

PROGRESS REPORT

CERN/IDEASQUARE SUMMER SCHOOL

Powered by



Luc Thomas, Fleur Milder, Etienne Kant, Andrei Tociu
4th of September 2022

Team composition and members' background

1. Introduction and members' background

The team for group 1 was composed of four members, namely Luc Thomas, Fleur Milder, Etienne Kant, and Andrei Tociu. This was the first collaboration between the diverse students with each a different academic background, as the teams were indiscriminately formed by the TU Delft. Below follows a short introduction from each member, with details including, but not limited to their studies, work experience, and expectations about the course.

Luc Thomas

Luc Thomas is a third-year Aerospace Engineering student at Delft University of Technology in the Netherlands. He is part of the Honours programme, and is currently researching the advantages and disadvantages of applying functional programming techniques for flight systems. Aside from being a full-time student he runs a small software development company, H2C Studios, that specialises in providing Unreal Engine ready-to-use assets as well as various consultancy services. In his free time, he enjoys travelling, hiking and playing around with technology.

Luc joined the summer school, as he was interested in learning more about technology transfer. This originated from the fact that technology transfer, in his view, is something of great importance to the Space industry he is passionate about. He also wanted to gain more experience in working within a multidisciplinary team and fell in love with the prospect of spending some time on the world-renowned CERN campus.

Some of the things Luc brings to the table include a strong background in software development and CAD design as well as experience in building prototypes and designing electrical circuits. While his engineering background brings advantages to the table, it also makes him quicker to shoot down ideas as technologically unfeasible and makes it harder for him to enter a creative/ideation mindset. The in-depth technical knowledge he has acquired over time also caused a language barrier from time to time when talking to people outside of his field, though patience and repeated attempts at explaining things can help.

In light of these strengths and weaknesses, he hopes that being in a multidisciplinary team (which includes people coming from a non-technical background) can help him grow in these aspects. Furthermore, he hopes that the team can have an open and collaborative spirit where everyone's strengths can be utilised, and people can be patient with and help each other in areas where they are weaker.

Fleur Milder

Fleur is a Business Graduate from the Erasmus University Rotterdam (RSM). Fleur was born and raised in Rotterdam, The Netherlands, where she also stayed for her BSc in Business

Administration and subsequently chose a MSc Strategic Management including the Honours programme. During these studies she noticed that she was drawn mainly to the creativity and challenges faced during entrepreneurship and innovation projects and therefore explored this during a temporary MBA program in Boston, USA. Next to her studies, Fleur has been working in marketing for several years and is currently exploring a job in consulting. In her free time, she enjoys working with children, playing sports and travelling.

Fleur joined the summer school, as she was mainly interested in the process of going from technology to a (possibly) marketable product or service and seeing all the steps along the way. Most of the time, business people have the idea and let other people execute the technology and necessary details to make it operable. This CERN summer school gave Fleur the opportunity to be part of all the decisions and see how technical-minded coworkers view a project like this, which in her view is crucial to experience to truly understand the challenges and opportunities in building a business better.

Some of the things Fleur brings to the table are a sense of market analysis and open-mindedness to tackle obstacles from different angles, while not being afraid to 'fail' or having to start over. However, always seeing an opportunity makes you sometimes fall in love with the idea without considering the technical or market constraints which will limit your impact along the way. Therefore, it was a great balance to work with people who look more from the feasibility side during this project.

So, the main interest for the summer school is based on the combination of exploring design thinking and the entrepreneurial elements next to working with technical-minded people with different approaches.

Etienne Kant

Etienne is a first-year Analytical Chemistry student from the University of Amsterdam. Etienne followed his Bachelor at Avans University of Applied Sciences in Breda, where he chose a specialisation in both Analytical and Organic Chemistry. In his free time Etienne likes to code, play chess and game.

Etienne joined the summer school mainly, because he wanted to go to CERN. He looked forward to working with the technology and transferring it to the market. His interest has always been in market analysis since you mainly work with numbers there, which is his cup of tea due to his analytical background. Moreover, Etienne also looked forward to working with a multidisciplinary team, since this would be his first time doing so.

Some of the things Etienne brings to the table are analytical thinking, quick investigation in new topics and working with numbers. However, analytical thinking is also a challenge since it restrains the creative thinking process. This makes him vulnerable to bypass creative ideas easily without exploring the boundaries first properly.

Etienne would love to learn during the summer school is the creative thinking and the marketing side of business and research. As an analytical chemist he never learned about ideation, which is unfortunate since they are on the frontline of new technology development.

Andrei Tociu

Andrei is a second-year Computer Science and Engineering bachelor student from Delft University of Technology. He was born and raised in Bucharest, Romania, but decided to continue his studies in the Netherlands in order to expand his horizons and gain a broader view of his future career options.

Even though Andrei's main academic studies lie within the field of IT and programming, his curious mind and extracurricular activities from the highschool years pushed him to explore other academic fields as well. This is why Andrei applied and has been subsequently selected for the Next Generation Robotics Honours Program of TU Delft. As part of this program he had the opportunity in the past year to attend multiple university courses in various disciplines and work for a few robotics companies or student projects. Andrei successfully completed an International Relations and Diplomacy Honours course at Leiden University and attempted another in Mechanical Engineering at the Aerospace Engineering department of TU Delft. Besides this, he worked on the LOBSTER project to develop a deep-sea exploration robot and had a short internship at FESTO, the world leader in industrial automation.

My extracurricular activity as treasurer in a few study association committees at the university opened Andrei's eyes to the fields of economics and business. This newly acquired interest represented the main drive for him to apply to the CERN Summer School. Besides this, the opportunity to work for a short while at one of the biggest research institutes in the world represented another strong incentive.

2. Rules for the good functioning of the team

The first meeting with the entire team took place on the 9th of June 2022. After doing an informal introduction there was a quick conclusion that the diversity in backgrounds and working styles needed to be addressed. Therefore, a set of rules were discussed and agreed upon in order to safeguard a smooth collaboration and a safe space for every member. The rules have been neither written down nor discussed in-depth; instead, they represented a verbal mutual understanding between the team members.

After each person highlighted the main flaws they believe could hamper a smooth collaboration, the rules have been devised to tackle precisely these issues. Some of the rules are introduced below as examples:

- A. Any delay of more than 5 minutes should be announced prior to the activity;
- B. Any disagreements between the members should be brought up on the spot or as soon as possible, rather than letting frustration accumulate
- C. Members should be mindful of the team's energy level, since members have various environments in which they feel most comfortable and productive
- D. To ensure smooth communication online, members should reply on the communication channels as soon as they see a text message or signal that they had received the message

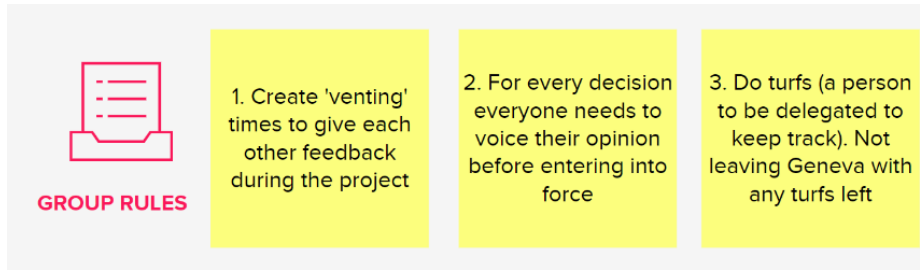


Figure 1 - Initial set-up of group rules

Innovation Process, Choices and Milestones

1. *Setting up the process*

Even before starting to carry out research on the assigned technology, the team focused on designing a process that would transform the technology into a business application. The aforementioned design was not conceived as an unchangeable set of steps, but rather as an overview of the upcoming process. The team came up with a total of 7 high-level steps to be carried out in the innovation process. The steps were conceived on the first meeting of the group, on the 9th of June 2022. They can be observed below, one step per post-it.

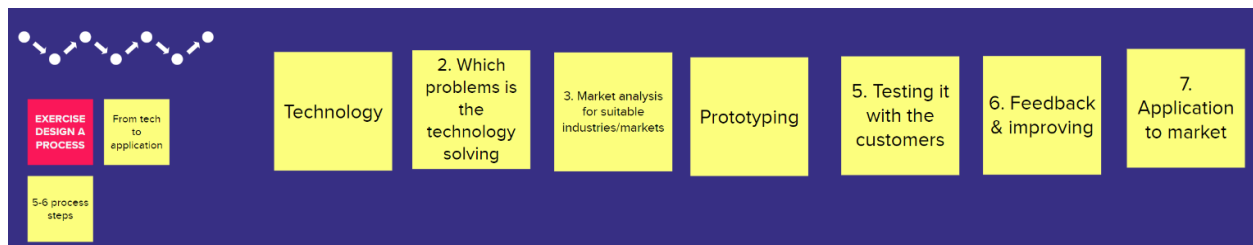


Figure 2 - Initial High-Level Approach to Innovation

2. *Technology unbundling*

After setting up the process, during the same session on the 9th of June 2022, the group was assigned the technology: **Unicorn Dx**. Only a small description of the technology was provided together with its title, Therefore the priority was on understanding its technicalities and the “We know how to”-sentence in the first few weeks.

A lot of progress was made during the session on the 16th of June 2022 where the focus was on examining a number of related research papers. While this provided a basic understanding of the technology, the team also discovered that the actual technology has not been officially published yet. This meant that online resources were limited and more information would be needed from the initial research team at a later stadium.

However, although limited information was present some initial conclusions could be made regarding the question of “We know how to”:

1. Unicorn Dx identifies organisms / viruses / bacteria;
2. Unicorn Dx can/could detect biological particles while detecting signs of life functioning indicators;
3. Unicorn Dx can detect proteins of harmful viruses and bacteria.

Concurrently, the group tried to boost their understanding of the technology by devising ideas and questions relating to the capabilities of Unicorn Dx. This represented a team exercise and produced input in three different domains, as can be observed below:

1. Remarks and Insights
 - a. What type of information does the database of diseases need to include in order to have the technology work?
 - b. What types of fluid can be used for the electronic screening?
 - c. Does the target element need to be organic?
2. Why does this technology have potential?
 - a. Unicorn Dx is the only device on the market able to detect individual virus particles.
 - b. Unicorn Dx can detect virus particles before the patient starts showing physical signs of disease.
3. We know how to
 - a. Unicorn Dx can detect elements with a count as low as 1.
 - b. The technology can be potentially paired with a database of viable treatment methods per identified virus/disease.

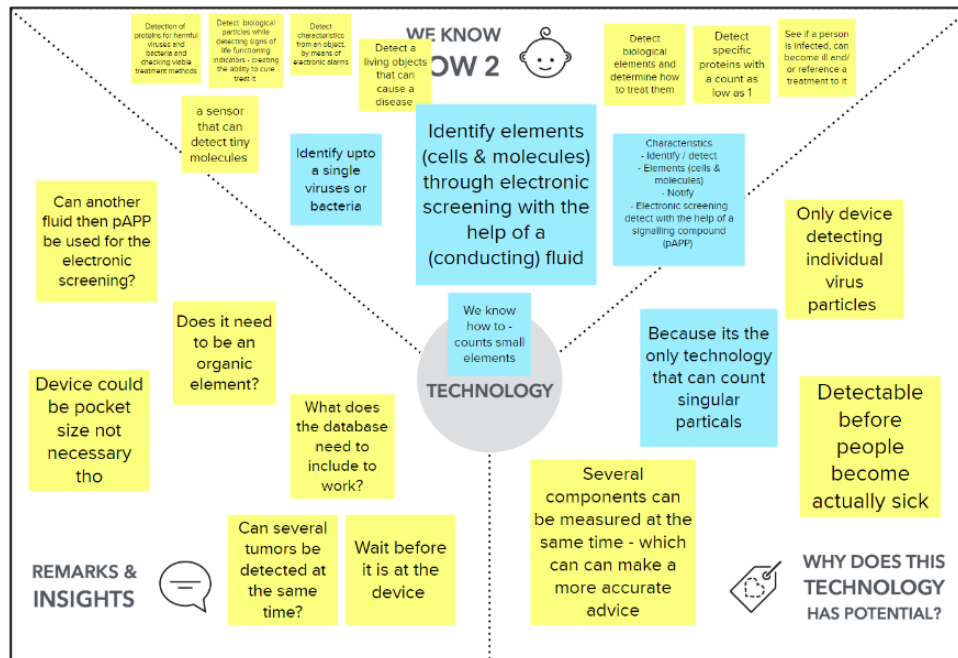


Figure 3 - Technology Unbundling, Phase 1

On the 6th of July 2022, the team came up with one compact answer to the question of “We know how to”, based on the knowledge accumulated in the previous 2 weeks.

We know how to identify elements (cells & molecules) through electronic screening with the help of a (conducting) fluid.

On the 7th of July 2022, the team organised a meeting with Pepijn Beekman, the CTO of ECsens responsible for the development of Unicorn Dx. During the meeting, the group asked certain unanswered questions about the technology and aimed to validate the proposed “We know how to”-definition. Besides this, the background of the technology was also explored.

A number of important discoveries have been made by the team during the meeting, the most important ones being:

1. The current 2 possible fields of application for Unicorn Dx are tumour cell detection (i.e. cancer treatment) and respiratory diseases (e.g. Covid-19).
2. There needs to be a predetermined particle that the machine will try to detect.
3. The size of the sample chips is reduced (i.e. USB-stick) and the detection machine is portable.
4. Currently the machine only identifies one disease per sample chip, but there exists the possibility of identifying multiple ones. Research must be carried out on this topic.

3. Domain exploration

In this phase of the innovation process the team started brainstorming different domains and subdomains in which the Unicorn Dx technology could find its application. No specific research was conducted beforehand in order to encourage creative thinking. For each domain, the group aimed to find at least 2 specific subdomains. As can be seen in the figure below, the domains are marked in yellow, with the subdomains in blue. (The highlighted green domains were chosen later on as highest potential).

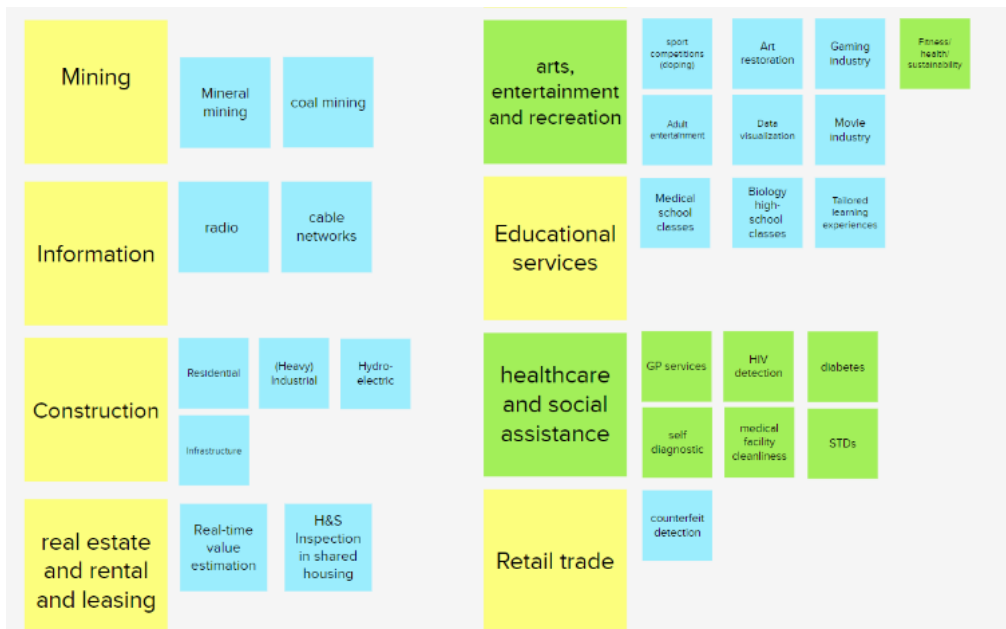


Figure 4 - Excerpt from Domain Generation Process

Having a large selection pool (over 100 domains and subdomains), the team members jointly selected the 12 most appealing subdomains. Due to time constraints, the choice was based on small-scale research. Each team member contacted experts working in these fields to check whether interest for the Unicorn Dx technology exists in the specific working domain. If results were promising, the subdomain had a higher chance of being selected among the 12.

The 12 subdomains were: Animal disease detection, Immunology, Food production and services, Water quality management, Agribusiness, Fitness and wellbeing, STD detection, Medical, Cleaning, Fuel contamination, Bioreactors, and Forensics.

For each of the 12 subdomains the team members did turns on finding images associated with the topic and subsequently generating ideas. This was done both as a brainstorming exercise and as a means of enhancing the members' understanding over the selected subdomains.

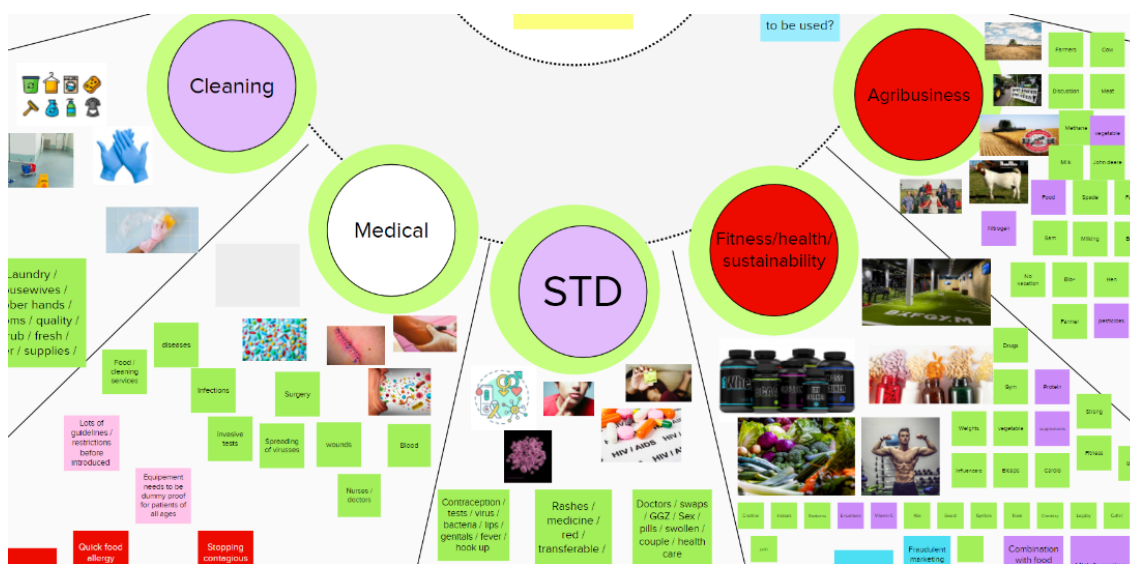


Figure 5 - Subdomain Exploration

The following days were dedicated to more brainstorming sessions, attempting to delve into new ideas, besides the above mentioned 12. The attempts had limited success, since most times the end results were identical or very similar to already identified (sub)domains. Some of the techniques used for enhancing creative thinking were based on visuals, while others on associative connections. The team interpreted this phenomenon as confirmation of the viability of the applications identified in the prior days

Finally, the team agreed on 14 possible applications, out of which 8-9 have already been identified above. These ideas are: Post-surgery infections, Muscle growth hormone, Diets, Mobile hospitals, Biometric identification, Food production, Agribusiness, Immunology, Cleaning, Water quality management, Forensics, Animal disease, Education, and STD detection.

 Specific domain & characteristics	Post-operation (incl. hospital bacteria)	muscle growth hormone	diets (fats, alimentation etc))	(Army) mobile hospital	Biometric ID	Food production (factory, production lines etc)	Agricultural business (farmers)	Immunology
 Key players & users	patients, doctors, nurses, government, at home care	sports people, gym users, gym owners, personal trainers	dietician, people on a diet, eating disorder patient	army, army medical staff, people affected by calamities, first responders, developing countries	banking, security business (brainstorm more here)	farmers, end consumers, government, policy insurers	farmers, end consumers, government, policy insurers	patients with immune deficiency disorders, researchers, medical staff (hospital + GPs)
 Opportunities & pains	Able to detect zoonosis (phages, gym, other infection) longer recovery time, resistant bacteria	healthy diet for gym rats, confirmation of routine, confirmation of protein-based diets for the bros	effectiveness of diet (e.g. weight loss)	limited resources, time constraints, ruggedness (?)	Extra factor of protection	crop sensitivity, disease/parasite detection, TO BE CONTINUED	Let farmers check quality themselves	
 Potential applications	At-home infection detection from (finger) blood sample	Rapid blood sample analysis, tailored nutritional / gym recommendations, product verification	Tailored diet recommendations	Rapid diagnosis of common diseases (w/ limited resources)	Extra factor of protection on top of finger pattern	Early ID common plant diseases from random sample of crop	Check hormone levels in milk	

Figure 6 - Further Tradeoff between Concepts

The final step in the domain exploration process was to consolidate the 14 final subdomains. A table was used for this purpose, in which data about the key stakeholders, opportunities and potential applications per subdomain was filled in. The team members used both intuition, as well as online resources in order to fill in the required details. This step helped all 4 team members get an equal level of understanding of the 14 subdomains and get acquainted with them. This was crucial for the upcoming step of domain selection.

4. Domain selection

After having generated a solid set of application subdomains, the team started the process of selecting the most promising ones. The target was to reduce the 14 ideas to 2 which was a big challenge for the team. In order to achieve this target in a systematic way, a set of criteria was created, based on which each idea was graded.

Five criteria have been used, namely:

1. Technical feasibility - can the technology be applied right now, directly?
2. Viability - from an economical perspective
3. Societal impact - ability to change the status quo into better
4. Market size
5. Time scale - present, short-term future, long-term future

The grades have been averaged for each technology in part and the final score was colour-coded:

1. Green - above 3
2. Yellow - between 2.5 and 3
3. Red - under 2.5

Five technologies ranked in the green section: Post-surgery wound infection, Depression detection, Muscle hormone growth, STD anonymous detection, Veterinary self-tests for animals.

Domain	Application	Technical feasibility (can the technology achieve this right now directly)	Viability	Societal Impact	Market Size	Timescale	normalized avg (excl. timescale)
Medical	Wound infection post surgery	4	3	4	3	Present	3.80
	Hospital cleanliness (equipment, rooms)	2	2	3	3	Present	2.77
	Depression detection	3	2	5	2	Long-term future	3.08
Food Production	Allergy detection in food production factories	3	2	3	1	Short-term future	2.38
	Allergy detection at home	2	1	5	2	Short-term future	2.50
	Forbidden substances checks (in production facilities, but also ports/etc.)	3	1	3	2	Present	2.38
Agriculture	Full-chain monitoring	1	3	5	2	Long-term future	2.28
	Soil fertility/quality detection (incl. fertilizer quality detection)	2	2	3	2	Short-term future	2.43
	Data integration / smart greenhouses	2	3	3	2	Short-term future	2.77
Fitness	Muscle growth	2	2	5	3	short-term future	3.17
	Sweat	2	1	5	1	short-term future	2.17
	Supplement use	2	1	3	2	short-term future	2.10
STDs	Immunology and STD detection combo	1	2	5	2	Long-term future	2.58
	Self-service anonymous xtesting	3	3	3	2	present	3.02
Veterinary	Selective breeding / detection of fertility	3	2	3	1	short-term future	2.38
	Self-tests for disease detection in animals	2	3	4	3	present / short-term future	3.30
Survival / Remote Areas	Monitor drinking water	3	2	3	1	present / short-term future	2.38
Diets / health	Country specific disease chip (accurate diagnostics + best treatments database)	2	2	4	3	Long-term future	2.97
	Metabolism accuracy	4	1	4	2	Long-term future	2.80

Figure 7 - Decision Matrix for Remaining Technologies

In the next stage, the 5 green applications were reduced to 3. The 3 applications have been selected not only based on the highest score, but also on the ability to revolutionise the market/society and the potential to produce revenue - an incremental impact on society. An explanation for the two removed applications is shown below.

The STD anonymous identification idea was removed, because it was deemed unprofitable. In most western countries STD tests are already provided by the national authorities, most of the time free of charge. For this reason, the group considered that it would be hard to produce enough revenue to make the business profitable. Moreover, authorities already dedicated resources to making the process anonymous and destigmatizing it. Therefore, the Unicorn Dx technology based on chips does not have a real advantage.

The muscle hormone idea, even though it had the 3rd largest score, was removed because the business model was considered unprofitable. The technology is too expensive to allow individual users to purchase it. Moreover, fitness centres would most probably not invest a few thousand euros in a technology that is considered complementary to their main field - fitness.

The 3 applications left were post-surgery wound infection, hormone-based depression detection, and veterinary self-tests for animals. The team turned to a customer-based evaluation approach of these ideas, in order to reduce them to only 2, the final goal. Charts like the ones below have been filled in for each application in part, containing data about the pains of the potential user, the possible gains of using the technology and the customer jobs involved.

Even though depression detection had the greatest potential to revolutionise the industry and produce a profitable business in the long-run, the lack of solid scientific evidence for the ability to detect depression based on hormones represented a huge downside. Moreover, depression represents a tightly regulated industry with many stakeholders, which could mean that the technology is adopted at a very slow pace. For these reasons, the idea was dropped (and therefore also limitedly filled in in figure 8).



Figure 8 - Pain-Gain & Industry Exploration Final 3 Candidates

Visuals were made for each of the last two remaining applications (see figure 9). Helped by them, the team pitched the applications to multiple people and observed their reactions. For the animal self-test idea multiple pet and farm owners in the Netherlands were contacted to express their opinion. General feedback was positive from multiple actors, such as exotic parrots owners, cattle farm owners and dog breeders. Regarding the application concerning post-surgery infection self-tests, enthusiasm was also quite high, however a number of obstacles have been identified. The most important one was the question of how the self-tests will be delivered from the patient at home to the healthcare facility in a cheap, fast and secure way. The final application selected was the one of **self-tests for animals in the veterinary domain** based on (mainly) feasibility and regulation.

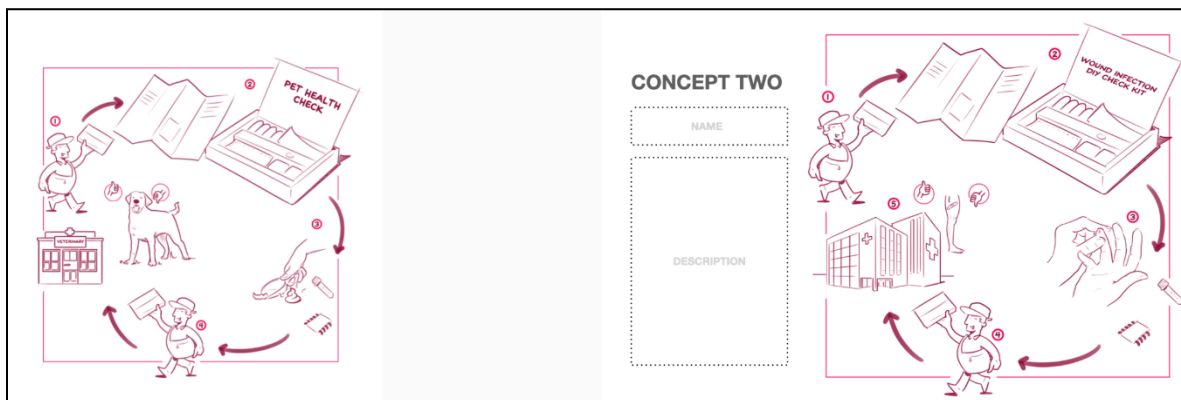


Figure 9 - Visualisations of 2 Final Candidate Technologies

Clearly Defined Problem

Many pet owners need to frequently take the animal to the vet, either for regular check-ups or due to illness. This happens usually one time per year, but can vary depending on the pet and whether it is a farm or pet owner. **Invasive blood samples** required for most tests are a big issue; especially for small animals, such as guinea pigs and birds, this can cause significant stress for both the animal and its owner.

The **long analysis time** and the **high costs** are also downsides of current technologies on the market.

Lastly, for the average pet owner, taking the animal to the veterinary doctor poses a burden. The person needs to **take time off** especially for the visit, alongside causing **stress** in the animal during the journey. The **logistics** for the trip are also a great pain.

Solution

1. User story

The proposed alternative to the problem defined above is the following:

1. The veterinarian purchases the device which analyses the samples. They also purchase a batch of sampling chips, made for a certain type of pet. Each chip contains a contrast substance for a number of the most prominent diseases for that specific pet (e.g. parrots).
2. When the pet owner wishes to test their pet for a possible disease, they go to the veterinary and purchase a sampling chip made specifically for their animal.
3. Returned home, the owner samples faeces/urine/etc from the pet and mixes it with a conducting fluid, for instance water. Then, they place the liquid sample on the chip.
4. The owner takes the chip to the veterinarian and can leave.
5. The veterinarian introduces the chip in the machine for analysing the sample. The machine produces a result and uploads it on the online platform. The veterinarian can see the result and add feedback or steps to follow in the online platform.
6. The result is sent online to the pet owner, who can visualise it (alongside the feedback) without needing to come back to the veterinarian. This step should occur within 24 hours from delivering the sample to the veterinarian.

2. Advantages of the Unicorn Dx technology

Regarding the issue of invasive (blood) samples, the alternative proposed by the team bypasses the obstacle. Faeces or urine can be used instead, sometimes needing a conductive fluid, which removes the possibility of inducing stress to the animal. Moreover, for small fragile animals like guinea pigs, it also shelters their health.

The analysis time of a sample with help of the Unicorn Dx technology can be reduced to roughly 15-30 minutes per sample, meaning that the results should arrive at the owner within 24 hours from handing in the sample chip to the veterinarian. Moreover, mass-produced chips could cost around 5-10 euros a piece, to which the profit margin of the veterinarian is added. The final price for the test should be at most 20 euros.

Lastly, the pet owner does not need to bring the animal physically to the veterinarian. Instead, they collect the chip and bring it back, without needing to wait at the office. This also reduces the stress for the animal, which stays at home, and the logistics for the pet owner.

Impact and market exploration

Most of the horse and cattle (cow) owners (~90%) wanted to buy the apparatus. The remainder would like to see the veterinarian to have the device. Everyone was willing to pay more for a non-invasive method, but the goal is not to be more expensive.

When speaking to cattle owners, the lowest cost for the veterinarian is around €113 per cow per year. This includes travel, veterinarian and medicine costs. With 1.6 million dairy cows in the Netherlands, this comes down to €180 million per year. A rough estimation was made that the average visit costs €1200 euro (including medicine) made up of €400 for the veterinarian and €800 for the medicine. Unicorn Dx cannot save any of the medicine costs, but may lower the number of visits. It was estimated that around 90.000 visits per year are done by veterinarians for dairy cows. It was assumed that the cattle owner would have a decrease of 10% (no proof of this number) of the visits when Unicorn Dx is available at the barn. If 10% of the 90.000 visits can be saved, that would mean that €3.6 million ($€400 \times 9000$ visits) would be spent less on veterinarians. Our turnover would be hard to determine. This is dependent on the price of the chip. More information is needed about the common diseases in cattle to determine how many visits can really be saved. The maximum revenue could be 3.6 million with 100% market share. When a farmer uses a chip everytime a visit would be needed (90.000 times) the maximum price per chip would be €40 per chip. Making the profit, with a cost of 5 per chip, €3.2 million per year.

For horses the methodology is the same, but the numbers are different. There are around 450.000 horses in the Netherlands with an average cost of 100 euro per horse per year for the veterinarian. This would make the market size €45 million per year. The veterinarian costs here are assumed to be the same (€400) but with an average medicine cost of €500 per visit. This would mean that there are around 450.000 visits per year or 1 per horse per year. If 10% of the 450.000 visits can be saved, that would mean that €18 million ($€400 * 45.000$ visits) would be spent less on veterinarians. This would mean that the maximum revenue could be €18 million with 100% market share. When an owner uses a chip everytime a visit would be needed (450.000 times) the maximum price per chip would be 40 euros. This would make the maximum profit €15.2 million.

For parrots it is harder, since parrots are mostly held individually. Here the veterinarian would be the owner of Unicorn Dx. Here no visits can be saved and the price per chip and/or revenue is almost impossible to calculate. Some parrot shops would like to have Unicorn Dx. The shop owners would like to use a chip with every transaction. It is also not known/mentioned how many times this is per day. Therefore no calculation can be made for parrots. In market size it could be the same as horses, since there are also around 450.000 parrots in the Netherlands. The price per chip would be lower, since the veterinarian costs are lower for parrots.

This shows that there are potential markets for Unicorn Dx, but more information is needed before real prices and revenue could be calculated.

Individual Reflection

To sum up, the idea enjoyed quite some enthusiasm among the people to whom it was pitched at CERN, but also during the market research. Certain pet owners in the audience identified the struggle that bringing the animal to the veterinarian entails, while others appreciated the non-invasive characteristic of the approach. Lastly, the significant size of the pet owners market was validated. Alongside it, the role that the owners' feelings towards the animals play in this environment was highlighted.

A short final remark from each team member follows on their experience of the whole journey:

Luc Thomas

“For me, the CERN HPD summer school provided a unique opportunity to work alongside people from other disciplines and to use some of the amazing prototyping facilities at CERN IdeaSquare. The differing backgrounds of the team members (both academically and personally) brought plenty of new ideas to the table, and allowed us to tackle the technology from different perspectives. This, combined with the various idea-generation techniques we were taught in this course, allowed me to feel confident that we could come up with a great idea for our technology. The mutual respect, patience and shared work ethic between team members also helped create a safe and positive team atmosphere, making the entire process a lot of fun.

The last few days at CERN, where we worked on the prototype, were probably my favourite coming from an engineering background. The facilities that were available for us allowed us to quickly create a feature-rich prototype. I also got to learn about various manufacturing techniques I had not used before and got more hands-on experience working in a fast-paced engineering environment.

All in all, while there were of course struggles and disappointing moments during the course, I think our team managed to pull through and pivot ideas well. I personally enjoyed the experience, and am already applying some of the ideas taught during the course (such as reaching out to industry members as soon as possible) to other business ventures. I can definitely recommend the CERN HPD course to other students, and can't wait to see what they will come up with.”

Fleur Milder

“The whole CERN HPD summer school was a once-in-a-lifetime experience for me. Getting the opportunity to work at CERN (which always felt out of reach for a business person as myself), working in a technical team and learning to make choices under pressure during ideation to move along in the process were all useful experiences for me. The multidisciplinary teams worked

really well to enhance this learning curve and even though we had some challenges in the beginning on how to communicate with each other and the need to be more explicit instead of assuming each other's knowledge, made us even closer as a team once we knew each other's views.

One of the things that will stick by me are the fun you can have while doing something completely out of your comfort zone, but also in research in general. There is much more to it than the stereotype I might have had beforehand. Last but not least, one of the lessons I will take with me in my future working projects, but also during my personal life is one of the quotes I heard during the design thinking phase; 'There is no problem, your thinking is the problem - Change it and your problem will be solved'."

Etienne Kant

"For me the CERN HPD summer school provided me the unique chance to learn about ideation and creative thinking. I also got to work in a multidisciplinary team, which was my first time. The chemistry was immediately present in the team, which I really loved. This allowed, in my opinion, for an open discussion in the ideation process, even though my analytical brain says too fast: 'This won't work'. During the course I learned to be more open minded to the ideas without criticising too much (at least I tried).

I loved the business part and gathering new information about a completely different field. I might do some more courses in the creative thinking field in the future. I can and will recommend this course to other students since it is a truly unique experience. "

Andrei Tociu

"For me, the experience represented an interesting mix of business and science elements. The approach of understanding the capabilities of Unicorn Dx, while refraining to delve into its technicalities, represented something new for me. Above all, I enjoyed the innovation process: diverging with ideas and subsequently converging towards one key application. Combining elements from multiple disciplines, such as life sciences, business and marketing made the entire process feel fresh and new at every step."