

Processing Pals



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1. Executive summary

A new paradigm is emerging

There is a new shift towards pooling resources together and using them communally instead of everyone having their own private “tool” and disposing of it however they please.

Take for example cars: a car sits around unused roughly 90-95% of its lifetime [1] – so much time, money and effort invested into building a 2-ton vehicle with extremely low efficiency. Given the human population size and earth’s limited resources plus the pollution manufacturing causes, it is simply unsustainable for everyone to have their own car.

Carpooling is the solution that addresses this wasteful behaviour and still fulfills the mobility needs of the people. In the future we will probably give up owning cars and instead rent one from a fleet based on punctual needs. In this way, we “do more with less”.

We believe the same goes for computers.

Processing Pals is an online social platform aiming to bring together people with functional but outdated personal computers on one side and people with powerful machines on the other.

But why would these 2 groups of people be interested in each other?

We identified a need and respectively a potential to fulfill the need.

The first group of people – who we shall call “users” – need to perform computationally demanding tasks from time to time but buying a powerful PC just for that is a big investment with little relative return. The second group of people – who we shall call “providers” – dispose of powerful machines on which they do their usual activities such as working in data science, video processing, or just gaming but aren’t using them all the time.

The users and the providers can enter a symbiotic relationship thanks to our platform. Users would be able to book and use remotely providers’ computers through our platform. On one hand, the efficiency of the providers’ computers increases as they are used for a larger percentage of their lifetime while also earning them money. On the other hand, it allows the user to save money by punctually renting someone’s else’s PC instead of buying a brand new expensive one.

IT for Green

Our platform falls under the “IT for Green” category of digital technologies. It aims to mitigate climate change by increasing the efficiency of already-manufactured computers while at the same time reducing the demand for new ones. The latter implicitly decreases resource extraction and production which have a considerable negative environmental impact.

Our solution is part of the future and the new paradigm that is unfolding.

2. Problem and solution

We identified two problems to which we offer a unified solution.

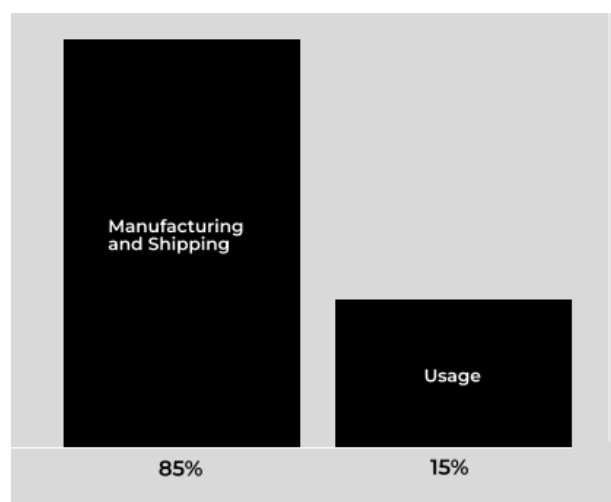
The first problem is that some people need to do computationally expensive tasks on their computers, but they are simply too old or too basic to cope with the software requirements.

For example, computer science students might have to upgrade their computer to a more powerful one just to be able to do their homework. This may happen multiple times over an academic career as the software technical demands go up over time, and the tasks themselves become more complex too. This results in a lot of waste not only economically speaking, but also materially:

- Buying expensive hardware only for punctual needs.
- Old PCs turn into a waste of space and material as they become redundant.
- Demand for new hardware keeping steady or going up translates into more resource extraction and manufacturing which in turn translate to more pollution.

Another solution at the hand of people with a limited budget is renting cloud services from providers such as Amazon or Microsoft, but they come with a big environment impact as new servers are developed and put online for people to use; again, resource extraction and manufacturing is encouraged this way – bad thing for the environment.

The second problem is that some people have powerful machines they use regularly to do demanding work, but they also stay idle most of the time. Essentially, we have an untapped pool of computing power that needs to be made available to the people. This is wasted potential as someone else could be benefiting from a machine while the owner doesn't need it. A lot of time, money, and effort has been put into extracting resources and manufacturing those machines, it is a shame the product isn't used to the fullest.

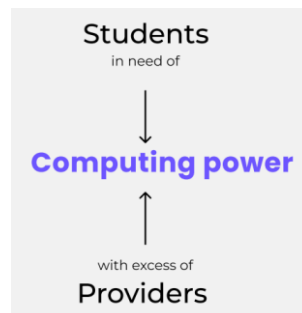


Share of CO2 emissions of a computer. [2]

The picture displayed before shows the immense overhead of pollution that comes with buying a new PC. We aim at eliminating it by making use of already-existing computers.

Our unified solution bridges the gap between two sets of people and help them form a symbiotic relationship in which one's problem becomes the other's opportunity – problems are business opportunities after all.

Processing Pals can be thought of as “Airbnb for computers”: your house is empty while you are away for a prolonged period? Just rent it on Airbnb, don't let the living space go to waste! The same goes for computers: we aren't using them 24/7 nor at their full capacity when we do, so let us rent them to others in need while we are doing something else and earn a passive income.



The online platform

Processing Pals doubles as a social network where people with complementary interests can collaborate and achieve great things together. Both types of clients we mentioned previously shall download our application and then set it up properly according to their role.

Privacy and security

The clients using Processing Pals will have their identity verified, thus one individual can have only one account on the platform. The reasons are the following:

- In order to prevent hoarding of PCs by providers, we shall set a limit to how many computers can be made available by one individual: a limit of 2-3 computers should leave unaffected most people, while preventing providers from antisocial behaviour.
- The users need to be held accountable for what they're doing on someone else's PC: to prevent our platform from becoming a proxy for illegal activities, logs of “who used what” will be kept.
- The providers need to be held accountable for what they're doing with someone else's data: users need to be careful as to what data they manipulate and if the provider is using it without permission, they must face consequences.

The choice of technology

What happens in the virtual machine, stays in the virtual machine.

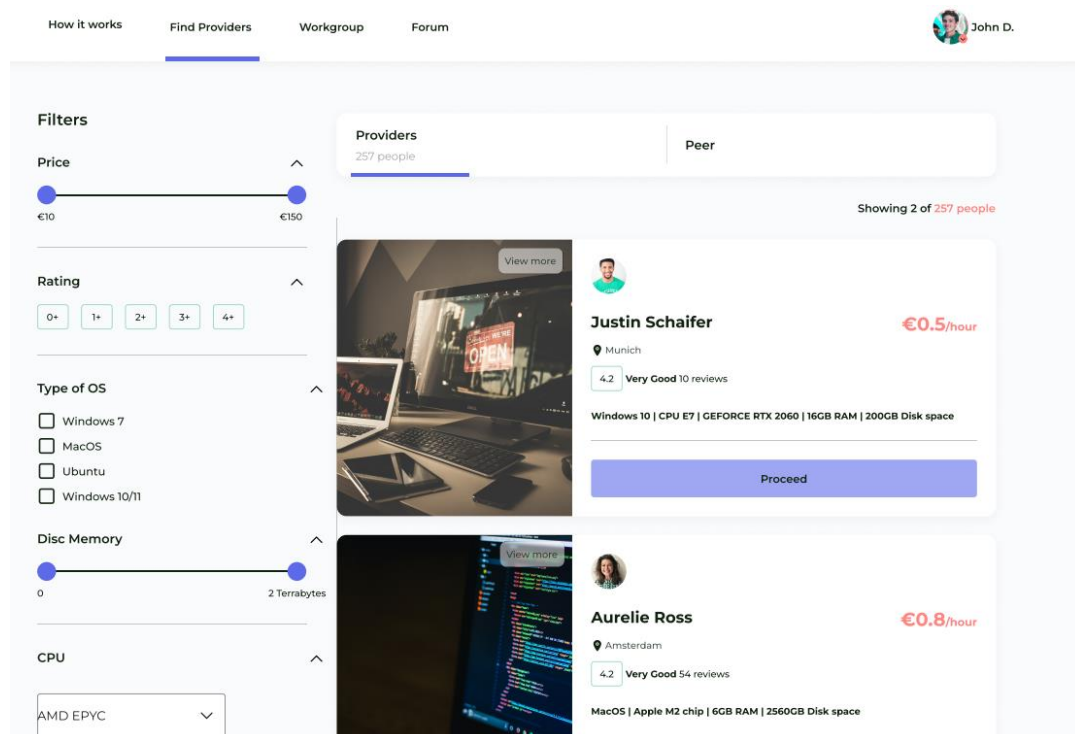
Virtual Machines are the technology allowing users to work on providers' PCs. They emulate real computers and provide insulation to the physical computer from the virtual one. Think of teamviewer that allows remote control of a PC – except our application will limit the remote control to a virtual machine running on a PC, rendering access to the main PC normally impossible.

The provider's need to feel safe is essential to our business and virtual machines provide this safety by not allowing the user to access the rest of the computer from the virtual machine. There are still ways to exploit your way out, which is why we'll be giving extra-safety recommendations to providers such as keeping their sensitive data on a separate storage device, physically inaccessible to malicious users.

"User" perspective

As a "user" – someone demanding computing power – one would be able to browse through the network and view the "providers" of computing power, their availabilities, and what they put at the user's disposal.

The user shall be able to filter available computers by technical specifications, price, and geographical location. When the user finds a suitable computer, they can proceed with renting it paying by the hour.



The user will be able to operate on the provider's computer thanks to a virtual machine running on the latter's PC.

“Provider” perspective

The provider too shall install our application on his PC and then register on the platform as such. The application will automatically collect the computer’s technical specifications and ask the provider for a schedule during which his machine is supposed to be available to users if it’s online as well as the amount of resources (CPU, GPU, RAM, DISK etc.) they are willing to offer.

The application will use the computer’s specifications to propose a renting price that the provider can ask to the user – the technical capabilities and estimated power consumption will be taken into account when determining this figure.

If the provider wishes, they can put at disposal multiple computers, but not more than 2-3 as to prevent them from hoarding solely for making a big income from our platform.

And that’s it! After the initial setup, the provider has nothing else to do but enjoy the passive income from people using their PC – a virtual machine will automatically boot up on user request.

Common features

Providers and users will be able to form “workgroups” and befriend each other to privilege working together rather than with strangers. In fact, users in particular are interested in trusting their providers since they may manipulate sensitive data on their computers and are exposing themselves. Collaborations envisioned are between students and teachers or groups of friends, researchers among others.

3. Business modelling and planning

3.1. Business modelling

We are dealing with a two-sided market. One side is represented by the “users” who seek out computer power to perform their tasks, the other is the “providers” with capabilities to fulfill this need for a price. Consequently, we have 2 business model canvases, let’s describe them putting the users and providers in parallel where the models differ.

Problem:

Users	Providers
<ul style="list-style-type: none">- Need more powerful computing resources.- Limited budget cannot afford a big investment with little return.- The need is punctual not chronic.	<ul style="list-style-type: none">- Dispose of powerful machine that stay idle outside of working hours.- The investment could be paying off much more.

Solution:

Users	Providers
<ul style="list-style-type: none">- Online service that allows them to work remotely on someone else’s computer.- Pay-per-use/hour.	<ul style="list-style-type: none">- Online service that puts their machine at the disposal of others for a price.

Key metrics:

- Customer retention: we are deeply interested in fidelizing our customers. Firstly, we must secure a base of providers by convincing them of the safety and rentability of our solution. Secondly, we must provide the user with an efficient and fast application that allows proper remote control of a VM on another PC.

Unique Value Proposition:

Users	Providers
<ul style="list-style-type: none">- Investments with huge upfront cost and little return are avoided.- Pay-per-use/hour model fits perfectly their punctual need.- Financial savings for the users- Cost reduction for the previous responsables for the users (eg. Universities for students)- Preventing electronic waste	<ul style="list-style-type: none">- Their machine is utilized at a higher rate -> increased efficiency.- Passive income with no effort after the initial setup.

High-level concept: Processing Pals is the Airbnb for computing power.

Unfair advantage:

We are making use of already-existing machines which greatly cuts the upfront investment needed to kickstart the business.

We are pressing on the environmental issues button to push our solution as the green alternative to already-existing solutions. In contrast to big companies advertising their servers are “green IT” we are not increasing the supply physically, but instead bringing to surface an already-existing supply of computers, making it useful for longer, thus preventing unnecessary electronic waste and decreasing the demand for new PCs.

Customer Segments:

Users	Providers
<ul style="list-style-type: none">- Students, with the core subdemographics being:<ul style="list-style-type: none">o STEM students, especially computer science and engineering.o Environmental activists: sensitive to the “IT for green” message and our values.- Freelancers.- Digital nomads who cannot carry heavy machines with them.- Universities letting us alleviate their burden when it comes to providing students with PCs. <p>Early adopters: students because of their limited finances and openness to new technologies as well as enthusiasm for climate change activism.</p>	<ul style="list-style-type: none">- Companies with idle computers outside of working hours- Universities with idle computers outside of working hours- Gamers- Software developers in WFH- Machine learning amateurs- Graphic designers in WFH- In general, people with idle powerful computers <p>Early adopters: developers in WFH and gamers.</p>

Channels:

Users	Providers
<ul style="list-style-type: none">- Social media- Online advertisement on other websites- Physical advertisements- Our own website- Word of mouth	
<ul style="list-style-type: none">- Seminars about us at universities	

Cost structure:

- Hosting the website from which our customers will learn about us and our product and download it.
- Ad campaigns in the online and real world.
- Salaries for the software developers as well as customer support.

Revenue streams:

- Modic subscription fee paid by the customers to access our platform: a very small fee such as 1 euro per month would translate into tens even hundreds of thousands of euros in revenue after market growth given our worldwide reachability.
- A small “cut” from the payment the providers receive from the users.
- Future acquisition by another company.
- Deposit: a deposit shall be paid by customers in order to discourage harmful behaviour. It shall be refunded when the customer ends their subscription.

3.2. Business planning

The business modelling helped us see a birds-eye view of the problem, solution, and the markets we target - now we need to develop a strategy and perform deeper analysis to “conquer” them.

A market segmentation helps in moving from abstract groups of people to concrete ones. From all the user demographics we target we’re going to focus on the students at first. In fact, even this demographic can be segmented into more specific subdemographics: STEM, environmental activists, others.

The following is our market penetration strategy:

1. STEM students:

They are the students that have the *burning need* to use our product. As with all students, they dispose of a limited budget and cannot afford huge upfront investments with little return.

They have complex homework to do from time to time, so the pay-per-use/hour model is perfect for their budget and usecase.

We will focus on securing this subdemographic first as it’s the easiest to approach not only because they need us but also because they understand us, from a technological perspective.

2. Students keen on environmental activism.

They may or may not have the burning need, but they certainly have the *burning passion* to be part of something greater than themselves and contribute to mitigating climate change.

Even if they may not be the most profitable customer segment, they are a vector of publicity and by word of mouth they will spread the news about us to their social circle – effectively making it easier for us to persuade other customers.

3. Other students

These are students who may not have the burning need nor the burning passion, but this doesn't mean they cannot become our customers.

With everything going digital and software getting more demanding, non-STEM students are starting to find themselves needing more powerful computers too.

Having secured the previous two core demographics, this third one will be easier to persuade into becoming our customer; essentially, we will have already penetrated their social circle and the influence of their friends being our customers will naturally push them towards us.

In fact, this is our approach when it comes to *bridging the gap* between the early adopters (students) and early majority: the demographics have ties one to another and by sorting them by "approachability" like the students, we can enlarge our customer base step by step, making use of the inertia we are building by seizing segments one at a time.

Besides online and physical advertising, we need to get the foot in the door. We shall contact universities and organize seminars where we introduce ourselves, talk about our company vision and values, the problems we identified and how we plan on fixing them. We will talk with students about their needs and problems to better refine our strategy and product.

Worldwide there are about 235 million tertiary education students [3], out of which 18 million reside in the European Union [4]. From these 18 million, close to 4.7 million (25%-26%) are students in STEM [5] – the customers with the burning need.

The numbers are on our side, the pool of students sensible to our service offerings and company values is very large even in just the EU. Let's assume we manage to convince only 1% of the STEM students to sign up on our platform: by imposing a 1 euro/month subscription fee – negligible cost for the customer – we would make 47.000 euros in revenue a month; on top of that you could add the revenue from the providers' subscription fee and our cut from the rent paid by the user to the provider and the revenue numbers would blow up.

When it comes to approaching the providers, online social media is our best tool. People with similar interests often congregate on public forums, facebook groups and such. We can join their communities and introduce ourselves there and receive feedback from them.

4. Business development process

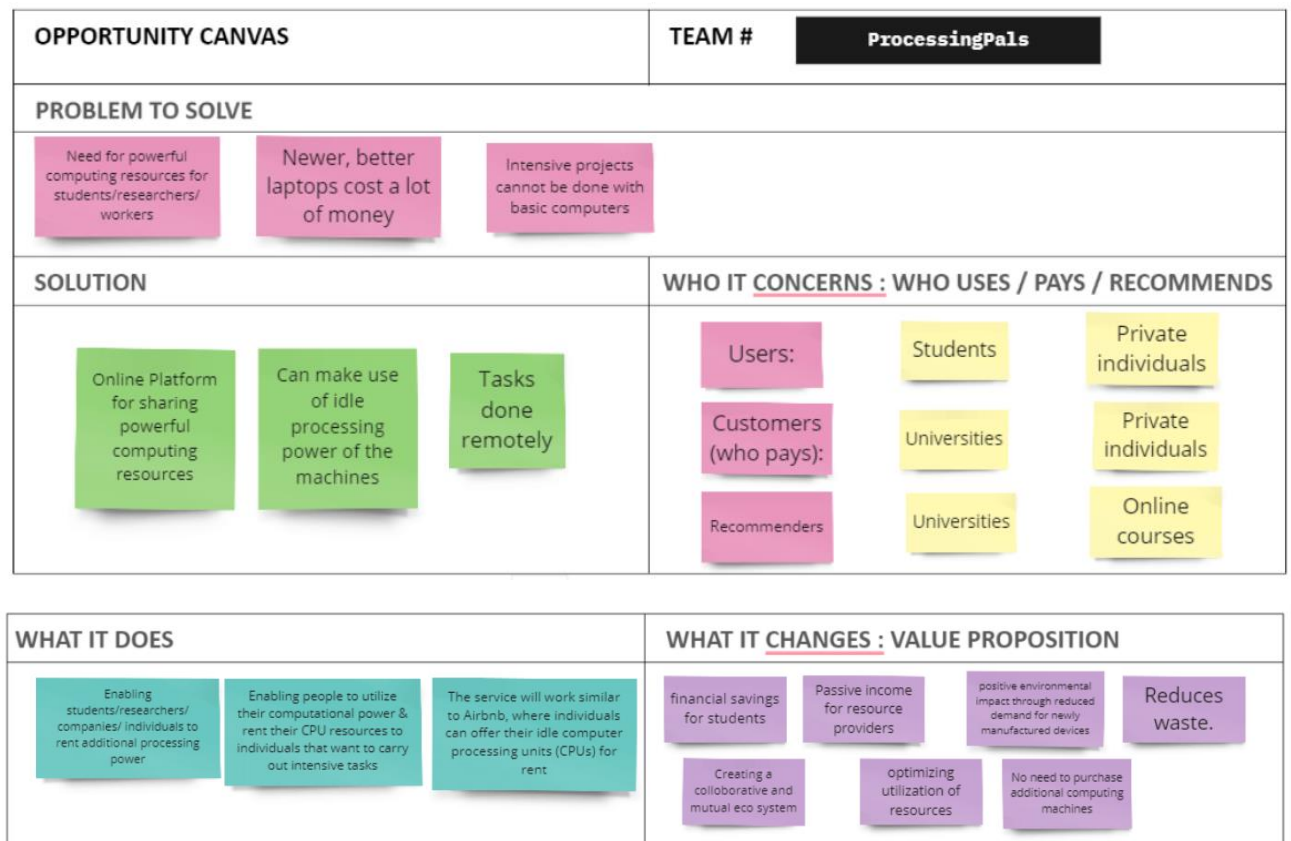
The first group exercise was getting to know each other. By sharing the values we hold, our background and our expertise we were prepared to understand each other better and talk in a mutually spoken language. For example, one person in our team was from a social sciences background instead of STEM like the rest, thus we had to change the vocabulary and way of explaining things accordingly. In a business environment, with time and money at stake, if people do not understand you then you'll automatically get a "no" as an answer – no matter how great you think your idea is, if it's not understandable you will get rejected.

Thankfully, our team's skillset was wide enough to cover the critical aspects of envisioning the business. A couple of teammates and I had the knowledge to develop a technical solution that allows the user and provider to interact with each other, another teammate had the knowledge required to design a proper user interface and experience. Finally, we were lucky enough to have a teammate with a background in social sciences who helped us create the empathy maps and customer personas. Cherry on top, we also had a teammate willing to pitch by himself and with a very great excitement – he really put on a great show! All in all, I was pleased with my team's composition and commitment to the project.

The second group exercise we did was complain about things inconvenient to us. Everyone wrote down on sticky notes what they found inconvenient or even harming to themselves and society. I think it was a relevant exercise to our final purpose as problems are business opportunities after all. We identified a diverse range of problems in society and then chose a category we found more "fruitful". In the end we talked about how much waste is generated because of our inability as a society to pool resources together. Initially, we were going to tackle the problems of small farmers not congregating together to efficiently increase production and develop better logistics for sales and transport of produce.

It turned out most of the team wasn't sure how to approach this and we decided to pivot slightly. From helping farmers pool resources together, we pivoted to helping people pool *computing* resources together. A teammate and I both faced the problem our team ultimately decided to address. We were coerced into investing into expensive laptops because of the increasing demands from softwares and the need to do our homework properly – both of us being computer science students.

We went on and developed an opportunity canvas during the lessons:



It was a good occasion to clear up confusion and help us all converge to the same solution and implementation.

In one of the next lessons, we learned about getting to know our market. We did that by developing empathy maps for the 2 sides of our market, users and providers. I think it was a great opportunity to clarify how to approach the market and how to persuade them into becoming our customers.

Not only that but we also developed customer personas. Essentially, we attempted to impersonate and understand at a deeper level how an individual from the markets we target could be interested in our offer, be they a user or a provider. Personally, I found this type of exercise quite fun and very useful as it prompted us to paint a realistic image of who we're going to talk to, set our expectations straight, and familiarize ourselves beforehand with the customers – before even approaching them! I believe this process helps make us, or at least me, more comfortable with trying to persuade potential customers.

Another benefit of focusing so much on getting to know the customers was being able to perform customer segmentation. We managed to identify certain segments that are more “needy” than others and some that are more “sensitive” to our message and values. This allowed us to make a market penetration strategy in which we focus on certain segments at a time, in a pre-established order, so that when it comes to approaching the next demographic, we can leverage the fact that we already convinced the previous ones.

One main challenge was dealing with the competition. In one of the lectures, we were tasked with identifying our competitors and comparing our solution to theirs. We found no competitor that does exactly what we propose, however there are plenty who do part of it by addressing only one side of the double-sided market, the users or the providers. Even if their solution is only “partial” with respect to ours they are still a big threat. We learned to differentiate ourselves from them by insisting on the uniqueness of our solution and benefits.

Probably one of the toughest things to deal with was finding a reliable, secure, and user-friendly implementation. Providers’ sense of safety is essential, otherwise there is no business. We went over various types of technologies such as Docker containers, Virtual Machines, app plugins among others. After evaluating their safety, we decided to go for virtual machines as they are the safest way of letting someone else use your computer.

We also had to deal with safety and trust issues from the users’ perspective. In fact, after doing a survey of the summer school students, it turns out most users can tolerate a varying degree of exposure of what they are working on. For those who need to trust the provider, we propose workgroups and friendships, where people trusting each other can congregate and work together. For example, a student would befriend their professor on our platform and privilege using their computer instead of someone else’s. In any case, users shall be provided with information on how exposed they are and to be careful now to work with sensitive data on untrusted machines.



The survey we ran on potential users. The question was “If someone over the internet would let you use their computer so you can do your homework with their hardware resources, how concerned would you be about that person being able to access your homework?”.

I want to add something else:

3 responses

It's more the idea that someone you don't know could have material from you, independent of if the material is very private or important

A particularly interesting response that made us think of workgroups and collaboration.

5. Self-evaluation

Getting things started was tough. Particularly, brainstorming and then picking an idea to go on with was difficult and induced a bit of anxiety, as we weren't even sure if we could propose a pertinent solution to it. However, by remaining open to pivoting and focusing on more concrete issues I got the idea of sharing computer power among people – it's something I had to face myself as well.

I was a bit intimidated by our summer school's programme as it sounded very abstract and tough to approach. Normally, I am given problems to solve but here I had to find it myself – more difficult than I thought it could be. The lessons are methods of work imposed by the teacher proved very useful in concretizing what we are going to do.

I felt particularly relieved and proud of myself at the end when we won the award for the best entrepreneurial team as I wasn't sure the idea I proposed to my team would lead us to victory and in fact I was even worried it may screw us up. The lesson I learned is to trust my teammates' judgement as they trusted mine and keep moving forward.

I liked the fact that people spoke their mind even if they weren't educated formally on the topic. In fact, it's a common occurrence that novices notice things experts do not, because being new in a field means they don't lose themselves in details unlike experts who sometimes may "not see the forest because of the trees".

In the end, it turned out I bumped into quite a few business opportunities in my life so far, I just wasn't aware – now thanks to the summer school I expect to be better equipped in this regard.

I definitely wouldn't have been able to do the project by myself as well as we did as a team. I am thankful for my teammates' variety of skills and outlooks as they compensated for my lack thereof. We all carried each other towards the light at the end of the tunnel. I am a technical person focused on how to make things work in the background, but I lack the expertise in making them pretty to the eye – luckily, we had someone studying HCID to do the web and app design. I am a quite timid person and dislike "exposing" myself to strangers, but our pitcher was an extrovert who wasn't afraid to put on a show like he did. He is one person I look up to when it comes to speaking in public and dealing with audiences.

6. References, web links

- [1] - <https://www.reinventingparking.org/2013/02/cars-are-parked-95-of-time-lets-check.html>
- [2] - <https://www.it.ox.ac.uk/article/environment-and-it>
- [3] - <https://www.unesco.org/en/higher-education/need-know>
- [4] - https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tertiary_education_statistics
- [5] - <https://www.umultirank.org/blog/In-which-European-countries-are-STEM-graduates-most-highly-recognised/>