

EIT Digital

Innovation & Entrepreneurship

Minor Thesis

Enviz:
Enhancing the understanding of
big data with personalised
visualisations.

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Abstract

Information visualisation is a recent scientific field where the capacities of computer graphics are used to display information to the user in an efficient way. While this definition is very broad, the important point of focus in our work involves selecting, transforming, and representing abstract data in a form that facilitates human interaction for exploration and understanding.

The new methods for browsing and interacting through data are still mainly contained to the scientific community, as the novelty of data visualisation involves many users do not know about this field.

Several fields imply for the user to take decisions based on big data, such as management, marketing, and research.

Yet, we believe the potential of visualisation, applied to emergent types of problems like big data, represents an unique opportunity for entrepreneurship. This thesis, written for a class within TUDelft, as part of the EIT Digital master program, presents an entrepreneurial project that takes advantage of the recent scientific discoveries for data visualisation to answer big data problems faced by a growing number of companies. Thus we present our idea for a product regrouping adaptive visualisations solutions: Enviz.

Keywords: Big data, visualisation, multi-touch.

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1 Enviz

Enviz is a company that develops visualisation solutions that allows the customer to use rich visualisation tools in order to better understand the data he is dealing with. Developing in Javascript allows us fast prototyping, and gives us access to a large amount of public libraries of already coded visualisations. Many visualisations can be found for free on www.d3js.org, visualisations for Data-Driven Documents, which provides a rich first material for visualisations richer than the ones the users are used to. While the code is available online, im-

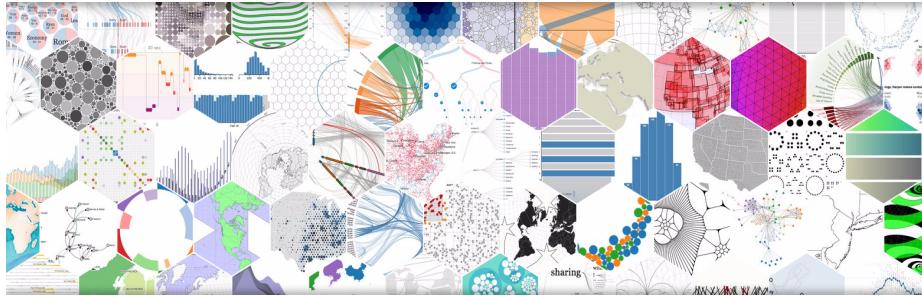


Figure 1: A display of several free visualisations on d3js.org where the code is accessible in Javascript.

plementing a program that uses efficiently the different visualisations, and can adapt to several type of data, is a time consuming task that adds a high value proposition to Enviz. This constitutes a rich material for our first value proposition of Enviz:

Our value proposition is the implementation of a prototype for a specific visualisation problem, by hiring our team for the development of rich visualisations personalised for the user's problem. An example of this is a work we developed for the European Patent Office, where their employees are using unhandy software for document triage, and thus we developed a new visualisation tool.

In order to properly fulfil the missions, direct communications with the customer is necessary and thus efficient organisation is vital.

Another objective we consider necessary for an effective product is to be able to provide solutions adaptable to several devices. For example, the prototype we realised for the European Patent Office was design to offer more interactions when using a multi-touch device, and took use of its large size. Thus, we have to be able to offer solutions according to the customer's need, which can be a regular computer, a large multi-touch device, or a smartphone.

Finally, the last point that shall be implemented in further years are tools to efficiently communicate with other users in order to discuss interesting findings when browsing the data.

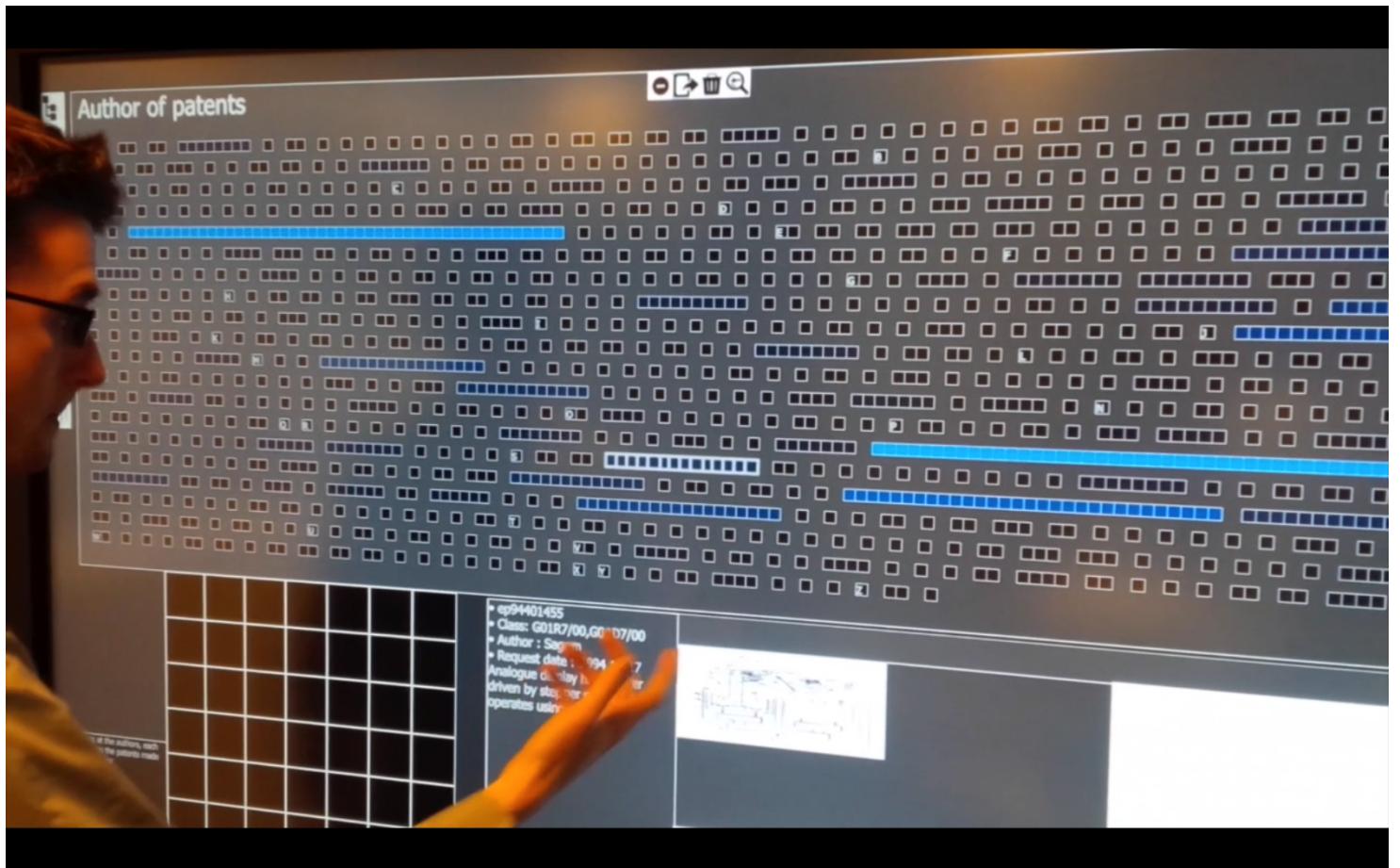
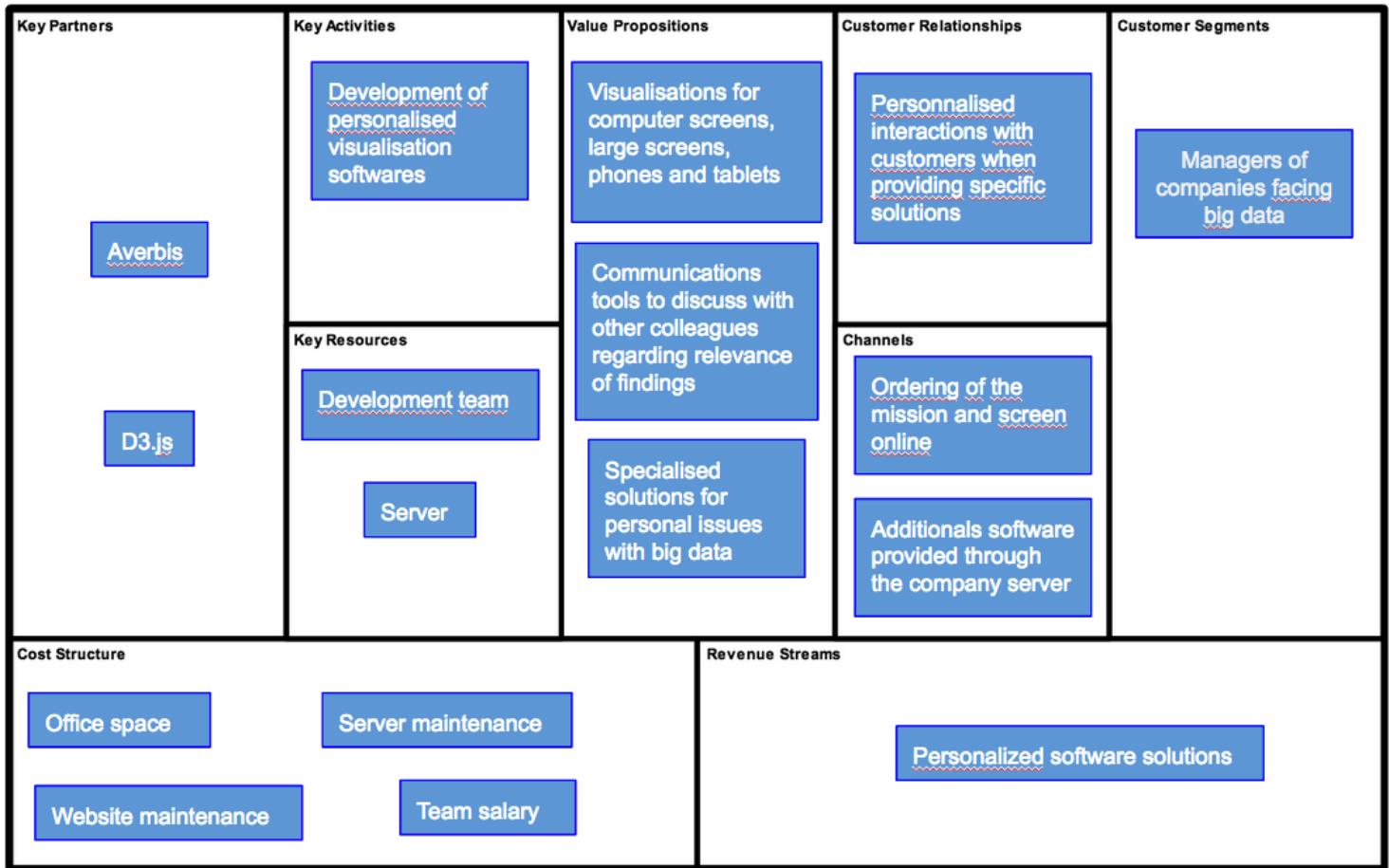


Figure 2: A demonstration of a personalised visualisation developed for a document triage software with the European Patent Office.



2 Business Model Canvas

2.1 Customer segments

Our main target are managers within private companies that have to deal with big data but do not yet implement rich visualisations within their analysis. Within the current market, many companies outsource the implementation of a database able to deal with a large amount of data. While this is a necessary part for the customer, the user still has to face large tables of data without the tools to efficiently browse and interact with the data, even though it got structured. The companies are often facing a massive amount of data recorded from their customers purchases, activities, habits, and thus the companies . Big data companies simply help businesses set up their databases so that they can keep track in an efficient and flexible way. Another issue companies have to deal with is to continue tracking advertising

campaign performance and to use it to optimize their media budgets. It turns out from analysing the competition that the list of companies willing to outsource the tackling of large data based problems are numerous.

Here is a non exhaustive list of possible clients: TKP, ASR, Rabobank, Bol.com, Canal+, Essent, Human Inference, ING, KLM, NS, UPC, Societe Generale, Gemeente Amsterdam, Booking.com, ING, Sanoma media, KPN, Tomtom, Rabobank, Greenhousecorp, Tieto, Belastingdienst, Funda, Reed business media, Essent, Wekhamp, Cool blue, Zorgdomein, NPO, Schipol group, KLM, Sonepar. All these companies outsourced the implementations of their databases, but as stated earlier, still do not have proper tools for an efficient analysis.

2.2 Value proposition

Enviz provides personalised solutions to deal and visualize big data, according to the type of device the user requires. Our approach is innovative because while many companies can set up databases, statistical analyzes, they do not focus on visualization, and offering such solutions that are visually accessible on different kind of devices means more efficient work, and in the case of large multi-touch screens, improved team work, presentations and explications of decisions.

The users gain, from using our product, a tool to save, interact, and analyse with all the data they gather.

2.3 Customer relationships

In order to provide our value proposition to our customer, it is absolutely necessary to provide personalised interactions with customers, such as email exchanges, video conferences, and live prototypes demos in between the development team and the customers.

2.4 Channels

The first businesses will have to be contacted through management networking. Online forms available on our website are also to be provided for any possible customer to contact us.

For the first contract between Enviz and a business, video conferences are held in order to define properly the mission. First contracts are expected to happen in Europe, and thus visiting the company for to start the work can easily be done.

Past the first mission accomplished, companies can always contact us through forms on the website, or channels that were used for communicating during the first mission.

2.5 Key activities

Development of personalised softwares. The mission of our company is to provide data analysis and visualization methods through the possibilities provided

according to a specific problem and the available hardware.

2.6 Key resources

In order to provide the desired effectiveness, it is primordial to have a specific profile of developers that have heterogeneous skills: front end visualization development, with communication skills to adapt according to the needs of the client.

2.7 Key partners

Averbis is a company that we already worked with before starting our project with the European Patent Office. While we can consider the company as a customer, our goal is to set a long contract for the large amount of issues they face with proving the quality of their work to their customers. Thus, our objective is to provide visualisation solutions, and at the same time, use them to reach our future clients, for short or long term missions.

We also consider the organisation D3js as a key partner, as it is the source of many of the key materials of our visualisation software solutions. Thus, in order for the organisation to grow stronger and more visible, thus bringing us more free visualisation ideas, we intend to participate actively in this community to keep it dynamic and interesting for new comers.

2.8 Cost structures

The cost structures are the team salary, office space, server maintenance, website maintenance.

2.9 Revenue streams

The revenue streams come from contracts with businesses.

3 Team

Our product requires a very specific set of abilities in order to run smoothly and operate efficiently with the company expansion. While the company can start off with one person dealing with the creation of the basic package, and a second dealing with the communication and marketing of the company, it is interesting to highlight that the future will involve hiring marketing people, and more specifically people that are both good developers and visualisation experts.

4 Market analysis

In order to consider the whole picture for the visualisation market, we need to consider the current market for big data businesses. This necessity comes from one specificity regarding the concept of visualisation:

- Complexity of understanding data is often related to its size.
- There is no need for a very intelligent visualisation when the problem is simple.

Big data is a well known problem today, and databases today can handle with very large amount of data easily. Nevertheless, the interactions provided by a simple database do not help the user to get insight from the data. When the user is faced with too much data at once, he is also more likely to disregard it. According to Platfora, most companies analyze a mere 12% of their data. These issues are slowly being taken into consideration by big data companies. If we look at the top ten Big Data companies ranked by revenue in 2013, only a few of them offer rich visualisation solutions. Most of the companies will only set up database for company to keep track of the records, provide solutions to get a few statistics from the database, but then leave the user alone to face the large amount of data they face.

Getting insight without rich visualisation is difficult and time consuming for the user. The study of the offer of these companies lead us to the following conclusion: providing rich visualisation is a feature that will in the future be inevitable. While most of the companies provide poor visualisation with the software they sell, it seems that most of them are based on copies of the most used visualisations nowadays: the visualisations provided by Microsoft Excel. There are as many needs as there are organisation types. Companies nowadays often hire data analysts in order to understand the data they are faced with, but also often to measure efficiently the impact of the management decisions. This is where we believe our company can make a difference. Inspired by the way users create folders during the document triage process, it might be interesting for analysts to be able to save selections of data. This way, non relevant data can be disregarded from the presentation and thus improve the speed of decision.

The term visualisation is too narrow to consider there is a market on its own. Visualisation can indeed consider several aspects, as in gathering and analyzing big data, but it also considers difficult data to deal with, such as network relations.

As described within the HorizonWatch 2015 IBM Trend report ¹, several experts describe visualisation as the critical step for companies to be able to take efficient decisions, and companies that do not follow the pace will not survive. The speed and efficiency in decisions based on rich visualisations provide an

¹<http://fr.slideshare.net/HorizonWatching/data-visualization-horizon-watch-2015-trend-report-client-version-28jan2015>

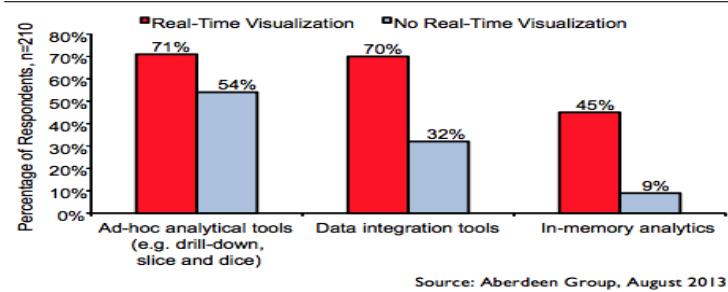


Figure 3: Percentage of respondents according to the usage or not of real-time visualisation.

advantage that is now recognised even within large companies, such as IBM. The companies that require visualisation solutions do so for the following reasons: operational inefficiencies, shortening window of time for making critical decisions, too many business decisions are based on inaccurate or incomplete data, and customers demand timely and accurate responses to queries.

Aberdeen report also gives us valuable numbers to justify the need for companies for visualisation solutions, such as an augmentation of 15% of cash generated from operations from companies that decided to integrate visualisations to their work.

Evaluating the market size is extremely difficult as it is very dependant of the personal problems faced by a company, and their policy on visualisations tools, both being information companies are often not willing to share openly. Data Visualization market is currently valued at \$4.12² billion and is expected to grow at a CAGR of 9.21%, to reach \$6.40 billion by the end of 2019.

It is interesting to see that quite often companies that took the directions to tackle issues thanks to visualisations, whether by themselves or outsourcing, call different companies several times, for example by organising contests, or simply several contracts at once, like Google. Thus, we believe the market can be segmented as follows:

- European Union Countries, as this allows easier interaction with customers.
- Medium companies do not yet make use of visualisation solutions, and large companies that are either in the same case, or are likely to run several missions at once.
- Companies where internal and external communication is primordial for decisions.
- Companies that are open about communicating efficiently and openly about issues they are facing.

²<http://www.reuters.com/article/2014/05/26/research-and-markets-idUSN265151a+100+BSW20140526>

5 Patent analysis

We performed a patent analysis to analyse the state of the art and being assured of the inexistence of lawsuit risk for patent infringement. We used Esp@cenet to verify the European Patent Office database, and the United States Patent and Trademark Office search engine to determine it. We were surprised not to find any patent related to data visualisation. Further inquiry indicated us that the nature of data visualisation was opposed to the basic principles of patent creation, as the american law excludes "abstract ideas" which involved refusal of some patents involving software, and is highly relevant in data visualisation. As for the European Patent Office ³, the established policy is that a software is not patentable unless it brings "further technical effect". This reassured us regarding the risks of lawsuits, but implied that if we brought a whole new paradigm concerning data visualisation, protection tools are very limited. Nevertheless, the lack of protection is not a great issue as the solutions, personalised and focused on specific companies issues, are not likely to be easily copied directly. The basic visualisation methods can be copied, but mixing them together, scaling and modifying them for different kind of hardware, and modify interactions according to it, is a long and a difficult task, and impossible without the same hardware.

6 Competition analysis

We found several companies that share similarities with our value proposition. Our approach differs, but there is much to learn by analyzing their companies. We here provide a list that shows interesting companies and what there is to learn from them, while highlighting our differences.

- Carbon Visuals is a company that focuses on providing visualisations related to the carbon emission, from power stations, public building, time evolution of gas carbon, and more. They focus on 3D visualisations to have physical representations of data we can not see. While our domain is more abstract, as we focus on data companies want to deal with (documents, organisations, networks), providing a comparison in between invisible and visible objects to give hint seems like an efficient way to convince the customer of the need to realise the importance of the data.
- CLEVERFRANKE is a company more focused on solving the same kind of problems for companies than us. One interesting piece of their work is the Google Consumer Barometer, where the visualisation help to understand the consumer's habit through time. Nevertheless, we stand out from their offer by our ability to offer visualisations on different types of hardware, thus adding an added value.

³<http://www.epo.org/news-issues/issues/software.html>

- Ideal-analytics presents an interesting business model. While most of the visualisation related businesses deal with missions, this company made the choice to put their softwares available online, but limit the possibility if the user sticks to free usage. If the customer wants to use the software with more than 1Gb at once, he has to pay 80\$ per month. While we do not believe the quality of their software is worth such a high price, it seems like a good idea if a massive amount of rich visualisations are available.
- ito! focuses on providing solutions for collecting, aggregating, managing, analysing and generally making sense of complex public transport and spatial data, including real time data feeds. It is interesting to see a pattern with the high quality of the visualisations because of the focus on a field. This comforts us in our decision to focus Enviz on a limited amount of types of problems.
- Jess3, while using a very classical business model, also performs analyses as missions, and then make a montage in order to directly explain the reflexion process to the customer. This is an interesting value as the user does not have to go through the data himself, but also an inconvenient as this implies the user is then losing the interactions with his data, which he is very likely to have special knowledge about.

Something we learn from analyzing several companies is the desire to educate the customer, and easily face him with the advantages of rich visualisations. The companies websites often display a lot of different kind of visualisations in order to inspire the customer, as often customers would not by themselves be persuaded of the necessity of visualisation tools.

7 Marketing plan

As described earlier, our market is very broad, but can seem difficult to reach without proper contacts. Our work with the European Patent Office, nevertheless, is an opportunity to use as a gap for further contracts. Indeed, during our work with the European Patent Office, we first fulfilled a mission to visually analyse the quality of the results of a project to automatize the classification of patents requests. The prototype was developed by Averbis, but the European Patent Office sent our visual analysis in order to justify modifications within the results. Thus, we can, in the close future, through the European Patent Office, our first customer, contact Averbis, and establish with them the missions where they could need our data visualisation expertise. Our objective is to establish a first contract where our company would be providing during 12 months for Averbis.

This first contract is of drastic importance, as it provides us with income to survive the launch of the company, and it also gives us credibility regarding our expertise on data visualisation, and especially when dealing with ordinal data, which is not always a service proposed by our competition. At the same time,

Averbis also often meets with its customers in order to discuss advances on their projects. Our ability to provide visualisations for different types of hardware, especially large multi-touch device for these discussions, is a clear advantage for Averbis in order to prove to the user the efficiency of their work. These meetings are the opportunity for us to display the efficiency of our prototypes, enrich our list of contacts, and thus future missions opportunities.

Considering a mission is on average in between 1 and 12 months, long discussions with companies working with Averbis are particularly important before starting our other missions, as our objective is both to get our company's name out, but also to get the best missions possible in order to display our efficiency, especially if we have possibilities to work on large multi-touch devices, where our experience separates us from the competition.

Another important point for our marketing plan to underline is our need to quickly have numerous projects to display. Thus, we will try to focus on the shortest missions as much as possible. The balancing in between interest of the mission and duration will be critical in the two first years of Enviz, where our team will be small but needs to have visibility. Our objective is to work on a 1 year contract with Averbis, and after 3 months of work with them, use their relations in order to get short side contracts, preferably interesting and around 3 months long.

8 Financial plan

8.1 Development Costs

The development costs of Enviz will be highly related to the contracts we sign through our relations with the European Patent Office and through Averbis. That being said, even for our first contracts, a team of three developers seem necessary in order to implement quickly solutions for our customers, even though we can consider one of the developers, the CEO, would have to be less focused on actual development in order to deal with communication with the customer, keep track of the company's finances, and planning of future contracts.

8.2 Investment

In order for the company to get known, we mainly plan on two elements: the contacts through the European Patent Office and Averbis, and a website to display our previous and current projects, in order to visually appeal to customers during discussions. Thus, the need to have our own server:

We can consider a server with a low-end processor, as little as 1GB to 2GB of RAM, and 500GB to 1TB of RAID storage will most likely suffice, and should cost your business as little as \$400, with an enterprise Linux server distributions that range from free to \$1,000 or more for an annual support subscription. As

it is unlikely a large amount of potential customers check our website at once, we consider that a free Linuc license is enough, and thus the cost of the server would be of \$400.

Another important investment is the acquisition of a large multi-touch device in order to verify the viability of our programs regarding this specific hardware. Our good relations with the European Patent Office will allow us to use theirs for a while, but we do not believe it would be possible after a year. The price for a large 70 inches multi-touch screen is around 7000, but as price greatly depends on the size, a slightly less big screen would cost around 4000 and still allow us to efficiently prototype as long as our considerations of adaptations to the customer's screen are kept in mind.

8.3 Cash Flow Analysis

Our cash flow analysis describes our plan up to 2019. Our objective is to get a one year contract from Averbis, get a multi-touch large screen plus server for 4400 , and after three months get additional contract for 10K a quarter, operating expenses are growing because of our need to visit our customers. The income section describes the evolution of our contracts. Raise of income is justified by the increase in the number of contracts and our price coming from our added expertise, and the addition highly valued features of communication on results, which is possible with the addition of employees through time.

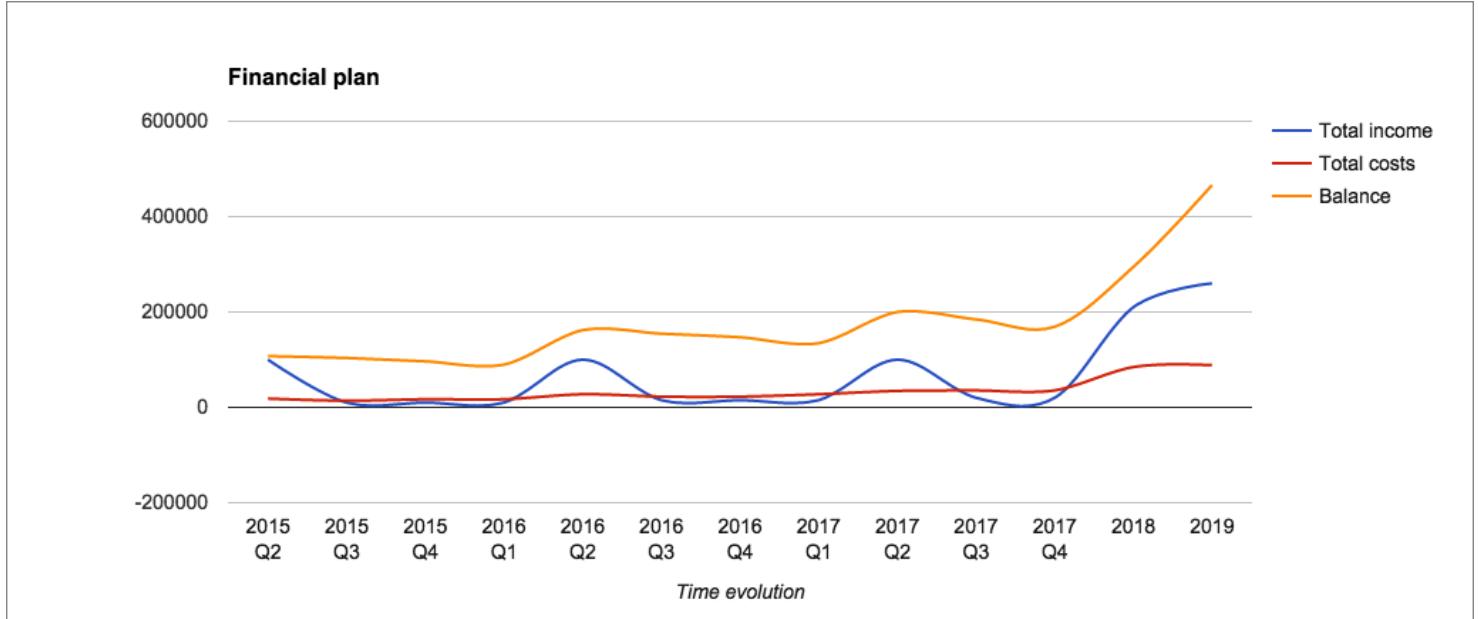
The lack of income from 3 months contract recurring comes from our objective to estimate realistic plans where finding contracts might not always be simple, and some contracts might be more time consuming than planned.

	2015 Q2	2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018	2019
Income													
Contract 1	100000												
Contract 2					100000								
Contract 3								100000					
Contract 4												150000	
Contract 5													200000
3 months contracts		10000	10000	10000		15000	15000	15000		20000	20000	60000	60000
Total income	100000	10000	10000	10000	100000	15000	15000	15000	100000	20000	20000	210000	260000
Costs													
Investment	4400				7000				7000			10000	14000
Salaries	9000	9000	9000	9000	12500	12500	17500	17500	22500	22500	22500		
Operating costs	5000	5000	8000	8000	8000	10000	10000	10000	10000	13000	13000	52000	52000
Total costs	18400	14000	17000	17000	27500	22500	22500	27500	34500	35500	35500	84500	88500
Mutations	81600	-4000	-7000	-7000	72500	-7500	-7500	-12500	65500	-15500	-15500	125000	171500
Balance	107500	103500	96500	89500	162000	154500	147000	134500	200000	184500	169000	294500	466000

Figure 4: Enviz financial plan up to 2019.

9 Customer development

Our customer validation comes from the two elements, the value of our visualisation solutions, and our ability to provide solutions adapted for large touch screens.



The competition received very positive comments from previous customers with a similar MVP to Enviz, thus, we can establish the value of our MVP, and the feedback from examiners trying the large touch screen was highly positive, especially considering the advantages and pleasure to use the large touch screen. Our business model relies heavily on our first contract with Averbis, but the success of our first mission for the partnership in between the European Patent Office and Averbis brings a proof of our efficiency to solve problems Averbis is faced to regularly, and thus our marketing road map will be able to bring Enviz to the market.

The scalability of our business model is also validated from the study of the Aberdeen group, and the increasing number of companies currently realising the advantages of visualisation solutions.

A concern in the scalability of Enviz is the difficulty to find experts in data visualisation in the current market, with the right kind of skills to discuss with and educate the customer, especially for setting up new contracts. Thus, while the survival and continue growth of our company seems reliable, it is highly unlikely we get the possibility for a brutal growth of customers as it is directly linked to our number of visualisation experts and developers. Nevertheless, an efficient managing with software developers focusing on different tasks than the data visualisation experts should allow Enviz for a steady growth, as software developers will be easier to hire than data visualisation experts.

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