



International Division - Entrepreneurship & Engineering Innovation Division Towards a new type of hybrid mode collaboration in Academia-Industry Hackathons.

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Towards a new type of hybrid mode collaboration in Academia-Industry Hackathons

The expanded use of digital technologies due to COVID-19 outbreak made it possible to try out new learning tools and models on a large scale for innovation development and competencies empowerment. The barrier of accepting the online format has dramatically lowered. People including experts are more willing to participate online. Thus, it has become easier to make international events for a large audience. Hybrid learning model has also demonstrated many benefits like cost-efficiency, cancellation decrease, technology leverage etc. We think that hybrid learning terminology may include physical presence together with online and virtual platforms. Design thinking as a semi-formal method demonstrated application efficiency. This method sets a time frame and general approaches, but at the same time does not limit participants in the choice of specific techniques. This research continues the series of studies about the future of project-based learning using design thinking published in ASEE in 2018 and 2021 (Taratukhin, 2018, 2021).

This paper explores innovative educational events held in pandemic and post-pandemic times by SAP University Alliances mostly in collaboration with the University of Muenster: Ideathon Challenge 2020, Virtual Research experience – International Project (VRE-IP), Bizarre IT-IDEATHON, International Conference for Information Systems and Design (ICID). For instance, VRE-IP – integrated learning experience scientific based on design thinking methodology that tested the hypothesis of the advantages of using virtual reality for teamwork, creativity, and innovation. Bizarre IT-IDEATHON – unique immersive collaboration to tackle climate change and ecological problems organized in hybrid mode, online and on site. It gathered total of 70 students from 15 different universities with engineering, economics, IT and management background. Participants used design thinking methodology, experts' interviews, and developed innovative solutions.

Various collaborative learning events showed that COVID-19 has not only brought dark sides and uncertainties but also made it possible to develop new innovative opportunities such as the new hybrid approach which proves to be the most effective way of setting up cross-cultural and multinational environment to aimed at learning, connecting, networking, and driving innovations. The outcomes provided in the research could be used to enhance educational strategies, develop problem solving and collaboration. In addition, these findings are relevant for the future of learning.

Academia-Industry Collaboration.

Innovative thinking and problem solving are required to resolve the world issues of the COVID-19 pandemic. Tech companies need new powerful tools to address communication, environmental and technological challenges (Ulfsnes, 2021).

Organizations can use university–industry collaboration (UIC) to absorb new technologies and information while also enhancing their inventive capabilities (Spencer, 2003). UIC has been widely regarded as one of the most important contributors to successful innovation and economic growth over the last three decades (Hall and Gibson 2004). Previous research has focused heavily on the impacts of UIC policy. According to the fundamental conclusions, UIC policies have a positive impact on knowledge innovation and transformation. According to MIT Sloan Management Review research, focusing on collaboration is critical for generating business value and gaining a competitive advantage (Kiron, 2007).

A hackathon is one of the most common types of university-industry collaboration. A hackathon is a competition in which students investigate a set of challenges and offer solutions based on data (Roy, 2017). Student teams collaborate with industry and faculty mentors over the course of a weekend to develop a concept or product. Students propose their ideas to jury composed of experts from business and academia. Although many hackathons focus on code and technology, these skills are not required. Some hackathons prioritize brainstorming, problem-solving, and business pitches over actual coding and product development. Bachelor's, master's, and doctoral students are typically invited to these activities. In demographics, students from various schools, programs, and grades are regularly represented. Depending on the topic, a successful Hackathon could include anywhere from 10 to 250+ student participants. In addition to student participants, each Hackathon includes judges, mentors, and assistants from supporting organizations and industry. Hackathons are commonly organized over the course of two to three days, usually on a weekend, to maximize student availability. The first day outlines out the challenges, defines any limitations, provides critical information, and welcomes teams of two to six people to participate. The second day is primarily devoted to solving difficulties and refining participants' ideas/products. On the third and final day, teams must present their proposals to a panel of judges who will select the winners. Based on our experience of holding hackathons, this structure is the most effective, as it allows to go through all the stages of design thinking at a normal pace, people in the team can get to know each other well and then come up with fresh innovative ideas together.

On the one hand, students gain experience with real business challenges, networking opportunities with industry experts and motivated students from other universities, and the

chance to win prizes. Companies supporting these activities and especially those acting as challenges owners may count on increased brand recognition among students, unique solutions to stated problems, soft recruiting opportunities, and increased interaction with faculty members. On the other side, hackathons can provide valuable insights and solutions for tech and other companies (Clough, 2021). Many hackathons are held as enjoyable, competitive corporate events to meet client needs and solve difficult business problems. Hackathons can play a critical role in promoting innovation and have the ability to speed things to market due to their frenetic pace. This type of interaction has many advantages over other types of cooperation. Hackathon-based collaboration provides practical learning opportunities for students, gives a spark in innovation and adopts disruptive technologies for industry, helps scholars with professional networking and career planning. Here are some examples of businesses that have effectively integrated hackathons into their new product development processes. (Galante, 2015):

1. Hackathons have been a part of the Facebook culture since 2007, with events held at the company's Menlo Park, California headquarters and around the world. Hackathons are used by companies like Facebook to proactively create partnerships and acquire top tech talent.
2. Dropbox, the cloud data powerhouse, hosted a Hack Week. During the event, dozens of projects were worked on. Many of the features of Dropbox that users use on a daily basis for example, Dropbox for Business, read-only shared folders, and file requests started as Hack Week initiatives.

SAP SE is no exception. Global academic initiative of SAP company - SAP University Alliances leverages its academic and industry ecosystem in numerous regions regularly setups and holds international hackathons. Earlier at the end of 2020 and during the year 2021 SAP University Alliances jointly with the leading universities and research centers in the USA and Europe organized various hackathons and experimental virtual activities to boost innovation and explore the efficiency of different collaboration tools, to solve specific tasks as well as global issues that correlate with UN Sustainable Development Goals.

In this article we present the outcomes of 4 international hackathons and then outline the results in the summary to make the conclusions. This paper draws on these cases to discuss the different formats of holding hackathons from offline and online to virtual.

This article firstly discusses design thinking methodology and its steps. Secondly, it shows the different formats and usefulness of innovative educational events by reporting four different organized events: a hackathon event Ideathon Challenge 2020, Virtual Research experience – International Project (VRE-IP), Bizarre IT-IDEATHON and International Conference for

Information Systems and Design (ICID). Thirdly, a number of key recommendations for future hackathon design and use are shared that aim to promote highly engaging learning experiences which exploit the new digital technologies. It is hoped that the insights of this paper are useful for educators, intending to replicate hackathons in an online or hybrid format in their own contexts.

Design thinking - the methodology used in Academia-Industry Hackathons

The ability to collaborate is what distinguishes companies and organizations that have built advanced digital capabilities. Design Thinking provides a solution-based approach to solving problems that helps to create new innovative solutions.

Design thinking is a creative approach to problem solving that differs significantly from analytical techniques such as critical analysis (Leifer 2016). Teamwork is an important component of this practice. That is why it is possible to assume that incorporating design thinking into team projects will improve student outcomes (Taratukhin et al. 2020). The methodology of design thinking in the approach to problem solving that includes five stages (Leifer 2016).

1. Empathize - with your users. Empathize - with your users. This stage includes observation, engagement, and immersion. The team studies the intended users of the final solution, meets, and communicates with them, learns what kind of experience users get and what problems they go through.
2. Define your users' needs, their problem, and your insights. At the second stage of design thinking, it is necessary to focus on and define a specific problem. This can be done by achieving two goals: understanding the target audience and the user of the final product and determining the POV (point- of-view) and further tasks based on the understanding of the user.
3. Ideate by challenging assumptions and creating ideas for innovative solutions. This stage usually starts with brainstorming, which is a technique for quickly generating a large number of ideas through teamwork and communal thought on the topic. The concepts can then be voted on, reducing the field of possibilities for future prototyping.
4. Prototype - start creating solutions. Prototyping is a part of implementation process. The chosen concepts are put into practice in the real world utilizing improvised methods. A prototype can be anything, such as a wall covered in paper stickers or a rough version of the application interface. At all levels, design thinking does not restrict the freedom of actions and manifestations of imagination.

5. Test your solutions. The goal of the testing stage is to improve problem-solving solutions. Testing is frequently done several times, interactively, and under real-world settings. Prototypes are typically demonstrated, and consumers' feedback is obtained during testing.

Design thinking is used in a variety of fields and has no boundaries (Leifer et al. 2019). It's worth noting that the five phases, stages, or modes aren't necessarily in that order. They don't have to be in any specified sequence, and they can often happen in parallel and iteratively (Dam, 2021).

New collaboration formats.

The COVID-19 outbreak has affected the lives of millions of people by causing a dramatic impact not only on many health care systems and the global economy but also on the way how we communicate and work together. This devastating pandemic has brought together communities across the globe to collaborate in a different way. This part of the study provides insights into how hackathons can be held in online, partly offline, and virtual reality modes and shows how such mixed events can contribute to solving the challenges and foster team diversity, increase cross-regional collaboration, and can be executed much faster and at lower costs compared to regular in-person events.

Case study 1: Ideathon Challenge

Ideathon Challenge 2020 – is the first international online research Ideathon.

Goal: During post-COVID World Challenge Ideathon the participants are encouraged to think broadly about disruptions and difficulties they see in remote communication.

Learning outcome: the students learn about research methods and design thinking methodology.

Participants: Senior year bachelor and graduate (Masters, PhD) students

Keynote speakers: business and academic institutions representatives

Format: 100% online

Numbers: 252 students, 15 countries, 50 universities

Countries involved: Austria, Belarus, Canada, Germany, Kazakhstan, Lebanon, Mexico, Peru, the Netherlands, Tunis, the UK, the USA and others

Dates: 11-13 December 2020.

Supported by: SAP University Alliances, ERCIS, University of Muenster.

Ideathon Challenge continued the research on the application of Design Thinking for innovation processes: previously organized offline collaboration sessions were for limited groups of students from one country in 2016 (Taratukhin, 2016) and 2018 (Taratukhin, 2018). This time, however, the hackathon was held virtually for students from all over the world with a variety of majors.

The Ideathon Challenge was divided into two time zones (European and American) to allow participants to pitch their project at a convenient time. Three challenges were presented to the participants, although they were not limited to them:

1. Learning and interaction in the post-COVID world
2. Ecology and climate change in the post-COVID world
3. Urban development in the post-COVID world

The first day of the Ideathon Challenge began with keynote speakers' welcome remarks, a setup challenge, and a workshop on the origins of Design Thinking. The first two stages were also thoroughly examined. The second day of the course provided an opportunity to put the remaining stages of Design Thinking into practice while also learning more about it. Mural.co — a digital workspace for visual collaboration – was used by the participants to come up with ideas for their projects. Participants presented their work on the final day, then discussed and shared their experiences.

The students had to pick a topic to work on, come up with an idea, apply Design Thinking techniques, and make a presentation that included a conceptual or technical prototype, codes, and other materials. For teams from the European and American time zones, the idea was submitted to the judging committee separately. There were specialists from both the industry and academics on the judging panel. The evaluation list with the precise requirements was utilized as the judgment criteria.

21 projects were presented during the final pitch session. All of the ideas were original, demonstrating the kids' outstanding entrepreneurial and research abilities.



Figure 1: some of the participants of Ideathon Challenge

Examples of projects created:

- The winning team demonstrated their point of view with a person who is an engineer and an entrepreneur, wants to relocate to a quiet, calm but developed place because COVID-19 showed her how harmful and stressful it is to live in the city
- The second-best solution was provided by the team, who tried to answer the question: how might we help seniors to better cope with isolation while using their untapped strengths (time, life experience) to help younger generations? They generated the ExperiSense-Platform that makes communication perceptible!
- The third-best solution matches parents and elderly people willing to share life experiences and knowledge through storytelling with their children.

To summarize, the Ideathon Challenge enabled industry and academic experts to collaborate with students in a virtual environment. Thanks to the online hackathon, Students from all around the world learnt about Design Thinking Methodology and developed their own projects but also helped to address the global concerns of the post-COVID world with their innovative solutions. The shift to "online" mode provided benefits such as: communication between participants regardless of their location; the ability to collect the opinions of a diverse group of people; time and resource savings; visualization of every step of the design thinking process using various platforms and services; and data collection simplification (Taratukhin, 2021).

Case study 2: VRE-IP

VRE-IP is an International Project Virtual Research experience.

Goal: support global SAP teams innovation process, prove the effectiveness of using VR technologies for teamwork, creativity, and innovation

Learning outcome: participation in innovative experiment in the multinational software corporation, learn about VR technologies and Design Thinking Method from world leading experts.

Participants: Senior year bachelor and graduate (Masters, PhD) students

Keynote speakers: business and academic institutions representatives

Format: 60% in virtual reality, 40% online

Numbers: 10 students, 2 countries, 6 universities

Countries involved: Germany, Norway (Svalbard)

Dates: 24-25 April 2021

Supported by: SAP University Alliances, ERCIS, University of Muenster



Figure 2: the process of VRE-IP experiment

The experiment followed the given steps:

1. Instructions and the general questionnaire about VR, innovations and SDGs before the experiment

2. Design thinking workshop and presentation of the task: propose solutions to the major environmental problems such as plastic pollution and carbon emissions
3. Teamwork in Rumii (VR workspace) using Oculus Go headsets. The participants used design thinking stages to produce their solutions
4. Final presentation of the innovative projects
5. Questionnaire and feedback after the experiment.

Examples of projects created:

- The app for waste sorting “Sortbuy”
- B2B platform for recycling plastic containers from delivery services
- Eco-social network with score system

As the result, the integration of virtual reality technologies into the process of remote team interaction was successful. The participants were enthusiastic about VR technology and reported a rise in motivation as a result of the unique experiences they experienced while immersed in the virtual world. VR technologies in teamwork improved the engagement rate and creativity. There was also an increase in interest in receiving and working with information. The use of the design thinking methodology has increased the positive impact of virtual reality technology due to the need for close communication within teams.

Conclusions: The experiment revealed the importance of developing a hybrid teamwork model. Due to the technical issues such as headsets overheating and low battery life it was impossible to use virtual reality during all stages of the experiment. That is why the combining the traditional teamwork tools such as MS Teams, Zoom, Miro, Figma, Notion etc. and VR technologies might be the best option for online teamwork at the current stage of technological development.

Case study 3: Bizarre IT-IDEATHON

IT-Ideathon in Divnomorskoe, Russia – an innovative workshop with international academia and industry experts

Goal: to tackle climate change issues

Learning outcome: knowledge about design thinking, new connections, real projects

Participants: Senior year bachelor and graduate (Masters, PhD) students

Keynote speakers: business and academic institutions representatives

Format: 80% offline, 20% online

Numbers: 70 students, 3 countries, 15 universities

Countries involved: Germany, Uzbekistan, Russia

Dates: 3-5 September 2021

On the 1st day of Ideathon, participants had a lecture about design thinking by Sohyeong Kim from Stanford University from South Korea, an executive director of the Stanford Center at the Incheon Global Campus. After that there was another lecture about sustainability.

Both lectures were a great source of insights and inspiration for students and young professional expert teams to jump-start their creative process and build up around design thinking process.

Following the steps of design thinking process teams interviewed experts which were present at the event venue (Power Grids Company, IBA Group, Napoleon IT) as well as connected via zoom remotely (SAP Japan, SAP CIS). Moreover, it is important to mention the unique working conditions: the event was held on the summer scene, so the students worked outdoors on benches or directly on the Black Sea shore. They used design thinking methods and templates to organize their teamwork, extract insights, generate ideas in divergent mode.

At the end of the IT-Ideathon 11 teams presented their sustainable business ideas and models in front of the expert jury.



Figure 3: IT-Ideathon team with their solution

Examples of projects created:

- The team «KosaITiki» introduced the best project - automatic recycling machine that could be implemented in shops and supermarkets. According to their idea, users can bring recyclable garbage to these mechanisms and get rewards for it. It will stimulate people to hand over waste to recycling collections points. The team generated the tangible model of the mechanism, the 3D prototype, and the telegram-bot.
- The second-best team was «RainbowPls», they developed an app prototype to motivate citizens to be more ecologically friendly and another app prototype «Track&Trash» to help people find recycling dumpsters and follow eco-habits respectively.
- The third-best solutions were presented by the students who proposed the ideas of the disposal of underwater mustard gas burials and bugs farm correspondingly

The tools, ideas, and proposals submitted through the innovative workshop – IT-Ideathon were reviewed by jury which included representatives of business and academia. The judging criteria included relevance to the SDG topic, innovation, teamwork, and prototype (visual, functional, and formal component). The jury consisted of business and science representatives. IT-Ideathon proved the effectiveness of hybrid mode for teamwork, also it showed that an unusual venue contributes to an increase in creativity and allows you to combine recreation with the new idea creation.

Case study 4: ICID – 2021

ICID – 2021 is the Second International Conference for Information Systems and Design (ICID-2021).

Learning outcome: knowledge about design thinking, new connections, real projects

Participants: Senior year bachelor and graduate (Masters, PhD) students, professors and other academy representatives

Keynote speakers: the participants

Format: 20% offline, 80% online

Numbers: 70 students, 5 countries

Countries involved: Germany, Japan, Uzbekistan, Russia, Kazakhstan

Dates: 6-7 September 2021

Supported by: SAP University Alliances, ERCIS, University of Muenster

ICID is a global collaboration network that encourages open industry innovations in academia. It focuses on practical results-based studies prepared by industry specialists in the design, deployment, and adoption of information systems. The conference also attracts the most active and brilliant students, who come to showcase their research and development projects, form new teams, and meet new people. The community's major purpose is to foster collaboration between institutions and businesses. The ICID conference is a vibrant scientific gathering with over 100 attendees and guests from Germany, Russia, Japan, the United Kingdom, Finland, Belgium, the United States, and other nations. Leading academic and industrial professionals are invited to speak on the current subjects at the conference (ICID conference website, 2022).

The conference has two submission steps: abstract submissions before the conference date and paper submissions after the conference. The program committee blindly reviews all abstracts and papers submitted. All approved abstracts authors are given a chance to present their work during the conference. Springer's CCIS series published selected conference proceedings, which are indexed by SCOPUS. ICID 2021 was organized in hybrid mode this year, some presenters joined the conference in Divnomorskoye, the Black Sea Coast, others attended it online.

Conclusions and recommendations for future hackathon design.

Having looked at the 4 practical cases of holding hackathons in various modes, some recommendations and conclusions could be made. Firstly, all modes were effective for problem-solving and creativity, however for virtual reality hackathons the most advanced technology and quick Wi-Fi is needed to avoid technical and connectivity problems. Students and researchers who participated in the events above provided mostly emotional positive feedback, they were excited to learn about design thinking and were satisfied with great networking opportunities. Secondly, the following recommendations are proposed for those embarking on similar events, noting that key success factors include:

- An extended timescale (at least 48-hours)
- Provision of a team of organizers to supervise the event
- A creative rather than competitive environment, using design thinking methodology
- Participation by students from a broad range of academic disciplines.
- Ensure mixed skill sets in working groups by inviting university students from all over the world
- Realistic goals with a focus on design requirements and prototypes over finished coded solutions

- Prepared platform and rooms for teamwork such as design-thinking steps templates in Mural or Miro

All in all, this study provides insights into how online hackathons can contribute to solving the challenges and effects of a pandemic in several regions of the world. The online format fosters team diversity increases cross-regional collaboration and can be executed much faster and at lower costs compared to in-person events. Results on preparation, organization, and evaluation of this online hackathon are useful for other institutions and initiatives that are willing to introduce similar event formats.

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