g., contemporary art), they will rate or behave similarly with regard to other performances in the sense of having similar positive or negative opinions. Methods based on Collaborative Filtering use the user's database of preferences for previous performances to suggest additional theatre performances that may be of interest to the new user. From within the app, it is possible to purchase a ticket or invite friends.

[36] Challenge Rocket: Polecamy dobrą sztukę *(We Recommend Good Art)*. Access online: https://challengerocket.com/hackart/works/polecamy-dobra-sztuke_c69e4e (accessed 10.12.2024).

360° of Culture (original name: "**360° Kultury**") is **awarded fourth place in HackArt** competition. It offers a 360° view of the venue of a cultural event in a live stream format using just a smartphone. The users can select many perspectives, like front seat, balcony, or even get a behind the scenes look. What's unique about this solution is the fact that the art "comes to people", which can be a blessing for disabled people not being able to leave their homes easily.

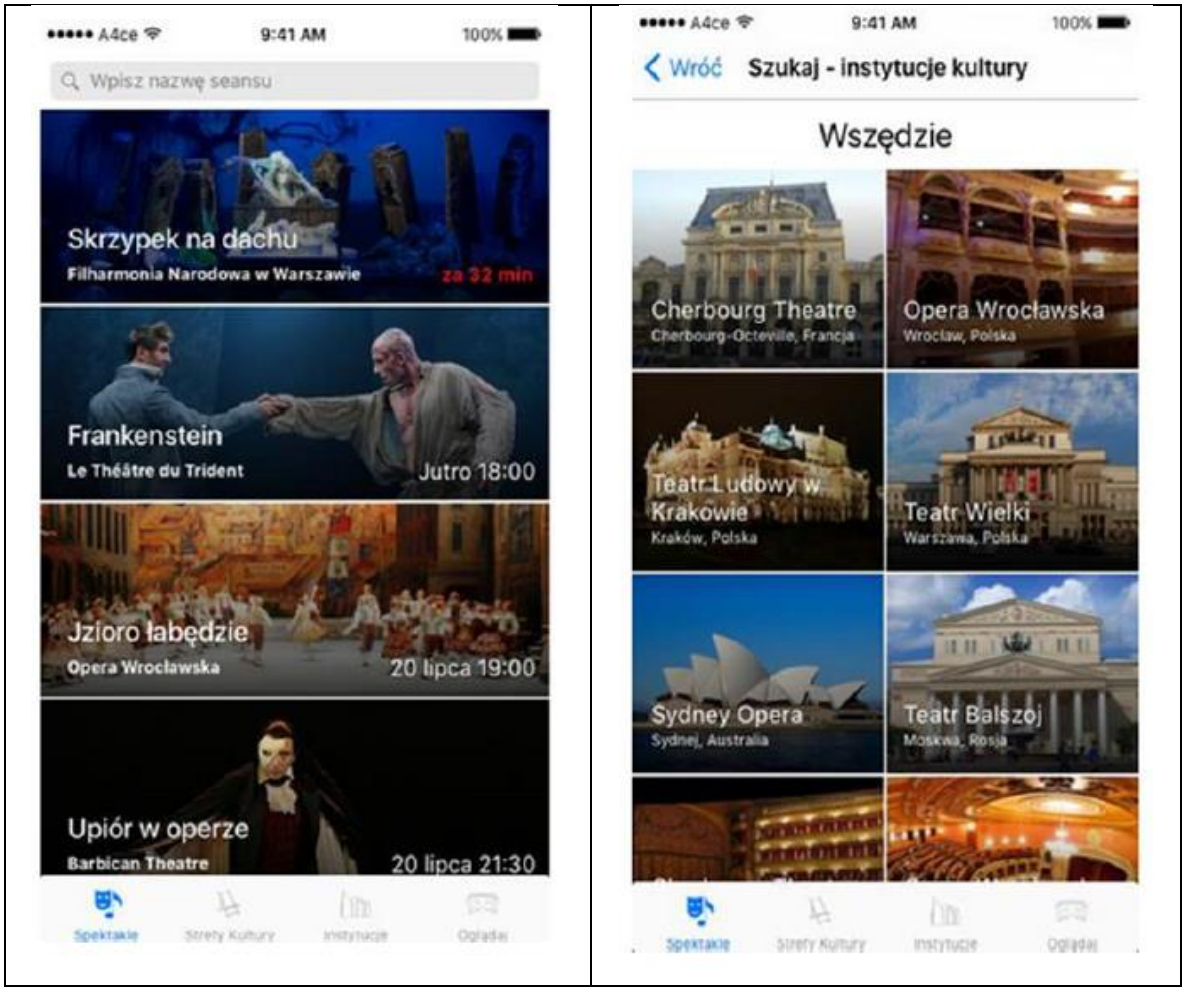

Figure 22. The fourth place of HackArt – project 360° Kultury
(source: Challenge Rocket[37])

To watch the show you need to:

- install the "360° Kultury" application on your smartphone (Android, iPhone),
- in the application there is a repertoire, a list of Cultural Zones and institutions from which the broadcasts are available,

[37] Challenge Rocket: 360° Kultury. https://challengerocket.com/hackart/works/360-kultury_9fb3e9 (accessed 10.12.2024).

- come to the Cultural Zone in your city with your own smartphone and Google Cardboard (which can also be purchased on site),
- at the designated time, launch the app and select the "watch" option,
- connect to the Wi-Fi network provided in the "Culture Zone",
- place the smartphone in Google Cardboard,
- the application detects the connection to the network of the Culture Zone and at the appropriate time begins to receive streaming video of the performance,
- the video is recorded with 360° cameras, by placing the smartphone in Google Cardboard you can watch the broadcast in virtual reality,
- the viewing perspective (e.g. from the audience, from the balcony, from the stage, from backstage) can be changed during the transmission with a button,
- viewers do not need to use their own headphones, as there is a sound system in the Cultural Zone.

Tropiciel Kultury *(in English: Culture Trailer)* won fourth place (ex aequo) in the HackArt contest. It's a mobile app that makes the user decide what cultural events to take part in on the basis of first impression. The application presents little information about a given event and makes the user decide whether they're interested or not. On top of that there's an element of surprise where a completely unrelated to preferences event will be shown. It's meant to prevent people from falling into a closed circle of interest with no way of expanding those. Two sample screenshots of Tropiciel Kultury app are provided in Figure 23.

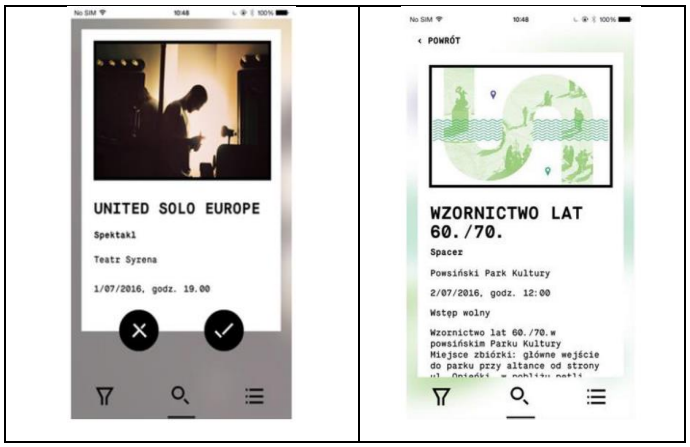

Figure 23. The fourth place (ex aequo) of HackArt – Tropiciel Kultury app
(source: Challenge Rocket[38])

[38] Challenge Rocket: Tropiciel Kultury. Access online: https://challengerocket.com/hackart/works/tropiciel-kultury_cedd0b (accessed 11.12.2024).

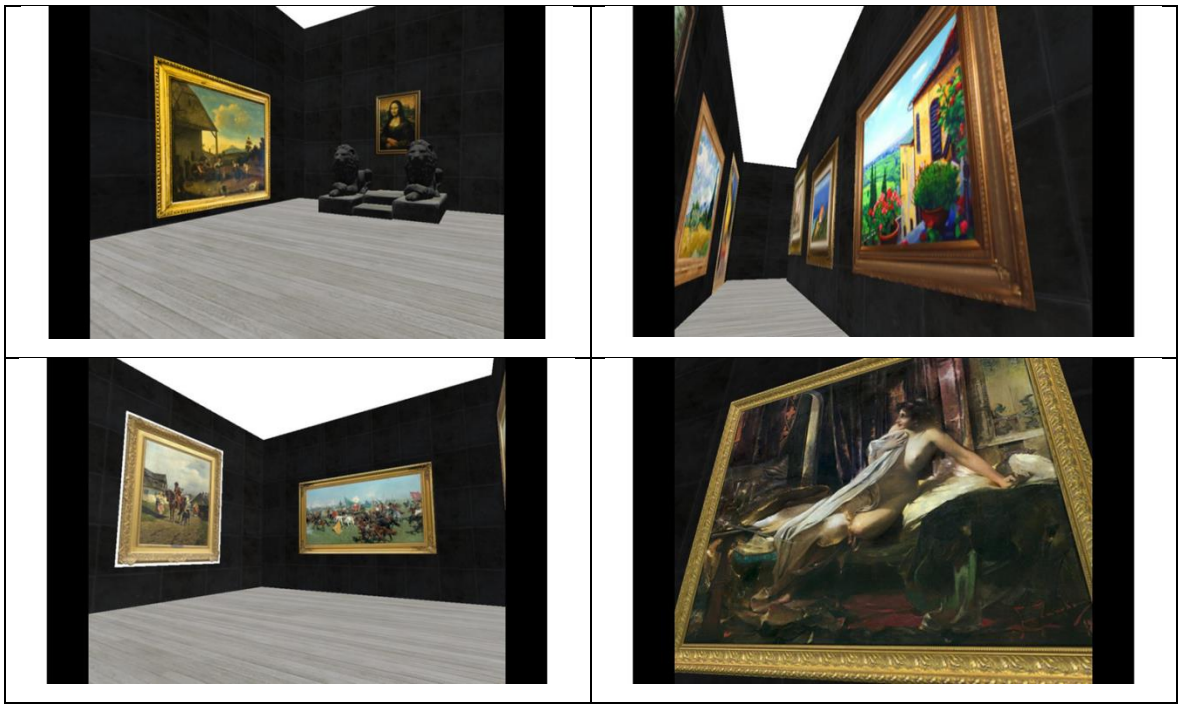

Figure 24. Screenshots of Virtual Tour app – Public choice award of HackArt
(source: Challenge Rocket[39])

In total in HackArt hackathon were 26 projects submitted by the participants. Aside from the ones chosen by the judges, the public selected one work to receive **the Public Choice award**, and that was **Virtual Tour** (Figure 24). It's a desktop application that enables exploring museums, theatres, concert halls. Users can control it with either the mouse and keyboard combination, or with a virtual reality headset.

Partners and sponsors

IBM was the technological partner of the event, which enabled the participants' experience to be on the highest level. Content Partners were Allegro.Tech and Wolves Summit. Strategic partner was Golden Line. The event had also gathered valuable sponsors such as Alior Bank, SALES Manago, Estimate, Brand24, IQ.pl, myPhone, Helion, leads MANSION, PayDayMansion, kod++ and Velis.[40]

[39] Challenge Rocket: Virtual Tour. Access online: https://challengerocket.com/hackart/works/virtual-tour_51ff37 (accessed 11.12.2024).
[40] Challenge Rocket: HackArt. Access online: https://challengerocket.com/hackart (accessed 11.12.2024).

8.2. Providing differently-abled children equal education opportunities. Project C.O.D.E. – case study of a hackathon

In 2019 organized VanHacks Hacathon in Vancouver, Canada. The social-good project was in aids of C.O.D.E. Initiative, a non-profit organization that provide programming education for students with special needs.

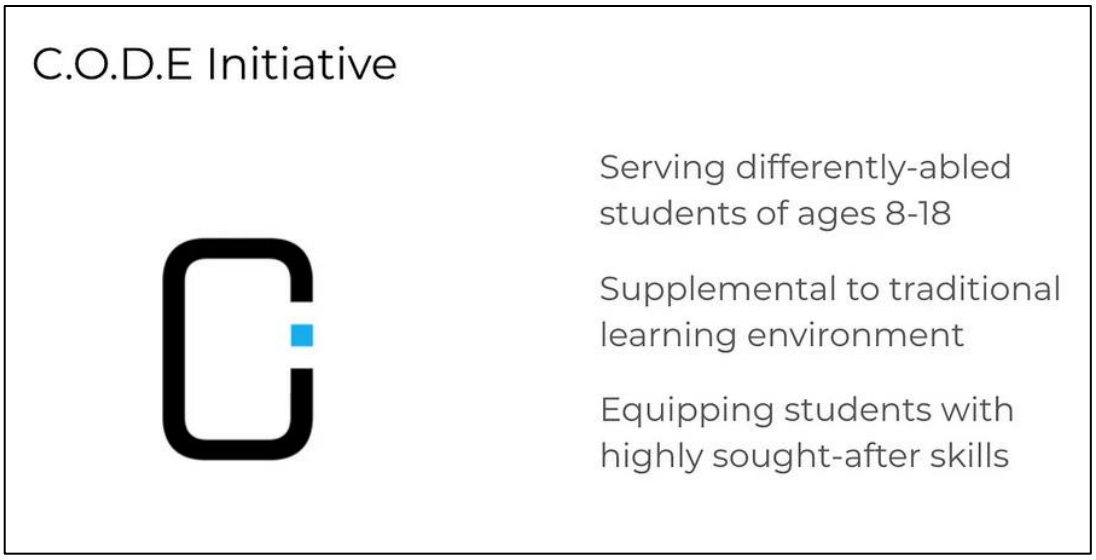

Figure 25. The C.O.D.E. Initiative Logo (source: Sun A.& Chan T., UX Planet[41])

Description of the C.O.D.E. Initiative

C.O.D.E. is a non-profit organization founded to Create Opportunities and Define Education. Their mission is to provide opportunities for and open doors to youth who may struggle in traditional educational settings by offering them a supplemental experience. The organization's primary focus is helping children with Autism Spectrum Disorder (A.S.D.), and other differently-abled youths find a passion and an interest in coding. By sparking this passion, C.O.D.E. hopes to introduce them to a highly sought after skill in today's job market and bring them a step closer to independence.

C.O.D.E. Initiative offers a 1:1 student to teacher ratio to accommodate all students with a variety of needs. The whole organization is deeply devoted to finding, celebrating, and scaling the strengths of all children, and enabling them with the appropriate tools to build on those strengths.

[41] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study, Providing differently-abled children equal education opportunities. https://uxplanet.org/project-code-7934f4cc87bd (accessed 12.12.2024).

Diagnosis of the problem to be solved

As C.O.D.E. Initiative raises more awareness in the differently-abled learner community, more and more parents have expressed their concern about travelling to UBC Campus, where C.O.D.E. is located, from all over Metro Vancouver.

The organization finds a connection gap between parents and volunteer tutors. There is no practical way to connect parents and volunteer tutors for learning session arrangements. C.O.D.E. admin doesn't have an efficient means to oversee and manage all the activities either. A team of 5 people was formed, participating in the hackathon work, whose responsibilities were as follows: Member 1 and 2: Full Stack Web Development, Member 3 and 4: UX/UI Design, Member 5: UI Design + Front-End Web Development.

Research and Initial Client Meeting

Due to the nature of hackathon event, participants worked with limited information. Frustrations in motivating C.O.D.E wanting to develop their own system:

- Many parents have expressed their concern about travelling to UBC Campus from all over Metro Vancouver.
- There is no effective way to connect volunteer tutors and learners' parents.
- No current software client allows C.O.D.E to effectively match or allow continuity of tutoring.

Determining Goals

Determined MVP (Minimum Viable Product) is to first have the base of how a Learner, Volunteer and Admin is able to manage booking times in Metro Vancouver.

1) User Goals

- To be able to match volunteers with learners based on their location.
- Admin is able to modify, add or cancel sessions.
- Volunteers are able to select/cancel their available time slots.
- Learners are able to book/cancel their bookings.

2) Business Goals

- Provide value-added education to people who are differently-abled.

3) App Goals

- Having an intuitive system that aids the matching process for all relevant stakeholders (admin, learners and volunteers).

Solution

To C.O.D.E. Initiative's current technical problems, the solution is a responsive web app for parents & volunteers to arrange learning sessions.

This web app can be used to:

1) Sign up for new accounts.
2) Book sessions with volunteer tutors in certain cities.
3) Manage bookings on the dashboard.

With a clear objective of this web app, the team divided into four main user flows: parents, learners, volunteers, and admin. For each flow, there is a sign-up/registration process. Using research about confidentiality and liability, the team members decided the best way to register accounts (for parents and learners) is through third-party login authentication, e.g., Google, Apple, and Facebook. Third-party authentication can help increase security, achieve compliance, and improve user experience with password-free login.

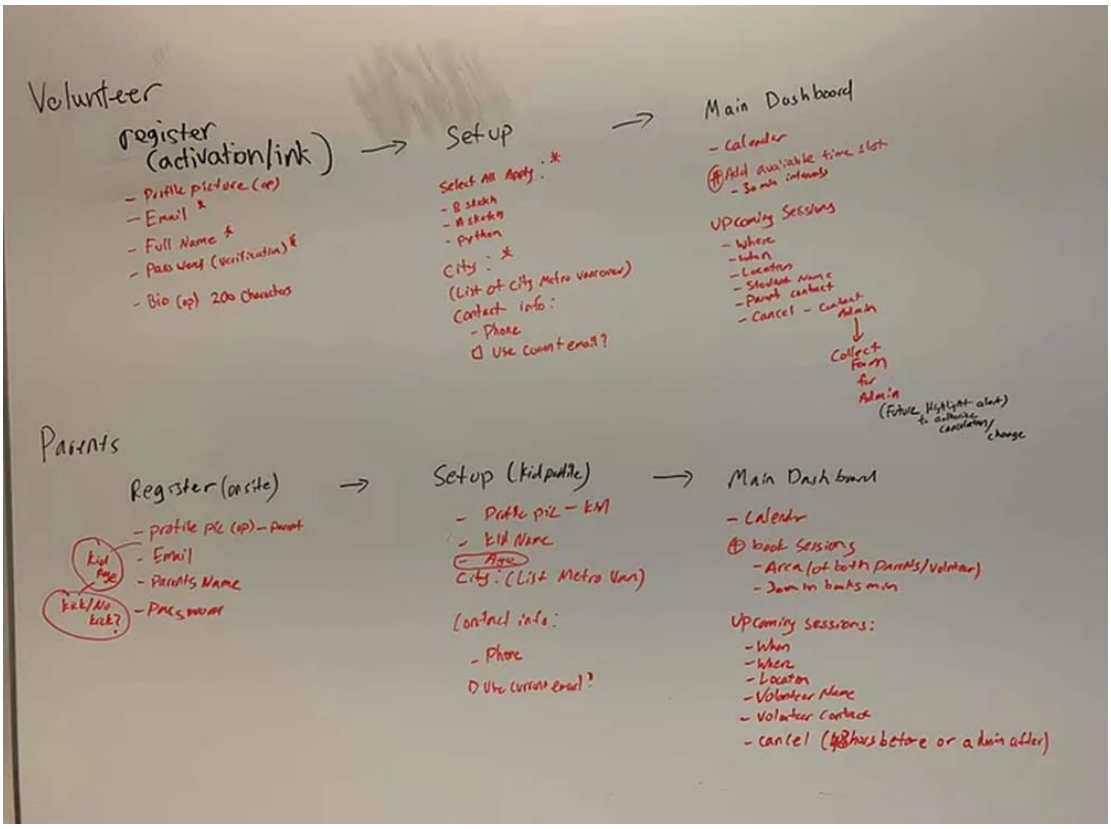

Figure 26. User Flows of Volunteers and Parents (source: Sun A. & Chan T., UX Planet[42])

[42] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study, Providing differently-abled children equal education opportunities. https://uxplanet.org/project-code-7934f4cc87bd (accessed 12.12.2024).

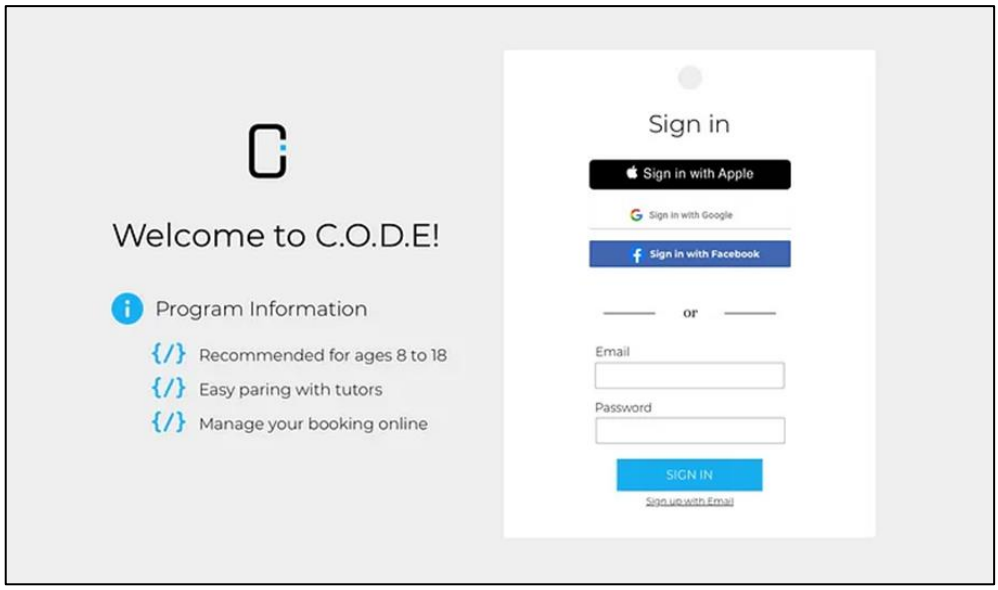

Figure 27. Sign-up page: desktop version – project C.O.D.E.
(source: Sun A. & Chan T., UX Planet[43])

For volunteers, C.O.D.E. will have an onboarding training session with them before emailing them a link to register accounts. The internal link sends their registration information to a separate database away from the learner database. This internal link method can avoid confusion on the website if it shows both learner and volunteer registration flows. As for sign-in, volunteers and learners/parents can all sign in from the same page.

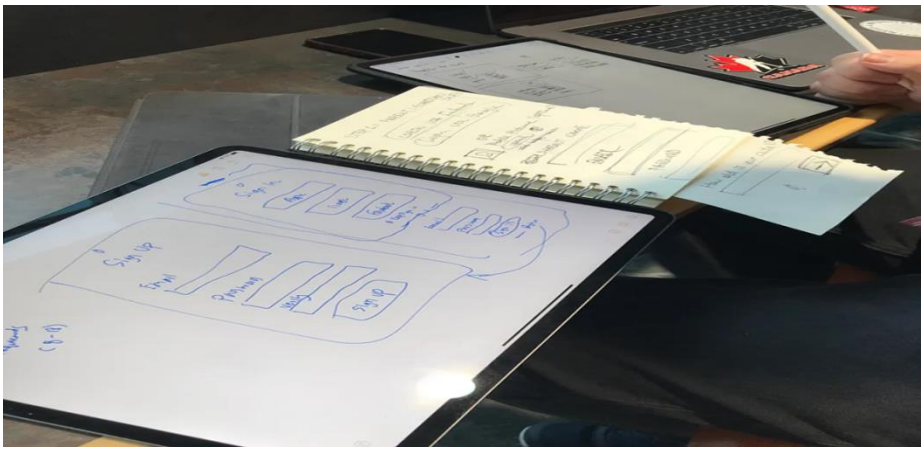

Figure 28. Team sketching: discussing how the platform could look like – project C.O.D.E.
(source: Sun A. & Chan T., UX Planet[44])

[43] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study, Providing differently-abled children equal education opportunities. https://uxplanet.org/project-code-7934f4cc87bd (accessed 10.12.2024).
[44] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study… op.cit.

Once both parties have registered an account, they will be redirected to the configuration page, where they will fill in more information according to their roles and preferences. They can return to this page at any time if they want to change anything.

The design process should include the most critical aspects of each page, and make sure that all questions are asked for a specific reason. In this way, a minimum configuration page was created for all parties.

The dashboard can be considered the most critical part of this web app, as this is where all the bookings happen. The team used volunteer management systems Better Impact as a reference for the dashboard. Both parents and volunteers would want to see schedules straightforwardly, so they include calendar view and list view for their convenience.

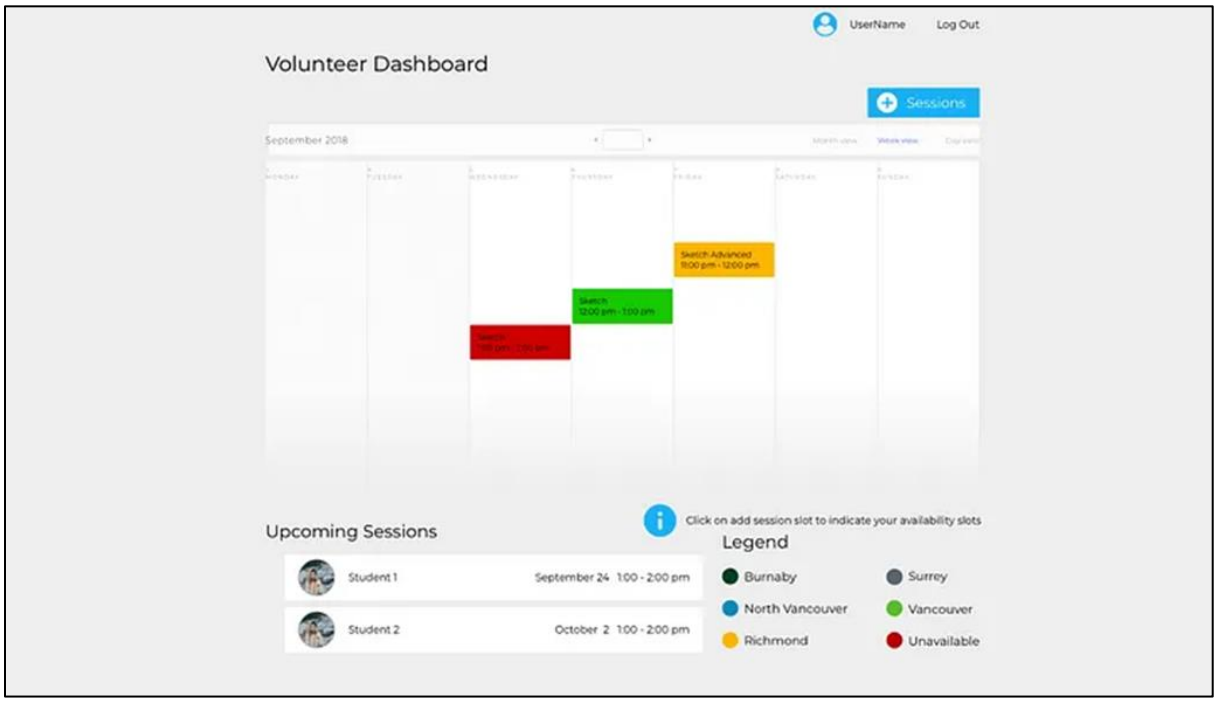

Figure 29. Volunteer Dashboard (Desktop Version) – project C.O.D.E.
(source: Sun A. & Chan T., UX Planet[45])

The dashboard is also where parents/learners and volunteers can add/modify their sessions. C.O.D.E. Initiative has a well-written policy on cancellation and modification, which helps with the making of this system.

[45] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study… op.cit.

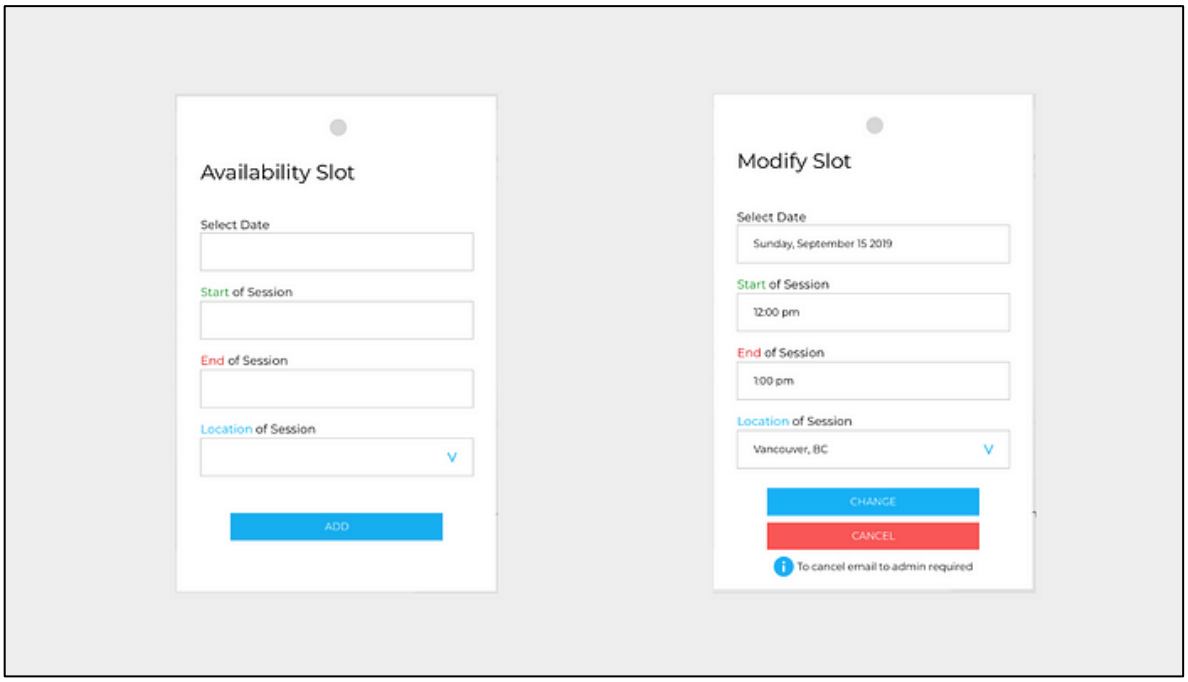

Figure 30. Pop-up windows for adding and modifying session times (volunteer view, desktop version) – project C.O.D.E.
(source: Sun A. & Chan T., UX Planet[46])

Responsive web application

To make sure that this web application can be used with ease, it was designed for both mobile devices and desktop computers. Research conducted by Nielsen Norman Group has shown that although there is a tendency to do more tasks via phones, most people still use a desktop computer to perform basic transactions. For the administrative flow, only the desktop version was designed because of the importance and all the steps involved in managing reservations and sessions.

Taking into account the design of the C.O.D.E. website, the platform's user interface was adapted to the existing style and aesthetics. Consideration was given to:

- Fonts: Montserrat, Old Standard TT, and Arapey.
- Colour scheme: C.O.D.E. has clean, minimal colours on its website. For the web app, they will make sure this style is consistent. As for city colours in calendar and list views, the team picked the colours from each city government's website.

[46] Sun A., Chan T., UX Planet (2019): Project C.O.D.E. — A Hackathon Case Study… op.cit.

Wireframing & Hi-fi Prototyping

To help the developers understand how the web app would look like, the ideas were put into hi-fi prototypes through Sketch. During the hackathon 26 desktop and 10 mobile user interfaces were created, including four user flows, respectively, for parents, independent learners, volunteer tutors, and admins.

Coding (Back-end, Front-end & Stylings)

When part of the team was designing the user flow and hi-fi prototypes, the web dev team started building the back-end database. They used Graphcool to build database, which includes the following:

- Users — Uid, Email, Password hash, Type,
- Parents — ParentID, Uid, Name, Photo, Email, Phone, Preferred contact method, List of LearnerID,
- Learners — LearnerID, Photo, Uid, ParentID, First name, Last name, Age, City, Accessibility needs,
- RegisteredEvents — LearnerID, EventID,
- Volunteers — VolunteerID, Name, Location, Phone, List of what they teach,
- Events — VolunteerId, Date, Location, Time.

In terms of front-end, React and Sass were used. Stylings were done with HTML/CSS. During the weekend, the team built an entirely constructed back-end database and a basic structure of the web app's desktop version.

Presentation

The hackathon project was presented with the design process and platform design outcome. Both competition judges and "C.O.D.E. Initiative" executives were present to give constructive feedback. It is important to note that it was not the final version of this web app, as the team will be conducting more user testing in the near future. C.O.D.E. has expressed their appreciation for all the effort and work during the weekend, and they were interested in continuing the project until the official launch.

8.3. IT'S JUST TOO GOOD TO WASTE – Food Waste Hackathon

The aim of the project

The goal of this initiative was to raise awareness of the issue of food waste in Cyprus and to promote the generation of ideas in civil society and among residents about food waste reduction practices that can address the issue, contributing to the Sustainable Development Goals (SDGs). Specifically, the goal of the project was to raise awareness, encourage cooperation among communities in addressing common environmental issues, and accelerate the testing of innovative, sustainable solutions for reducing food waste in Cyprus.

Event date and the main prize

In line with the principles of the United Nations Development Programme - Innovation Challenge, UNDP Cyprus organized a Hackathon with the support of CyprusInno - the first bicommunal online platform connecting Cypriot entrepreneurs and the largest map and database of startups in Cyprus[47]. The 2.5-day hackathon brought together a number of people from across Cyprus, who were supported through a series of workshops to form teams and develop ideas to solve the food waste problem.

The top three teams with the most innovative, replicable and sustainable ideas were shortlisted as finalists. In the second phase of the initiative, from April to May 2023, the three teams were supported through a series of mentoring sessions to further develop their ideas, which were reviewed and evaluated by UNDP. The selected finalist team won seed funding of €10,000 to implement their idea.

The course and stages of the hackathon

An open invitation was published island-wide for people from communities to participate in a 2.5-day hackathon in the buffer zone. Out of 54 applications, UNDP selected 35 hackathon participants. 29 participants took part in the 2.5-day hackathon.

The hackathon took place from March 17-19, 2023, starting with an interactive panel event on March 17, which was open to the public. The evening began with a welcome from the event's co-facilitators, the Swedish ambassador, the ambassador from Germany, the head

[47] For more about CyprusInno visit: https://cyprusinno.com/ (accessed 26.03.2025).

of the European Commission Representation in Cyprus and the head of the UNDP office in Cyprus.

The panel discussion featured four prominent speakers from the Cypriot food waste ecosystem: project coordinator of Friends of the Earth Cyprus and LIFE-FOODPRINT, Outreach Coordinator at Zero Food Waste Cyprus, founder of RescuedBox and representative of IKEA Cyprus Food. The discussion concluded with a question-and-answer session, during which participants and members of the audience asked the panelists questions to help generate ideas later.

The next two days included a series of workshops led by innovation specialists and food waste experts. The initiative was designed so that people could create innovative and sustainable solutions, as well as "hack" existing and new mechanisms to address the problem of food waste in Cyprus. Participants had the opportunity to attend 5 different workshops.

On the first day the workshops focused on the business model, an introduction to the latest information and communication technologies, team building and design thinking methodologies to guide them through team building, ideation, and proposal development. The rest of the day was set aside for teams to begin collaborating and working on their ideas. The second day began with a pitching workshop to support teams in presentation skills. Teams then had the rest of the morning and early afternoon to continue and finalize their work, and prepare for the presentation of their idea.

Figure 31. Cooperation of team members on the proposed idea
(source: UNDP Cyprus[48])

[48] UNDP Cyprus: 'It's Just Too Good To Waste' Food Waste Hackathon. United Nations Development Programme in Cyprus website. Access online: https://www.undp.org/cyprus/its-just-too-good-waste-food-waste-hackathon (accessed 09.12.2024).

At around 5 p.m., the teams were asked to stop work and gather to begin their presentations. The teams presented in front of a pre-selected high-level jury panel. Experts from CyprusInno and Microsoft were also present to advise the panel. This composition of the panel combined the expertise of UNDP, as well as other food waste reduction partners, along with the technical expertise of innovation and development organizations, to ensure that the most cost-effective solutions were selected. A list of predefined evaluation criteria was used to select the top three teams as finalists. The evaluation criteria focused on financial sustainability, long-term viability, scalability and accessibility of the ideas developed, with full consideration of UNDP's policy on innovation challenges.

Figure 32. Presentation of food waste idea and solution before a panel of experts (source: UNDP Cyprus[49])

The three finalists were assigned expert support (up to four mentoring sessions) to transform their ideas into a viable project proposal. Their revised project ideas were evaluated by UNDP, and the highest rated idea was selected for seed funding of €10,000.

Table 10. Evaluation Criteria for proposed solutions to the food waste problem[50]

Description of the evaluated elements of the project proposal	Importance
Clarity of submitted proposal	10%
Degree of innovation with Consideration of risks	25%
Development impact and Project quality, including Intervention logic	25%
Potential for scale up and replication	20%
Long-term sustainability	20%

[49] UNDP Cyprus (2024): How an Idea on Food Waste Uncovered the Need for a Full Systems-Change. United Nations Development Programme in Cyprus website. March 30, 2024. https://www.undp.org/cyprus/blog/how-idea-food-waste-uncovered-need-full-systems-change (accessed 13.12.2024).
[50] Source: based on UNDP Cyprus (2024): How an Idea on Food Waste Uncovered the Need for a Full Systems-Change… op.cit.

The winner of the competition and proposal to solve the problem of food waste

The winner of the Innovation Challenge was a group that called itself the Cyprus Food Hub (CFH/The Hub). Intended to be a non-profit entity, CFH designed itself to collect surplus food from food producers and distributors, making it available to food insecure beneficiaries. The main goal of the project is to reduce food waste in Cyprus. To achieve this, the Hub's specific goals include:

- reducing food waste throughout the food cycle,
- reducing food insecurity,
- promote zero food waste policies and interventions among food producers and distributors.

Figure 33. Members of the winning team – 1st place in the hackathon
(source: UNDP Cyprus[51])

The main idea of the CFH is to implement collection and redistribution of surplus food based on local networks using already existing initiatives, while filling in the gaps to maximize their efficiency. The Hub has a modular structure and will consist of (but not be limited to) three main components:

- Community supermarket and warehouse Food Hub;
- Food Hub Network (FHN) to connect existing initiatives, maximize resources, share logistics costs, and facilitate communication and coordination;
- Food Hub Knowledge Center to collect data and create relevant knowledge on food sensitivities, nutrition and nutrition interventions in Cyprus.

[51] UNDP Cyprus (2024): How an Idea on Food Waste Uncovered the Need for a Full Systems-Change. United Nations Development Programme in Cyprus website. March 30, 2024. https://www.undp.org/cyprus/blog/how-idea-food-waste-uncovered-need-full-systems-change(accessed 08.12.2024).

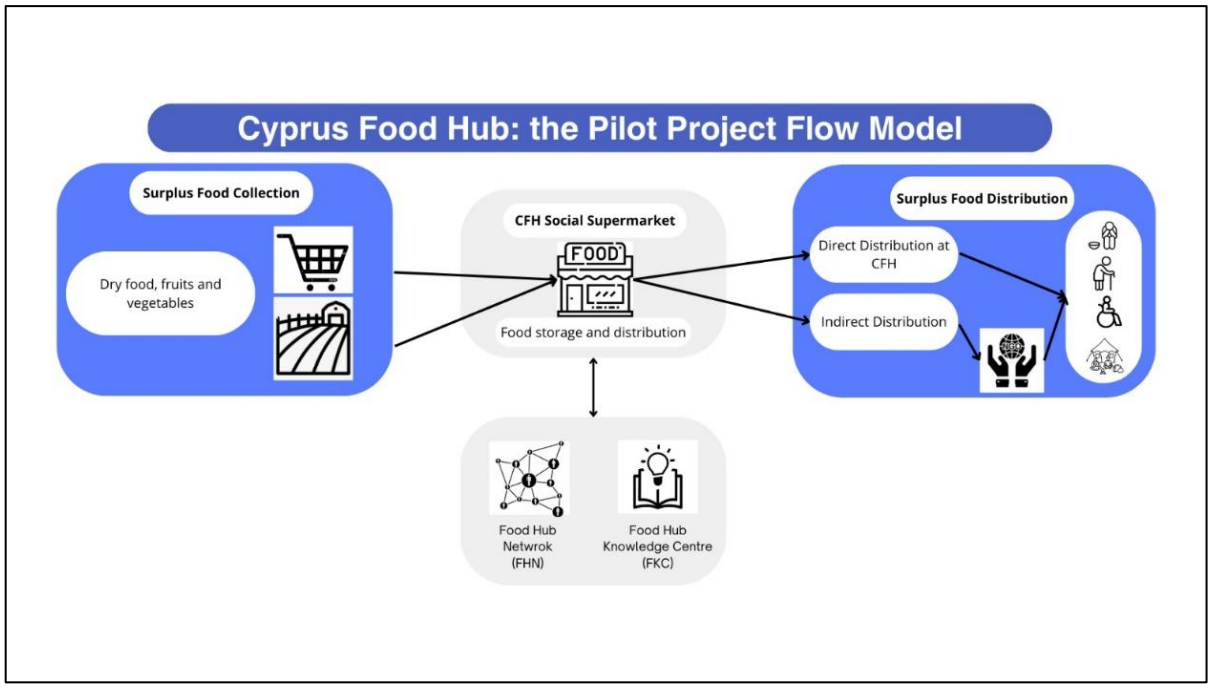

Figure 34. Components of the food flow model in the Cyprus Food Hub
(source: UNDP Cyprus[52])

As part of the pre-feasibility study, CFH met with several charities and NGOs that are currently implementing food interventions. All of these organizations confirmed that the demand for food support is high and currently exceeds current capacity. Logistics was also identified as a common challenge, with major difficulties in storing and/or transporting food parcels. This feedback further confirmed the need for such a project.

The project involves an island-wide approach, which ultimately makes it an effort of both communities. CFH's modular structure means that not all replications need to generate revenue, nor is there a need to recreate the entire "Hub" configuration from scratch. What is required is a more detailed feasibility study to identify needs and opportunities in the Turkish Cypriot community. In this way, the most beneficial elements of the project can be transferred to have the greatest impact, both in terms of social benefits and food waste reduction.

The CFH pilot focused on solidifying the basic elements of their design. Six months later, the following main results of the pilot were obtained:

- Establishment of a network between the Hub and relevant stakeholders. Several companies and NGOs have confirmed their interest in participating,
- Obtaining legal personality as a "non-profit company",

[52] UNDP Cyprus (2024): How an Idea on Food Waste Uncovered the Need for a Full Systems-Change… op.cit.

- Meeting with the Greek Cypriot mayor of Nicosia, who showed great interest in supporting the initiative and initiated contacts also with the Nicosia Municipal Multipurpose Foundation,
- Meeting with the Milano Urban Food Policy Pact team and initiating collaboration to support the creation of Nicosia's first urban food policy strategy,
- Creation of an official CFH website,
- Development of an Monitoring & Evaluation framework to ensure continuous learning from results achieved.

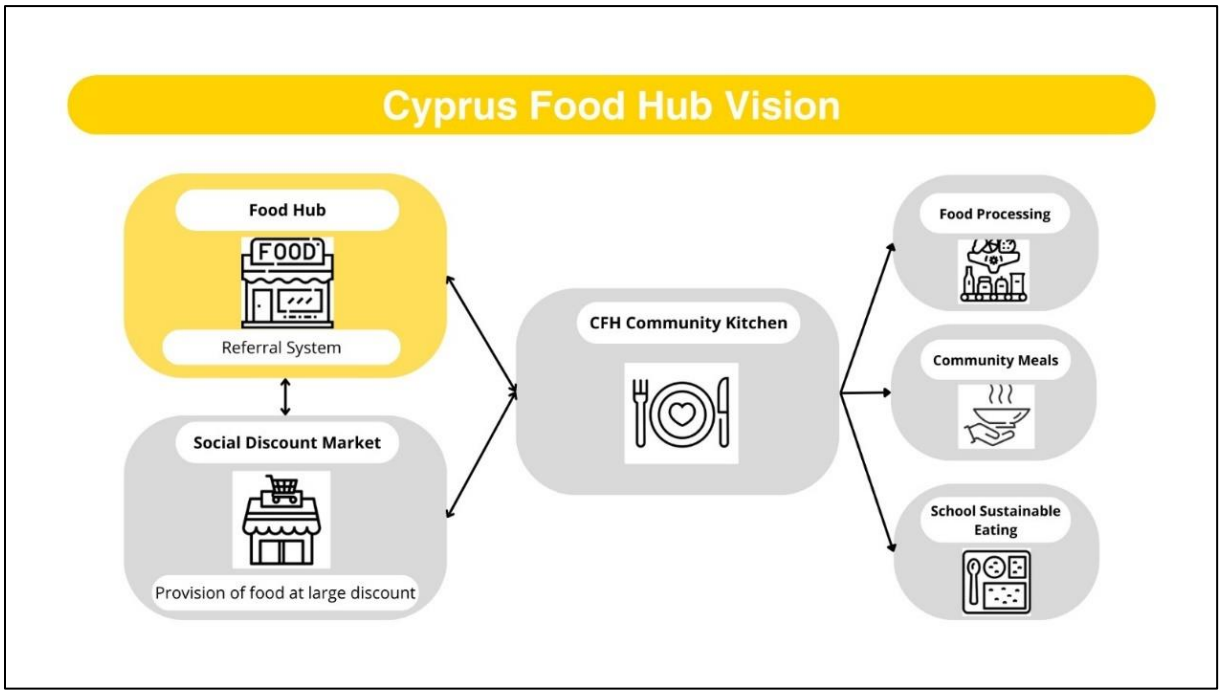

Figure 35. Visualization of the Cyprus Food Hub model
(source: UNDP Cyprus[53])

By establishing a network of new partnerships with food manufacturers and supermarkets, CFH has revealed a huge gap (and potential opportunity) in the food arena. One of CFH's founding members explained that "there is interest from companies, but like everywhere else in the world, companies are very profit-oriented." She went on to explain the logistical challenges faced by companies donating surplus food, highlighting the time-consuming process of sorting, selecting and delivering donations. While the intention of making a donation is commendable, the practical issues involved can often be seen to outweigh the benefits, as the resources spent on preparing and packaging surplus food can be significant.

[53] UNDP Cyprus (2024): How an Idea on Food Waste Uncovered the Need for a Full Systems-Change… op.cit.

There is no comprehensive mechanism to promote inclusive and sustainable use of surplus food products. Priority is given to profit-oriented competition, and the lack of economic incentives/penalties only perpetuates this business trend.

Challenges for the future

The discussions with countless companies have proven that simply creating a “small food hub to deliver food to needy beneficiaries” is no longer enough; “we need a full system change - a common food policy with a circular economy as its backbone.” Without this change at a higher level, any intervention will have an expiration date, no matter how forward-looking it may be.

The goal is to convene key stakeholders from across the island's food industry, including suppliers, retailers and logistics providers, to take collective action. The initiative will encourage companies to unite in a shared commitment to eliminate food waste, maximize utilization and give these resources another chance to realize their potential. Moreover, by redirecting surplus food to those in need, the effort will also serve to address food insecurity. The event will encourage stakeholders to create a “food waste network” and contribute to the realization of the first food hub through in-kind contributions, donations, as well as financial support. The main goal, however, is to work together on substantive food policy.

9. Examples of Topics/Theme/Challenges for Hackathons related with Food Value Chain

Food wastage is a universal issue, and unfortunately, the food produced in any region of the world is either lost or wasted. The food wastage however isn't limited to one level alone but perforates through every stage: from planting, harvesting, processing, packaging and transporting to the end stage of consumption (Figure 36). Weddings, events, restaurants, hostels and households are also the major source for food wastage.

If this food waste continues, it will create the significant impact on environment. All the resources which are required to bring food from the farm to table such as water for irrigation, land for planting, fuel for powering harvest and transport vehicles as well as preparing and cooking in the kitchen are also affected. To solve the problem of food waste and encourage sustainable lifestyles, new technologies and ideas are needed that bring intelligent and innovative solutions to the problem of food waste.

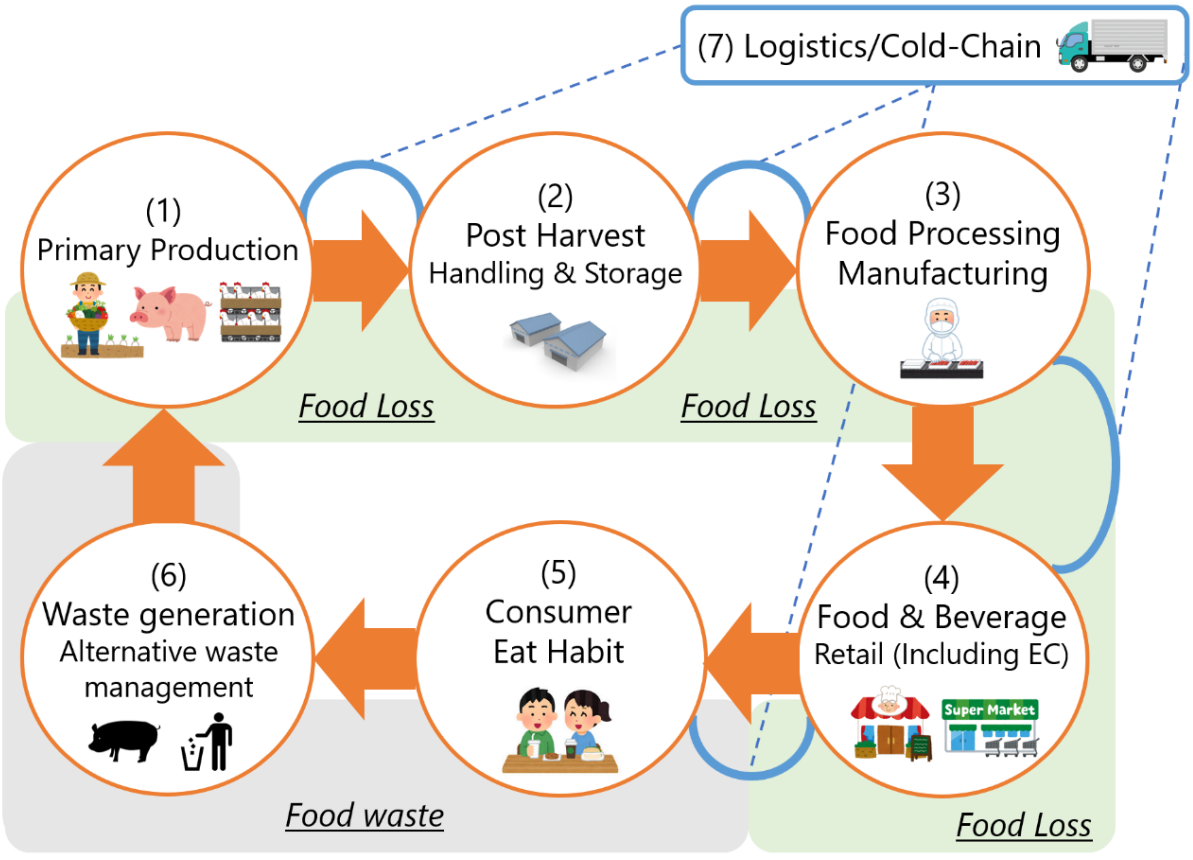

Figure 36. Examples of issues topics during the Hackathon related to food value chain (source: HackerEarth Inc[54])

[54] HackerEarth Inc website. www.hackerearth.com/challenges/hackathon/nec-hackathon-food (accessed 14.10.2024).

Based on Figure 36, some main topics to be evaluated during the Hackathon can be defined:

- Primary production (with the increasing rates of food wastage the innovative solutions to control inefficient food production at its source are required).
- Handling & storage (a lot of food is wasted due to mismanagement and low quality of storage, therefore the solutions to improve post-harvest processes that affect the food supply chain are needed).
- Food processing & manufacturing (innovative solutions to minimize food wastage in processing and manufacturing activities need to be developed).
- Food & beverage in retail (food wastage is high in retail and restaurant sectors due to food products that go unsold, as a result, effective solutions to control supply of food products to minimize food wastage in these sectors must be elaborated).
- Consumer eating habits (efficient solutions should be offered to alter and align consumer eating habits to encourage practices that prevent food wastage).
- Waste generation & alternative waste management (with high amounts of food wastage, it is important to manage food waste efficiently. NEC is looking out for solutions to efficiently reduce, reuse and recycle food waste.
- Logistics / cold chain (cold chain processes play an important role in ceasing food wastage, as a consequence, smart innovative solutions to enhance cold chain processes to minimize food wastage are wanted).

If the Hackathon is narrowed down to a specific audience/participant, the topics can also be more specific. Examples of topics related to specific areas of food waste could be:

- Food waste reduction in schools/universities,
- Food waste reduction in markets/shops,
- Food waste reduction in hotels,
- Food waste reduction in households,
- Food waste reduction in restaurants.

10. Examples of Hackathon Leaflets and Advertisements related with Food Value Chain (FVC)

At the stage of preparing the Hackathon, it is important to properly disseminate information about the event. One way is to develop posters, leaflets or announcements with basic information about the Hackathon. Examples of such advertisements or announcements related to FVC, sustainable agriculture and renewable energy are shown in figures 37 – 45.

Figure 37. Example of Hackathon announcement related to sustainability development (source: LNCT[55])

[55] LNCT: Join the Sustainability Hackathon Challenge and contribute to a better future. LNCT Group of Colleges, India. https://lnct.ac.in/join-the-sustainability-hackathon-challenge-and-contribute-to-a-better-future/# (accessed 19.03.2025).

Figure 38. Example of Hackathon announcement related to agro food chain sector (source: LNCT[56])

[56] LNCT: National Agro Hackathon – 2023. LNCT Group of Colleges, India. https://lnct.ac.in/national-agro-hackathon-2023/ (accessed 19.03.2025).

Figure 39. Example of Hackathon announcement related to supply chain in agriculture (source: LNCT[57])

[57] LNCT: National Agro Hackathon 2023. LNCT Group of Colleges, India. https://lnct.ac.in/national-agro-hackathon-2023-2/ (accessed 19.03.2025).

Figure 40. Example of Hackathon announcement related to precision agriculture (source: KNOWAFEST[58])

[58] KNOWAFEST: Smart Agrothon 2023. KNOWAFEST.com website, Campus Festivals in India. https://www.knowafest.com/explore/events/2022/11/1802-smart-agrothon-2023-karpagam-college-engineering-hackathon-coimbatore (accessed 19.03.2025).

Figure 41. Example of Hackathon announcement related to green skills
(source: GlobeNewswire & Green Talent Generation[59])

[59] GlobeNewswire & Green Talent Generation: Southeast Asia EcoHack 2024 Brings Together Innovators for Virtual Environmental Challenge. Source: Green Talent Generation. https://www.globenewswire.com/news-release/2024/06/23/2902707/0/en/Southeast-Asia-EcoHack-2024-Brings-Together-Innovators-for-Virtual-Environmental-Challenge.html (accessed 19.03.2025).

Figure 42. Example of Hackathon announcement related to sustainable energy (source: SSN[60])

[60] SSN: 8 TWh by 2030 Hackathon . SSN.no website. https://www.ssn.no/en/calendar/porsgrunn/2024-03-16/8-twh-by-2030-hackathon (accessed 19.03.2025).

Figure 43. Example of Hackathon announcement related to green energy
(source: Mustardbridge.org[61])

[61] Mustardbridge.org: Tech for Green Energy Hackathon. https://mustardbridge.org/?tribe_events=tech-for-green-energy-hackathon (accessed 19.03.2025).

Figure 44. Example of Hackathon announcement related to harvesting innovation (source: RNB University[62])

[62] RNB University: Events. RNB Global University website. https://www.rnbglobal.edu.in/event/06-03-2024/announcement-harvesting-innovation-hackathon-2024 (accessed 19.03.2025).

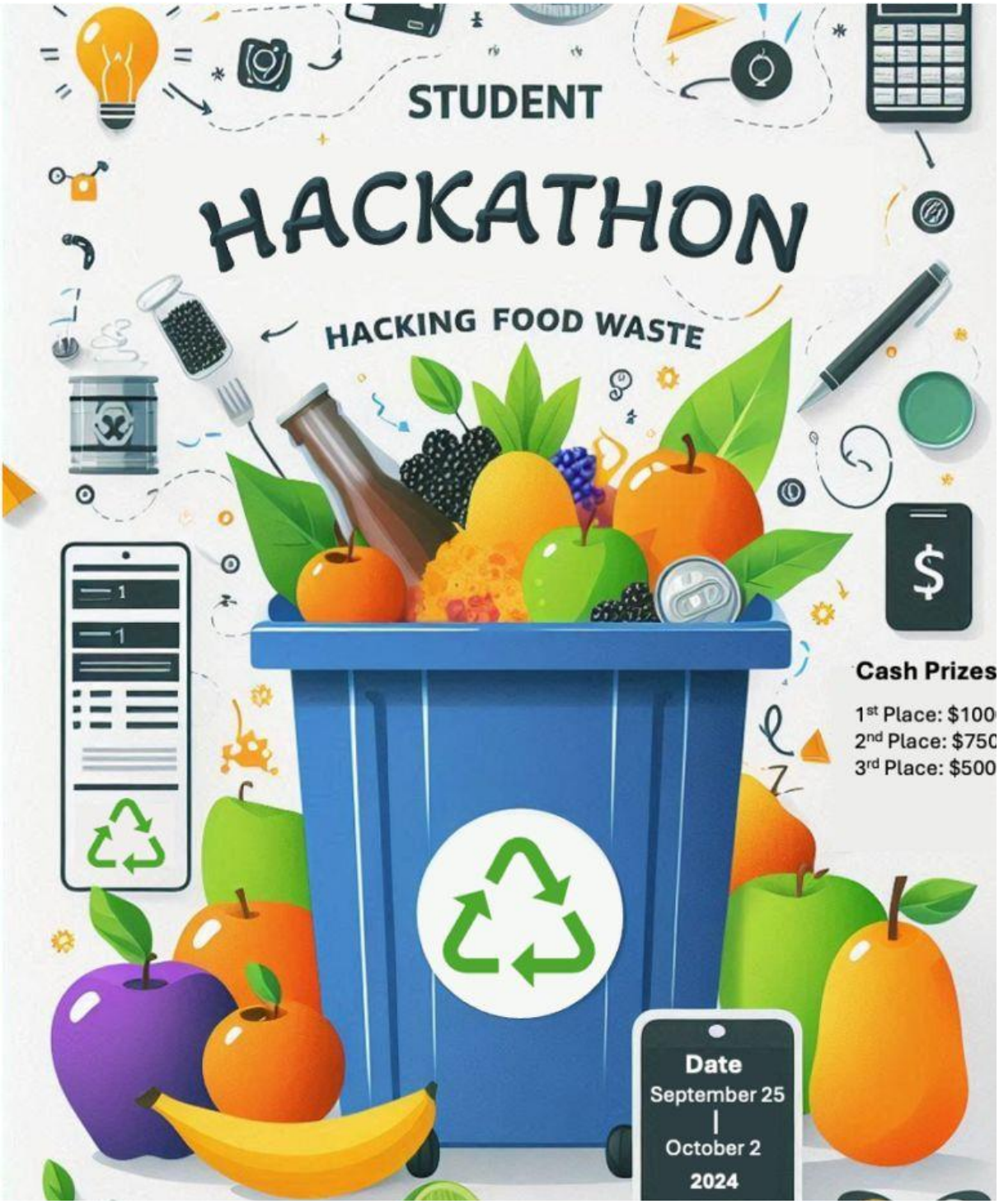

Figure 45. Example of Hackathon announcement related to food waste
(source: LinkedIn.com[63])

[63] LinkedIn.com: IFT Fruit & Vegetable Products Division. https://www.linkedin.com/posts/ift-fruit-vegetable-products-division_hackathon-fruitandvegetabledivision-sustainablefooddivision-activity-7240809719643136000-Rx4m/ (accessed 19.03.2025).

List of figures

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e-Manual on organizing student hackathons

Uniwersytet Przyrodniczy we Wrocławiu (UPWR – Wroclaw University of Environmental and Life Sciences), Wroclaw, POLAND, 2025

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More about the CHAIN project:

- Official website: **https://project-chain.eu/**
- LinkedIn: **Chain Erasmus**
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Cooperation for Holistic Agriculture Innovation Nests in Sub-Saharan Africa