

## **Bringing Together Engineering and Management Students for a Project-Based Global Idea-thon: Towards Next-Gen Design Thinking Methodology**

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# **Bringing together engineering and management students for project-based Global Ideathon. Towards to Next-Gen Design Thinking methodology.**

## **Introduction**

Nowadays, we face a remarkable number of issues to be resolved as the world changes towards a post-COVID-19 future and an important range of opportunities to develop new approaches, expand new industries, and establish new realities. Seeking to address the issue of the changing post- COVID world disasters with very serious consequences, world-leading German academic institution, together with the market leader in enterprise application software and other partners, organized a hackathon named Ideathon Challenge for students from final bachelor year to Ph.D. level who are interested in engineering and innovation to encourage them to contribute to the problem resolution and think broadly about the disruptions and difficulties they see around them. Their ideas could be new or linked to an existing company's redesign. During the challenge, the students learned about research methods and Design Thinking methodology via lectures and workshops.

This paper presents how an international research hackathon could be an innovative business driver and a great tool for accelerated learning. Ideathon Challenge could be studied as an example of a new practical tool for educators to foster creativity and present the latest technological developments to the motivated audience in limited timeframes in the post-COVID reality. These days engineers use many multidisciplinary IT solutions that is why we believe that new engineering education is about bringing original ideas to transdisciplinary teams. We believe that this approach can benefit new engineering education.

The Ideathon Challenge took place online in December 2020 and hosted more than 250 students from 15 countries and more than 50 universities.

The methodological approach of Design Thinking was used in the Ideathon Challenge. It was introduced to the students by industry and academic keynote speakers. Design Thinking is a methodology that aims to create innovative ideas that solve defined customer problems and, therefore, considers the customer's needs and expectations throughout the whole product development life cycle (Leifer, 2005). Next-Gen design thinking is the additional development of Design Thinking methodology introduced in previous projects on the topic (Taratukhin V., Pulyavina N., 2018). Furthermore, the coordinators operated as facilitators to guide the participating students through all the steps of the Design Thinking methodology during the three-day Ideathon Challenge. The Ideathon Challenge participants were also granted access to Mural, a digital workspace for visual collaboration to interact remotely with team members. Student teams enrolled for the hackathon were offered the opportunity to elaborate on current world challenges while being supported by experts both technically and content-wise. The team project results were evaluated by the judging committee composed of university and industry representatives.

## **Post-covid reality and new innovative learning opportunities**

Social interaction and creativity in post-COVID reality are some of the most burning issues today (Navleen, 2020). These fundamental factors are crucial not only for students but for business as well. The financial and sustainable wellbeing of many technological companies highly depends on creative stimulation, which in turn is made via face-to-face communications. Lockdown limited social contact and left us with only online tools that cannot 100% substitute direct human interaction. Although more people are using common video chat sites to communicate with families, colleagues, and friends during the COVID-19 pandemic, Stanford experts have noticed that such video calls are probably exhausting us (Ramachanran, 2021). However, this provides new educational opportunities via Virtual Reality Technologies and other innovative and handful online tools such as Mural (<https://www.mural.co/>), Spatial VR (<https://spatial.io/>), Miro (<https://miro.com/>), Slack (<https://slack.com>).

### **The first international online hackathon “Ideathon Challenge”**

The idea to hold an online hackathon came up during the online 8-week sprint Stanford Rebuild held by Stanford Graduate School of Business. We combined the materials and information about the creation of the innovative products by Stanford Rebuild and our personal experience of taking part in various international hackathons (BCG Idea Challenge, Hult Prize, Cup Russia, Arctic Opportunity Explorers, AMC Makeathon) to make the profound Ideathon Challenge. Various activities have been used to make the experience more engaging and collaborative.

- Online meetings with experts from world-leading universities;
- Design Thinking workshops with industrial speakers, lectures from invited speakers from industry and academia;
- Practical tasks with online innovation tools;
- Pitch-deck sessions;
- Feedback minutes.

The uniqueness of this hackathon lies in the fact that it was fully organized and carried out during the pandemic. Ideathon Challenge continues 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). However, this time the hackathon was held virtually for students with various majors and from all over the world. The main ideas about bringing together engineering and management students were discussed in the previous work (Taratukhin V., Pulyavina N., 2018).

## **Lectures, case studies and challenges**

### **Lectures**

To give the participants the most current knowledge about Design Thinking, the professionals in this topic were invited. For example, Michael Shanks – played a significant role in the development of design thinking and is the originator of the creative archaeology lab at Stanford University, working closely with Design Thinking.

Another speaker was Kakeru Tsubota, Principal and Japan Representative, SAP Labs Silicon Valley. Also, Tamara Carleton, the CEO and founder of Innovation Leadership Group LLC and a research associate at the Foresight & Innovation lab affiliated with Stanford's Center for Design Research.

During the Ideathon Challenge, there was a division into two time zones (European and American) to provide an opportunity to pitch the project at a suitable time. The students were offered but not limited to three challenges.

### **Case study 1: Learning and interaction in the post-COVID world**

Isolation can often lead to a reduction in communication, stress, or even psychological problems (Bonnici, 2020). Each of us needs a person with whom we can communicate in our spare time and discuss ideas. That is why in this case study, it was suggested to create an international platform to support people not only in the special conditions of the post-COVID world but also people who were in such conditions long before the global lockdown 2020. It was necessary to propose a prototype project of such a platform that will be accessible to people of all ages, from students and young professionals to seniors from nursing homes who do not have support and wide learning opportunities.

### **Case study 2: Ecology and climate change in the post-COVID world**

The safety of the sea is endangered by a dramatic rise in the usage of masks and gloves. Also, there was a reduction in recycling initiatives. Therefore, this section required to create a sustainable project that will:

Eliminate unnecessary goods (ex: small non-recyclable items like straws);

Enhance investing in sustainable development;

Increase the rate of recycling;

Create more organizational and transparent accountability of international business in terms of sustainability and climate action. Any ideas are welcome if their business model can work in post-COVID conditions.

### **Case study 3: Urban development in the post-COVID world**

The unusual circumstances have forced many employers to explore and accept the advantages of online. Students and employees returned to their hometowns, some people from large cities began moving to new places closer to nature. In this section, participants had to create a project that will help to resolve one of the coming problems that your city faces due to COVID-19 change and focus on Sustainable Development Goals. The main goals were Goal 4 «Quality Education», Goal 9 «Industry, Innovation and Infrastructure», Goal 11 «Sustainable Cities and Communities», Goal 13 «Climate Action» and Goal 17 «Partnerships for the Goals».



*Figure 1: United Nations Sustainable Development Goals addressed during Ideathon Challenge.*

### **Challenges of organization**

<b>Challenge</b>	<b>The lesson learnt</b>
No automated mailing. We did not prepare the automated mailing, so it was challenging to send all the emails to all participants on time.	Prepare all the mailing in advance and automate it via mailing systems
Some of the participants who have already graduated from the university have registered in the registration form. So, we had to check the status of student for each registered person via Internet.	Add a student confirmation field (via university email or a photo of student card) in the registration form
Having 3 communication channels (Discord, Facebook, email) and additionally Zoom to share the information during the hackathon. So, we had to make the reminders manually and quickly duplicate it on time to each communication channel.	Use only 1 main channel for communication with participants.

### **Design Thinking methodology**

Design Thinking methodology was used to handle the process of problem analysis, concept creation, and prototype production of the solution during the Ideathon Challenge. In our context, Design Thinking stands for the analysis in this framework that focuses on brainstorming and functions as an innovative approach for Design and development that seeks to provide unique strategies for the best user experience in an organized manner (Mabogunje, 2016). Design Thinking follows six stages (Brown T., 2009):

1. understanding the problem
2. observing the behavior of users
3. defining the point of view
4. ideation which means generating ideas to solve the given problem considering the user behavior
5. building a prototype
6. testing the prototype

The first three stages form the «problem space», whereas the latter three present the «solution space». Spending a significant amount of time on problem analysis,

identifying potential users, and getting insights about their relevant needs allows the participants of Design Thinking sessions to avoid a commonly encountered issue of «jumping to the solution» which is often the reason behind many product launch failures. By the end of the third stage of the «problem space» participants have developed an actionable problem statement - point of view (Leifer, 2005).

Ideation, the first stage of the «solution domain», is a step that focuses on the idea of generation in terms of concepts and outcomes and is aimed at exploration of a large number of ideas and diversity among those ideas. During prototyping, the ideas and explorations are taken out of heads and into the physical world – the more artistic the prototypes are, the more feedback (both negative and positive is collected) on these, the better. The sixth stage is testing but is not usually the last one since testing is an iterative process that initiates the creation of the next version of the prototype, representing an opportunity to refine solutions and learn more about users (Branson S., 2020).

Next-Gen Design thinking (or Future Design thinking (Taratukhin, 2020)) as a further development of Design thinking (aka Stanford Design Method), based on a significant new understanding of Ideation and Prototyping stages, novel approach of use storyboards (for example SAP Scenes) and finally Gamification approach are some of the possible ways to improve learning motivation and engagement specifically for millennials and post-millennials students.

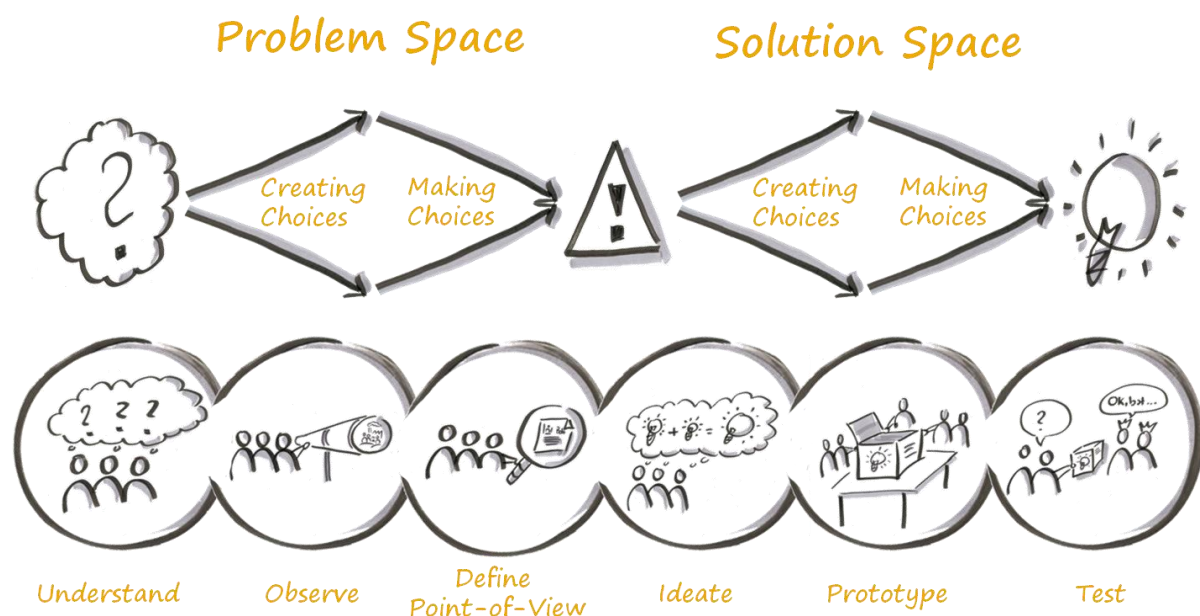


Figure 2: Infographic of Design Thinking Steps and Mindset.

Overall, students had to follow Design Thinking steps, be visual, actively collaborate, use online tools, and appreciate time frames (Taratukhin, 2018).

### Lectures and workshops

The first day of Ideathon Challenge started with the welcome speeches of keynote speakers, a setup challenge, and a workshop that was dedicated to the history of Design Thinking. Also, the first two stages were comprehensively analyzed. The second-day workshop gave a chance to put into practice the rest stages of Design Thinking and gain

more knowledge about it. The participants ideated their projects via Mural.co – digital workplace for visual collaboration. During the last day, participants presented their projects, then discussed and shared their experiences.

### **Participants**

There were more than 250 interested and registered participants, but for personal reasons not all of them reached the solution of the cases. 86 students successfully finished Ideathon Challenge. Participants from many countries took part in the hackathon, which complicated organizing the teams' performances due to the difference in time zones. There were students from Austria, Belarus, Canada, Germany, Kazakhstan, Lebanon, Mexico, Peru, Russia, the Netherlands, Tunis, the UK, and the USA. The participants were divided into 21 teams, which consisted of 2-7 people. All groups showed unique and interesting solutions to the provided cases in three areas.

### **Judging committee and assessment**

The students had to choose a topic to work on, create the idea, use Design Thinking methods, and produce a presentation with a conceptual or technical prototype, codes, etc. The project was presented to the judging committee separately for teams from European and American time zones. In the judging committee, there were experts both from the industry and academia. The judging criteria used the assessment list with the requirements presented below:

1. Innovation. The project is innovative across multiple innovation channels, clearly creates new value in new ways, and has a clear pathway to being a transformational, game-changing solution that disrupts the sector and creates systematic change.
2. Team. The team is kind, works amazingly together, looks good, sells well, has the willingness, ability, and group dynamics to succeed. They either have experts or a clear pathway to success and demonstrate the resourcefulness required to continue onwards with their enterprise.
3. Design Thinking. The projects include Design Thinking steps.
4. Relevance. Does a business idea have a positive net impact on problem-solving after COVID-19?
5. Tangibility. Can the product or service be sold? (Demonstrated market or pathway to market for the product or service).
6. Market entry. Can the business reach at least a thousand consumers, or can it be implemented in an international working business?
7. Research. Does the project include a research component? Does the team present any results of the research analysis? Do they use relevant references and information sources?

Each team was evaluated according to the listed criteria. The final results were announced during the last online session.



## Ideathon Challenge results

During the final pitch session, 21 projects were presented. All the ideas were unique and indicated the great entrepreneurial and research skills of students. The best ideas are represented below:

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 (figure 3).

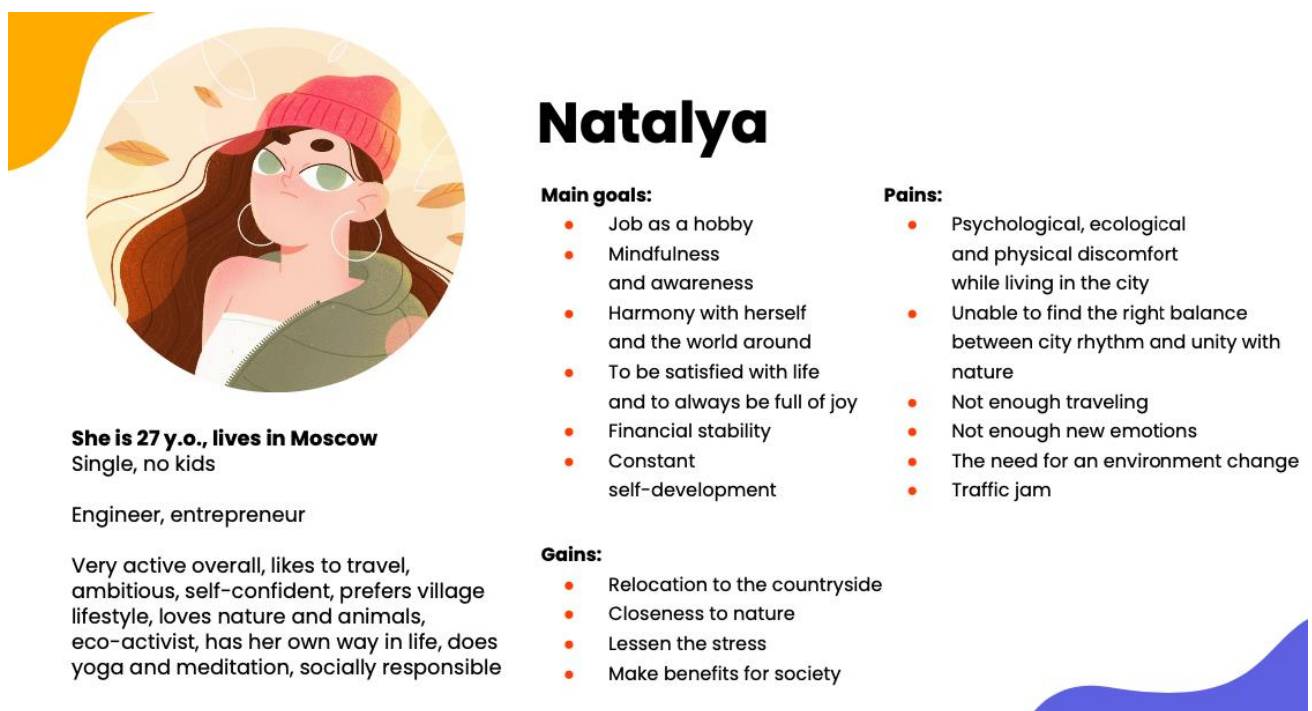


Figure 3: Persona of the team.

The major problem was psychological, ecological, and physical discomfort while being in the city and following desire to relocate to quiet countryside with developed infrastructure. Initially, the team had more than 25 ideas, although they focused on one view of an app that helps to find a perfect eco-village for you. They made the prototype of the website and the searching engine (figure 4). According to the team, their project will solve the problem of people who experienced psychological, ecological, and physical discomfort while being in the city and had a desire to relocate to the countryside with developed infrastructure during self-isolation.



# Prototype

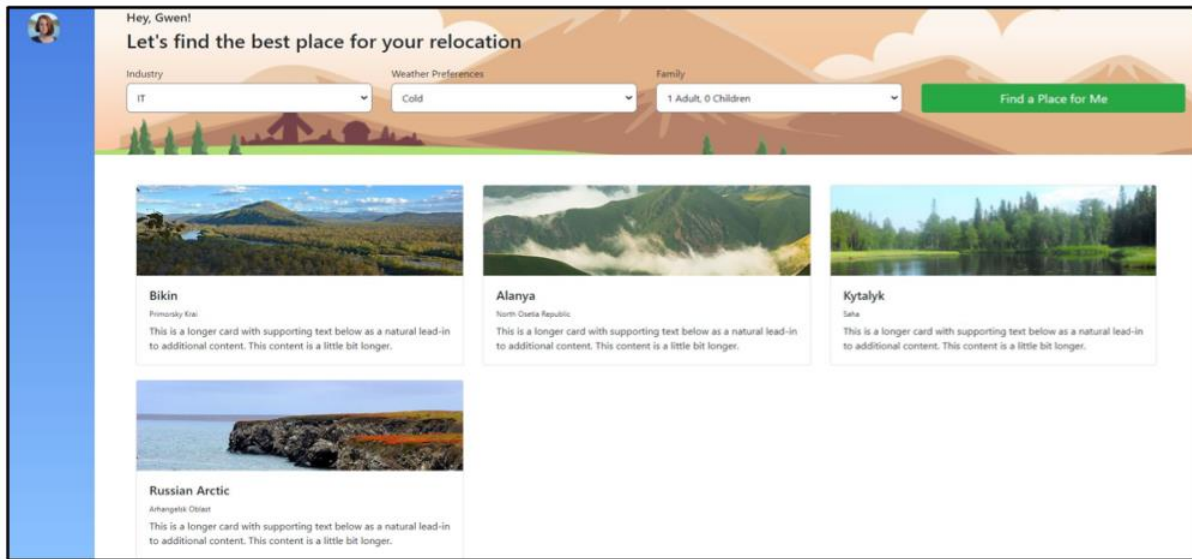


Figure 4: Prototype of the team.

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? The group showed two personas (figure 5).

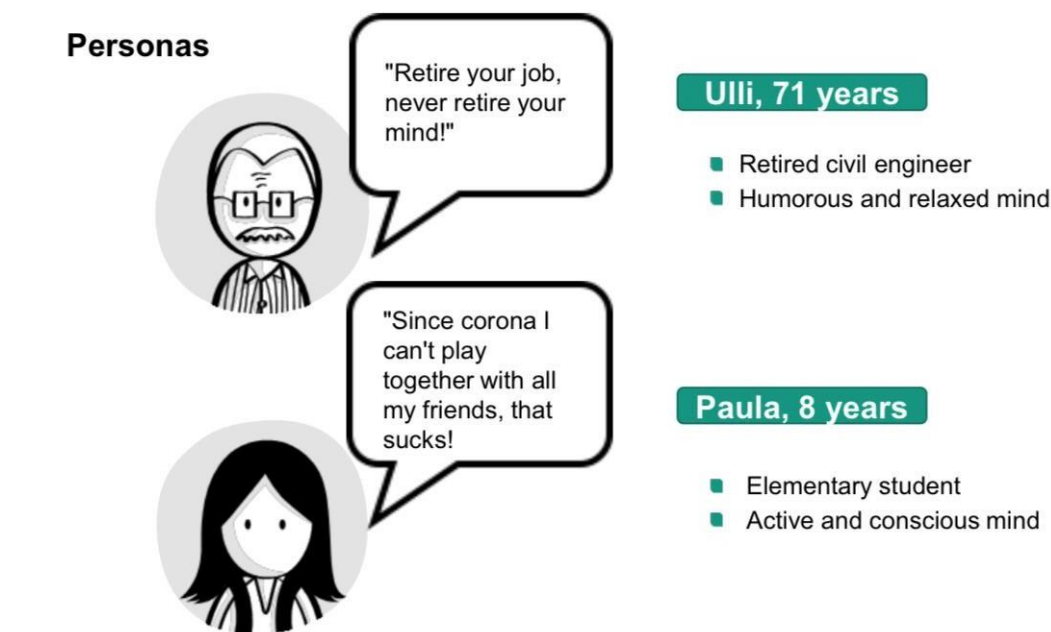


Figure 5: Personas of the team.

The emerging problems are that current tools are too technical with no experience; moreover, there are no natural impressions. Human beings need to create valuable moments with people they love and like, share moments, and enjoy the sounds, smells, and touches. To make this come true in our post-COVID reality, the team suggests making digital communication feel real via ExperiSense-Platform. It combines featured devices such as VR Glasses, Smart Gloves, Scent Diffuser, Home Box, Hologram

Devices, and Skin Sensors.



Figure 6: ExperiSense-Platform.

The opportunities of this platform are huge. During the COVID world, people can meet others in different virtual places, connect with family members, prevent isolation and loneliness. In the post-COVID world, such a platform will help make and share moments, work together, and create genuine experiences.

The third best solution was given by the team, who started their presentation with a question: Do you remember the emotion and imagination flying when listening to stories as a child? And gave the proof of declining wellbeing of families and deteriorating school facilities there due to remote studying. That is why the team demonstrated the following personas and points of view from two sides (a retired woman and a mom).

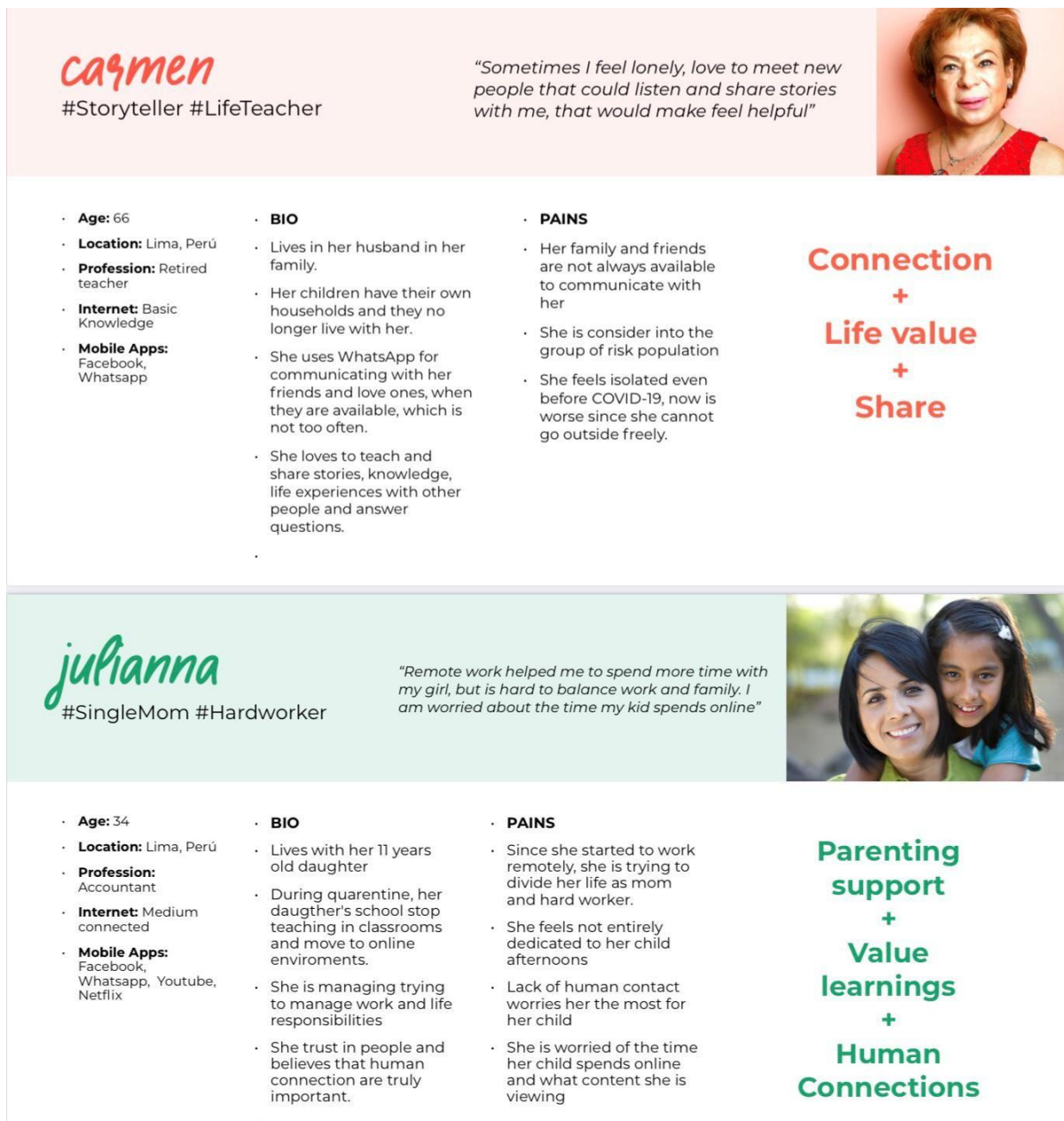


Figure 7: Personas and points of view

As stated by the team, there is a solution to the problems of both personas: More Than Tales. It is a solution that matches parents and elderly people willing to share life experiences and knowledge through storytelling with their children. A joint parent who is worried about their kid's online connectivity time wants them to value learnings and connections with elderly who wish to share and feel less isolated and a sense of usefulness that reinforces their life purpose. The team even made a prototype of their idea.

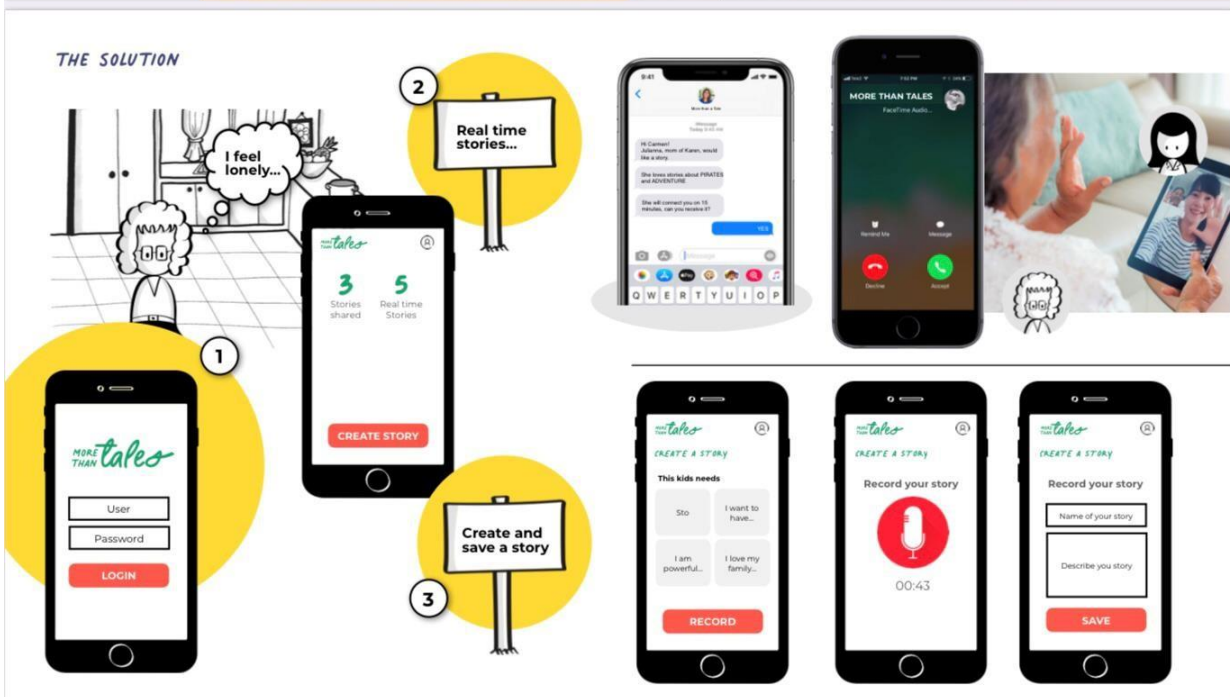
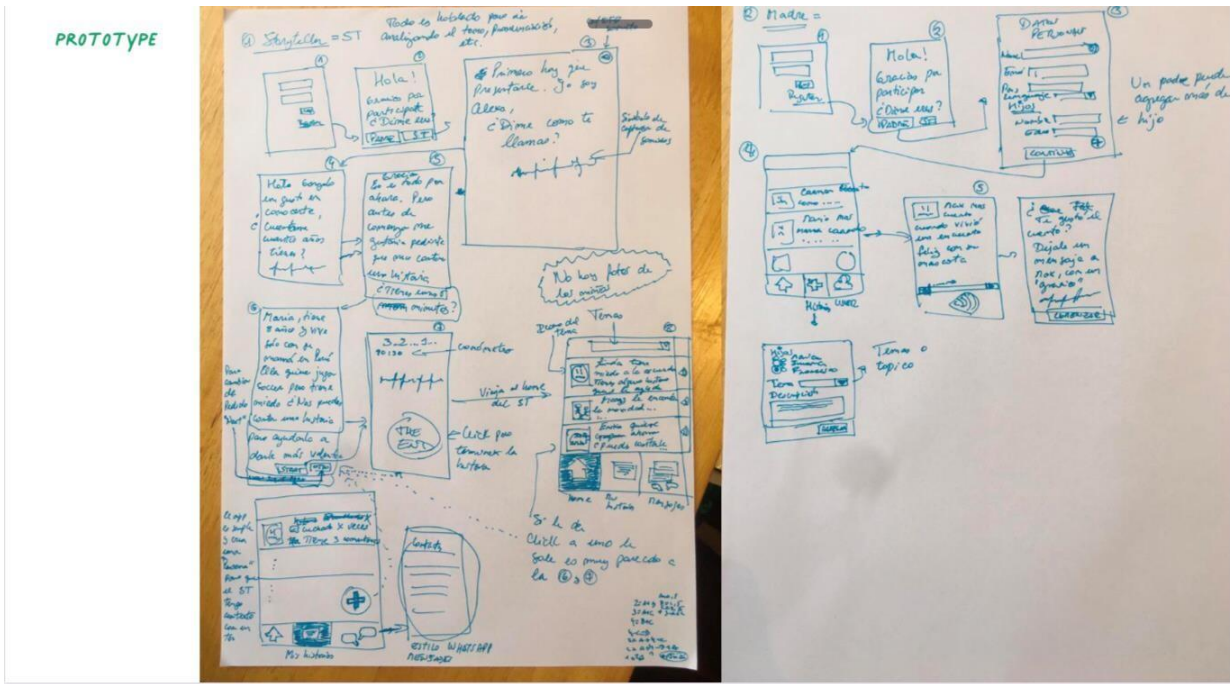


Figure 8: Prototype

To conclude, Ideathon Challenge made it possible to gather industry and academia experts together with students in a virtual environment. Thanks to the online hackathon, students from all over the world not only learned about Design Thinking Methodology and created their own projects but also contributed to tackling the global challenges of the post-COVID world with their innovative solutions.

The transition to the "online" mode brought to this process such advantages as:

communication between participants, regardless of their location; the opportunity to collect the opinions of a wide range of participants; save time and resources; visualize every step of the design thinking process using different platforms and services; simplify data collection.



## **Reviews**

The final part of the hackathon was the celebration, when participants could share their experiences, ask questions, and give feedback. Most of the students were particularly grateful for the opportunity to work in the multicultural atmosphere and to learn about Design Thinking from professors from world-leading experts.

One student mentioned that this hackathon inspired her to study product developed for master's degree, another scholar from the USA said that since she is a disabled person without the ability to move around and she was extremely happy to participate in Global Ideathon Challenge because it was the only prospective opportunity for her to do it. Other participants mentioned that the timing of Ideathon Challenge was comfortable since weekends are free from classes and work, so they could 100% be in and take part in all activities.

## **Recommendations for future work**

Ideathon Challenge participants had an opportunity to learn about Design Thinking from worldwide experts, gain unique professional experience in research analysis, create innovative original business solutions (that should be of great interest to industry and academia), and pitch them to a professional judging panel. They had a chance to put their academic knowledge and creative thinking to the test to solve real-world problems of the post-covid world. Moreover, it was a great chance to meet with students and experts from other countries and expand the network.

- Being the organizers, we came up with the key characteristics identified for the success of such endeavors as the online international hackathons.
- Early preparation (website and registration form, marketing materials creation);
- Clearly stated and thought-through challenge statements;
- Inviting worldwide experts;
- Wide marketing campaign;
- Student and organizers diversity;
- Proper arranged space for online work and communication;
- Giving the proper instructions to moderators and administrations of the event;
- Greatly moderated process of dealing with challenges (Design Thinking is a very useful tool in this case);
- Availability of technical resources for effective collaboration;
- Information support and reminders throughout the event;
- Time difference. During the organization of hackathons, people need to take into consideration the time zones of the participants. In our case, there were students

from North and South America, the UK and Europe. Every student should have had the same time for project preparation, access to workshops and lectures;

- Clearly stated assessment criteria for the judging committee;
- Organization of final celebration which helps to gather feedback and interact.

### **Conclusions**

To conclude, nowadays, engineers shift their focus from being highly specialized to broadening their knowledge and becoming multi-skilled from different perspectives. The future of engineering education should support the process of creativity and innovation, where design thinking plays one of the leading roles. Therefore, we believe that this work will enable engineers to think more broadly, creatively, and use new education tools and acquire new knowledge.

The experience of holding such events could particularly interest new faculty members because that is a fantastic way to assemble student teams, use pedagogical methods and new educational approaches to strengthen group relations, and prepare for an international experience. In addition, integrating engineer and manager students in one team helps young faculty members establish connections between different faculties such as management, engineering, etc. In fact, young faculty members usually have limited university infrastructure and networking possibilities, and such interfaculty teamwork will help establish excellent relations between managerial and engineering students.

The provided results could be used both for educational and business innovation purposes. The next step of our work is to explore the effectiveness of using Virtual Reality Technologies for the engineering team innovation process during Design Thinking Sessions.



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