Progress Report CERN Summer Course

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Geneva, Switzerland
August 31, 2023

Contents

1 Team and its members

The crucial part of the CERN Summer Course is the teamwork. The teams were formed by the course instructors based on individuals' backgrounds and the type of personality. This way, team number five came to life. It is composed of four students: Luca Chicos, Nikodem Dudek, Silvia Grigorescu and Svetoslav Yordanov, as seen in Figure 1.

Figure 1: Team Spark working together.

They all have distinct background and experience that is outlined in subsection 1.1. However, they are united by their motivation and curiosity to make a difference with their selected technology. The team was named SPARK with the logo presented in Figure 2.

Figure 2: Logo of team Spark.

Its motto is that a spark of idea can ignite the flame of positive change. To facilitate a better collaboration experience, at the beginning of its existence, the team agreed on the set of rules described in subsection 1.2.

1.1 Background of team members

1.1.1 *Luca Chicos*

Luca is a second-year bachelor's student in the Nanobiology programme at Delft University of Technology. Before university, he spent the majority of his life in Bucharest, Romania, but he decided to continue his studies abroad for the same reasons as most of his international peers: broadening his horizons and having a first-hand experience of a different culture.

The main idea of the Nanobiology programme is the indispensability of interdisciplinary activity, especially in research teams. This very idea resonates strongly with Luca, and therefore, he is keen on expanding his knowledge and skills in various ways and as much as possible. Consequently, Luca follows the Nanobiology Honours Programme, in which his focus is on Quantum Mechanics studies. He is also very interested in astronomy and has participated alongside an amazing team in the NASA Space Settlement Contest of 2020. Overall, throughout his academic journey, Luca has had contact with several science domains, all of which have fascinated him, as each subject brings a new language and means of tackling the knowns and unknowns of the universe. However, Luca is also engaged in plenty of hobbies, such as playing and watching tennis and table tennis, hiking, travelling, and dancing, having been a professional ballroom dancer for 9 years.

Nevertheless, one whole area that has been missing from Luca's grasp is anything business or economics-related. As a scientist, he thinks it is important to have tangents and know how to navigate through this vast, mostly (but not completely) shark-filled sea, and the CERN Summer School seemed to be a perfect opportunity as a starting point in this direction. Other main attractors were the prestigious institute, the hub of particle physics studies, and the birthplace of the World Wide Web that CERN represents, but also the possibility of meeting people, employees and researchers with priceless ideas and notable life experiences.

1.1.2 *Nikodem Dudek*

Nikodem is a third-year student in the BSc Aerospace Engineering programme at TU Delft. He comes from Poland but decided to pursue studies abroad to widen his horizons and gain international experience. In addition to the regular curriculum, he follows the Honours Programme. Its central part is the research project which he conducts in the field of orbital mechanics. During the first semester of his third year of studies, he is doing his minor in robotics and management at Nanyang Technological University in Singapore.

His education is mostly in the technical field. First, he builds the fundamentals of mathematics and physics in the Physics Academic Class in his high school. Then, he dived into the engineering discipline during his studies and is still in his Honours Programme and minor. However, on multiple occasions, he goes beyond his current discipline and develops other (often soft) skills. For example, he took a "Rhetoric and Public Speaking" interfaculty course, went to Berlin to practice German or began Chinese in Singapore. As a second theme for his minor, he wanted to learn about management. Knowing how to plan, organise, lead and control is important for him in personal and professional dimensions.

Nikodem perceived the CERN Summer Course as a valuable opportunity. Firstly, he wanted one more time to divert from the comfortable Aerospace field. Particularly, he was expecting to deal with the technologies from a business or applied standpoint. This way, he could get a wider view of technology transfer. Furthermore, he wanted to establish new contacts. Summer course was to provide a multitude of such opportunities: from meeting fellow course participants, and course instructors, to CERN employees and interns. Finally, the exciting part was working in interdisciplinary teams. It was something he had not experienced before.

1.1.3 *Silvia Grigorescu*

Silvia is a third-year bachelor's student in the BSc Industrial Design Engineering at TU Delft. In addition to the regular curriculum, she follows the Honours Programme. Silvia is from the Netherlands but with parents from Romania. This made the interaction with her other team members easier as they had some commonalities in terms of culture. After high school, she did not immediately start with the Industrial Design Engineering program. She started with the bachelor of Applied Physics at TU Delft and got her propaedeutic diploma after two years. During her studies, she discovered that she preferred doing projects and wanted to work in a more creative field, while still maintaining the technical elements of her study. She found out that Industrial Design Engineering was a good fit for her and switched to this bachelor's program.

Industrial Design Engineering is very much about combining the knowledge of different disciplines into the creation of a product or service that creates value for the end users. In her curriculum, she learned by doing several projects that one should always question assumptions that they make about the users and other elements of the problem. These assumptions can be tested and evaluated by testing elements of the product or service with the end user by means of interviews or user tests. This mindset helped the team to sometimes question our own assumptions and not jump to conclusions too fast.

Silvia already had previous experience working in interdisciplinary teams. She did the Small Rocket Project organised by the student team DARE where she designed a rocket with her team that launched an egg 1 km in the sky and retrieved it safely. She did a summer course at TU Berlin in the field of cognitive engineering where she worked on a project about the usability of the transportation ticket systems in Germany with a team of people from all around the world. The interdisciplinary teamwork was something she enjoyed a lot and sometimes lacked in her own studies. With this experience in working in interdisciplinary teams and her background knowledge in both the technical domain and design world, the summer school was the ultimate fit and a valuable experience for Silvia to grow even more in her career development.

1.1.4 *Svetoslav Yordanov*

Svetoslav is a graduating student in the MSc Strategic Entrepreneurship program at the Rotterdam School of Management. Originally from Bulgaria, he completed his Bachelor of Arts degree at the American University in Bulgaria, graduating with Magna Cum Laude honours. He majored in Business Administration with a concentration in Management and minored in the German language and the history of the Ottoman Empire. In his final semester, he is enjoying an exchange program at Duke University's Fuqua School of

Business and their Daytime MBA program.

Svetoslav has internship experience in the card business, corporate banking and private equity investment sectors. Following his graduation from AUBG in 2021 he spent a year working at the Burgiss Group as a private equity analyst, where he was eventually responsible for the training and mentoring of junior analysts. He also spent 2 years at 180 Degrees Consulting Sofia, where he rose from junior consultant to branch vice president. While Team Leader he won the 'Team of the Semester' award and also placed third in the 180 Degrees-organized Business Consulting Marathon. He remains part of the branch Advisory Board. In his spare time, he is keenly interested in certain branches of science, being active as an amateur radio operator and a fully qualified marine mammal observer.

Svetoslav was drawn to the CERN Summer School because it represented an opportunity to work on cutting-edge technology without having a scientific background. Additionally, he was curious to explore the dynamics of working in a team composed near-exclusively by engineers. Last but not least, he was looking forward to the intellectual challenge of carrying out a project at one of the world's premier research centres.

1.2 Team rules

At the second lecture at TU Delft, right after its creation, the team SPARK agreed on the team rules. They are displayed in Figure 3. It is essential to set expectations for each other from the start and to write them down. This way, the collaboration becomes smoother and the team may avoid some misunderstandings and conflicts.

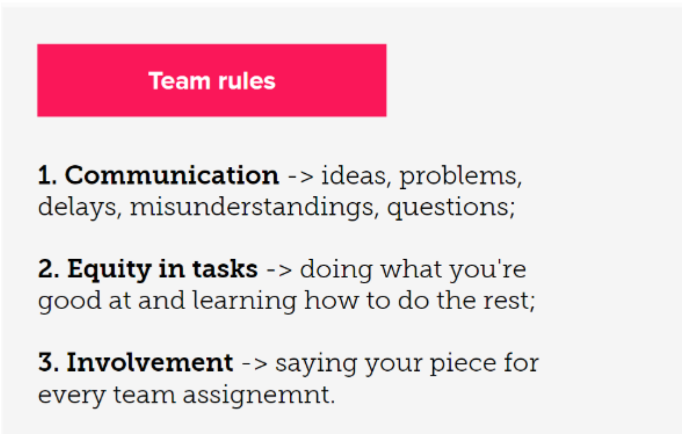

Figure 3: Rules of the team SPARK.

2 Innovation process, choices and milestones

The heart of the whole project was the innovation and ideation processes. Each team navigated through countless tasks based on creative power and we were steered towards their completion with the help of lectures and imaginative exercises. Our entire journey started as diverging from a technology into multiple application domains, to then converge towards a singular, final, explicit application.

2.1 Technology unbundling

An important milestone during the course was the selection and familiarisation with the technology. After the second lecture at TU Delft when the teams had been formed and its members integrated, the instructors provided descriptions of five technologies from the ATTRACT programme. Each team had to choose one to work on. SPARK opted for VISIR2 which is a novel visible-infrared complementary metal oxide semiconductor (CMOS) compatible image sensor. Only the basic information was provided on the technology card: function of technology, working principle, unique characteristics and potential domains of impact. The team performed further research using available sources found on the internet. The emphasis was, however, on what the technology can do rather than what are the technical processes behind it. Team members understood how an image sensor works, what it requires to operate and what objects are detected using visible light and SWIR.

After the series of lectures at TU Delft, the group scheduled an online meeting with Andrea Ballabio, the technology contact person. He is the co-founder and CEO at EYE4NIR. Beforehand, the team members prepared a list of questions regarding VISIR2. During the meeting, the contact person provided the presentation with more information about the technology and resolved some of the unclearities the team members had. Overall, the meeting was perceived as very insightful. Some of the most important learnings are:

- The image sensor captures two images of an object simultaneously (one in visible light and one in SWIR).
- Medicine is a domain of application with high potential but was not thoroughly explored for the use of VISIR2. This is contrary to automotive where extended studies are currently being undertaken on this matter.
- Other promising fields of application are wildfire monitoring, product quality control, agriculture and security.
- VISIR2 is not the best product in the markets with a demand for high performance e.g. military or aerospace.

Finally, on the first day of a design sprint at TU Delft, the VISIR2 technology was "unbundled". The group discussed and summarised all the information and findings it learned so far. Then they brainstormed to improve their understanding. The process was supported by filling in the online canvas in Figure 4.

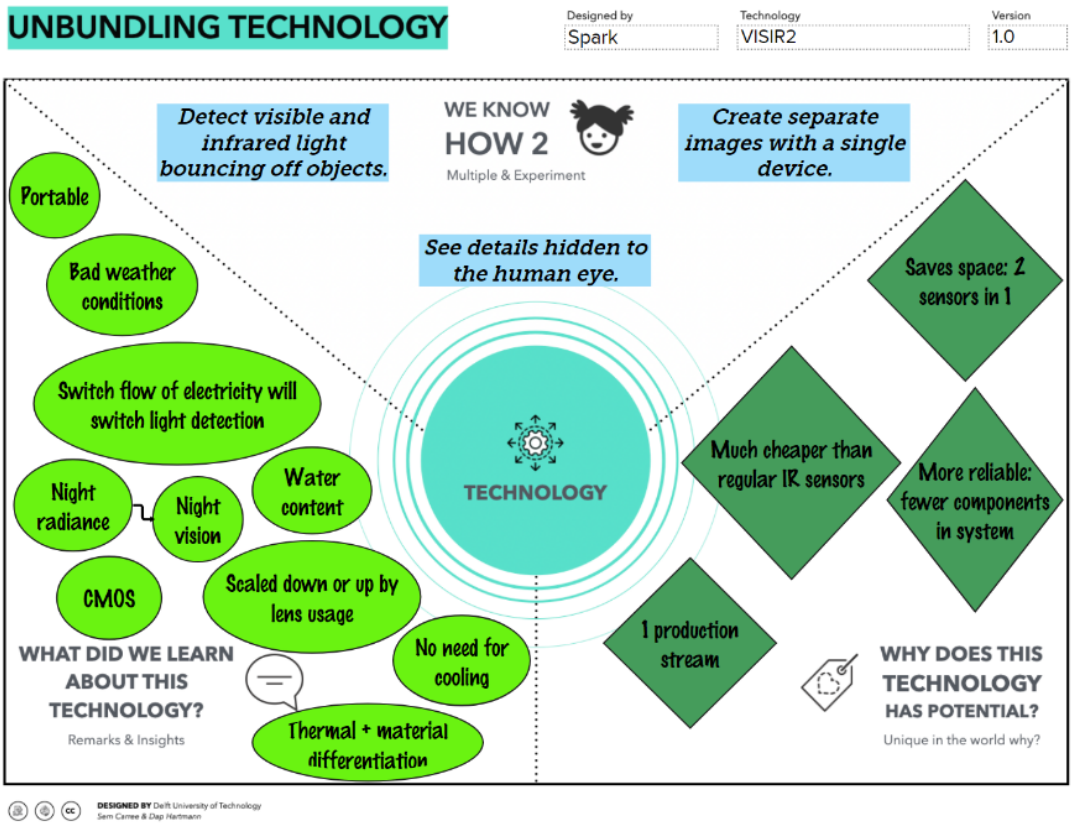

Figure 4: Mural canvas of unbundling technology.

It contains remarks and insights. These were mostly the interesting characteristics of VISIR2 that the group captured from the technology card and a meeting with a technology contact person. Further, it was expressed what VISIR2 characteristics made it unique. Essentially, that was the scalability, affordability and combination of radiation ranges in one device. In the end, the group attempted to finish the sentence "We know how to...". Its members were thinking critically about the potential answers and presented them to the instructors and other course participants. After a couple of iterations, the final statement is:

> "We know how to create images from visible and short wave infrared light bouncing off objects."

2.2 Domain Exploration and Domain Selection

After defining the "we know how to", the team had to come up with 100 possible domains and sub-domains for the VISIR technology (see Figure 5). The focus was to find domains that could make use of infrared imagery and/or visible light imagery.

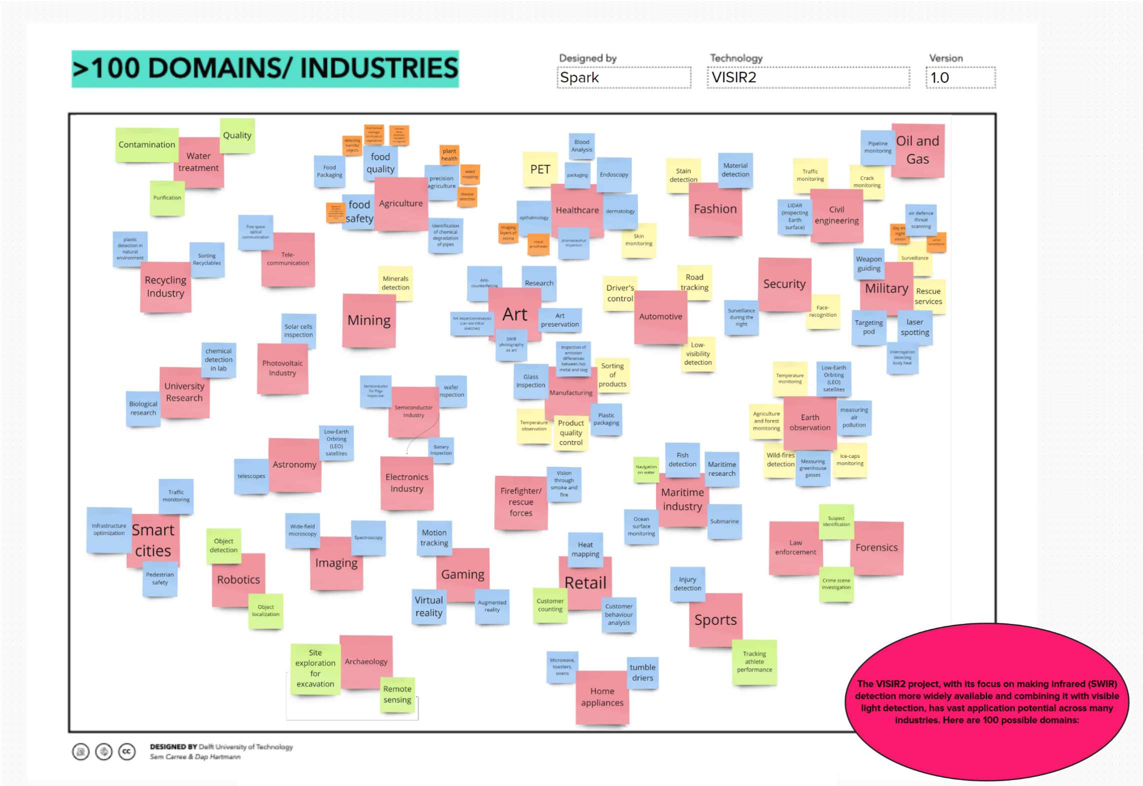

Figure 5: 100 Domains and sub-domains for the VISIR technology

From these domains, the most interesting eleven domains with subdomains were chosen. Each of these domains was then explored with the help of the industry canvas. An example can be seen in Figure 6. The main goal was to discover what these domains exactly did in terms of detection. These findings were then evaluated based on whether our sensor could contribute to the domain.

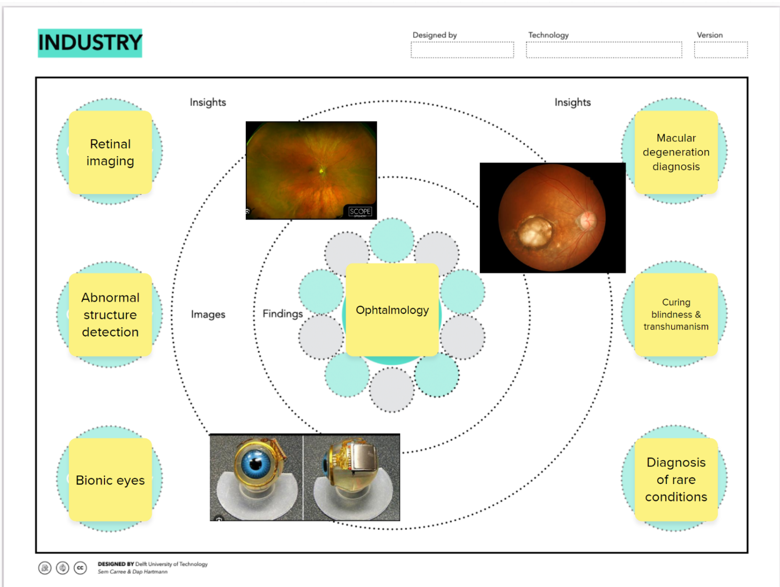

Figure 6: Industry Canvas

Afterwards, the ideation wheel was used to come up with potential applications within each domain (see Figure 7). A lecture about the Sustainable Development Goals was given and was also an inspiration point to find even more applications that also consider these SDG's.

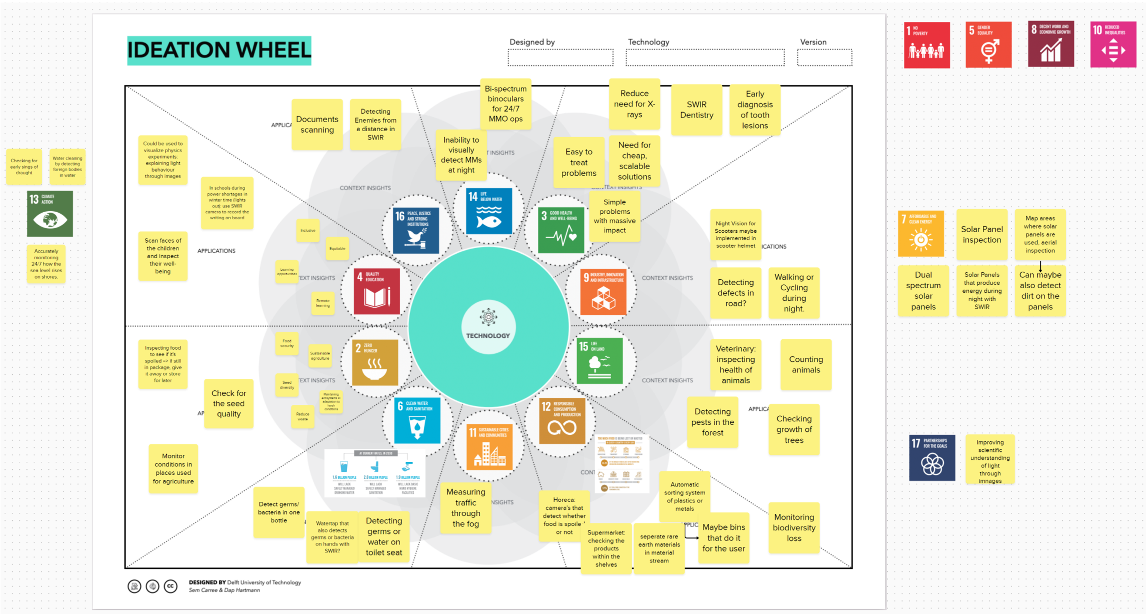

Figure 7: Ideation Wheel with SDG's

Again, the most interesting domains were chosen and this time the application had to be matched with the VISIR technology. It is important when matching the technology and application within the domain to discover who the key players and users are, and the opportunities and pains of this group. This was necessary to evaluate which domains would have the largest impact.

The domains with a larger impact were chosen and evaluated again with the opportunity field canvases. Instead of only relying on online sources, the team also interviewed stakeholders within some of the domains. The interviews were held with people from the following domains:

- Security of Documents: Engineer (Silvia's uncle) who worked within a French company responsible for engravings within passports and ID cards.
- Security of Spaces: CERN head of security.
- Biometrics: EPO patent examiner (Silvia's mom)
- General Healthcare: General Practitioner (relative of Luca) from Romania.
- Dentistry: Retired dentist (contact person from one of the lecturers) in the Netherlands

These people were interviewed throughout the process when certain assumptions we made needed to be tested. Not all interviews led to a solution for their problems but were a starting point for further exploration of the domain. For instance, the EPO patent examiner was familiar with current technologies regarding biometrics but was not the one using them.

Apart from the discussions with the people, our team thought of 5 important criteria that would help in ranking the possible applications: feasibility (quantifying the ability of VISIR2 to work in a given situation), viability (whether the business idea would last), desirability (quantifying if the users want or need our product), societal impact (the number of people that would benefit from our idea) and environmental impact (keeping in mind the effects on the environment). We deemed as most important feasibility and societal impact. These criteria were used to construct the c-box in Figure 8, which helped in visualising the advantages of some domains over others.

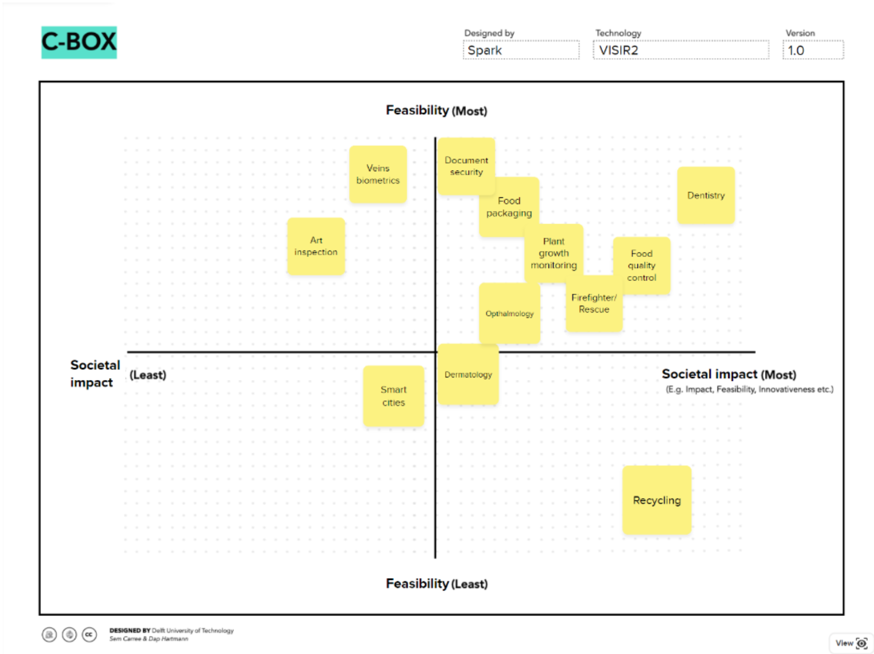

Figure 8: C-box based on feasibility and societal impact

Based on all the acquired information, in the end, we limited the application pool to three domains:

1. Dentistry – It scored the highest on the societal impact axis, and there is a recent scientific study "Assessment of the activity of secondary caries lesions with short-wavelength infrared, thermal, and optical coherence tomographic imaging" by Chang et al. that backs up the ability of SWIR light and sensors to detect active tooth decay.

2. Food quality control – Food waste is one of the biggest factors that detriments our society (based on the SDG's) and thus having control over sorting fresh from close to spoiled aliments has both a highly positive societal and environmental impact. In addition, there have been numerous studies that use SWIR light successfully to detect bruised or decaying specific foods, which makes VISIR2 fairly feasible in this matter.

3. Veins biometrics – Even though it does not have a big societal impact, its feasibility is very high and it felt like a fascinating, novel idea for the use of SWIR light. Moreover, the palm vein pattern is unique for every individual and this type of biometrics is not invasive from a privacy point of view (such as eye or face scanning). It is very hard to replicate and be breached (one would need a full hand prosthetic with channels filled with water resembling the user's vein pattern) compared to fingerprints which can be "stolen".

In the final stretch, we had to limit ourselves to a singular application, for which we conducted a final round of expert talking and deeper research. For the application of veins biometrics – apparently, there are already efficient and effective devices, that are quite affordable (for example, Fujitsu's PalmSecure device, which is around €200-300). On top of this, it is already implemented in some healthcare clinics to access laboratory test results. Next, food quality control is relatively difficult to implement properly as an automatic process for smaller businesses and companies – usually, there are already people working manually in sorting aliments, and our solution would lead to them losing their jobs (which might be one of the only possible income sources in their areas). Then, in the areas where the process is automatized, numerous companies have fully operational, multi-functional apparatuses on the market (e.g., Tomra, Hamamatsu, Linx, Xenics, etc.), creating immense competition.

Therefore, our domain of choice was dentistry. VISIR2 provides a novel modality of identifying cavities, so there is no competition. The method of detecting tooth decay using SWIR light has been scientifically proven and in our device, it would be coupled with visible light detection, providing an extra layer of affirmation for a given observation. Dentistry also provides the biggest market and correlates to a very high societal impact.

3 Defined problem

In 2022 more than 3.6 billion cases of caries were diagnosed globally. This is only a part of the actual amount of caries in the world. Through the interviews and research, it was also discovered that secondary cavities are also a frequent problem dentists encounter with their patients. Current techniques of detecting cavities are either through a physical exam of the teeth or an X-ray. Early-stage cavities are hard to detect, and X-ray is expensive and invasive for the patient.

4 Solution to the problem - user story

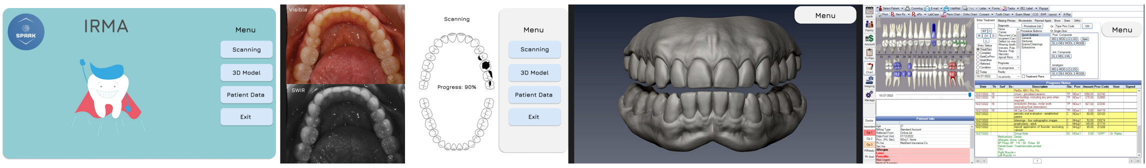

Figure 9: IRMA software: User Interface for Dentist

From the user perspective, the proposed utility of our product (IRMA) for the aforementioned problem is as follows:

1. The dental clinic purchases our device, which is compatible and can be connected to the already existing dental unit (containing the equipment of habitual use) in most cabinets.
2. After the installation of IRMA on the dental unit, the related software application (see Figure 9) can be installed on the monitors inside the cabinets. The software can be downloaded from the internet by having a specific licence that comes with the purchase of IRMA.
3. The online page for the software of IRMA will also contain an instruction manual for IRMA and for the application.
4. For every routine control of a patient, especially for those with pre-existing fillings in their mouth, the device will be turned on and used to scan the teeth (by making very similar motions to using a toothbrush). There will be no need for extra eyewear or eye protection during the scan.
5. The device has specific LED indicators that let the dentist know if (the start of) a cavity has been detected in a tooth. The dentist needs not to stop, however, as the software reconstructs the image in both short-wave infrared and visible spectrum of the whole mouth.
6. At the same time, during the scan, the application will let the dentist know how much of the mouth is left to scan and when the scan is done.
7. At the end, the dentist will check the images obtained on the monitor and give a respective diagnostic for the patient.

8. After every use of IRMA, its camera end (the head) will be cleaned and disinfected in the same way as other dental devices with reusable heads.

Consequently, IRMA will be a significant solution for better tooth decay prevention.

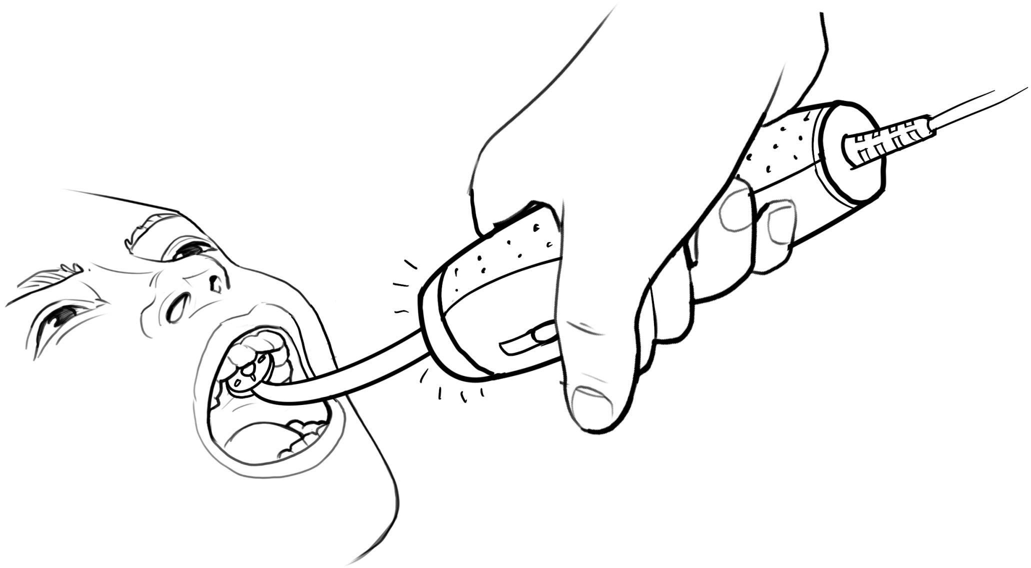

Figure 10: IRMA handheld device

5 Impact of Irma

Throughout the duration of the Summer School, the team was constantly reminded to aim high where the impact was concerned. The aim of the project, the team were told, was to generate quantum leaps, not incremental steps. With that in mind, the team decided to focus their efforts on the technology application that had the potential for the greatest impact in terms of both quality and quantity. Considering the universal pervasiveness of caries and its detrimental effects on public health and the economy, the team realized that a technology like Irma could truly represent the kind of disruption the team was looking to introduce.

As the single most common type of dental problem, it is impossible to overstate the ubiquity of caries. According to the World Health Organization, in 2023 there were about 2.5 billion people with the condition globally. The economic impact of caries is staggering - the total economic burden of all dental diseases is half a trillion dollars, with caries directly or indirectly responsible for 45% of that number. To put that number into perspective, the economic burden of caries is comparable in size to the economy of a country like Portugal or New Zealand. Caries incur this burden in two ways - directly, due to treatment costs, and indirectly, due to productivity losses to the economy. Of the two, direct costs comprise about 2/3 of the whole amount.

Yet even these numbers are an understatement, because caries, if untreated, has the potential to cause serious health issues in a patient's cardiovascular, digestive and pulmonary systems, and if recent research is to be believed, it can negatively affect cognitive health as well. Due to the sheer breadth of these issues, it is impossible to make an accurate estimate of the total economic burden caused by caries, but it is certain to run in the high hundreds of billions, at a minimum. Therefore, it can be surmised that caries have a massive impact on the global economy and public health. Consequently, any technology that can help fight caries will by extension have an impact that can reverberate around the world to the benefit of hundreds of millions of people.

It is important to point out that any innovative idea needs to have the potential to reliably generate a profit. Irma has the potential to capture a significant part of a 20 billion dollar dental imaging market globally, with ideal first markets including Europe and the Americas, which is where most cavity cases occur. Although it was not required of the team to make cost estimates, the team nevertheless was made aware that the VISIR2 sensor - likely to be the single most expensive component of the Irma device - costs less than 100 dollars. This essentially means that a device can be made relatively cheaply and then sold at a reasonable profit margin, and can be expected to turn a good profit.

Dentists are likely to be interested in purchasing a technology like Irma due to the inherent limitations of current cavity diagnostic methods. There are two such methods in use today - visual examination and X-ray scans. Visual examination is quick, cheap, not reliant on specialist equipment and can be carried out an unlimited number of times. However, it is incapable of detecting secondary caries deep inside the tooth, or caries located beneath old dental fillings. According to several conversations that the team had with dentists in Geneva and the Netherlands, such secondary caries are some of the most common types of problems dentists deal with daily, and tend to only be discovered when old fillings are removed. At that point, it is often too late to save the tooth, necessitating complicated procedures such as bridges or implants. X-ray scans, on the other hand, are capable of detecting all types of caries reliably. However, they usually require the patient to make a trip to a separate clinic to have the scan done, and cannot be performed repeatedly due to the inherent risks of X-ray radiation exposure.

Irma aims to target the middle ground, where there is a need for a cheap, quick and effective way of detecting all types of caries that can be carried out at the dentist's office on every checkup. From the conversations with dentists, the team was able to determine that dental professionals do in fact frequently express the need for such a diagnostic method. Therefore, Irma has the potential to be that middle ground and become a fixture in every dentist's office, a fixture as common as the dental Dremel.

6 Individual reflections

6.1 Luca Chicos

“For me, the overarching takeaway after having finished the CERN HPD Summer School is that innovation is an intricate and relatively difficult-to-tackle process, yet it is required for societal development. However, once I managed to tap into my creativity due to many fun icebreakers and mental exercises, I started to come up with ideas that sometimes even surprised me. This ability I feel was definitely lacking from my skillset, which made it pretty difficult to complete my tasks early on. Although I started the course with some scepticism towards the entrepreneurial and business world, I now find it quite admirable for bettering society.

My lovely teammates have been amazing throughout the course. We have very different apparent academic backgrounds, yet our interests align in many ways, mostly rooted in our attitude of curiosity for how the world works historically, politically and scientifically. The communication amongst us has been very sound, with no major clashes of ideas or quarrels happening. It appeared that in the moments when one person was lacking ways of moving forward, there would always be somebody who had the means of seeing the light at the end of the tunnel. From my perspective, we were completing each other.

The methods of working were very new to me, such as filling a canvas and having bullet rounds to bring forward ideas. Thus, they had a very fresh air to them, making me quite excited to keep up with it. However, especially towards the last few days of the course, having the exact same tasks felt rather repetitive, tiring and unnecessary. For example, at some points, I wanted to give up on specific ideation tasks due to both time and mental pressure. In those moments, Svetoslav, our business teammate, really shined through with his expertise and it somehow reassured me that it would be fine in the end. I would also add that we definitely had too little time for prototyping or preparing to prototype. In terms of the environment, the CERN Ideasquare space was stimulating and I loved the little family that is working there.

Finally, it was an amazing experience and, in the end, I have bonded not only with my teammates but with almost all of my colleagues of this summer school. I think I have evolved as a person after having first-hand experience with the concept of creativity, and now I have my precious ‘licence to dream’. The very last day was surprisingly enough one of the most relaxing ones and seeing the final product of my team was truly satisfying.”

6.2 Nikodem Dudek

"I find the CERN Summer Course an unforgettable experience. Temporally leaving my comfortable aerospace field and diving into the innovation process turned out to be a great idea. I remember the first time I was confronted with VISIR2. The initial temptation of an engineering student is to look at the working principles behind the technology. However, a completely different thinking at that time was required of us. As a result, I started paying more attention to user needs, my entrepreneurial ideas expanded to unlimited domains of application and I became more creative. The last characteristic "creativity" has always been pertaining to me, but this time during the course it could flourish as no boundaries were given.

I appreciate the variety of tools we had a chance to use. The mural canvas was a new environment where everyone's ideas met. Moreover, the course did not only include the written form of the assignments. On various occasions, I had an opportunity to present my ideas in front of the course participants and instructors. An important achievement was the final presentation of our project to the CERN audience. As a group, we also had to record several videos which I found a satisfying activity. The last days of the stay in CERN and the design sprint at TU Delft included making a prototype. It was indeed gratifying to make a material representation of my vision with my hands using suitable materials and tools.

Furthermore, I cannot miss the people aspect of the CERN Summer Course. Working in multidisciplinary teams taught me a lot about group dynamics and communication. It also gave me the experience that will be useful in my future career. It was valuable meeting fellow course participants as everyone had a different background and contributed to the friendly environment. Finally, we were surrounded by the course instructors, guests, and CERN employees who were available to help in difficult moments.

Overall, I can recommend the CERN Summer Course to the future students. In my case, this course added great value to my education, career and personality. I improved in using a variety of tools to convey my ideas. Finally, I made new friends and established connections with people around me."

6.3 Silvia Grigorescu

"The CERN HPD Summer School was overall a great experience. I got to work with amazing people from different backgrounds and learned way more than I expected. As an Industrial Design Engineering student, I already did a project that was similar to what was described in the course description of the CERN HPD Summer School. I thought this summer school would be similar to that project. However, it was a completely new experience. Some concepts were already familiar to me which made it easier to follow some of the steps within the process, but many elements were quite different.

When the course description mentioned that we would be looking at the feasibility, viability, and desirability of a technology that would turn into innovation, I was expecting to start looking at these three pillars relatively early in the process and test the assumptions we made. However, we had to fill in a lot of canvases with similar outcomes. We did this repeatedly in short time spans. This made the outcomes in my opinion feel as if there was not enough substantiation for the choices we made. If given more time to delve further into the domains instead of doing the same tasks repeatedly, the choices would be more substantiated. This also left less time for testing the three pillars with prototypes.

Talking with people is a part of the process I also deem important to understand the actual pains of the end users. We did get opportunities to talk with people, but this was usually on quite short notice. This caused some levels of frustration and stress within the team. In the end, we did manage to reach out to people in our own circles, but if given more time in advance to find people I think we could have gotten some very valuable insights from people that were crucial key players in the domains. In the end, I do think that the time pressure can benefit a team in moving forward instead of remaining stuck in the process. However, I think if the tasks that were given in this short time were more about prototyping and testing assumptions, we could have made more iterations. I also think that leaving a bit of freedom in the design process instead of handing out canvases can really help with the creativity and result of the project."

6.4 Svetoslav Yordanov

"I had some good moments at the Summer School, but there were just as many moments that were an exercise in frustration. It's a good program that suffers from sub-par execution in key places. I don't think I ever had any kind of problems with my team, so these issues have mostly to do with the approach the Summer School takes in the execution of its aims. One such issue is the overreliance on established frameworks and canvases. They're useful in the very beginning, to get things going and give people something to hold onto, but they quickly become redundant and even harmful to innovation. On many occasions I observed people struggling to fill out a canvas because their ideas did not fit in its paradigm or conversely, fill out a canvas in mere minutes and then sit idle because the canvas lacked focus. To be filling out canvases nearly until prototype day was something that I think few participants appreciated.

One thing I regret is not getting more support from some of the organizers. I think it's a true shame when people with careers like that, which are actually impressive and even distinguished, elect not to share their know-how and experience with the participants. This extends to feedback, as my team didn't really get any meaningful feedback throughout the program, and I believe this is something most teams experienced as well. Basically, all the feedback I saw being given out was 'Your ideas suck', and that's a verbatim quote. Thus, we had a situation where we had no idea how to do things right, and no idea what we were doing wrong. From this point of view, I feel like it would have been very helpful to have one mentor per team from the start of the school until the end.

I still had good moments - bonding experiences with the rest of the participants and the guest lectures of Han Dols and Robert Cailliau were standout moments for me. Most of the time though, I really didn't know what to do with myself. I was brought on the team for my business expertise, but there wasn't much need for that in the end."