SENSEwork

By

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GRADUATION REPORT

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This thesis is dedicated in memory of my grandfather Mr. W. A. J. Moerdijk who has been my inspiration and motivator.

Abstract

This thesis describes a feasibility study into a new venture named SENSEwork. This research describes all the business elements of the company and defines the company structure.

The research contained two primary sections: the business model generation and research and the business concept validation.

SENSEwork focus of business is consultancy, project guidance and outsourcing within the sensor technology domain. The key activity of SENSEwork is defined as: the outsourcing, project guidance and consultancy to companies that are looking into the recruitment of a sensor technology educated engineer or to the application of sensor technology. On the other side of the costumer segment it is the guidance and consultancy of young professionals that are currently studying at the advanced sensor applications bachelor or have recently finished this study.

It was concluded that the SENSEwork is feasible as a company in both financial as conceptual terms.

DECLARATION

       I hereby certify that this report constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions or writings of another.

       I declare that the report describes original work that has not previously been presented for the award of any other degree of any institution.

Signed,

Rene Nijland

Acknowledgement

This bachelor thesis would not have been possible without the help of several persons that contributed and assisted in the preparation and completion of this study.

First of all I would like to thank my family, relatives and friends for their support and encouragement over the last years.

I would like to thank my supervisor Ms. Fenna Feenstra who continuously guided and supported me. I would like to specially thank Ms. Saras Sarasvathy & Mr. Henk Hindriks.

Lastly, a special thanks to all the staff members and students of the Hanze Institute of Technology. The last years have shown me a lot of different perspectives, enabled me to meet a great amount of new and inspiring persons and showed me how fun a study environment can be.

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Chapter 1 - Introduction

1.1 – Rationale

As a graduation project for the entrepreneurship line of the advanced sensor applications study a research will be based on the feasibility of a new company. This new company will be named SENSEwork and offers a special service to advanced sensor technology students/alumni and the industry. The service provided by SENSEwork will be a fit to purpose project and job guidance consultancy.

1.2 - Research Question

Currently there is no specialized sensor consultancy that focuses on both students/recent graduates and the industry. Also no temporary employment agency is specialized in this area. The feeling exists that this can be a unique opportunity to start a business in this segment. In order to research this opportunity the next research question is defined:

"What does it take to start a specialized consultancy agency that focuses on long term working relationships between sensor technology students and professional companies from the industry, while being profitable for the founder?"

In order to research this the nine building blocks of the business model canvas (Osterwalder & Pigneur, 2010) are used as sub questions, the nine building blocks are:

1. Customer Segments
    a. For whom are we creating value? And who are the most important costumers?
2. Value Propositions
    a. What value do we deliver to the customers? Which one of our customer's problems are we helping to solve? Which customer needs are we satisfying?
3. Channels
    a. Through which Channels do our customer segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?
4. Customer Relationships
    a. What type of relationship does each of our customer segments expect us to establish and maintain with them? Which ones have we established? How costly are they? How are they integrated with the rest of our business model?
5. Revenue Streams
    a. For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?
6. Key Resources
    a. What key resources do our value propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?
7. Key Activities
    a. What key activities do our value propositions require? Our distribution channels? Customer Relationships? Revenue Streams?
8. Key Partnerships
    a. Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?
9. Cost Structure
    a. What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive?

Next to the nine building blocks the 10th sub question holds:

10. What is the best usable business pattern to use?

1.3 - Objectives

The desired outcome of this research is a business model that describes all of the functions and which is financial viable. This can be achieved as following:

- Create a business plan.
- The business plan needs approval and commitments from persons/institutions/companies in the market.
- Business plan needs to be market ready.
- Create contingency plan for SENSEwork.

The research will be developed around the following flow chart:
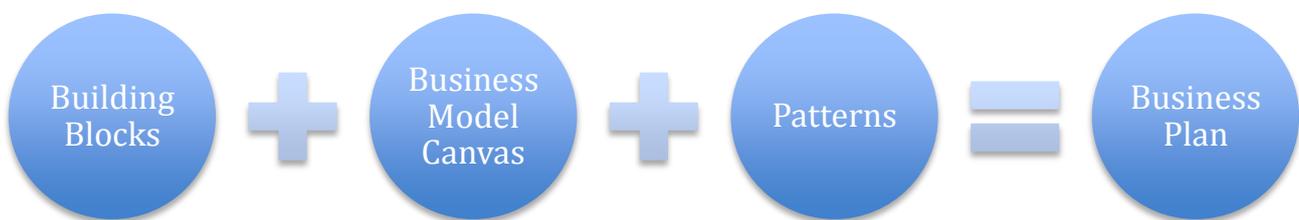
Table 1 Flow Chart Research

1.3.1 – Building Blocks

The sub questions described in section 1.2.

1.3.2 – Business Model Canvas

The Business model canvas works like a real canvas to paint on, the nine building blocks are divided over the canvas after which a brainstorming session fills in the various blocks. This shapes the general idea of the business. This also allows to add a personal dimension to the business and to separate the business from other businesses. The business model canvas is shown in section Chapter 4.0 - Conceptual model.

1.3.3 – Patterns

Business models can consist of a large variety of concepts and patterns. These business model patterns are slightly different and not every pattern is usable for every business. Therefore an overview of the different patterns has been researched. This research has been performed to determine the best usable business pattern for SENSEwork.

Chapter 2.0 - Situational Analysis

In this chapter an overview of the current situation and the stakeholders is given. The hypothesis to support the research will also be defined at the end of this section.

2.1 - Current Situation

Currently a large demand of technical personnel exists. According to published work by the Rabobank (Hardonk, Vries, Cocu, & Maas, September, 2013) an extra 30.000 technical schooled employees (on all educational levels) are required until the year 2020. This is out of line with the current intake of students that select a Beta study (science, mathematics and computing, engineering, manufacturing and constructing). An additional problem is the fact that from 1998 till 2010 the amount of students that decided to select a Beta study has decreased. With a lower amount of technical personnel on the market and a high demand it would make sense to think that the unemployment rate of Beta graduates is at one of the lowest points in history. Unfourtunatly that is currently not the case, when looking into research (Berkhout, Prins, & Werff, June 2013) we can see that the avarage beta student on an HBO level takes around 2.5 months before he or she finds a job. In addition to this a 6 percent margin of the recent graduates with a job become unemployed after a period of 18 months and a 4 percent margin exsists on Beta graduates within 6 months. SENSEwork is a to be started company that wants to assists both students and companies. At the moment Sensor technology is still a relatively new technology in the professional industry. In the past companies and institutions like Sensor universe, Sensor City, Wetsus and energy valley have contributed to the promotion of sensor technology. However sensor technology is a new technology for most traditional engineers. Therefore SENSEwork wants to offer a project guidance consultancy especially focused on sensor technology. The initial company setup is to create a student profile for every student that is interested in the service. As soon as this profile is created a database can be created consisting of all the students with different profiles. When a company offers a project for students the best fitting student for the project can be selected. This system is based on the online date system in which a person is selected based on the preferences of another person and a best fit is searched. However since this a niche and speciality market SENSEwork will not automatically select the best fit but propose a selection of the most competent persons and will elaborately discuss this with the project owner.

According to the statistics of the Institute of Engineering the advanced sensor application education counts 71 students enrolled (Appendix I, Table 8 Number of Advanced Sensor Applications Students). According to the recently stopped sensor universe around 80 companies in the Northern part of the Netherlands are using sensor technology in their daily business.

2.2 - Stakeholders
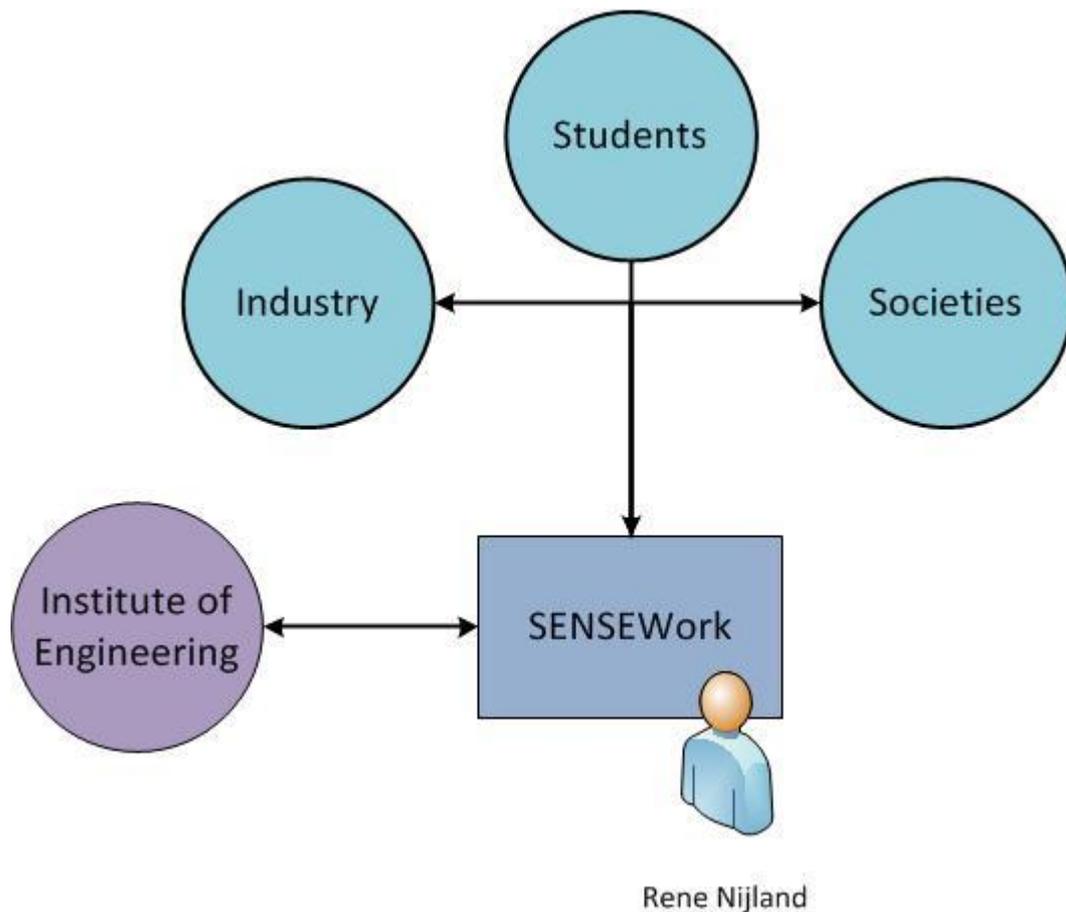
Figure 1 Stakeholders Overview

In Figure 1 Stakeholders Overview an overview is given of the various stakeholders during this project. SENSEwork is a to be realized company with Rene Nijland as the owner of the company. The research performed during this graduation project is an integral part of the Advanced Sensor Applications study at the institute of engineering at the Hanze Hogeschool and therefore this is a direct stakeholder of SENSEwork. The industry (various companies) is a stakeholder since it can deliver projects to SENSEwork and also seek advice. Students of the institute of engineering are also a stakeholder since without SENSEwork they will have to search for their own projects and possibilities within the industry. The final stakeholder in the overview is society. This can be seen as professional societies that want to collaborate with SENSEwork for example the HIT Society.

2.3 - Survey

During the start of the research a survey was created to receive feedback from the advanced sensor applications students. Since the main purpose of this survey was to get a general overview of the plans and current situation of the students five questions were used. These five questions would be sufficient enough to get a clear overview and not to time consuming for the students. Appendix III shows the five questions used for the survey. The outcome of the survey

is used as one of the facts for the feasibility of SENSEwork. The outcome of the survey can be summarized as follows:

The survey had a total amount of 22 participants, 21 of the 22 participants were indeed students of the Advanced Sensor Application Bachelor.

The main purpose of the survey was to research if students have any interest in a service similar to the SENSEworks principle. If there was no interest amongst the students this would mean that the value propositions needed to differ.

More then 90% of the students reported that professional companies are not approaching them.
More then 90% of the students would like to be approached by professional companies with potential projects and job offers.

When analysing the results from the survey it can be concluded that the answers show enough potential for SENSEwork.

Chapter 3.0 – Theoretical analysis

Several business model concepts have been considered for this research described by (Osterwalder & Pigneur, 2010). An overview of the five patterns is given with relationship to SENSEwork, therefore this section including the pros and con's for every pattern. In addition Appendix II describes the basis of the five patterns.

3.1 – Unbundling Business Model

In the case of SENSEwork an unbundling business model can be used. The usage of the unbundling model does request SENSEwork to be split up into three major parts. In work from (Longenecker, Palich, Petty, & Hoy, 2012) one important tip for starting a business is described, have a clear overview of the company and the segments and try to cover all the segments at the startup. The unbundling business model could proof to be very helpful in a larger company in which we can see a lot of intersections of the segments.

In the case of SENSEwork two of the three segments of the unbundling business model are of higher importance, the customer relationship and the infrastructure business. At the start of SENSEwork customer relationship business for SENSEwork is merely focused on identifying and socializing with various potential partners. After this first step is taken a long-term sustainable relationship needs to be established. In terms of the infrastructure business with regards to SENSEwork it can be forseen that as soon as the long term relations are build with companies that SENSEwork needs to implement it specialty to these partners. The most important aspects to conisider for SENSEwork are how to supply the knowledge and power that SENSEwork has in the most efficient and reliable way. In terms of product innovations business SENSEwork does not plan to invest in research and development for the first five years.
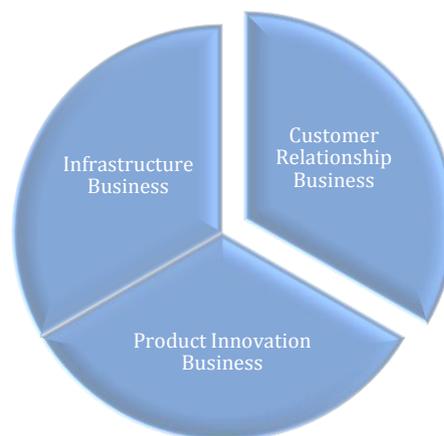
Figure 2 Unbundling Business Model Overview

3.2 – Long Tail Model

In terms of compatibility this business model does not suit the goals and company structure of SENSEwork. SENSEwork does operate in a niche market however is not aimed at the production of items. Due to the fact that SENSEwork does not deal with the production and sales of produced items (SENSEwork sells a service and not a product) it is safe to conclude that this business model does not foresee in the needs of SENSEwork. What can be interesting is to perform a research after SENSEwork has been founded to investigate if the described working of a long tail model is the same for products as for services. (Anderson C. , 2006) describes that the long tail model is primarily used by large retailers that can have large warehouses with items on stock.

Figure 3 Long Tail Example

3.3 – Multi Sided Business Model

One of the business models that shows a lot in common to SENSEwork at first sight. By bringing both students and alumni together with the industry we create value for both groups. One of the theories behind the multi sided business model is that the larger the group of students and alumni grows the larger the industry group grows. With this theory in mind the growth rate of SENSEwork seems to be one of the most important factors to work with the multi sided business model.

3.4 – Freemium Model

In terms of strategy the freemium model seems the best fit for SENSEwork in the startup period. With this model SENSEwork is able to offer the service to students free of charge. This free of charge membership will create a profile of the student. This profile enables the student to point out his or her points of interest, specialties and extra curricular activities. A freemium model contains of several layers that when combined create an ultimate service for the students. On the other side of the business a free of charge look into the skillset pool of SENSEwork can be offered to the companies and partners interested in people/personal. When

a company decides that one or more persons are worth hire ring from SENSEwork a fee needs to be paid. This fee can be determined from different subscriptions. The various to offer subscriptions will be researched into more detail when answering sub-question 5: Revenue Streams.

3.5 – Open Business Model
In the case of SENSEwork the open business model is not preferred as the to use model. Reason for this is because SENSEwork does not have a research and development department for the initial start-up phase. In the future of the company R&D will become a more important factor. While not being preferred the full potential of the open business model will be considered in the long-term sustainability planning of SENSEwork.

The hypothesis for this research holds: A business model can be written to uncover the potential of a sensor consultancy start-up and show that it can be profitable. In order to achieve this a freemium or subscription based service will be used to create a business case.

Chapter 4.0 - Conceptual model

The conceptual part of this project consists of a business model canvas that describes the nine business segments of SENSEwork. For this start-up phase the business model canvas is printed out on an a1 format after which a brainstorm session took place on all the nine segments of SENSEwork. During this research the nine segments will be researched into depth, this research needs to confirm or falsify the brainstorm and first thoughts on the direction of SENSEwork.

The brainstorm session on the various elements of SENSEwork will be the general guideline for the rest of the research. The brainstorm was performed in three stages, the first stage was a brainstorm at home. The second stage was to present this brainstorm at an Amsterdam Centre of Entrepreneurship & Kickstartup meeting. This stage delivered great feedback and therefore the third and last stage was an evaluation of this feedback. After analysis was performed and the strong and weak points were highlighted the final business model canvas was created.

The following section will describe all the nine business canvas elements into detail.
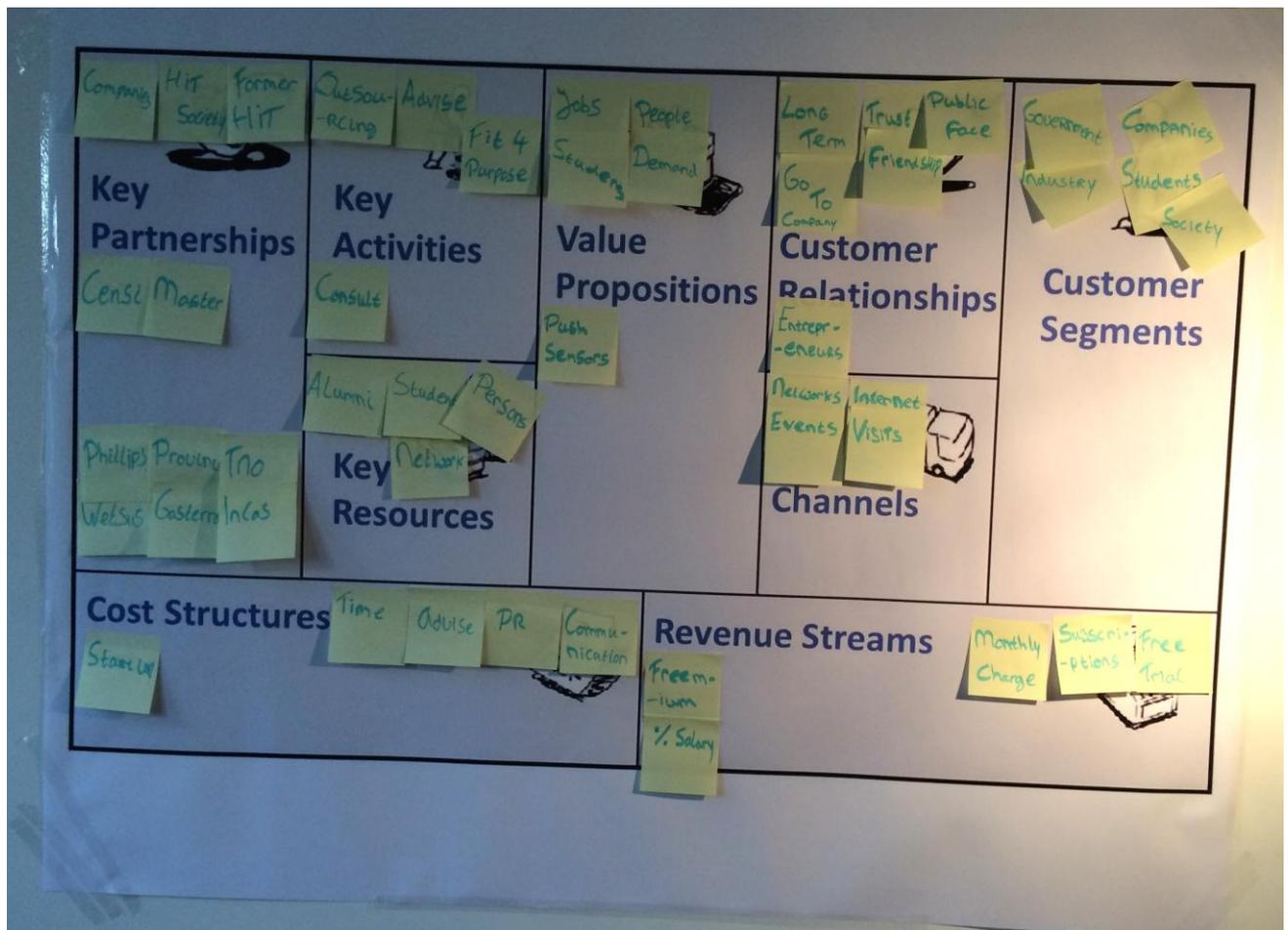
Figure 4 Brainstorm Business Segments

General | Resource Based | Idea Based | Market Based | Price Based | Large

Name of the Business Plan

SENSEwork

Take ScreenShot

KEY PARTNERSHIPS:

Companies
HIT Society
HIT
CENSI
MASTER
Phillips
Province
TNO
Wetsus
Gasterra
INeas

KEY ACTIVITIES

Outsourcing
Advising
Fit 4 purpose
Consult

KEY RESOURCES

Alumni
Students
Person
Netwok

value propositions

Jobs
People
Demand
Students
Push Sensors

CUSTOMER RELATIONSHIPS

Long term
Trust
Public face
Go to company
Friendship
Entrepreneurs

Chanels

Network events
Internet
Visits

Customer segments

Government
Industry
Companies
Students
Society

Cost Structures

Advise
Startup   PR
Time   Communication

Revenue Streams

Freemium
Monthly Charge   % Salary   Free Trial
Subscription

**Figure 5
Digital Version of Brainstorm Session**

4.1 - Customer Segments

SENSEwork aims to have customers segments in two distinct sections. Section one contains of students and alumni of the advanced sensor applications bachelor. Section two contains of companies that use or want to start using sensor technology. Both customer segments will be researched into more depth with the aid of a SWOT analysis (Pershing, 2006).

In the case that students are not willing to collaborate or participate, SENSEwork cannot move from the business case to a real company. At the other end there is a danger when the companies show no interested into SENSEwork. Since both of the scenarios could occur in the worst-case scenario a SWOT analysis is created.

4.1.1 - Students

The students of the advanced sensor applications bachelor are one of the two most important aspects in the business case for SENSEwork. Without students the company cannot exist.

Strengths	Weaknesses
Eager	Not ready for long term commitment
Open for Opportunities	Multiple interests
	Potential to continuing studying (master)
Opportunities	**Threats**
Wants to exceed	Not enough money to cover SENSEwork service
Multiple interests	More offers from companies like Brunell and Yacht
New technology	Potential to continuing studying (master)
Early exposure to companies	Not ready to work
Wants to extend resume and experience	Advanced Sensor Applications Bachelor discontinued

4.1.2 - Strategy

In order to overcome the threats and weaknesses a strategy has to be designed that covers cooperating with the threats and weaknesses.

4.1.2.1 Weaknesses

- Not ready for long term commitment
  - This will only be applicable if an offer is made to a student that is graduated or schedulded to graduate soon. When a company makes a specific offer to the student and he or she might not be ready for a year long commitment SENSEwork can mediate and try to convince the student of the possibilities.
- Multiple interests

- o The main purpose of the meetings that SENSEwork has with the students is to find out what the interest of the student is. Next to this an overview of the student is created that maps out all the preferences, past experiences and skills that he or she posses.
- Potential to continue studying
  - o This is a potential weakness that cannot be overcome by the intervention of SENSEwork. If a student has decided to continue to study with either another bachelor or a master program then SENSEwork will only support this decision.

4.1.2.2 Threats

- Not enough money to cover SENSEwork service
  - o This threat can be overcome by the usage of the freemium business model as researched in 4.5 - Revenue Streams. With the usage of the freemium service students are not required to spend a subscription fee to the service when they do not want to. The premium upgrade from the freemium service can be cancelled on monthly basis.
- More offers from companies like Brunell and Yacht
  - o Outsourcing companies will continue to approach students and alumni with potential job offers. From phone inquiries with: Brunel, Yacht and start 4 people it was found out that these companies do not have a separate sensor technology section. This puts SENSEwork in a specialist's role since SENSEwork does not only work with advanced sensor applications students but also knows the full curriculum.
- Potential to continue studying (master)
  - o This threat is the same as the weakness described at 4.1.2.1 Weaknesses.
- Not ready for work
  - o A student might inform SENSEwork that he or she is not ready to start working yet. SENSEwork will have a meeting with the student to look at the potentials and the future plans that a student has.
- Advanced Sensor Applications Bachelor Discontinued
  - o SENSEwork does not have any influence into this. However if the bachelor is discontinued new students will not become available anymore.

4.1.3 - Companies

The biggest link between the companies and the students is that they both want something. On the other hand they cannot exist without each other.

Strengths	Weaknesses
Available resources	Sensor technology
Know what is required	Prefers business with larger companies
Willing to pay for quality	
Opportunities	**Threats**
Unknown with sensor technology	Companies like Yacht and Brunel
In need of technical personal	

4.1.4 - Strategy

In order to overcome the threats and weaknesses a strategy has to be designed that covers cooperating with the threats and weaknesses.

4.1.4.1 Weaknesses

- Sensor Technology
    - Since sensor technology is a rather new technology companies might not know what to do with it exactly. During the start-up phase SENSEwork aims to inform and promote sensor technology.
- Prefers business with larger companies
    - A company might have a strong preference to do business with larger companies with established track records. SENSEwork can show that it works different and for a specific niche market. Also the amount of personal guidance in combination with a owner that knows the sensor technology domain create an unique combination.

4.1.4.2 Threats

- Companies like Yacht and Brunel
    - Outsourcing companies are a threat to SENSEwork due to the fact that these have an established name and track record. SENSEwork can use its unique selling points and show the customers the specific market in which it operates.

4.2 - Value Proposition

One of the most important aspects to question is what a student tries to achieve by using SENSEwork? When approached from the company perspective the question is what do companies want to achieve by using SENSEwork? When looking at the goals that both the students as the companies try to achieve another question that can be asked is what problems do the students and companies encounter when trying to reach their goal?

4.2.1 - Value proposition students

During the duration of the study of the advanced sensor applications bachelor a lot of emphasis is focused on the connection with the industry. Unfortunately the curriculum only allows one specific point of exposure to companies and this is the fourth year graduation research. In order to allow more exposure to companies and to assist the students to start off a career SENSEwork aims to offer short and long term projects with companies. (Gault, Leach, & Duey, 2010) Describe that the full time position offers are significantly increased when a student is exposed to multiple internship positions or short-term projects. When one takes this into account the added value of SENSEwork and the long term planning of a student make a perfect combination.

The specific benefits that SENSEwork offers to students are the following:

- Exposure to companies that are highly interested into the application of Sensor Technology
- The ability to be visible to companies that have projects that contain sensor technology
- Getting new projects offers as one of the first
- No need to search for project and job databases
- Be responsible for your own career

4.2.2 - Value proposition companies

The main value proposition that SENSEwork offers to companies is a pool of sensor technology students that are eager to work. Next to this core business SENSEwork offers a consultancy/advisory role in the recruitment of students for new projects.

From meetings with Sensor city and the municipality of Assen it was shown that there is a large demand for sensor skilled personal in the three northern provinces of the Netherlands (Drenthe, Groningen and Friesland). From research performed by consultant agency Yacht at the end of 2013 it was shown that the demand of bachelor and higher-level technical graduates rose with 23% in comparison to the research a year earlier. (Kooi, 2014) (Berden, 2013).

The specific benefits that SENSEwork offers to companies are the following:

- Fit for purpose solutions for projects
- Extended database with students that are eager and willing to work
- Up to date knowledge that students posses
- Personal guidance while searching for the right candidates
- SENSEwork does not force itself to companies, only works on supply and demand basis
- SENSEwork is specifically focused on sensor technology students
- Clear company structure with known prices and percentages

4.2.3 - Unique Selling Point

The unique selling point (USP) of SENSEwork is that SENSEwork only focuses on sensor technology outsourcing and consultancy. This transfers SENSEwork from a normal outsourcing agency to a niche-outsourcing agency. Apart from this the owner of the company also has a background in sensor technology and therefore is capable of advising both students and companies.

4.3 - Channels

The various channels that SENSEwork plans to use in the start-up period as well as in the first five years of existence will be described and explained in the following section.

SENSEwork aims to distribute the added values mainly digitally. This is done via Internet in the form of a website and regular email contact. The added value is the offering of the different projects and jobs to students. Next to this the students will be able to upload their resume and personal information.

The start-up phase of SENSEwork will proof that the distribution channels will be different from the planned distribution channels this is due to the fact that at the start-up phase of SENSEwork the main focus is placed on personal contact. The focus will be put on strong personal relationships with companies and institutions that are identified as potential partners.

The communication channels are divided into communication to students and companies.

4.3.1 - Student Channels

What	How	Frequency
Available projects update	By e-mail and website	Weekly update
Upcoming partnership news	By e-mail and website	Biweekly update
New long term projects	Presentation or e-mail	When new long term projects are offered
Invitation to apply for specific project/job	By phone	When required

4.3.2 - Company Channels

The company distribution channels differ from the once that are required for students. Apart from the distribution channels that are described bimonthly or monthly meetings might be required with company partners.

What	How	Frequency
Request for projects update	By e-mail	Biweekly
Status on open projects	By e-mail and Phone	Interval set by company
New student registration that fits company	By e-mail	When new long term projects are offered

4.4 - Customer Relationships

The customer relationships that SENSEwork plans to create and how to maintain these relationships is explained in the following part of the research.

Since SENSEwork works together with two main customer segments it is important to realise that service needs to be one of the main priorities of SENSEwork. Since SENSEwork offers a service to both segments the after sales requires a same level of service and expertise.

Service will eventually lead to a long term relationship with the customers, long term relationships will eventually lead to a trust bond (Sultan & Mooraj, 2001) between both SENSEwork, the companies and the students/alumni.

4.5 - Revenue Streams

Two scenarios for revenue are designed, this is required to research which form is most appropriate for SENSEwork.

4.5.1 - Monthly subscription

A monthly subscription is required from both companies and students that want to make use of the services that SENSEwork is offering. The monthly subscription is based on a set fee. This set fee will allow SENSEwork to gather the required resources to supply the business and to generate a profit over time.

A contract with SENSEwork contains of a one year contract in which all the services are included for the fixed monthly fee. Hence a difference exists between the prices for students and companies. The prices for the year contract are as follows:

Students: 5 euro per month

For this subscription fee of 5 euros a month the students will get the following:

- Full profile of the student
- Database with projects
- Track record on companies that are in partnership with SENSEwork
- 24/7 mediation and advise on projects

Companies: 20 euro per month

- Full search in student database
- Companies are allowed to offer project to students
- Both short and long term offering of projects are included into the fee
- 24/7 mediation and advise on projects and students

The monthly subscription of 5 euros was decided due to the income of students. In general a student does not have a lot of money to spend and therefore a subscription to SENSEwork cannot be to expensive.

4.5.2 - Freemium

The second scenario is a freemium cost structure (Pujol, 2010). With a freemium cost structure the basic services that SENSEwork offers are free of charge.

4.5.2.1 - Students Freemium options

Both students and companies can enrol into the freemium cost structure. After enrolment and the creation of an account the students are offered several options:
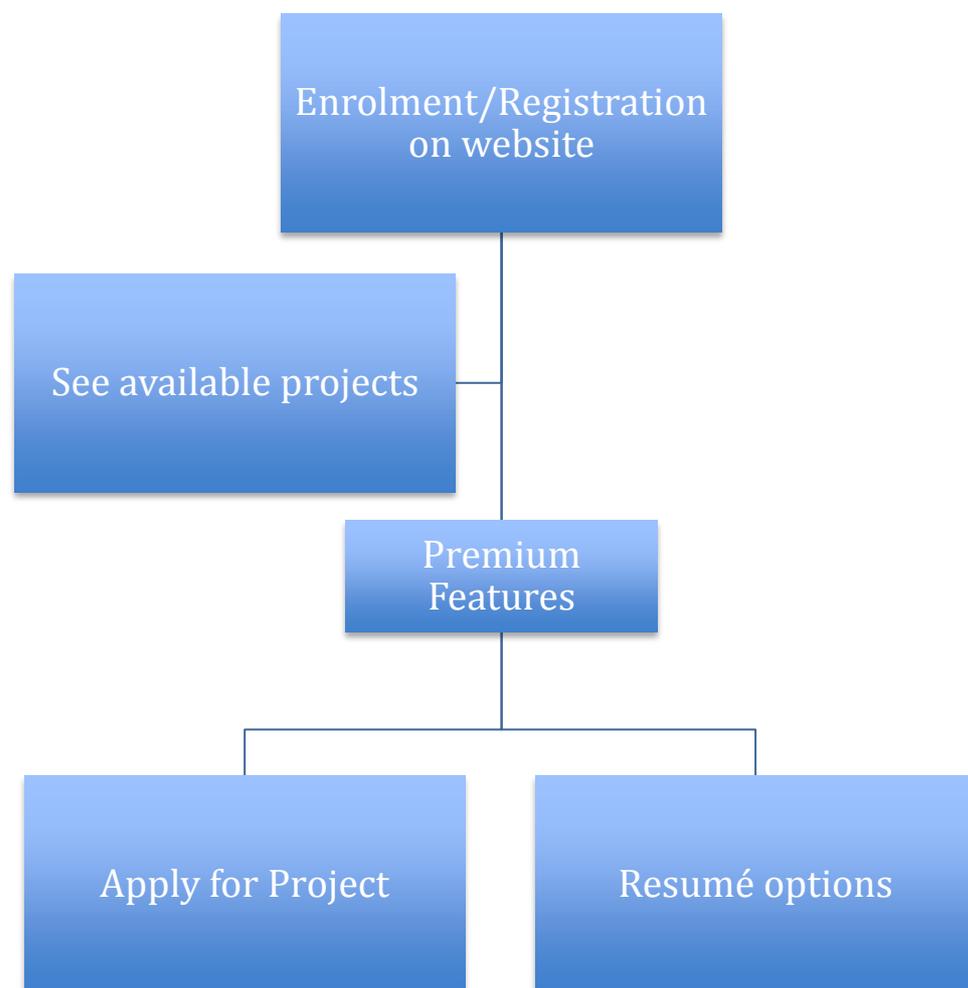
Figure 6 Freemium Structure Students

Enrolment

Students enrol into the website by creating a free account. This account holds the basic information of the students like: name, address and interests.

See Available Projects

The ability to see available projects enables the students to search thru the open job opportunities and projects. At this point the students will not be able to see the companies that associate to a particular project.

Premium Features Upgrade

After the students decide to update to the premium features the next level of the service will be opened. Upon payment for the premium features the students will be able to have a free week trial in which responding upon projects is not supported.

Apply for Projects

Upon upgrading to the premium level students are able to apply for projects. Within this online environment students can also check upon the status of their application.

Resumé Options

Another added value upon upgrading to the premium features is the ability to upload your own resume.

Upgrade Fees

To upgrade from the freemium stage to the premium stage a yearly subscription of 50 euros will be charged or a monthly subscription of 5 euros a month.

4.5.2.2 - Company Freemium Options
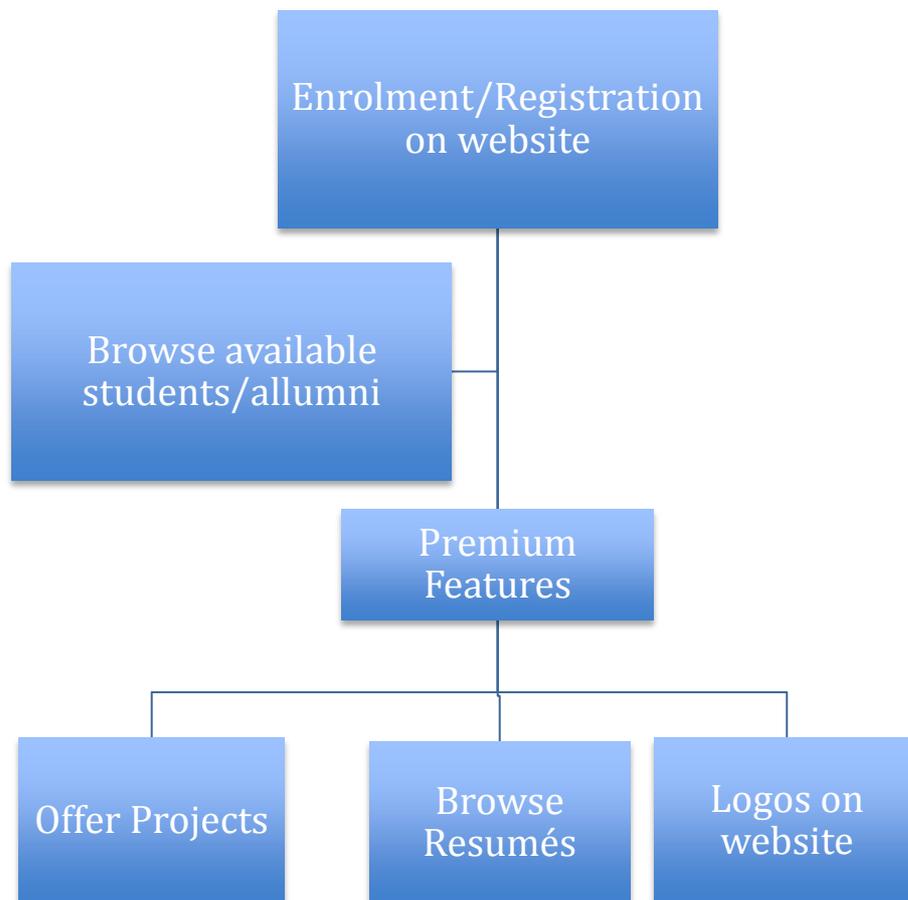
Figure 7 Freemium Structure Companies

Enrolment

Companies enrol into the website by creating a free account. The company account will not enable the company to expose any company information on the website. The only addition of a company account is the capability of browsing thru the pool of students/alumni.

Browse available Students/Alumni

The companies will be able to browse thru the available students and alumni that are enrolled into the SENSEwork website.

Premium Features Upgrade

The companies will be able to upgrade in order to access the premium features.

Offer Projects

Companies will be able to offer the projects on the website with a full description of the time line, work to be done and the deliverables. Next to this the company will be able to add a small description of the company with the basic information.

Browse Resumés

By browsing the resumes the companies are allowed to seek thru the students that might potentially join the company.

Logos on Website

The addition of adding a logo onto the webpage allows a company to gain more exposure towards the students.

Upgrade Fees

To upgrade from the freemium stage to the premium stage a yearly subscription of 200 euros will be charged or a monthly subscription of 20 euros a month.

4.6 - Key Resources

The main key resource that SENSEwork requires is financial means. The financial means will allow SENSEwork to make the initial investments to start-up the company. Another key resource that SENSEwork requires is a network, this can be established by joining networking events, hosting networking events and by establishing key partnerships as discussed in section 4.8 - Key Partnerships.

4.6.1 - Financial Resources

In order to attract financial resources various options are available. The business plan can be pitched at a bank. Another option is to raise a kick-starter campaign at which crowd funding can be gathered. Both options are considered but since there are personal finances available it was decided to not opt for an external money source. This decision was made due to the fact that the general economy is currently recovering from a financial crisis and thus it is harder to get financed as a company (European Central Bank, July 2014).

4.6.2 - Network

A resource that is as largely important when compared to financial resources is the network of SENSEwork. The network is of high importance due to the fact that companies and partners need to be introduced to the principle of SENSEwork. After working with sensor city and their commitment towards SENSEwork that a pilot could be started the network of SENSEwork already grew significantly. Not only the municipality and the province of Drenthe are interested in the progress of the pilot but also offered to share their network with SENSEwork.

4.7 - Key Activities

The core business of SENSEwork is outsourcing and advising professional companies in terms of Sensor technology educated personal. This in combination with a fit for purpose solution creates a unique concept. The key activity for SENSEwork is outsourcing and selecting personal. This is done on a supply and demand basis. This means that a demand of personal is raised after which the most suitable selection of students is supplied. After this the company can select the most suitable students and invite these for a job/project interview. In conjunction to average outsourcing companies it is anticipated that SENSEwork has two significant differences:

- SENSEwork does not try to conquer a wide market and thus focuses on a small niche group of students.
- SENSEwork works on a supply and demand basis. SENSEwork will not try to sell additional personal or resources to the companies.

4.8 - Key Partnerships

SENSEwork plans to create key partnerships with various companies and institutions. First and foremost the connection between SENSEwork and the students/alumni of the advanced sensor applications curriculum is very important. On a second hand it is also equally important to have a very good relationship with the industry.

4.8.1 - Sensor City

The first key relationship that is established is with Sensor City. Sensor city was selected as key partner due to the extended network that it has already established. Nevertheless Sensor city is a key player in the entire sensor market in the northern part of the Netherlands. Together with Mr. J. Reitsma and Mr. A Huijgen a plan is created to start with the first SENSEwork and Sensor City pilot as of September 2014. This pilot is created with close collaboration of the municipality of Assen.

Sensor City will be a key relationship since the added value of the sensor city network is significant. Not only can sensor city supply us with easy access to small to middle sized companies. But it also enables a partner that can point SENSEwork to the available subsidies and help that the province and municipality currently have to offer.

4.8.2 - Advanced Sensor Applications Bachelor

The advanced sensor applications bachelor showed support to SENSEwork. Therefore the relationship with the advanced sensor applications bachelor is currently being established. The pilot will be used to determine the specialized role that the advanced sensor applications bachelor can play in conjunction to project consultancy.

4.8.3 - Companies

Currently SENSEwork is making a selection of companies that might be suitable to join the pilot that is currently being scheduled for September 2014. Amongst these companies are: Xsens, Phillips and IBM.

4.9 - Cost Structure

Main costs during the starting period of SENSEwork can be separated into two segments. The service costs and the daily overhead costs. Of both costs types an overview is given.

4.9.1 - Costs

The operational costs will be the costs required to be able to perform the day to day required tasks. Parts of this are a fully functional website, being able to make and receive phone calls and have an office or area to work from. An overview of the costs is shown in

Table 2 SENSEwork Start-up Costs. The costs have been broken down and

	Per Month	Per Year	One Time Expenses	Total Expenses per Year
Website Domain		€ 10.00		€ 10.00
Website Hosting		€ 50.00		€ 50.00
Website Build startup costs			€ 799.00	€ 799.00
Website Build/Maintenance	€ 29.00	€ 348.00		€ 348.00
Chamber of Commerce		€ 65.00		€ 65.00
Flex Office Regus	€ 159.00	€ 1,908.00		€ 1,908.00
Phone bill Unlimited calls	€ 20.00	€ 240.00		€ 240.00
Transportation costs	€ 100.00	€ 1,200.00		€ 1,200.00
Computer, printers etc.			€ 4,500.00	€ 4,500.00
Insurance	€ 15.00	€ 180.00		€ 180.00
Accountant		€ 2,000.00		€ 2,000.00
Unforeseen expenses		€ 2,500.00		€ 2,500.00
Total				**€ 13,800.00**

described into detail.

Table 2 SENSEwork Start-up Costs

Website Domain

The costs of owning a specific website domain name. This is for one domain name: www.sensework.com and might be expanded to different versions over time as for example www.sensework.nl and www.sensework.eu.

Website Hosting

In order to showcase a website it needs to be hosted. The costs for hosting are per year and are from the same company that also supplies the domain.

Website Build Start-up costs

The website will be build and maintained by a professional company. This company does charges for the orientation and start-up phase of the website.

Website build & maintenance

Maintenance and tweaks to the website that are required periodically.

Chamber of commerce

Every company in the Netherlands needs to be registered at the chamber of commerce. In order to have this registration annual fixed cost needs to be paid.

Flex office Regus

It was decided to use a flex office instead of a fixed office. A flex office offers the luxury of an office without high monthly rental costs associated to it. Next to this SENSEwork might have several meetings around the country and the flex offices offer a place to work from a lot of cities in the country.

Phone bill unlimited calls

A contract for unlimited texting and calling will be used as a company phone. This will bring fixed costs for a phone bill.

Transportation Costs

Required transportation costs in order to travel from and to appointments.

Electrical needs

Equipment that is required to run the day-to-day operations like a computer and printer.

Insurance

Insurance is required for every company. In this case we specify the insurance as the liability insurance that will cover accidents that might occur during the day-to-day operations.

Accountant

Yearly costs of an accountant that is required to create the financial overviews at the end of the year.

Unforeseen costs

Costs that might occur during that have not been taken into account. Upon non-usage of these funds they will be saved. This will increase the equity of the company.

	Per Month	Per Year	One Time Expenses	Total Expenses per Year
Website Domain		€ 10.00		€ 10.00
Website Hosting		€ 50.00		€ 50.00
Website Build start-up costs			€ 799.00	€ 799.00
Website Build/Maintenance	€ 29.00	€ 348.00		€ 348.00
Chamber of Commerce		€ 65.00		€ 65.00
Flex Office Regus	€ 159.00	€ 1,908.00		€ 1,908.00
Phone bill Unlimited calls	€ 20.00	€ 240.00		€ 240.00
Transportation costs	€ 100.00	€ 1,200.00		€ 1,200.00
Insurance	€ 15.00	€ 180.00		€ 180.00
Accountant		€ 2,000.00		€ 2,000.00
Unforeseen expenses		€ 2,500.00		€ 2,500.00
Total				**€ 9,300.00**

Table 3 Yearly Cost Overview

The description of the costs shows the first investment that has to be made in order to gain the required resources to make SENSEwork fully operational. After one year the requirement of electrical needs can be taken out and the cost overview.

4.10 - Pattern

The business pattern that SENSEwork will use is the freemium business pattern.

The freemium business plan is selected due to two very important factors. The costs related to the premium upgrade are fixed and thus everyone knows what to expect. With the freemium to premium system implemented the threshold to join the basic SENSEwork service is kept low. Due to a free to join and benefit service users can already look into the potential game changers that SENSEwork will offer after a premium upgrade has been purchased.

Apart from knowing what to expect after joining the SENSEwork service another unique point is transparency. Transparency has become a very important item in nowadays business collaborations (Tapscott & Ticoll, 2003). All the customers know what is paid and what services to expect. This is different than when compared to other outsourcing agencies. In these service agreements a specific amount is taken from the salary of a participant. The hiring company also needs to pay a pre-determined amount to the service providing company. SENSEwork does not aim on such business model with as main motivation to be as transparent as possible.

Chapter – 5 Financial Plan

SENSEwork aims to become a profitable company, to research if SENSEwork can be financial viable a business case is made. The business case is modelled with the business model canvas application.
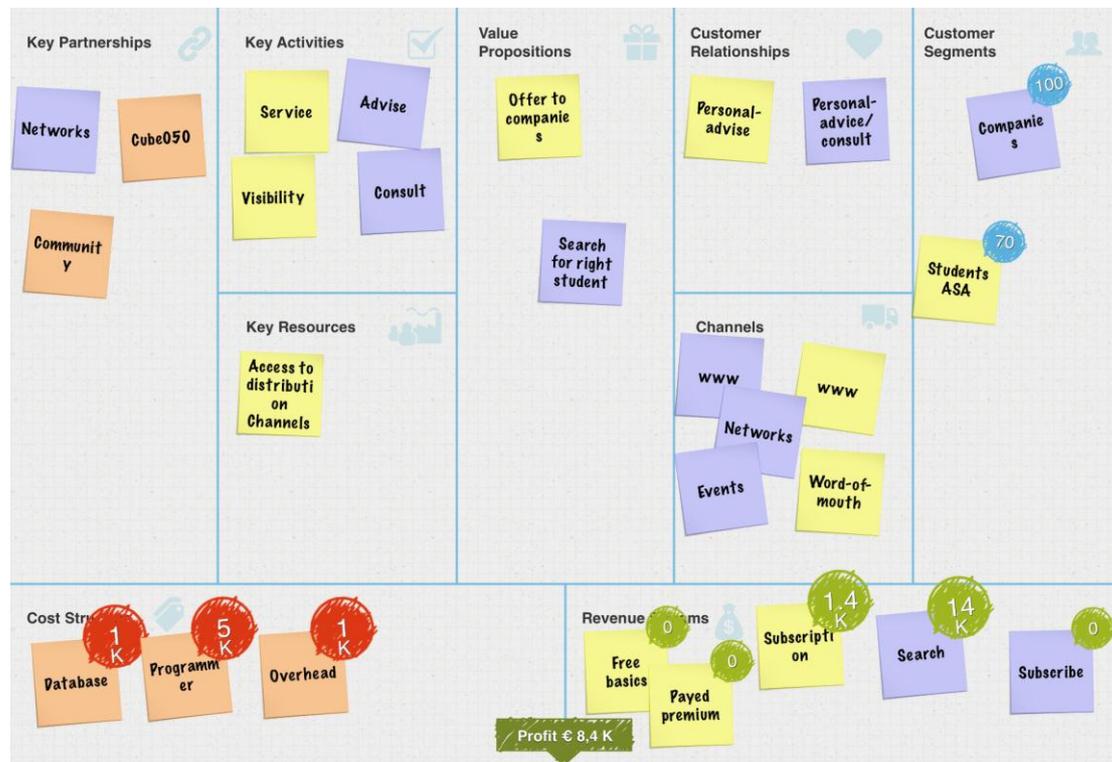
Figure 8 Overview of the Business Model and gross margin

In this business case assumptions are made. The first assumption that was made is that 90% of the advanced sensor applications bachelor wants to join SENSEwork. Since the advanced sensor applications bachelor consists of 109 students this holds 98 students. However since it might occur that students can only join for a specific time of a year due to financial problems the calculations are made with a maximum of 64 (65%) paying student members. The second assumption that is made is that after the startup phase approximately 100 companies will be interested into the service of SENSEwork. This increase from 0 to 100 companies is reached over a time span of 10 years. The business model canvas application allows for quick brainstorming on different scenarios, as a result of the various brainstorming session's two scenarios are created in which the overall financial performance of SENSEwork can be seen.

In order to create a scenario in which gross yearly incomes can be measured a hypothesis is designed that takes into account a 10 year time span. This thus results in hypothetical incomes and growth rates of the company.

Scenario 1 – 10 year growth subscription based service

For this scenario a 10-year period has been taken, in the 10-year period a substantial growth of SENSEwork can be seen. In the 9th year we see a small decrease of income of SENSEwork and this has to do with the possibility of an economical weaker year. The tables with the growth rate and calculations per year can be found in Appendix IV Yearly growth scenario Subscriptions.
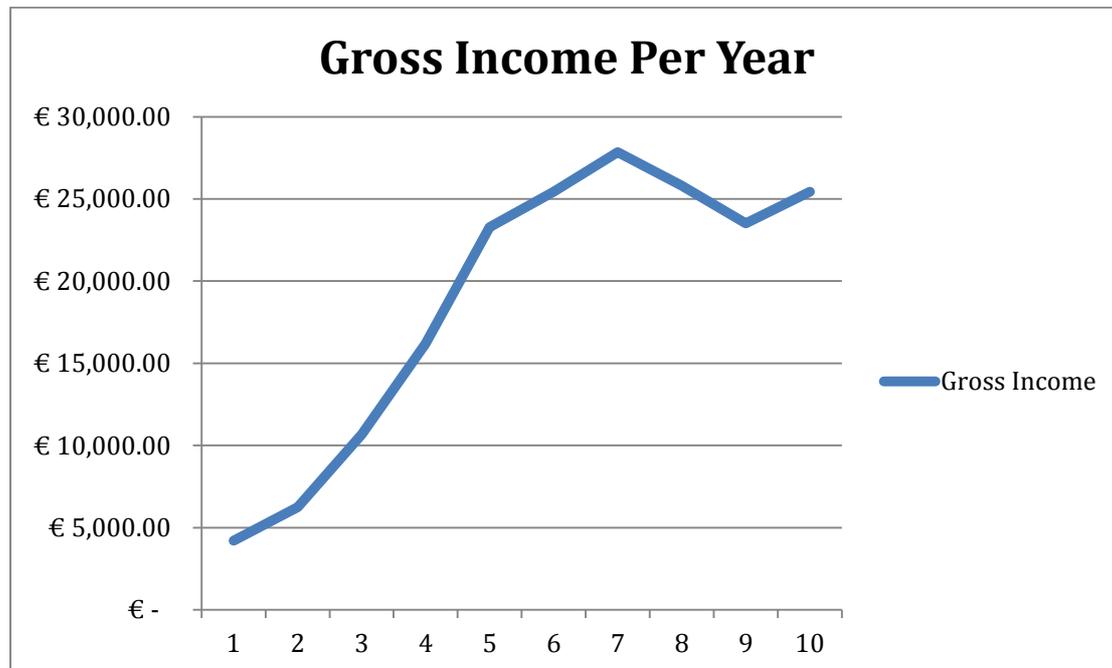
Table 4 Gross income SENSEwork per Year

When the costs of SENSEwork are taken into account as described in 4.9.1 - Costs it is possible to calculate the break-even point. The break-even point will show the point at which SENSEworks income will be greater than the expenses and thus becomes profitable. Table 5 Gross Income Vs. Expenses shows the expenses vs. the income of SENSEwork taken over the course of 10 years. From this table one can see that in year 3 of the existence of SENSEwork the income becomes greater than the expenses. And thus it can be determined that after 3 years of being operational SENSEwork becomes profitable. It has to be taken into account that this is only a hypothetical case and that results might vary. Year 1, 6 and 10 show increased cost. This is due to the purchase of new electronics and devices. A yearly € 2500 is saved due to unforeseen costs, if no unforeseen costs are required in the meantime this would create an extra buffer of € 2500 a year.

Gross Income Per Year
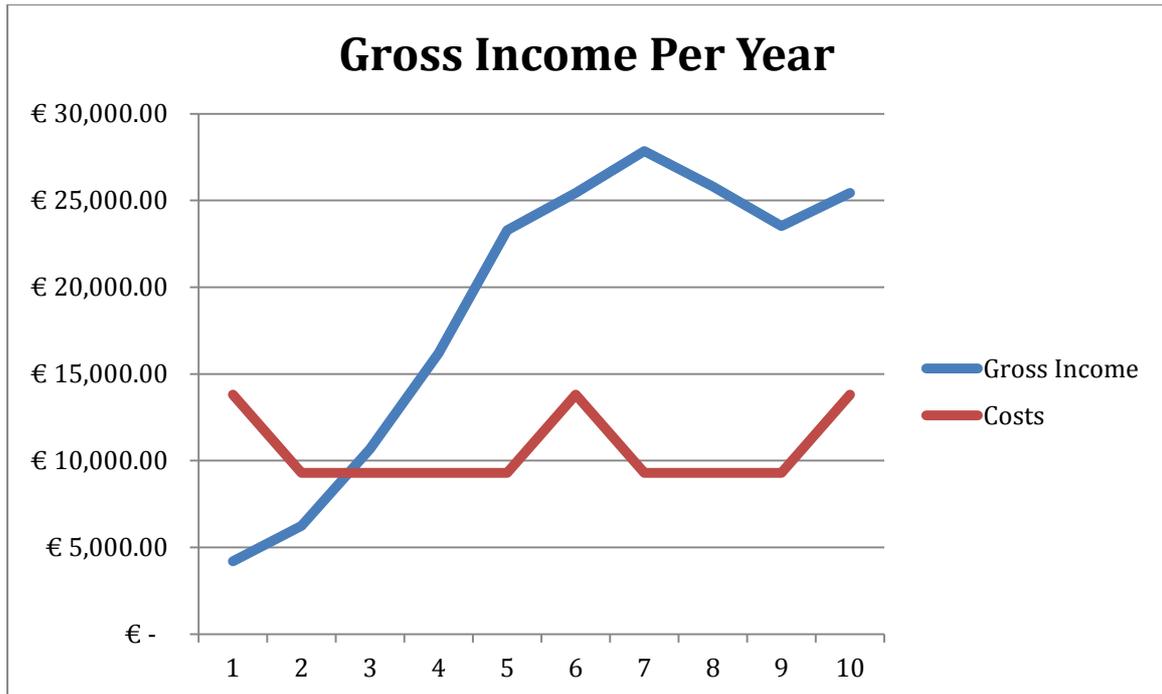
Table 5 Gross Income Vs. Expenses

Scenario 2 – 10 year growth Freemium based service

The 10 year plan that is designed for the Freemium version is similar to the plan for scenario 1, however since the freemium version offers a service without having to pay for it directly it is anticipated that the grow rate is slower than the grow rate of the subscription based service. In this 10 year scenario the grow rate is thus a bit slower and the same small financial disappointing year in the 9th year is calculated into the plan. The tables with the growth rate and calculations per year can be found in Appendix V Yearly Growth Freemium.
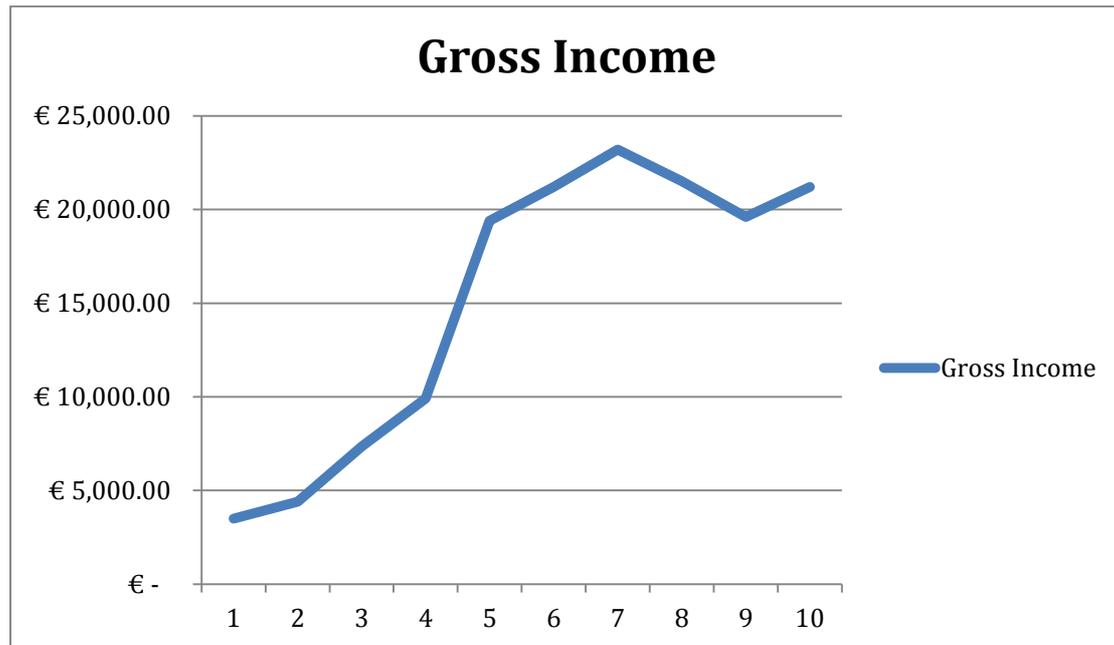
Table 6 Gross Income Freemium
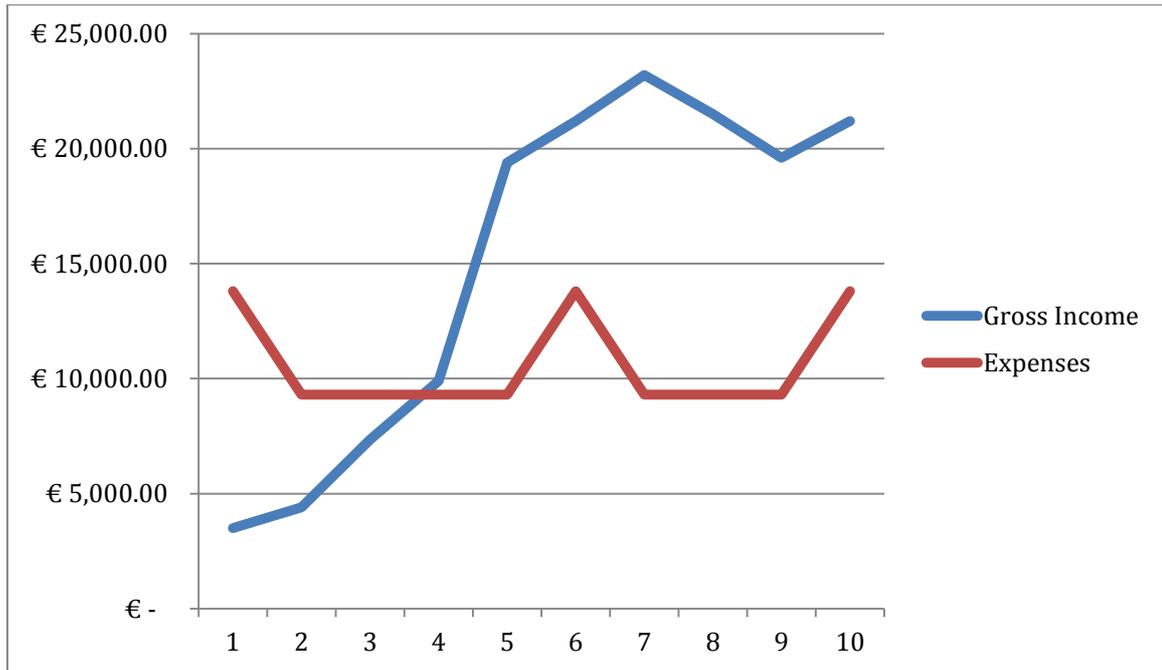
Table 7 Gross Income Freemium Vs. Expenses

Chapter 6 – Research Design

The goal of this research was to finalise a business plan that needed to act as a proof of concept. The research of this project contained nine building blocks based on theory described by (Osterwalder & Pigneur, 2010) Apart from the research on these nine building blocks a presentation was given at the end of the research period. The vallidation that was used to evaluate the results is based on research by Dr. Saras Sarasathi (Sarasvathy, What is effectuation?) and consisted out of a four block flow chart. The flow chart considered four key elements for an effectuation cycle. Figure 12 Effectuation Cycle shows the cycle and the key emelents of the cycle. Appendix VII Effectuation describes the basics of the four blocks used in the effectuation cycle and how these have been applicable in the research. The effectuation model describes a way of thinking that entrepreneurs can use in the process of new venture creation. Since SENSEwork is a new venture this model is highly applicable. This research design is the validation of the results that lead to the final conlusions and recommendation for the business case.
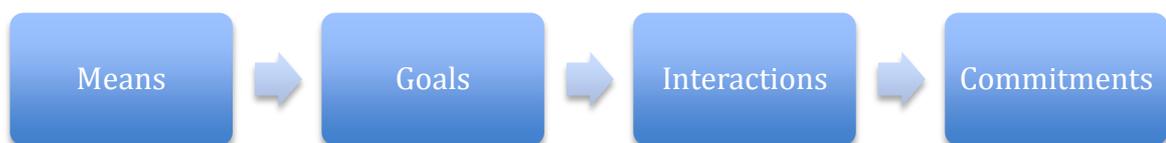
Figure 9 Effectuation Cycle

6.1 - Means

The full business plan with the research on the business model canvas and the financial plan are the means of SENSEwork. This in combination with the founder of SENSEwork that has specific knowledge on sensor technology creates a niche company that operates specifically in the sensor technology market.

6.2 - Goals

The goals of SENSEwork have been identified as following:

6.2.1 Create a business plan

This full research is the business plan of SENSEwork. A full description of the core values is given. All the elements of the business model canvas are present in the plan and it also contains a financial plan.

6.2.2 Approval and commitments from persons/institutions/companies in the market

By the interest that Sensor City and the municipality showed for the pilot shows commitment from companies and institutions. Both Sensor City as the municipality (I. Boers) has agreed to collaborate with the pilot project.
In addition SENSEwork is currently in discussion with potential partnerships and collaborations with Xsens, Animo coffee machines, Phillips and NAM.

6.2.3 Business plan needs to be market ready

This full report including the support from Sensor City and the municipality for a pilot shows that this business idea is properly transferred into a market ready plan. The pilot will show all the potential improvement points, the evaluation of the pilot will be a very important aspect of the to be taken route of SENSEwork. When comparing this business plan to a standard business plan format of the Rabobank it can be concluded that the research into SENSEwork has been much deeper into the subjects and ideology behind the brand name.

6.2.4 Create contingency plan for SENSEwork

The combination of the aspects described in this report is the contingency plan for the start-up phase of SENSEwork. After the start-up phase is finished the next step of SENSEwork will be taken. It is anticipated that the start-up phase of SENSEwork takes around a year to a year and a half. The financial plan that was made is also a significant part of the contingency plan due to the fact that it takes into account a 10-year time span and the potential break even points.

6.3 - Interaction

A wide variety of interactions have been invoked in the research of the SENSEwork business case. Interaction is the most important aspect in the start-up phase of SENSEwork and the amount of interaction that was present till the finalisation of this research has been of a high level. The interactions are hard to define in terms of validation however when reflecting on the project and looking into the amount of feedback received during the research, a significant amount of interactions. Interaction did not only exist with potential partners and companies but also with fellow entrepreneurs and likeminded. These sessions demonstrated to be one of the key elements to for this research. During various interaction sessions with fellow entrepreneurs *(*Appendix Meetings and Presentations*)* a significant amount of time was spend on reflection on the business idea, pattern and business model canvas. Not only did this cover the business model and ideas but also the personal views and standpoints. An eye opener was Dr. Sarasvathy her statement on being entrepreneurial: entrepreneurs have to strive for the doable, set clear achievable goals and work towards these goals. While working towards these goals the limit has to be pushed. Another important aspect to consider according to Dr. Sarasvathy is the type of relationship that one commences with a key partner. This key

partnership has to be selected carefully and thoughtfully, it has to be avoided to end up in a partnership that none of the parties want.

6.4 - Commitments

Commitments have been established in order to start with a pilot project. This pilot project will be done in collaboration with Sensor City Appendix XI Letter of Consent Sensor City and Ms. I. Boers (municipality of Assen)Appendix XII Letter of Consent I. Boers. Future commitments have to be established upon successfully completing the pilot period.

Chapter 7 - Results and Validation

The results of this research can be separated into separate sections, the research started with the generation of the business case idea. After the business case was brainstormed by the use of the business model canvas (Osterwalder & Pigneur, 2010) a theoretical research was done on the nine core segments of the business model canvas.

The second part of the research consisted of the validation of the business concept. This is done with the usage of the effectuation cycle (Sarasvathy, What is effectuation?).

The result section is separated in: the business generation and business model canvas and the validation of the business model concept.

7.1 – Results Business generation and business model canvas

The performed research started with one central research question:

"What does it take to start a specialized consultancy agency that focuses on long term working relationships between sensor technology students and professional companies from the industry, while being profitable for the founder?"

can be answered with:

A feasibility study in the form of a business idea. This generated business idea requires research followed by a validation of the concepts and commitments by the industry.

The answer to this research question been formed by the combination of the answers that were researched in the ten sub questions.

7.1.1 - Results Customer Segments
For whom are we creating value? And who are the most important costumers?

The research showed that SENSEwork aims to create value for two distinct customer segments:
- Students that are enrolled or recently graduated from the advanced sensor applications bachelor.
- Companies that are interested into the applications and usage of sensor technology.

These two costumers are the only and thus also most important costumers of SENSEwork.

7.1.2 - Results Value Propositions
What value do we deliver to the customers? Which one of our customer's problems are we helping to solve? Which customer needs are we satisfying?

The value propositions are divided into two groups: students and companies.

7.1.2.1 Value Propositions Students
- Exposure to companies that are highly interested into the application of Sensor Technology
- The ability to be visible to companies that have projects that contain sensor technology
- Getting new projects offers as one of the first
- No need to search for project and job databases
- Be responsible for your own career

SENSEwork aims to solve the student's problems of not having sufficient working experience after graduation. The need of more experience in combination with an extended resume will be satisfied.

7.1.2.2 Value Propositions Companies
- Fit for purpose solutions for projects
- Extended database with students that are eager and willing to work
- Up to date knowledge that students posses
- Personal guidance while searching for the right candidates
- SENSEwork does not force itself to companies, only works on supply and demand basis
- SENSEwork is specifically focused on sensor technology students
- Clear company structure with known prices and percentages

SENSEwork aims to solve the company's problems of not having the right technical personal in order to solve sensor technology related problems. Companies want advise and service that fits their problem statements and SENSEwork will offer this.

The USP that SENSEwork offers is that it only focuses on the sensor technology outsourcing and consultancy.

7.1.3 - Results Distribution Channels
Through which Channels do our customer segments want to be reached? How are we reaching them now? How are our Channels integrated? Which ones work best? Which ones are most cost-efficient? How are we integrating them with customer routines?

The distribution channels of SENSEwork are a combination of digital and personal contact. In the start-up phase of SENSEwork the focus is on personal contact after which a transfer will be made to digital contact with biweekly personal meetings.

7.1.4 - Results Customer Relationships

What type of relationship does each of our customer segments expect us to establish and maintain with them? Which ones have we established? How costly are they? How are they integrated with the rest of our business model?

A service-based relationship will be established with both customer segments. The distribution channels will be used in order to maintain the customer relationships in full extend.
Both the companies as the students are our clients and SENSEwork needs to offer a fully providing service to both.

7.1.5 - Results Revenue Streams

For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?

Two business scenarios have been researched in order to attract revenue. One scenario is based on a subscription service whilst the other is based on a freemium-based service. The freemium-based service also works in conjunction with the freemium business pattern. The freemium revenue stream is selected as the most suitable revenue stream in the case of SENSEwork. Whilst this type of revenue construction does create revenue at a slower paste it is used due to the low threshold.
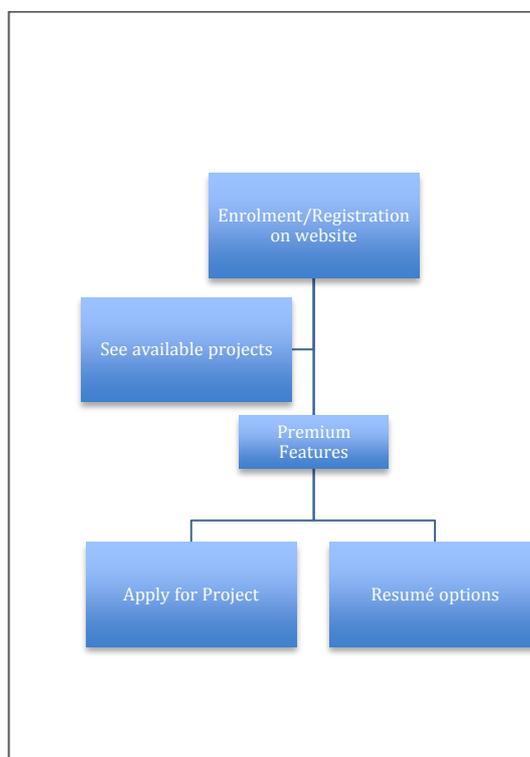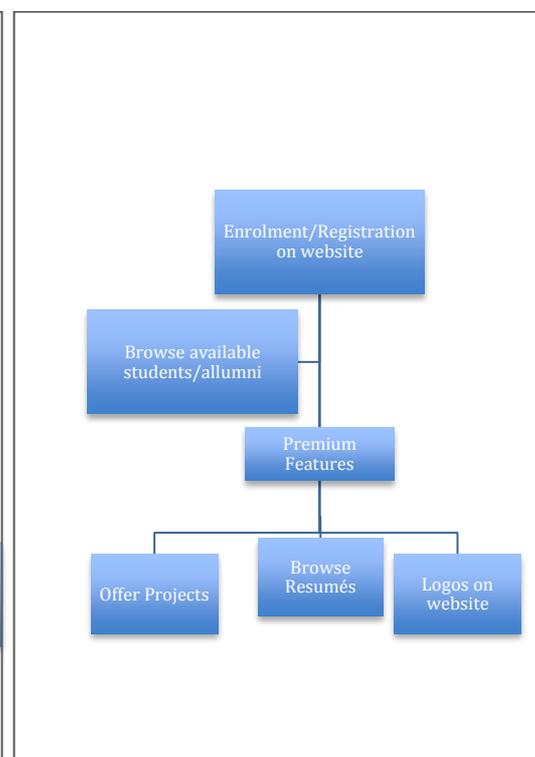

Figure 10 Student Freemium Options   **Figure 11 Companies Freemium Options**

7.1.6 - Results Key Resources

What key resources do our value propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams?

Two key resources have been identified during the research: Financial resources and Network resources. Both resources are equality important and without one of the two SENSEwork will have significant problems to be functional or even to have a future. Due to the slowly stabilizing economical market it was decided to use personal funds to fund the start-up of SENSEwork. SENSEwork has also shown great potential in building a network, the planned pilot will be a significant addition to the already established network.

7.1.7 - Results Key Activities

What key activities do our value propositions require? Our distribution channels? Customer Relationships? Revenue Streams?

The key activity of SENSEwork is: outsourcing and advising sensor technology students to companies that required sensor technology educated personal.

With two unique items in the key activities:

- SENSEwork does not try to conquer a wide market and thus focuses on a small niche group of students.
- SENSEwork works on a supply and demand basis. SENSEwork will not try to sell additional personal or resources to the companies.

7.1.8 - Results Key Partnerships

Who are our key partners? Who are our key suppliers? Which key resources are we acquiring from partners? Which key activities do partners perform?

One key partnership has officially been established. This is a partnership with Sensor City. Ms. I Boers from the municipality has also agreed upon a partnership for the pilot of SENSEwork. Apart from the already established partnership SENSEwork is currently in negotiation with the advanced sensor applications bachelor to see what role both parties could take in this project. The outcome of the pilot will proof to be valuable for potential future key partnerships.

7.1.9 - Results Cost Structure

What are the most important costs inherent in our business model? Which key resources are most expensive? Which key activities are most expensive?

The start-up costs of SENSEwork are aimed to be € 13,800,- these costs are for the first year of SENSEwork, after the first year the yearly expenses are planned to be € 9,300,-.

7.1.10 - Results Pattern
What Business pattern will be used for SENSEwork?

The freemium business pattern is considered the best fit for SENSEwork. Albeit revenue streams will be generated at a slower paste the threshold of joining this service is much lower than a subscription based service. Another added value of the freemium pattern is the transparency that it offers.

7.1.11 - Pilot
During the research of SENSEwork feedback was received on the usage of a potential pilot to evaluate the practical aspects of SENSEwork. This idea was transferred into concrete appointments with two key partners, Sensor City and I. Boers of the municipality of Assen.

7.1.12 - Summary Theoretical Research
SENSEwork focus of business is consultancy, project guidance and outsourcing within the sensor technology domain. The key activity of SENSEwork is defined as: the outsourcing, project guidance and consultancy to companies that are looking into the recruitment of a sensor technology educated engineer or to the application of sensor technology. On the other side of the costumer segment it is the guidance and consultancy of young professionals that are currently studying at the advanced sensor applications bachelor or have recently finished this study.

Two costumer segments have been defined: companies that want to apply sensor technology and students/alumni of the advanced sensor applications bachelor. SENSEwork delivers specific value propositions to both costumer segments. The unique selling point of SENSEwork is that it only focuses on the outsourcing and consultancy of sensor technology.

Two distribution channels have been defined in this research to communicate to the customer segments, SENSEwork communicates with the customer segments by digital and personal means. A service-based relationship will be established with the customer segments.

The revenue streams that will be used for the SENSEwork business model is a freemium business model that requires a premium upgrade in order to use the service. The basic service is free of charge after which the upgrade is required to fully use the service. This will lower the threshold of joining the service. The key resources to attract these revenue streams are identified as financial and network resources. The financial resources are required in order to be able to run the day-to-day operations. The network resources are required to establish a name into the market.

Two key partnerships have been established for a trial pilot of the SENSEwork service. This pilot will allow a full evaluation of the service strong and weak points. The results of this pilot will determine the final adjustments to the business of SENSEwork.

7.2 – Validation

This section will outline how and why the concept and research of SENSEwork is validated.

7.2.1 - Business Model Validation

The business model and the generated business idea of SENSEwork have been validated by the research performed. The extensive 10 sub question research that was performed is sufficient to validate the designed business model canvas.

7.2.2 - Business Concept Validation

The Effectuation cycle was used to validate the business concept. The usage of the effectuation model as a validation for the business concept has been positively received during feedback sessions. Due to the high focus on interactions and commitments the effectuation model is based on real entrepreneurial values like going out and getting things done. By supporting interactions a lot of knowledge is gained from other entrepreneurs but also extra insight into certain situations is added.

The interactions can be used in the advantage of SENSEwork and this has also been demonstrated throughout the research.

The goals described in 6.2 - Goals have been met, with the accomplishment of these goals it is also safe to state that the SENSEwork business concept research has been validated.

7.2.3 - Financial plan Validation

Both scenarios (subscription and freemium) show great potential in the growth of SENSEwork. The subscription based service requires a shorter period before the break-even point is reached.

The freemium scenario offers a lower threshold to both customer segments. In addition to the lower threshold the freemium pattern is more transparent then the subscription based service.

The freemium based service will be used in the future of SENSEwork, a longer break-even point period can be compensated for by the amount of interest that is already shown into SENSEwork.

7.2.4 - Summary Validation

The research on the business concept has shown that the business model canvas as brainstormed and revised can be used for SENSEwork. By the interactions that SENSEwork invoked it was shown that the idea of SENSEwork is an idea that the market is looking for. This is determined by the amount of interest that SENSEwork was able to create while being in the research phase.

Chapter 8 – Conclusion and recommendations

This research has shown that the business case of SENSEwork is both operational and financial feasible. This has been supported by an extensive theoretical and practical research that has been carried out over the duration of the research. This research eventually led to commitments to start with a pilot. The pilot will be the transfer from the theoretical and practical research into a real life situation. It was specifically designed as a separate item from the research to have a clear overview and vision on the research and practical part of SENSEwork. By not implementing the pilot into the research the identity of SENSEwork could be established in combination with the most suitable relationship to start the pilot with. The separation of the research and the pilot resulted in more time to build a solid business case in which the answers to the sub and main research questions could be researched.

For the future of SENSEwork it is recommended to schedule a second pilot of the service after the first pilot. This in order to implement the feedback received during the first pilot period.

SENSEwork is suitable as a company, the ten year prediction calculations have shown that the company can also become a profitable company for the founder. Assumptions have been made in these calculations, these assumptions have been based on the theoretical research. Since the model is based on the theoretical research and since some assumptions are present in the calculation models it is recommended to keep close attention to the upcomming revenue streams.

SENSEwork has shown great potential during the performed research. Sensor City being amongst the first key partner to collaborate allows SENSEwork to tie in to the extended network of Sensor city. From the collaboration with Sensor city the following recommendation was formed:

Extend collaboration with the municipality of Assen and province of Drenthe, this to extend the size of the already established network. Next to this both the municipality and the province have a fund reserve for sensor technology related projects, SENSEwork might qualify to these funds in order to make the start-up phase of SENSEwork easier.

Apart from this it is believed that the following recommendations should be taking into account:

Evaluate the freemium cost structure and premium upgrade prices upon completion of the pilot. This evaluation will allow considering the possibilities to increase the revenue from the premium subscriptions.

It is also highly recommended to work together with an outsourcing professional for the pilot project. This research has added a lot of knowledge and knowhow to SENSEwork as a company however the outsourcing business is still relatively

new to SENSEwork. In order to prepare fully and to conquer potential hazards it is advised to joint venture with a professional.

It is believed that transparency of companies will only become more vital in the near future (Tapscott & Ticoll, 2003). Therefore it is recommended that SENSEwork continues to use the freemium business model. Within this business model no hidden costs are related to a certain service. Full clarity on the company structure and its operations are a must for SENSEwork.

The final recommendation is to venture into more interactions, albeit this research has already ventured into interactions the added value from interactions has become clear during this research. It was anticipated that the interactions would improve the business concept of SENSEwork, this research has clearly showed that the added value is significant.

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Appendix I

Advanced Sensor Applications Students

Academic year	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Number influx	14	14	28	28	34	35
Total number of graduates	-	-	-	7	9	-
Number of drop-outs	5	2	14	13	18	9 (April 14)

Table 8 Number of Advanced Sensor Applications Students

Appendix II

Five Business Models

An overview of the five business models described in section 3.0 based on theory by (Osterwalder & Pigneur, 2010).

Unbundling Business Model

Builds on the theory that a business consists of three business fundaments: Customer Relationship Business, Product Innovation Business and Infrastructure Business. The three fundaments combined create the unbundling business model.

Summarized from (Osterwalder & Pigneur, 2010)

Long Tail Model

A long tail business model is primarily focused on offering niche products that sale infrequently. Main advantage for this business model is that it requires low inventory costs and strong platforms to make the niche products available to potential buyers. The long tail model is based on selling small volumes of products being sold over a large numbers of products available.

Summarized from (Osterwalder & Pigneur, 2010)

Multi Sided Business Model

The multi sided business model build upon the fundament of bringing two or more different customers together. This concept can only create a value for the other customer groups when all the costumer groups are present. Multi sided business models build upon the theory of a growing network. The larger the network grows the larger the amount of people it attracts.

Summarized from (Osterwalder & Pigneur, 2010)

Freemium Model

A freemium model contains of several layers that when combined create an ultimate service. The most basic layer in this service is free of charge, to gain more privileges or to be allowed into special sections of the service the user needs to pay. This transition can be seen as a transition from freemium to premium.

Summarized from (Osterwalder & Pigneur, 2010)

Open Business Model

Open business models are first described my Henry Chesbrough and refers to opening the research and developing part of a company to external companies. Theory behind this is that in a world in which gathering and distributing knowledge becomes easier for everyone organizations can create higher values and better exploitation when combining knowledge. Larger industrial companies primarily use this specific business model since research and development is very costly.

Summarized from (Osterwalder & Pigneur, 2010)

Appendix III
Questions of the survey:

1. In which year of the advanced sensor applications bachelor are you currently studying?
    a. 1
    b. 2
    c. 3
    d. 4
    e. I am not an advanced sensor applications student
2. Are you planning to continue studying after graduating at the advanced sensor applications bachelor?
    a. Yes
    b. No
    c. Maybe
3. Are you currently being approached by professional companies with short term projects, trainee positions or graduation projects?
    a. Yes
    b. No
4. Would you like to have the opportunity to be more visible to companies like for example Philips, Shell, ASML, TNO and Siemens?
    a. Yes
    b. No
5. What are the most important factors in a future job?
    a. Salary
    b. Colleagues
    c. Working Hours
    d. Education
    e. Location
    f. Travel
    g. Other

Total respondents on survey: 22

Question 1, amount of participants: 22

1. In which year of the advanced sensor applications bachelor are you currently studying?
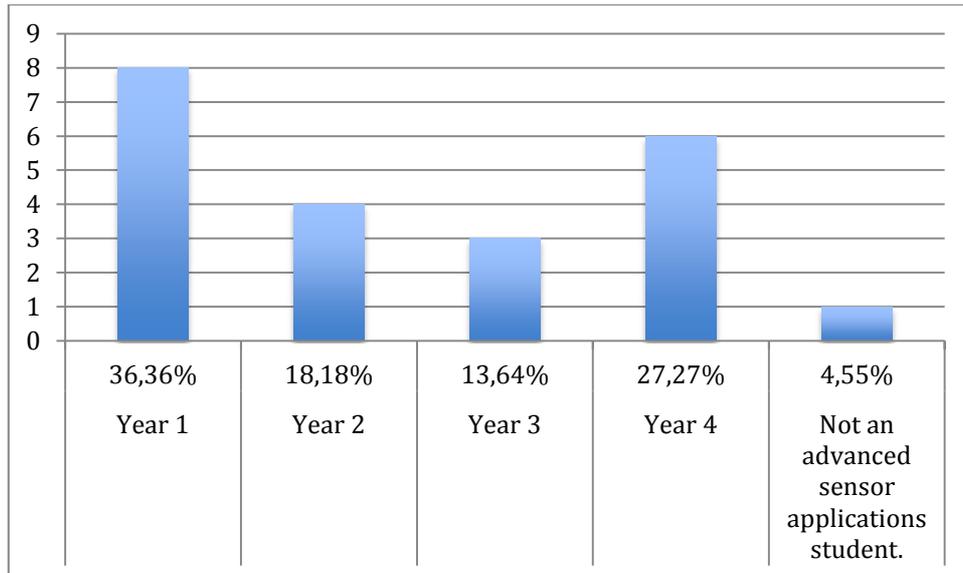
Answer	Percentage	Response
Year 1	36,36%	8
Year 2	18,18%	4
Year 3	13,64%	3
Year 4	27,27%	6
Not an advanced sensor applications student.	4,55%	1
Total	100%	22

Question 2, amount of participants: 22

2. Are you planning to continue studying after graduating at the advanced sensor applications bachelor?
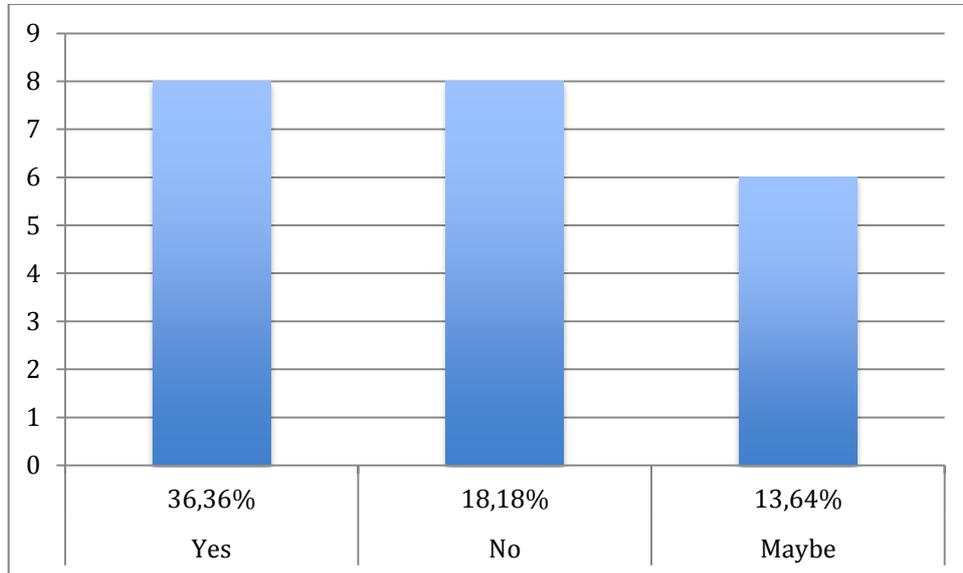
Answer	Percentage	Response
Yes	36,36%	8
No	18,18%	8
Maybe	13,64%	6
Total	100%	22

Question 3, amount of participants: 21

3. Are you currently being approached by professional companies with short term projects, trainee positions or graduation projects?
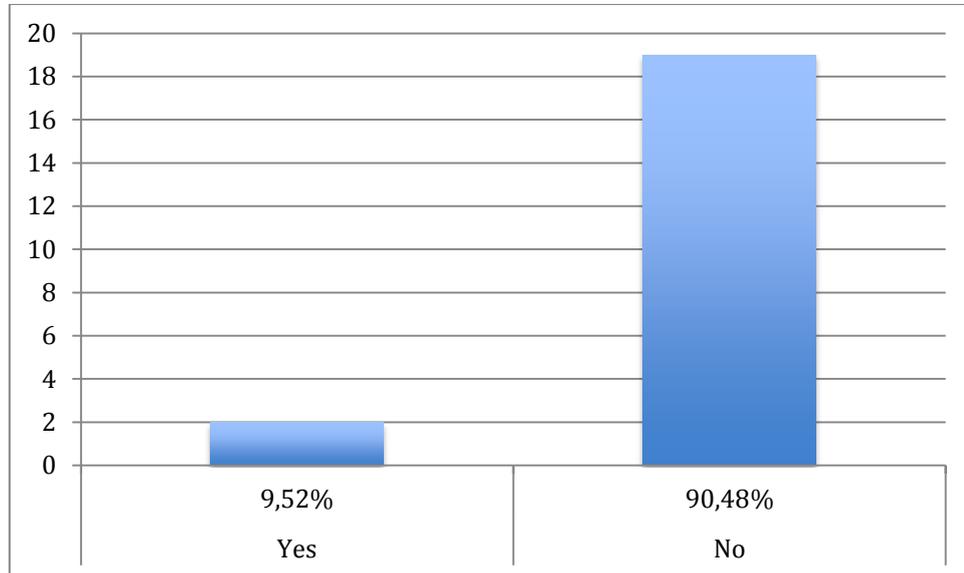
Answer	Percentage	Response
Yes	9,52%	2
No	90,48%	19
Total	100%	21

Question 4, amount of participants: 22

4. Would you like to have the opportunity to be more visible to companies like for example Philips, Shell, ASML, TNO and Siemens?
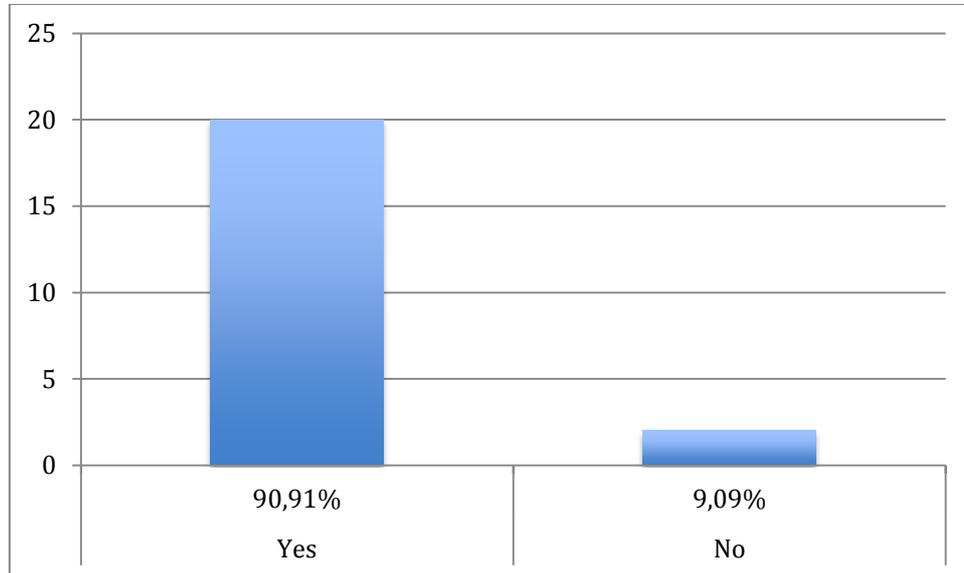
Answer	Percentage	Response
Yes	90,91%	20
No	9,09%	2
Total	100%	22

Question 5, amount of participants: 21

5. What are the most important factors in a future job?
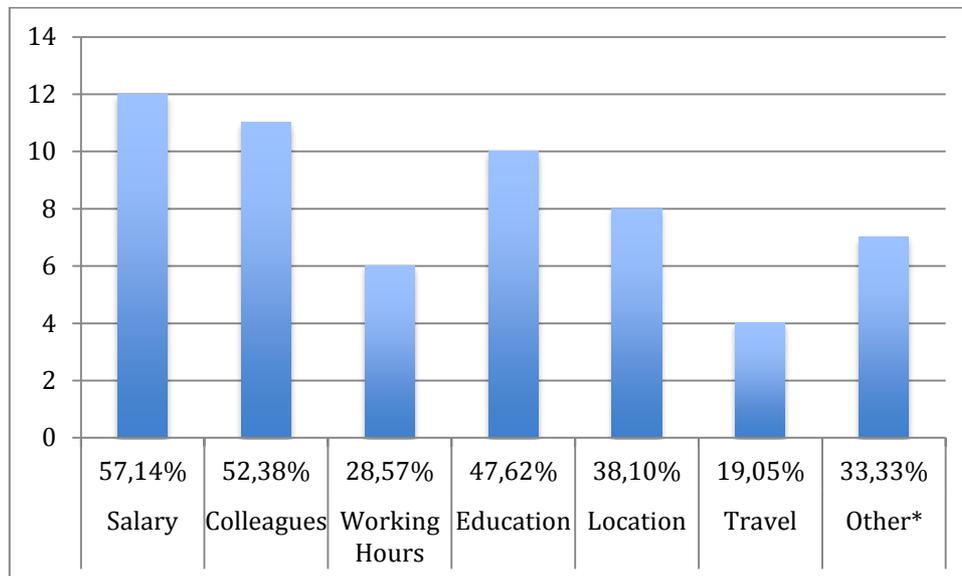
Answer	Percentage	Response
Salary	57,14%	12
Colleagues	52,38%	11
Working Hours	28,57%	6
Education	47,62%	10
Location	38,10%	8
Travel	19,05%	4
Other*	33,33%	7
Total	276,19%	58

Appendix IV

Yearly growth scenario Subscriptions

Year 1

10 students, 15 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 600.00
Company Subscriptions	€ 20.00	€ 240.00	€ 3,600.00
Total			€ 4,200.00

Year 2

24 students, 20 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 1,440.00
Company Subscriptions	€ 20.00	€ 240.00	€ 4,800.00
Total			€ 6,240.00

Year 3

38 students, 35 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 2,280.00
Company Subscriptions	€ 20.00	€ 240.00	€ 8,400.00
Total			€ 10,680.00

Year 4

50 students, 55 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 3,000.00
Company Subscriptions	€ 20.00	€ 240.00	€ 13,200.00
Total			€ 16,200.00

Year 5

64 students, 81 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 3,840.00
Company Subscriptions	€ 20.00	€ 240.00	€ 19,440.00
Total			€ 23,280.00

Year 6

64 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 3,840.00
Company Subscriptions	€ 20.00	€ 240.00	€ 21,600.00
Total			€ 25,440.00

Year 7

64 students, 100 companies	Income	Per Year	Total income per Year

Student Subscriptions	€ 5.00	€ 60.00	€ 3,840.00
Company Subscriptions	€ 20.00	€ 240.00	€ 24,000.00
Total			€ 27,840.00

Year 8

70 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 4,200.00
Company Subscriptions	€ 20.00	€ 240.00	€ 21,600.00
Total			€ 25,800.00

Year 9

64 students, 82 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 3,840.00
Company Subscriptions	€ 20.00	€ 240.00	€ 19,680.00
Total			€ 23,520.00

Year 10

64 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions	€ 5.00	€ 60.00	€ 3,840.00
Company Subscriptions	€ 20.00	€ 240.00	€ 21,600.00
Total			€ 25,440.00

Appendix V

Yearly Growth Freemium

Year 1

10 students, 15 companies	Income	Per Year	Total income per Year
Student Premium Upgrade		€ 50.00	€ 500.00
Company Premium Upgrade		€ 200.00	€ 3,000.00
Total			€ 3,500.00

Year 2

20 students, 17 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 1,000.00
Company Subscriptions		€ 200.00	€ 3,400.00
Total			€ 4,400.00

Year 3

27 students, 30 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 1,350.00
Company Subscriptions		€ 200.00	€ 6,000.00
Total			€ 7,350.00

Year 4

38 students, 40 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 1,900.00
Company Subscriptions		€ 200.00	€ 8,000.00
Total			€ 9,900.00

Year 5

64 students, 81 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 3,200.00
Company Subscriptions		€ 200.00	€ 16,200.00
Total			€ 19,400.00

Year 6

64 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 3,200.00
Company Subscriptions		€ 200.00	€ 18,000.00
Total			€ 21,200.00

Year 7

64 students, 100 companies	Income	Per Year	Total income per Year

Appendix V

Student Subscriptions		€ 50.00	€ 3,200.00
Company Subscriptions		€ 200.00	€ 20,000.00
Total			€ 23,200.00

Year 8

70 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 3,500.00
Company Subscriptions		€ 200.00	€ 18,000.00
Total			€ 21,500.00

Year 9

64 students, 82 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 3,200.00
Company Subscriptions		€ 200.00	€ 16,400.00
Total			€ 19,600.00

Year 10

64 students, 90 companies	Income	Per Year	Total income per Year
Student Subscriptions		€ 50.00	€ 3,200.00
Company Subscriptions		€ 200.00	€ 18,000.00
Total			€ 21,200.00

Appendix VI

Pilot Proposal SENSEwork and Sensor City

SENSEwork

Rene Nijland

Introduction

This document describes the pilot proposal create by R. Nijland the owner and founder of SENSEwork. After a very constructive meeting with Mr. A. Huijgens and Mr. J. Reitsma it was agreed that a proposal needed to be created in order to plan for a pilot consisting the ideas of SENSEwork, the input of Sensor City and the feedback from the municipality.

SENSEwork wants to outsource sensor technology students that are currently enrolled into the advanced sensor applications bachelor provided by the Hanzehogeschool Groningen. The idea of SENSEwork was founded due to the fact that the student society of the advanced sensor applications bachelor (HIT Society) was often approached by companies. The companies requested students for short term and long-term projects.

In order to research if the advanced sensor applications students are interested in a service like SENSEwork is planning to offer a survey was held amongst the students. From this survey it was proven that 93% of the advanced sensor applications students are interested in such a service.

With the addition of the network and expertise of Sensor city a pilot will be created in order to test the proof of concept of SENSEwork.

Pilot

For the pilot SENSEwork proposes to search for a suitable company that is currently searching for students in order to fill a short term project. After a company is selected with a suitable project is found an orientation meeting will be held in which the details of the project will be discussed. From the details an overview of the skills and expertise that a student needs to contain and or poses is created.

After this meeting students are selected that are most suitable for the short term project. After the selection is created a second meeting with the company will be scheduled in which all the proposed students will be discussed. From this meeting a short list will be created in which the most promising students are selected.

The third and final meeting will be between the company and the potential students. Contracts and appointments are made between the students and the company without any interference of SENSEwork.

At the end of the short term project an evaluation will be held with SENSEwork and the outsourcing company to receive feedback on the full process.

After this meeting another meeting is held with the student that was working for the company to discuss the final feedback.

Timeline

Date	Action
1st week of September 2014	Discuss with interested companies and evaluate projects.
2nd week of September 2014	Evaluate potential students and pitch projects.
3rd week of September 2014	Students are able to apply for position/suitable students will be selected for pilot.
4th week of September 2014	Students and Companies meet, discuss project, agree on scope, deadlines etc.
Project end	SENSEwork and Sensor city and company discuss and evaluate project.
Project end	SENSEwork discusses and evaluates the project with the student.
End evaluation	SENSEwork and company have a final meeting in which the students opinion will be reflected and in which future working relations can be established.
Final evaluation of pilot	SENSEwork, Sensor city, Municipality and company have a final pilot evaluation.
Report	SENSEwork will write a report on the pilot with conclusions and recommendations.

Appendix VII

Effectuation

| Means | Goals | Interactions | Commitments |
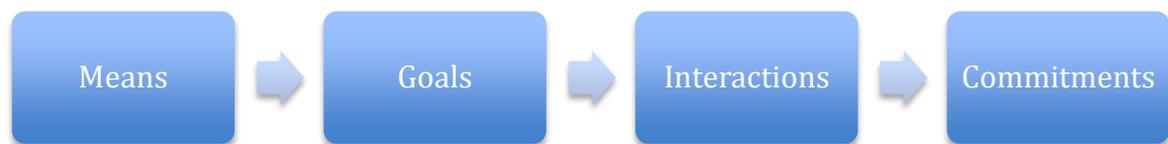
Figure 12 Effectuation Cycle

Means

An overview of the various factors required to start SENSEwork. In addition an overview will be given of what SENSEwork has to offer and what other potential partners might offer to SENSEwork. In order to research this a strategy and communication plan will be designed. With the aid of these plans approaching and collaborating with external partners needs to become easier.

Goals

In this section an overview of the goals of SENSEwork will be described. SENSEwork has various goals but the core goals of the business are as follows:

- Create a profitable company in the sensor technology market.
- Create a bridge between sensor technology graduates and the market.
- Create relationships with the industry based on trust and reliability.

If a closer looked on this research and the thesis is required the main goals of this project are as follows:

- Create a business plan.
- The business plan needs approval and commitments from persons/institutions/companies in the market.
- Business plan needs to be market ready.
- Create contingency plan for SENSEwork.

Interaction

The communication and strategy plan as described in section 5.1 means will be tested and evaluated. The interactions will follow up on the business plan and research performed in the form of interviews and sparring sessions. These

interactions have to proof if the business is viable on an interaction level and if external companies believe in the approach that SENSEwork is taking.

Commitments

Commitments can be a result from these interactions. Third party potential partners or collaborators will give commitments to SENSEwork in the form of job/project offering or even a full collaboration within the company.

Appendix VIII

Meetings and Presentations

1. Brainstorm Session SENSEwork Amsterdam 21st of February
2. Open office ACE Venture labs 6th of March
3. Open Office Ace Venture Labs 20th of March
4. Brainstorm Session and business model canvas presentation Ace Venture labs 20th of March
5. Evaluation and finalisation of business model canvas SENSEwork 21st of March
6. Venture Café meeting 10th of April
7. Venture Café meeting 6th of June
8. Email contact Ms. S. Sarasvathy 1st of May, 23rd of May, 11th of July, 10th of August
9. Email and phone contact Mr. H. Hindriks 6th of April, 7th of April, 10th of April, 11th of April, 3rd of May, 22th of May, 2nd of June, 12th of June, 20th of June, 7th of July, 26th of July.
10. Phone inquiry with Yacht 8th of May
11. Phone inquiry with Brunel 25th of April
12. Phone inquiry with start 4 people 25th of April
13. Discussion with Mr. F. Heukers from the province of Drenthe on the 6th of July
14. Phone meeting Xsens to discuss potential partnership 7th of April
15. Phone meeting Animo coffee machines to discuss potential partnership 28th of April
16. Financial advice Reijn & Partners by Joris Valk on the 23rd of May
17. Various Sensor city meetings by phone and in person
18. Email contact I. Boers 12th of August, 20th of August.

Appendix IX

Sensor Universe Companies

- Astron
- TNO
- ASML
- RijksUniversiteit Groningen
- Hanzehogeschool Groningen
- Wetsus
- Energy Valley
- INCAS³
- Spring Board
- Light Spark
- IBM
- Politie
- WNL
- Metsens
- Water Campus
- ILS
- Sensor City
- Roelofs
- Resato
- Friesland campina
- Stork
- The Maxwell group
- NAM
- Pezy
- Marketing Drenthe
- NOM
- SNN
- Phillips
- Sawa
- KZMA
- Kiwa
- Hak
- GreenIT
- Xsens
- Honeywell
- Dacom
- Grontmij
- Game Academy
- Seaport Groningen
- Variass
- Photonis
- DHV

Appendix X

Image Sources

Figure 1 Stakeholders Overview: Created by R. Nijland

Figure 2 Unbundling Business Model Overview: Created by R. Nijland based on idea of (Osterwalder & Pigneur, 2010)

Figure 3 Long Tail Example: http://www.thelongtail.com/conceptual.jpg

Figure 4 Brainstorm Business SegmentsFigure 5 Digital Version of Brainstorm Session: Created by R. Nijland

Figure 5 Digital Version of Brainstorm Session: Created by R. Nijland

Figure 6 Freemium Structure StudentsFigure 7 Freemium Structure Companies: Created by R. Nijland

Figure 8 Overview of the Business Model and gross margin: Created by R. Nijland with the use of the business model canvas application

Figure 9 Effectuation Cycle: Created by R. Nijland based on the idea of (Sarasvathy, What is effectuation?)

Figure 10 Student Freemium Options   Figure 11 Companies Freemium Options: Created by R. Nijland

Figure 12 Effectuation Cycle: Created by R. Nijland based on the idea of (Sarasvathy, What is effectuation?)

Appendix XI

Letter of Consent Sensor City

SENSEwork
Theseusstraat 15-2
1076XK, Amsterdam
The Netherlands

17th of August 2014

Letter of consent pilot.

To Whom It May Concern.

Dear Sir or Madam,

We, the undersigned have agreed to collaborate on a potential pilot that will be held between Sensor City and SENSEwork. This pilot is to evaluate the idea of SENSEwork and to evaluate the added value of the companies involved.

Yours faitfully,

R. Nijland
SENSEwork

J. Reitsma
Sensor City

Appendix XII

Letter of Consent I. Boers

SENSEwork
Theseusstraat 15-2
1076XK, Amsterdam
The Netherlands

17th of August 2014

Letter of consent pilot.

To Whom It May Concern.

Dear Sir or Madam,

We, the undersigned have agreed to collaborate on a potential pilot that will be held between Sensor City and SENSEwork. This pilot is to evaluate the idea of SENSEwork and to evaluate the added value of the companies involved.

Yours faitfully,

R. Nijland
SENSEwork

I. Boers