

Ambient Assisted Living Joint Programme

Project full title:

**Development of a non-invasive CAPactive sensor
oral MOUSE interface for the disabled elderly
(CAPMOUSE, AAL-2008-1-203)**

Deliverable report:

D6.5 Technology Marketing Plan

AAL project number:

Project starting date: 15/06/2009

Project duration: 30 months

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Contributors: BD, HMC, LOTS

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2. General

2.1. Task description

T6.4 Drafting a technology Marketing Plan (TMP) for commercialization of the CAP MOUSE project results

TMP will define further strategies for the commercialization of the CAP MOUSE project results. Interviews will be conducted or questionnaires filled in by potential users/user groups to provide the most adequate entry of the CAP MOUSE project end product to the market. The TMP composition will be lead by HMC with input from BD and PRO.

Participants: BD 1pm, HMC 2pm, Lots 0pm, PRO 1pm

At this stage (moment of writing this document) none of the project partners is strong enough to take on the industrialisation project. The search for an industrial partner is still going on.

In this document we sketch a working procedure/plan to get this product industrialised and bring it to the market.

2.2. Set-up

The document contains 2 parts.

- In a first part we present a plan/procedure, including a list of further steps necessary, to bring this product to the market in a professional way.
It can also help to select the partner (to check the professional level). A professional partner will already have implemented most of these steps in his plan or at least will understand the procedure.

Of course much will depend on the potential future partner for manufacturing and commercialising this product. In case the partner is an experienced industrial partner, the partner will probably have a similar procedure in place.

- In a second part we present the updated business plan, this plan is a lead for the further actions and steps that need to be taken to market this product and as a reference to search for interested customers/partners.

3. Technology and Industrialisation Plan

Before we manufacture and bring a product to the market we need to prepare a lot of data and pass a lot of steps.

The main objective is to make sure the product is producible at the right price, is safe to use, fulfils all requirements and is serviceable in an easy and efficient way. When the industrialisation is not well prepared the product will not be available in time and the right volume at launch or the quality/service will be inadequate.

3.1. Overview Release Gates

3.1.1. The process includes 4 major gates.

A gate can only be passed when all task before that gate are done, accepted and approved. If one or more tasks is not fulfilled the process will come to a halt and can even be a reason to stop the process completely.

| Gate | Name | Description |
|------|----------------------|--|
| 1 | Production Documents | Prepare all documents necessary to produce/market the product. |
| 2 | Order Samples | Select the manufacturer and |
| 3 | Design Transfer | |
| 4 | Product Order | |

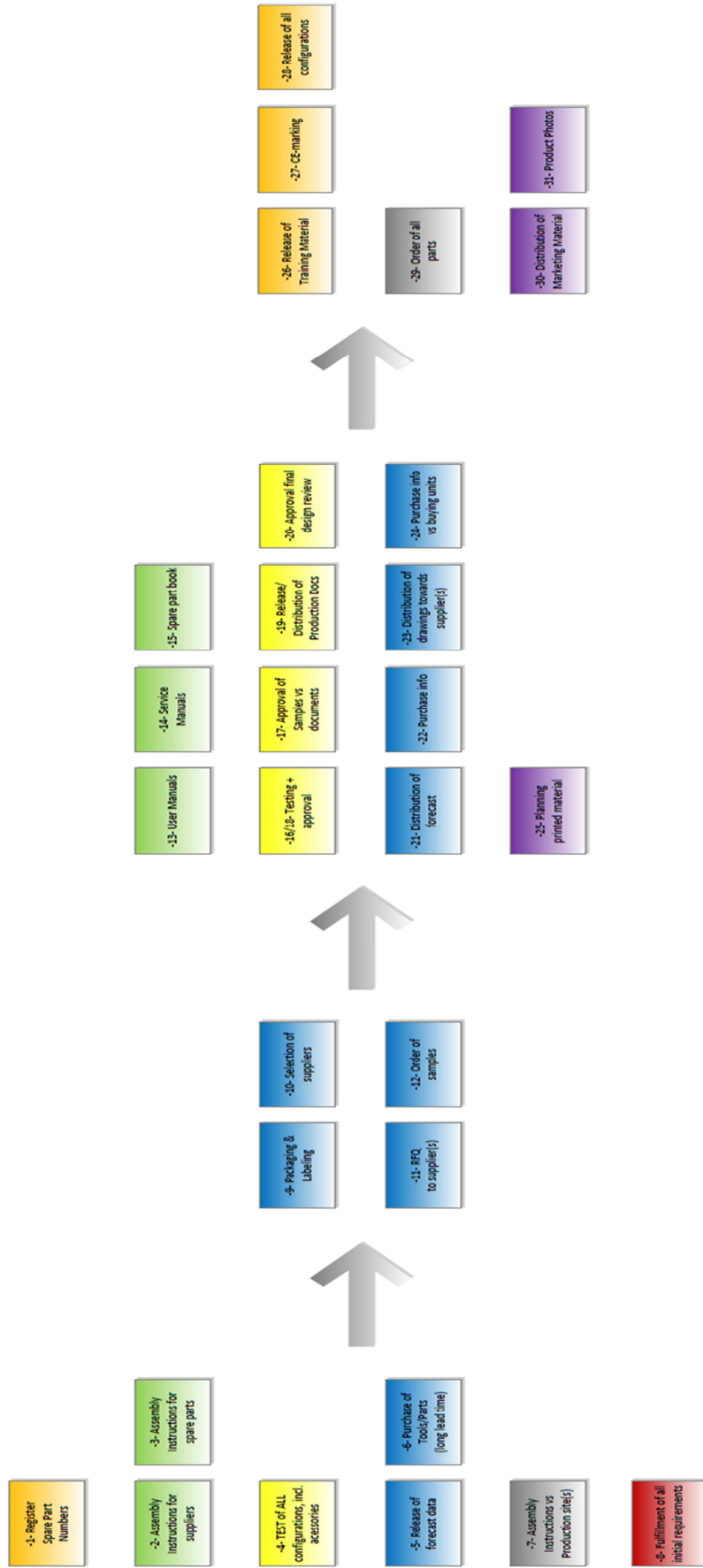
3.1.2. The process includes 7 major roles.

To fulfil all the tasks a team with different specialities is needed. The following list indicates the roles.

| Role | Name | Description |
|------|-------------------------|---|
| 1 | Product Management | Mainly the responsibility of the product owner. The product owner is the key person in making sure the product is brought to the market in a professional way and that it complies with the wishes of the market. Even when the industrialisation process is finalised this role will keep on existing. |
| 2 | Technical Documentation | Technical documentation writers, 3 different expertise's will apply here, mechanical, electronics and software. |
| 3 | Product Development | Mainly the R&D department. |
| 4 | Supply Management | Mainly operational activities. |
| 5 | Production | The production facility. |
| 6 | Marketing | The link to the market. |
| 7 | Project Management | Mainly the project leader, the project leader keeps an overview over the whole process and |

3.1.3. The process - overview.

See the diagram underneath for a graphical representation of the process.



Technology Marketing Plan CapMouse

3.2. Release Gate 1 – Production Documents

3.2.1. Product Management

- -1- Spare part numbers registered

3.2.2. Technical Documentation

- -2- Assembly Instructions for suppliers
- -3- Assembly Instructions for spare parts

3.2.3. Product Development

- -4- All configurations, including accessories tested ?

3.2.4. Supply Management

- -5- Release of forecast data
- -6- Tools/Parts that require long lead time to be purchased

3.2.5. Production

- -7- Assembly instructions for production sites

3.2.6. Marketing

- Not Applicable

3.2.7. Project Management

- -8- All initial requirements fulfilled ?

3.3. Release Gate 2 – Order Samples

3.3.1. Product Management

- Not Applicable

3.3.2. Technical Documentation

- Not Applicable

3.3.3. Product Development

- Not Applicable

3.3.4. Supply Management

- -9- Packaging and labelling
- -10- Selection of suppliers
- -11- Request for Quotations (RFQs) to be sent out to suppliers
- -12- Order of samples, in sync with drawings, specs, techn ref.

3.3.5. Production

- Not Applicable

3.3.6. Marketing

- Not Applicable

3.3.7. Project Management

- Not Applicable

3.4. Release Gate 3 – Design Transfer

3.4.1. Product Management

- Not Applicable

3.4.2. Technical Documentation

- -13- User Manuals, in different languages
- -14- Service Manuals, in different languages
- -15- Spare part book, in which language(s) ?

3.4.3. Product Development

- -16- Tests to be performed
- -17- Samples in sync with production documents to be approved
- -18- All foreseen tests to be approved
- -19- All production documents to be released and distributed
- -20- Approval of final design review

3.4.4. Supply Management

- -21- Forecast to be distributed
- -22- Purchase information should be established on all purchase levels
- -23- All drawings to be distributed to selected supplier(s)
- -24- Purchase information to be distributed to buying units

3.4.5. Production

- Not Applicable

3.4.6. Marketing

- -25- Printed material to be planned and booked

3.4.7. Project Management

- Not Applicable

3.5. Release Gate 4 – Product Order

3.5.1. Product Management

- -26- Training Material should be ready
- -27- All applicable articles should be CE-marked
- -28- Finalization of all configurations

3.5.2. Technical Documentation

- Not Applicable

3.5.3. Product Development

- Not Applicable

3.5.4. Supply Management

- Not Applicable

3.5.5. Production

- -29- All parts to be ordered

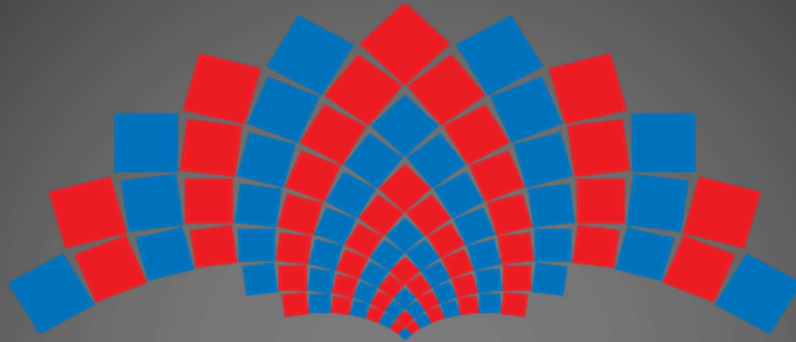
3.5.6. Marketing

- -30- Marketing material made and distributed
- -31- Product photos

3.5.7. Project Management

- Not Applicable

4. *Business Plan*



BRUSELL
COMMUNICATIONS AS

EXECUTIVE SUMMARY

Today there is a vast variety of devices bridging the gap between humans and computers but most of them are built to be controlled by the user's hands. This fact implies that people with certain physical impairments are excluded from everyday social and professional life. It also limits the use of existing computational power in professions where both hands are occupied with other duties.

**Our product, the "CapMouse", solves this problem:
Truly hands-free human computer interaction**

Attached to a state of the art headset, an array of our patented, non-invasive capacitive sensors is placed close to the corner of the mouth. Detecting the tongues movement against the inside of the cheek and lips, it offers the user the opportunity to easily interact hands-free with computers, smartphones and other digital devices, still comprising all features given by a computer mouse. The combination of performance and user friendliness is unique for all hands-free technologies on the market today. Interaction devices independent of hand control either lack most of the functionality given by CapMouse or restrict the freedom of its user severely in one or more ways.

Brusell Communications (BC) is an SME focusing on the development of high end human computer interfaces. Founded by Doctor Tomas Brusell, BC started developing its patented capacitive sensor technology with private financing in 2008. With a total budget of € 1,2M in additional external funds BC has since 2009 successfully coordinated an external consortium within an EU program aiming at realizing a fully functional CapMouse prototype.

- Discussions are ongoing with the Intervention Center at Oslo University Hospital and a major player on the market for communication equipment in the defense & rescue sector.
- Preliminary testing of the CapMouse is about to be enrolled in surgical environment.
- Distribution agreements are currently discussed with one of Europe's biggest producers of dental computer software and one of the leading producers of high end wheel chairs.
- Market entry is planned for in Q3 in 2013

Together with its partners BC has assessed the collective market size for CapMouse within the handicapped-, medical & dental- and defense & rescue sector to more than 105'000 units over the next 4 years. Currently we are analyzing the computer- and smart phone peripheral markets. With millions of gamers and estimated sales of 1 billion smart phones in the next year these markets hold a huge potential for CapMouse.

On markets denoting high entry barriers BC will be licensing the patented sensor technology to well established market players (the sensor can currently be produced at a cost below € 5). Complete headsets and application specific software will be provided on the dental-, computer-, and smart phone peripheral markets. Total production costs for Bluetooth headsets are estimated to be below € 50. Depending on the price sensitivity in each market BC is aiming at different product versions with retail prices between € 100-300.

With CapMouse, BC is laying the foundation for a successful high technology business.

www.brusell-communications.com

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1. BUSINESS IDEA

Based on its patented (CapMouse) and patent pending technologies, Brusell Communication (BC) will provide truly hands-free oral control interfaces for computers and all other ICT ([Information and communication technologies](#)).

We intend to give those people, which today are excluded from everyday social and professional life due to their handicap, access to computers and with it enhance their quality of life. CapMouse will also set new standards for the use of existing computational power in those professions where both hands are occupied with other duties.

1.1. BUSINESS IDEA BACKGROUND

During many years as an active dental surgeon, Dr. Tomas Brusell successively recognized the need for hands-free access to computers and telephones, without having to interrupt his patient related activities. Hygienic barriers were and still are a big obstacle when switching between odontological work tasks and computer related duties due to the nature of common computer interaction devices. Digital X-ray pictures and patient track data are today only accessible to dentists if they take off and put on new gloves every time they use a computer or when it is controlled by an assistant. The operator needs a “third hand”.

With the goal to develop an oral human computer interface (HCI) with the same functionality features as a common computer mouse, Dr. Brusell engaged in the research project “skattefunn”, financed by the Norwegian Research Council and Innovation Norway, in 2006. During the project, which originally aimed at the development of an ultrasonic technology, the capacitive technology, which is now used, emerged as a better and easier realizable solution for the interface. In the subsequent “IT-Funk” project (2007-2008), financed by the Norwegian Research Council, the first prototype of CapMouse was built and the sensor technology was patented. Between June 2009 and June 2012 BC further developed the technology when coordinating an external consortium in the AAL JP CapMouse project, financed by the AAL Joint Projects’ 23 EU- and 3 non EU- states. During the project, the CapMouse technology reached the final in DNB Norway, Innovation Price 2010 and the AAL Forum Award 2011. Presently the 3rd generation prototype, enabling full mouse functionality on both computers and smartphones, is about to be finished.

CapMouse makes use of the most precise neurological system in the human body; the oral cavity and the tongue. Together with lips they are vital to human’s capability of verbal communication and large portions of our motoric and sensory brain are connected to them. The oral muscles can change shape with accurate precision and rapidly perform very complex movements. Also these muscles have a very high endurance and can be controlled even in very severe cases of paralysis.

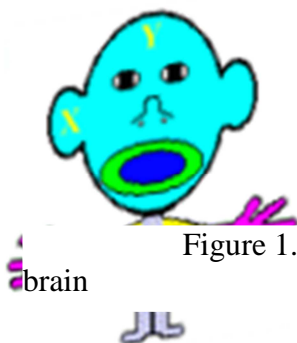


Figure 1. In the 'homunculus' the body is proportional to the amount of cortical tissue in the

CapMouse relies on patented capacitive sensor technology which allows for non-invasive detection of the tongues movement against the inside of the cheek as well as the movement of the lips. In a few easy-to-learn-steps, tongue and lips can replace all other means of controlling a computer.

Demonstration of the CapMouse prototype during Q1 and Q2 2012 has shown that there is a great interest for the technology on the Dental-, Med Tech-, Wheelchair & Handicap Aid and Defense & Rescue markets. Further markets, such as the smartphone peripheral market, are

under evaluation and preliminary analysis data indicates a high market potential in several of them.

1.2. PRODUCT AND INNOVATION

BC has developed an HCI which offers a hands-free alternative to common computer mice. Currently there are no present solutions offering full mouse functionality in an oral control device.

The combination of performance and user friendliness offered by CapMouse is unique for all hands-free technologies on the market today. Interaction devices independent of hand control either lack most of its functionality or they restrict the freedom of the user severely in one or more ways.

1.2.1. APPLICATIONS AND ADVANTAGES

CapMouse enables hands-free access to the computer and handheld devices. Clicks, double clicks, right clicks and other commands are implemented by detection of 'signatures'- or sequences of movements and positions of the lip and the tongue behind the cheek. The learning curve for the use of CapMouse is kept at a minimum. Translation of movements and commands is fully customizable and implemented in a learning module.

The numbers of applications for CapMouse are countless. Immediate applications discovered together with BC's partners are:

- A "third hand" for dentists, enabling access of digital x-rays and patient data, without having to cross hygienic barriers during patient treatment.
- Replacement of current foot control devices used for the activation of laparoscopic equipment during surgery. Also the need for overqualified assistants will diminish, who today act as input devices when switching between x-ray and ultrasound monitoring, handling the zoom of microscopes, tagging videos and controlling cameras for telemedicine.
- Computer-, wheelchair- and environment interaction for impaired people without the ability to use hand controlled devices.
- Mouse replacement for people with medical conditions such as "Carpal Tunnel Syndrome".
- Hands-free, in action ICT control for firefighters, police and soldiers.
- As a temporary or permanent mouse replacement CapMouse offers pain relief and the ability to keep working for people suffering from Carpal Tunnel syndrome, leading to improved life quality and vast savings for employers and the public health system.
- Full, hands-free mouse functionality, giving smartphones and tablet pc's complete mobility.
- Adding a new dimension of interaction to video console and computer gaming.

1.2.2. HARDWARE

CapMouse is a human-computer interface, utilizing a capacitive sensor, attached to a state of the art headset and placed close to the corner of the mouth, to deliver the interactivity of a mouse, using lips and tongue movements against the inside of the cheek. The hardware consists of a microcontroller circuit, receiving sensor's data through an AD7174 capacitive controller.



Figur 2. Second generation CapMouse prototype

Data communication with its host computer is handled via USB. CapMouse uses a Virtual COM Port for the communication with the computing system over USB. In this technique, the USB device is seen as a USART device, communicating using RS232 protocol. This means that, the software communicating to CapMouse sees it as a serial device, and not a USB device. This removes the implicit complications of communicating with the device as a USB device, and the software can simply use common libraries for communication over RS232. Converting the USB device to a Serial device is achieved using a common FT232 circuit. Future generations of CapMouse will be equipped with Bluetooth and rechargeable batteries and will therefore not need any cable connection to the host unit. CapMouse utilizes an AD7147 capacitive controller, for the conversion of the capacitive sensor's outputs to useful digital signals. Data is then forwarded to a microcontroller, which in turn sends and receives data to and from the PC (or Android phone) using USB. The communication is performed using AT commands.



Figur 3. Capacitive sensor with dongel

CapMouse was in its 1st generation only a hands free replacement for the clicking functions of a standard computer mouse. In its 2nd and 3rd generation it is a hands free, complete substitute to a computer mouse, comprising all of its interaction features.

Specifications of the CapMouse sensors:

- 1,8 volt lowest drive voltage
- power consumption of ~ 100nA
- resolution of ~ 0,1 mm

1.2.3. SOFTWARE

Implementation

There are two sets of software applications developed for CapMouse: One for Android handheld devices and one for Windows PCs. Although they were realized using different technologies, the principle of operation is the same.

Specific libraries have been developed for each platform (Android and Windows), acting as CapMouse's driver. This means that the applications only communicate with the corresponding library, and they don't need to take care of low level details of communication with CapMouse.

Languages, Technologies, and Operating Systems

C# was used for development of the Windows driver and applications. The choice of language allows for application development using Microsoft Visual C# Express, which is free to use, and compilation of the driver and applications to DLL and EXE files. Thus the need for third party software in order to use the devices has been eliminated.

Since CapMouse uses Virtual Com Port, installation of a FT232 VCP driver was necessary. The driver can be downloaded for free.

The software for android was developed using Java, which is the standard way of writing Android applications. For our prototype we used a Google Nexus phone with Android 4, which delivered the functionality that we required.

1.3. PATENT

Patent application submitted 2007-12-18

Swedish Patent - #0702813-7 granted 2009-10-06

PCT granted – PCT/SE20008/000531.

<http://www.wipo.int/patentscope/search/en/WO2009078776>

The technology is patented by the founders with the assistance of Bergenstråhle & Lindvall AB.

Further technology patents are pending.

1.4. COMPANY KNOW-HOW







BC's development history including internal technology development and the participation and coordination of different company external research projects has given the company diversified technical-, management- and legal competences (1.4.1). Together with its network of external partners (1.4.2) it possesses the know-how needed to successfully commercialize its current and future technologies.

1.4.1. COMPANY INTERNAL KNOW-HOW

| | |
|--|---|
| Dr. Tomas Brusell Partner, CEO and founder | <ul style="list-style-type: none"> • 2000-, R&D Computer Science & Odontology/Medicine • 1997-, Owner of a private dental clinic, and clinically active in Kongsberg Norway. • 1978, Odontological exam at Karolinska Institutet in Stockholm. • Co-inventor of the Oral Mouse and the <i>Cap Mouse</i>. • Inventor of <i>the Oral Ball</i> and <i>Oral Laser Mouse</i>. |
| Anders Rudback | <ul style="list-style-type: none"> • 2012*, M.Sc. Systems, Control and Mechatronics. |

| | |
|---|--|
| Partner, CTO and Hardware specialist | <p>*Est. Time of Graduation from Chalmers University of Technology, Gothenburg.</p> <ul style="list-style-type: none"> • 2012*, BBA*, Industrial and Financial Management *Est. Time of Graduation from School of Business, Economics and Law, Gothenburg. • 2011-, CEO and founder of Rudback Technology • 2008-2010, Head of business unit for technology development at Chalmers Teknologkonsulter AB, Gothenburg • 2008, B.Sc. in Mechanical Engineering, Chalmers Univ. of Tech |
| Ali Alavi Partner, head of Software development | <ul style="list-style-type: none"> • 2012*, M.Sc. Secure and Dependable Computer Systems. *Est. Time of Graduation from Chalmers University of Technology, Gothenburg. • 2008, B.Sc. in Computer Engineering (Hardware), Amirkabir University of Technology (Tehran Polytechnic), Iran. • Specialist areas: C/C++, Java, C#, .Net, VB, ASP, JavaScript |
| Erik Ullman Partner | <ul style="list-style-type: none"> • 1995-, Co-founder and CEO of ItsyBitsy AB • 1994-1995, Assistant editor Cybernetics & Human Knowing • 1993-1994, Windows app. dev in C++ for ISD and Astra Development • 1987-1991, Programmer, Pixie R&D, Copenhagen |
| Göran Nyström Partner | <ul style="list-style-type: none"> • Lawyer and Partner at Vinge, Stockholm • Specialist areas: Corporate Finance & Capital Markets, General Corporate, M&A |
| Sigbjörn Olsson Partner | <ul style="list-style-type: none"> • Sigbjörn Olsson Advokat AB • Former partner at Linklaters • Specialist areas: M&A, Corporate and General Commercial Law |

1.4.2. EXTERNAL PARTNERS

| | |
|---|---|
|  | Business advisors which have assisted us in coordinating the AAL project and they have evaluated our target markets. |
|  | Industrial Design Partner in the industrialization phase. |
|  | Responsible for the final design and production of the sensor, Artec Design has and will be an important partner for the realization of CapMouse. |
|  | They have successfully filed several patents for the partners in BC. |
|  | Partner in a pre-commercial development program for CapMouse in the dental sector. |
|  | Testing CapMouse in surgical environment they are an important Med Tech partner. |

| | |
|---|---|
|  | <p>Licensing specialist helping us out on markets with high entry barriers.</p> |
|  | <p>As a partner in the AAL project they have been a big part of the realization of the hardware for the first five-sensor CapMouse.</p> |
|  | <p>The owner of HMC being one of the biggest players on the wheel-chair market they make out a strong partner when addressing handicapped people.</p> |
|  | <p>Designing the CapMouse sensor head and the headset during the AAL project.</p> |
|  | <p>Financing a design project for the application of CapMouse on the dental market.</p> |
|  | <p>After successfully finishing the AAL Joint Program they guarantee help with marketing and form an important link to a great network.</p> |
|  | <p>Financing BC with 2M NOK for an IT-Funk project, during which the capacitive technology was invented.</p> |
|  | <p>As members of Oslomedtech we have access to important players on the MedTech market.</p> |
|  | <p>Telenor Open Mind performed the end user testing in the IT Funk project and will have the option to test and use the CapMouse.</p> |
|  | <p>MedTech West is ready for a joint efforts to apply for EU-financing</p> |
|  | <p>BC's trusted accountant since 2006.</p> |

2. MARKETS/COMPETITION

2.1. MARKET SITUATION

On the dental market the digitalization of the clinic has been very fast and changed the way dentists work with documentation during clinical sessions and the hygienic risk has increased with trespassing of hygienic barriers on a daily basis. On all markets mentioned in this document the digital revolution is changing the behaviors of people and the need for a hands free solution is obvious. People with Carpal Tunnel syndrome is a growing part of the work force in companies all over the world.

2.2. UNIQUE SELLING POINT

Detecting the tongues movement against the inside of the cheek and lips, CapMouse offers its user a completely hands-free, non-intrusive computer interaction device which is almost as easy to use as a computer mouse, still comprising all of its interaction features.

2.3. TARGETED MARKETS

Together with its partners BC has assessed the collective market size for CapMouse within the Dental-, Powered Wheelchair-, Handicap Aid-, MedTech and Defense&Rescue markets to more than 105'000 units over the next 4 years. In addition to the studied markets we are analyzing the Computer- and Smartphone Peripheral markets as well as the market addressing people with carpal tunnel syndrome.

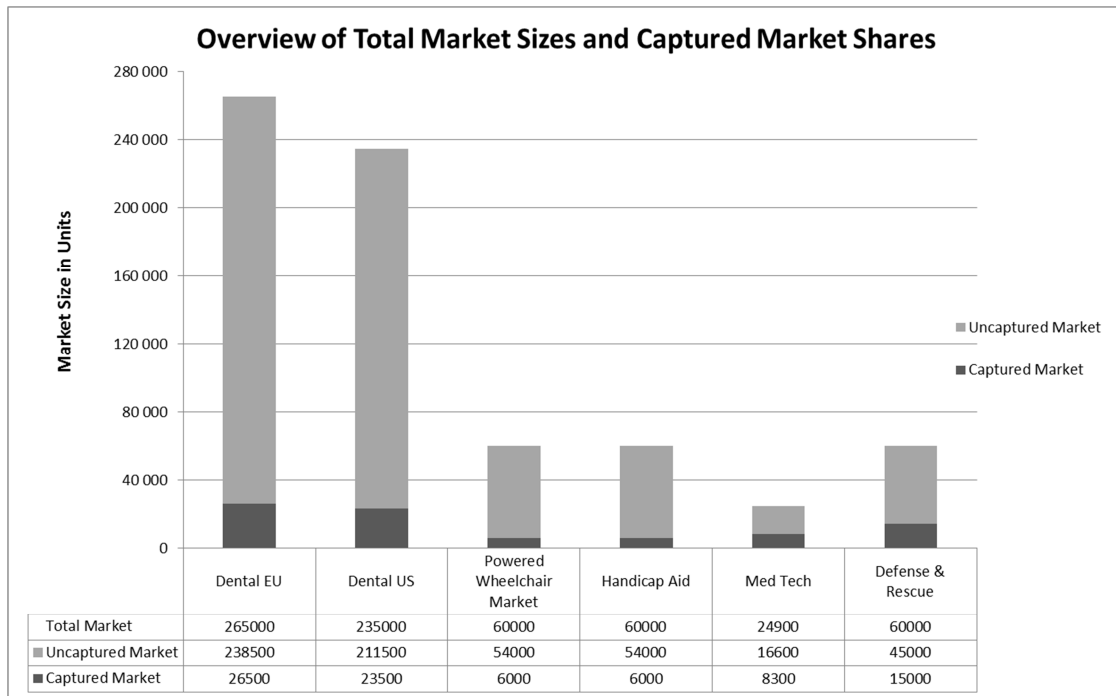


Figure 4. Total and captured market sizes, estimated by BC after consultation with partners acting on the respective markets.

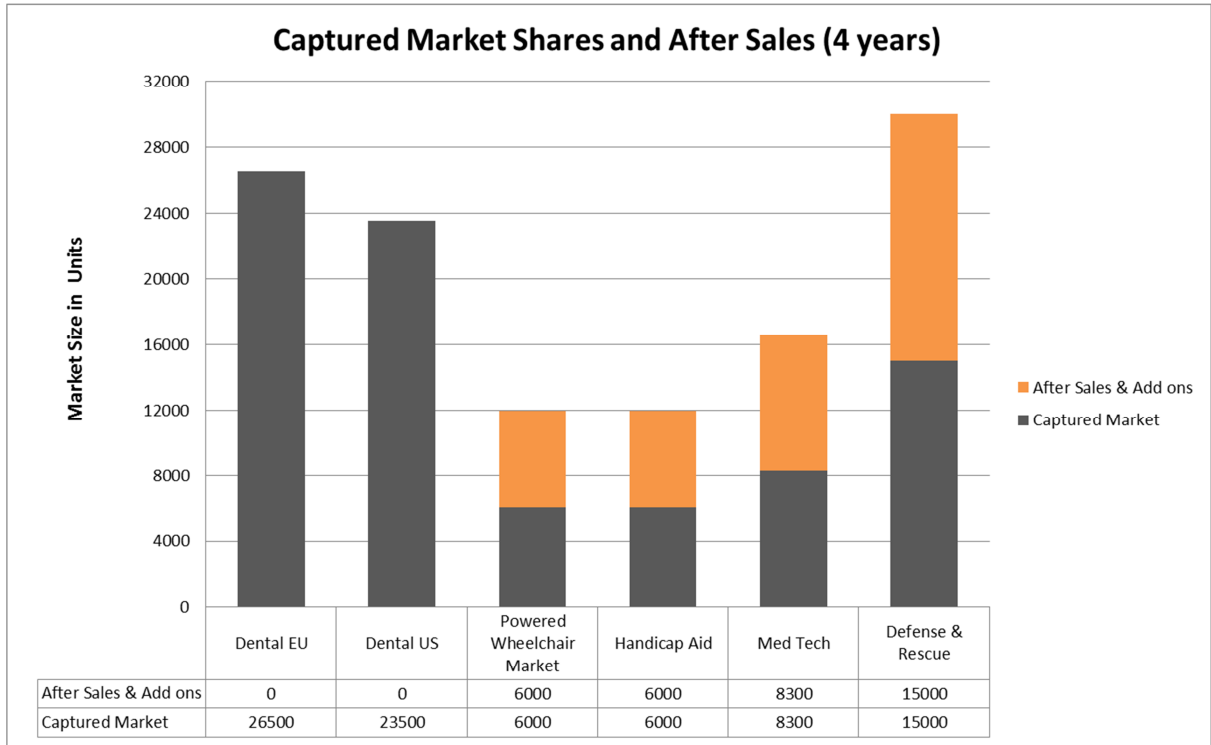


Figure 5. Total predicted sales, taking into account that early adopters will buy new models when marketed or replace old and damaged units.

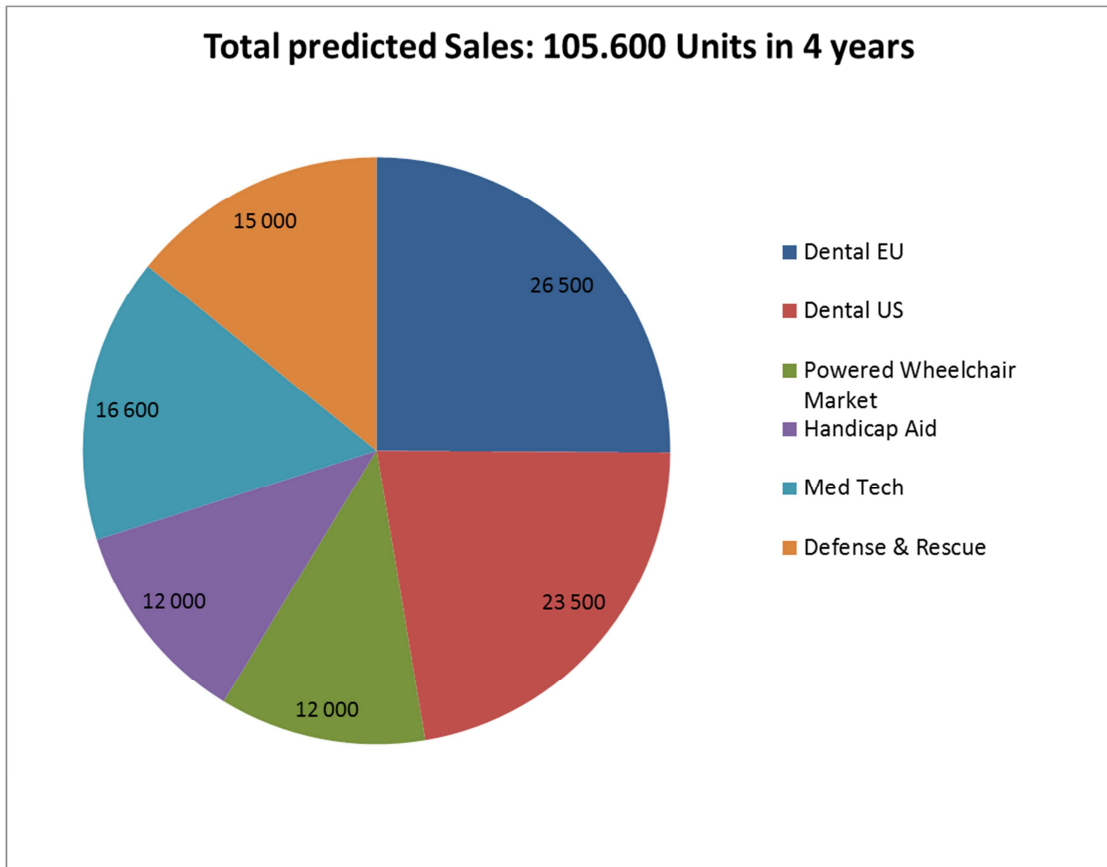


Figure 6. Total predicted sales showing how the different markets contribute.

2.3.1. WHEEL-CHAIR & HANDICAP AID

The market for equipment addressing disabled people is cost tolerant and offering an entirely hands-free computer interaction alternative will give CapMouse a strong position on the market.

On the powered wheelchair Market approx. 60000 units are sold every year and the market is expanding with increased budgets in the welfare systems. BC estimates to sell CapMouse as an add-on product to 10% of the powered wheelchair users. The same market potential is previewed on the market for Assistive technologies (AT).

Assistive technologies play an increasingly central role in equalizing opportunities for people with disabilities in all aspects of life. The enhancement in quality of life resulting from a wider use of ATs will lead to a generation of new aspirations, demanding the promotion of improved equipment, and thus to new innovations.

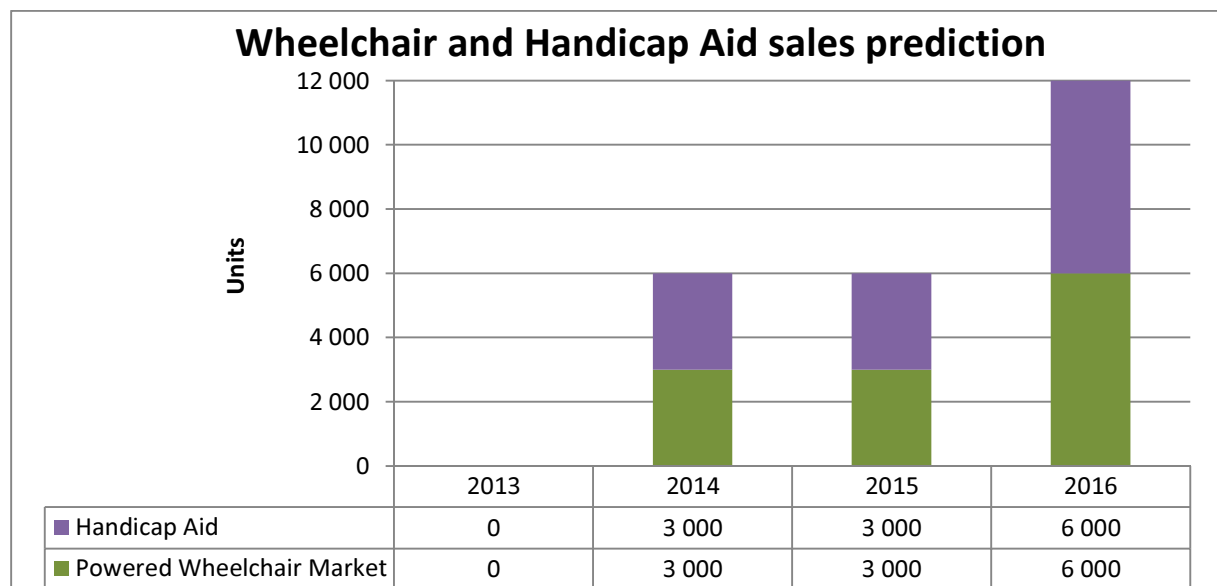


Figure 7. Distribution of sales on the wheelchair- and hadicaped aid markets during the first 4 years.

2.3.2. MED TECH

A market analysis, carried out by Baltic Invent in 2010, determined the market potential of CapMouse for laparoscopic surgery to 8300 units. Demonstrating the prototype at the Intervention Centre (IVS), at Oslo University Hospital, showed, that there is an interest for a hands-free interaction device in further medical areas. Testing of the prototype will be done under surgical conditions at IVS, where several market leading companies are involved, and a joint effort will be done to integrate CapMouse with other novel technologies, thus increasing its market size.

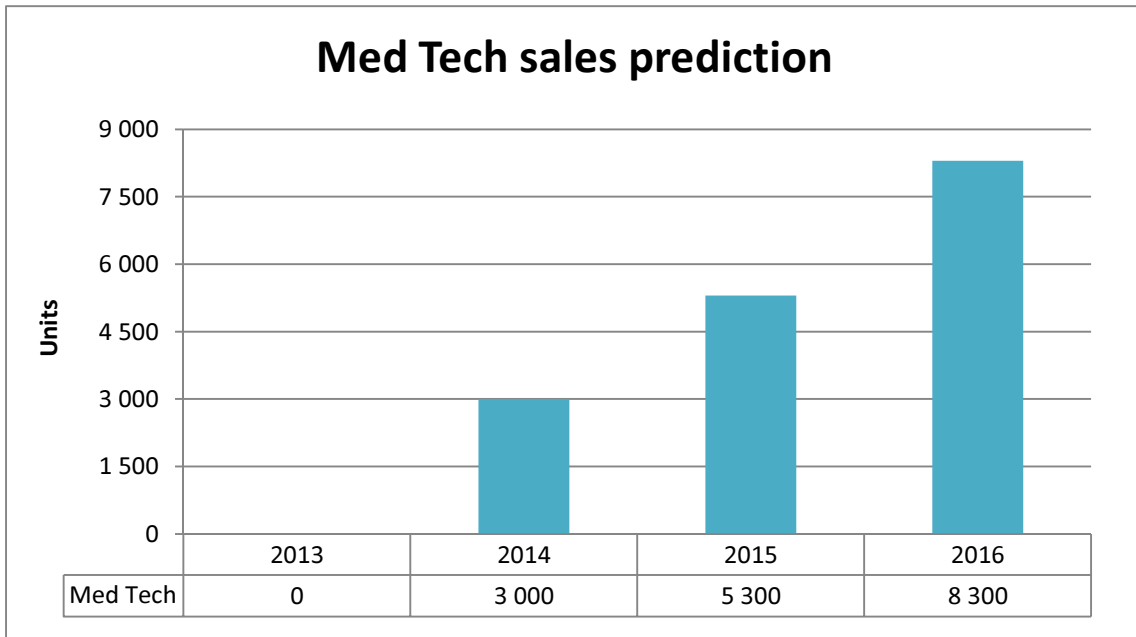


Figure 8. Sales distribution on the MedTech market, 2013-2016.

2.3.3. DENTAL

In EU and USA there are approx. 500 000 dentists and dental hygienists, and on that specialist market diffusion is relatively fast. BC will seek initial distribution of the CapMouse interface on the dental market in Europe. There are 265000 dentists in Europe, and the target market share for BC is 10%. BC is planning to use Opus Systems AS, holding >50% of the Scandinavian market for dental software, as a strategic partner.

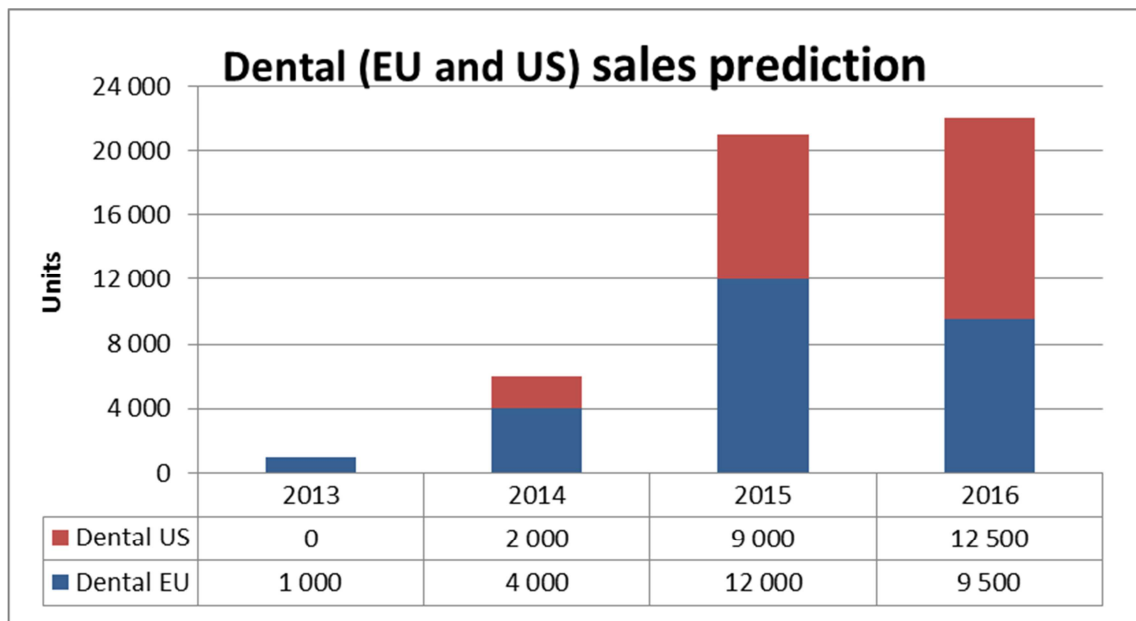


Figure 9. Sales distribution on the Dental market with different market entries in EU and US.

2.3.4. DEFENSE & RESCUE

The industry equipping the defense & rescue sector has shown great interest in the possible applications of BC's technology in existing products. A big player on the US-market is currently testing the CapMouse in the field. The market size for their product is 30000 units. BC predicts their total market share to less than 50% and estimates the market potential for

CapMouse to 25% of the total market. Further partners in both the US and Europe are being approached.

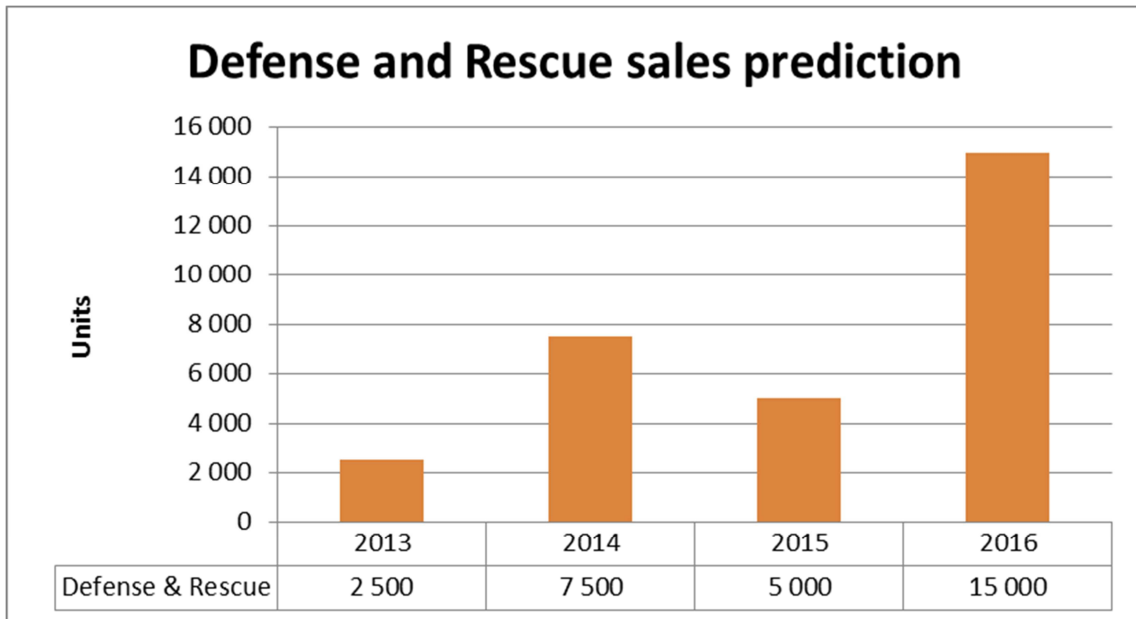


Figure 10. BC’s demand prediction for US defense & rescue market.

2.4. MARKETS UNDER EVALUATION

In addition to the assessed markets covered in the previous sections BC is currently analyzing the quickly emerging and growing markets for computer- and smart phone peripherals. Also the market targeting people with Carpal Tunnel Syndrome is being studied.

2.4.1. CARPAL TUNNEL SYNDROME

Musculoskeletal pain such as Carpal Tunnel Syndrome has been estimated to affect as many as one million, or 25% of Swedish computer users rendering it as one of the country’s biggest health problems.¹ The main cause of these problems are related to the use of a computer mouse and consequently many companies are selling products such as ergonomic mice, mouse pads, etc. into this market.

Our ambition is that 10% of the affected individuals would be interested to buy and benefit from the CapMouse. This equals a share of 2.5% of the total mouse market.

Further analysis of the market will be done.

2.4.2. SMART PHONE PERIPHERAL

The markets for smartphones and tablet PCs are growing quickly and the computational power known from stationary or laptop computers is suddenly accessible in mobile devices. BC is currently analyzing how big the interest for complete mobility and hands-free computer interaction is on these markets.

2.4.3. COMPUTER AND VIDEO GAMING

Video gaming, during the last years, has embraced alternative haptic and gesture controlled interaction devices, while computer gamers still foremost use keyboards and mice. Both markets

¹ Report; *Arbetslivsinstitutet. Sweden*, December 2003

have in common though, that the customers are prone to update their hardware if new or improved features are offered.

2.5. COMPETITION

There are several hand controlled and hands-free computer interaction devices on the market providing alternatives to common computer mice. Some of them are designed for disabled people with the goal to enable the use of computers despite handicaps precluding the use of hand controlled interaction devices.

2.5.1. DIRECT COMPETITION

Despite offering an alternative to common computer mice, none of the solutions available on the market come close to offering the same functionality features as abled bodied people are used to when using common interaction devices. Limitations are also set to their mobile applications as they often rely on some kind of monitoring device, which needs to be in a fixed position.

Therefore, there is no direct competition to BC's non-invasive oral interface.

2.5.2. INDIRECT COMPETITION

Intrusive oral interfaces

These products rely on a controller unit which needs to be in the user's mouth, making the solutions cumbersome and susceptible to technical failures due to extreme environments.

- Russian Gravitonus² has an intrusive interface on the market.

Head movement tracking

The offered interaction has strong physical limitations from the perspective of a user as well as restricted functionality. In order to get full mouse functionality, additional products are needed.

- Boost Technology³, Origin Instruments⁴ and Natural Point⁵ have different products on the market.

Eye tracking

Even if the need for hands is minimized, common functionality features demanded by today's users, still rely on hand inputs. With retail prices starting at \$6000 the technology is very expensive and it will take a couple of years before its ready for consumer markets.⁶

- Tobii⁷ and EyeTech Digital Inc.⁸ offer products which foremost are used for research.

Gesture control

Designed to be used with both hands, it will not become the input device of choice for either people with handicaps or professionals having both hands occupied with other tasks.

² <http://gravitonus.com> [Accessed 20 June 2012]

³ <http://www.boosttechnology.com> [Accessed 15 June 2012]

⁴ <http://www.orin.com> [Accessed 18 June 2012]

⁵ www.naturalpoint.com [Accessed 18 June 2012]

⁶ http://www.pcworld.com/article/247529/swedens_tobii_shows_gaze_control_on_windows_8_pc.html
[Accessed 15 June 2012]

⁷ <http://www.tobii.com/> [Accessed 16 June 2012]

⁸ <http://www.eyetechds.com> [Accessed 15 June 2012]

- Microsoft⁹, Flutter¹⁰ and Leapmotion¹¹ are some of the companies offering products based on different tracking technologies.

Voice Recognition

Used for vocal text input and a limited set of interaction commands. It faces some problems largely because of the many sources of variability associated with the signal. In addition to the technical problems, there's an averseness to speak to machines or to speak out loud at all in many situations.

- Nuance¹² is leading the market for voice recognition products.

Brain computer interfaces

The promising technology is still in the infancy of its development and there are several fundamental scientific problems to be solved. Currently there are no products available on the market.

2.6. MARKETING

2.6.1. MARKET ENTRY

1. On the defense market an established player is right now testing the CapMouse prototype. Depending on the test results, discussions regarding a license deal will be continued.
2. The dental market is planned to be entered together with Opus Systems who already is marketing its software product Opus Dental, which is the most widespread practice management solution in the Nordic countries. The software has more than 15,000 users in over 2,500 clinics. *Opus Dental* market share in Norway is over 80%.
Opus Systemer AS belongs to the Planmeca Group, one of the leading dental manufacturing companies in the world. Planmeca Group employs approximately 2,400 people worldwide and the 2012 estimated turnover amounts to 750 million euros.
3. The MedTech market is going to be approached in due order with consortia building including University Hospitals with the testing facilities necessary to certify a product before it can enter the MedTech market. As the market denotes very high entry barriers to newcomers, BC will approach one of its well established players with the results from the testing at Oslo University Hospital.
4. On the wheelchair and handicap aid market, BC's AAL project partner Permobil, which is one of the leading producers of powered wheelchairs, is the natural choice when it comes to marketing and sales of CapMouse.

⁹ <http://www.xbox.com/en-US/kinect?xr=shellnav> [Accessed 18 June 2012]

¹⁰ <https://flutterapp.com> [Accessed 15 June 2012]

¹¹ <http://leapmotion.com> [Accessed 18 June 2012]

¹² <http://www.nuance.com> [Accessed 21 June 2012]

5. How and if the markets currently under observation are going to be entered, will be determined once BC has a clear picture of the demand for CapMouse on the specific markets and an understanding of the attitude towards new market entrants.

2.6.2. LICENSING AND IN HOUSE PRODUCTION

Depending on the market, BC will either produce the entire headset in house, let established market players license produce themselves, or just offer the sensor technology to those companies who want to integrate the sensor in their own products.

Potential Licensing of the sensor technology

There are ongoing discussions with a company, acting on the defense & rescue market, regarding their interest in licensing deal for the sensor technology.

Licensing of the headset

In order to reach the MedTech market, BC will develop its headset in close cooperation with the Intervention Center at Oslo University Hospital. With their certificate at hand, an established market player will be approached with a deal for license production of the entire headset.

In house production

In close cooperation with Opus Systemer AS and Permobil, BC is planning to develop a headset, addressing the needs of the dental and the wheelchair markets and produce it in house. Opus Systemer AS and Permobil will then be responsible for marketing and sales of the interface in combination with their software on the respective markets.

2.6.3. PRODUCT PRIZING

Different versions of CapMouse will be sold, depending on the end customer. Prices will therefore be set according to the value impact in the corresponding market. Also, different markets denote different price tolerances which will influence the retail prices. On high end markets, such as the dental-, MedTech- and defense&rescue markets the estimated price tag will range from €300-€500. After the initial production phase, efforts will be made to cut the price for a mainstream model of CapMouse down to \$99.

2.7. PROJECT PLANNING

2012

Q3

- Implementation of Bluetooth and battery powering
- Optimization of the electronics
- Product design in close cooperation with partner Designit
- Zero-series based on the steps above
- Testing with Opus Dental software
- Sourcing of possible production sites and component suppliers

Q4

- Agreement with the defense & rescue company currently testing a prototype
- Testing of the new zero-series at the Intervention Center at Oslo University Hospital
- Presentation of the zero-series as an HCI for Opus Dental at Nordental¹³ and Riksstämman¹⁴
- Negotiation of prices with candidates for subcontracted production and assembly

2013

Q1

- Demonstration of the zero-series at Cebit¹⁵
- Launch production of a dental model
- Application together with Medtech West and IVS for the development of an advanced surgical application with funding from Horizon 2020 related programs.
- Adaption of the dental model to MedTech needs based on testing in Q4 2012
- Product design meeting the needs of the handicapped market

Q2

- Approach of a major player on the MedTech Market with the test protocols from IVS
- Closing of a deal with Permobil or an equivalent player on the handicap aid market

Q3

- Participation at a MedTech fair together with the MedTech partner approached in Q2
- Marketing of adjusted model to handicapped organizations together with Permobil

Q4

- Launch of production of CapMouse for the MedTech market
- Launch of production of CapMouse for the handicapped market

2.8. RISK ANALYSIS

2.8.1. MEDICAL RISK

There are no medical risks when utilizing the capacitive sensors, operating with a weak electric field (5V).

2.8.2. BUSINESS RISK

Financial risk refers to the risk of exhaustion of necessary funds before the completion of the project. Orderly progress of the CapMouse industrialization project is dependent on external financing by one or more investors. Adequate management of the costs for a project are assured with thorough budgeting, and financial control.

2.8.3. TECHNICAL RISK

The sensors and the headset, as well as the software are fully functional and have been tested thoroughly. Further development and testing will minimize the risk of technical failure.

¹³ <http://npg.no/Messer.aspx?docid=60>

¹⁴ <http://www.tandlakarforbundet.se/Riksstamman>

¹⁵ <http://www.cebit.de/>

2.8.4. PRODUCT DIFFERENTIATION

Product differentiation risk refers mainly to the competitive risk from the unknown innovative activity by the rival firms. Product differentiation risk has been managed by conducting a thorough market survey that maps out different hands-free control technologies, their applications and companies producing them. Market and technology research shows that CapMouse technology is unique in that while being non-invasive, it allows for the same functionality as a mouse, while being controlled with tongue and lip movements. All other alternatives on the market show significant disadvantages compared to CapMouse. Besides its functionality advantages, CapMouse has been designed with usability and ergonomics in mind.

2.8.5 MARKETING & MARKET ACCEPTANCE

The magnitude of market acceptance risk depends on how much prior experience the innovating firm has with the market it is introducing its innovation to, in particular, whether the firm has a business model that has previously been seen to work in similar markets and conditions. Effective marketing and access to distribution networks are also important determinants of success. Companies with strong marketing networks are able to establish long-term supply contracts with their customers, enabling future sales. Partnering with strong, established players, acting on their expertise markets will minimize these risks and BC will profit from these companies marketing experiences and existing distribution networks. It also enables BC to bypass lengthy and expensive process of building its own distribution pathways. The result of the licensing deal is shorter time to market and considerably faster revenue ramp up.

2.9. PROTECTION OF PROJECT RESULTS

Obtaining an industrial design registration in relevant regions and countries will protect the industrial design of the CapMouse headset. Design registration provides an enhanced scope of protection for CapMouse interface as it guarantees that the design of the interface cannot be lawfully copied or imitated without the registered owner's authorization. If the design incorporates any patentable features, appropriate legal protection will be sought. Issues concerning the usage of intellectual property and the results of the project will be regulated with a licensing agreement. BC, the owner of intellectual property for oral interface, will establish exclusive licensing agreement with companies like HMC International and Opus Systemer AS. Exclusivity will then concern solely the market of expertise of the respective licensee. Licensing agreement will regulate the distribution and marketing of CapMouse interface and determine the financial aspects (including required advances, royalty rates, and how royalties are calculated) of the use of the results of the project and intellectual property assets owned by BC.

3. CORPORATE PLANNING

An NABC Analysis (*needs, approach, benefits and competition*) applied on BC's focus markets and its positive results have been used throughout the generation of this business plan.

A business model canvas has been used to identify BC's most important customers, key resources, value propositions, cost structures and revenue streams. It also focuses on Customer Relationships and the channels through which our customer segments are reached.

3.1. FINANCIAL PLANNING

At the moment the CapMouse technology has exhibited proof of evidence and it is fully functional. The R&D phase has culminated in a 3rd generation prototype. It has been a costly enterprise and further investments are inevitable for the industrialization and commercialization of the CapMouse technology.

3.1.1. FINANCIAL NEEDS FOR INDUSTRIALIZATION AND COMMERCIALIZATION

Several arenas for financing are approached.

The first step to achieve positive cash flow is to make a license deal with an established player on the specific market for HMI's (human machine interfaces) and/or a player on the more general market for ICT (information and communication technology).

As a parallel process, new capital will be raised through an issue of new shares, where BC, as the executive party, looks for smart money – brought in by (a) partner(s) with both financial strength and an adequate market competence.

The incomes and investments will be used for the

- Development and industrialization of a commercial CapMouse headset according to a business case evaluation.
- Commercialization and marketing, focusing on attracting established market players and customers for whom a truly hands free input device makes a difference.

The industrialization and commercialization process will require € 225 000 in human resources and € 170 000 in other expenses. Adding up to a grand total of € 395 000 which is the investment BC is looking for.

3.1.2. PRODUCTION COSTS

With the experience from the development of different generations of prototypes, BC has good understanding of the costs arising from the production of the CapMouse headset and the different included components.

Produced in a volume of 5000 units the cost for each sensor is € 7. Further negotiation with the subcontractor and bigger orders will lower this price significantly.

For the in house production of the entire headset there is currently no fixed price as sourcing of production partners and materials used for the production will be done during the industrialization. Based on subcontractor quotes for the different subparts of the headset the estimated production price will be lower than €50. Also, partner Designit has been engaged and is designing all mechanical parts of the headset with production and assembly costs as one of the most important design parameters.

3.1.3. REVENUE STREAMS AND CASH FLOW

As described in the market chapters above, there are two different revenue streams, depending on which market is targeted. On the defense&rescue as well as on the MedTech market, BC is expecting to sell sensors or licenses for the production of the sensor only, whereas on the dental and wheelchair/handicapped markets, the entire headset will be sold.

Sensor sales/licensing

Both the defense&rescue- and the MedTech markets show high price tolerances and the expected retail price for the end user will be at least € 500. BC is calculating with a targeted net sales price for the sensor of € 40. With production costs for the sensor of € 7 the gross profit would be € 33 per sensor.

Figure 11 shows the expected discounted revenue distribution from sensor sales, based on the sales predictions in 2.3.

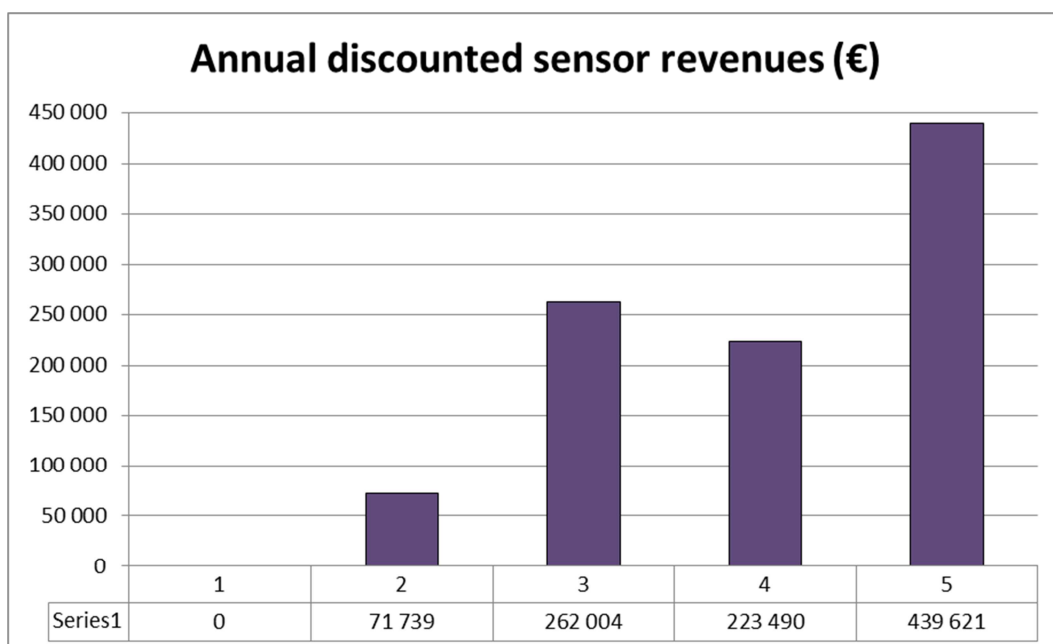


Figure 11. Discounted contribution of annual sensor sale to total revenues.

Headset sales

On the dental and the wheelchair/handicapped markets, BC is calculating with a retail price of € 300. The targeted net sales price to the marketing and sales company is € 179. With an estimated production cost of € 50 the gross profit would therefore be 129 € per headset. Using the sales predictions described in the market chapter, the discounted revenue stream from headset sales during the first 5 years is shown in Figure 12. Discounted contribution of annual headset sales to total revenues. Figure 12.

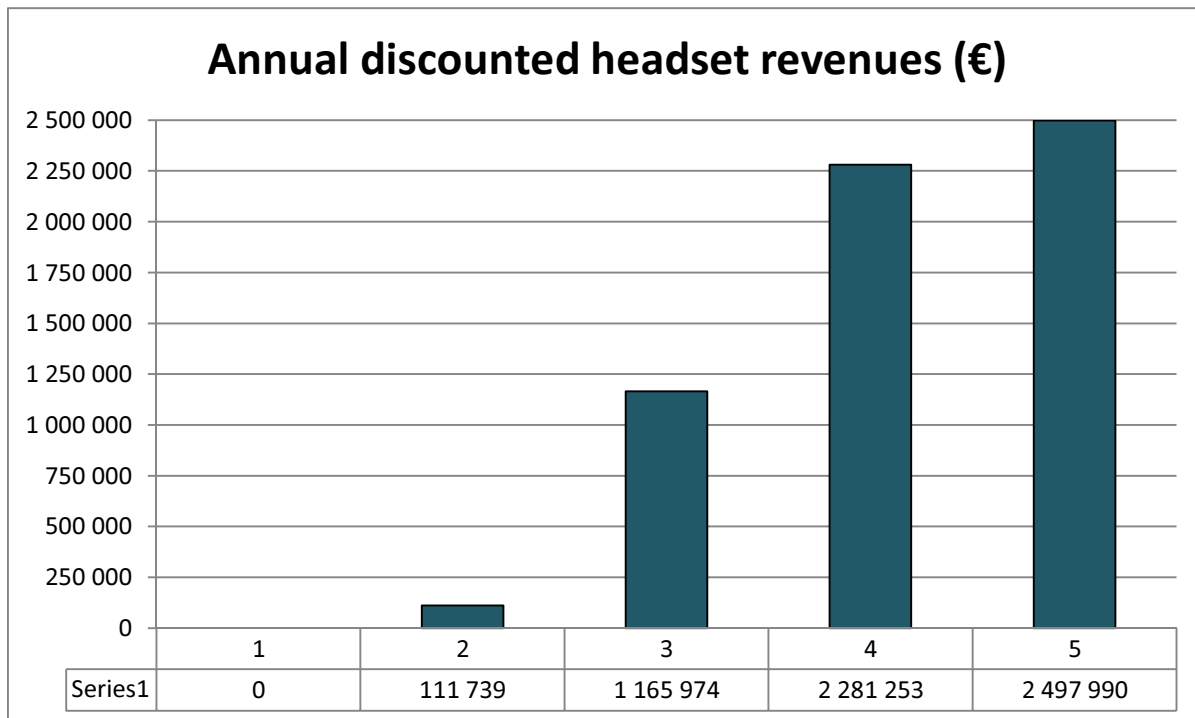


Figure 12. Discounted contribution of annual headset sales to total revenues.

Cash Flow

The calculations below are based on the sales predictions described in the market chapter. Markets under observation have not yet been taken into account. Positive annual cash flow is expected to be reached in the second year of the continued project.

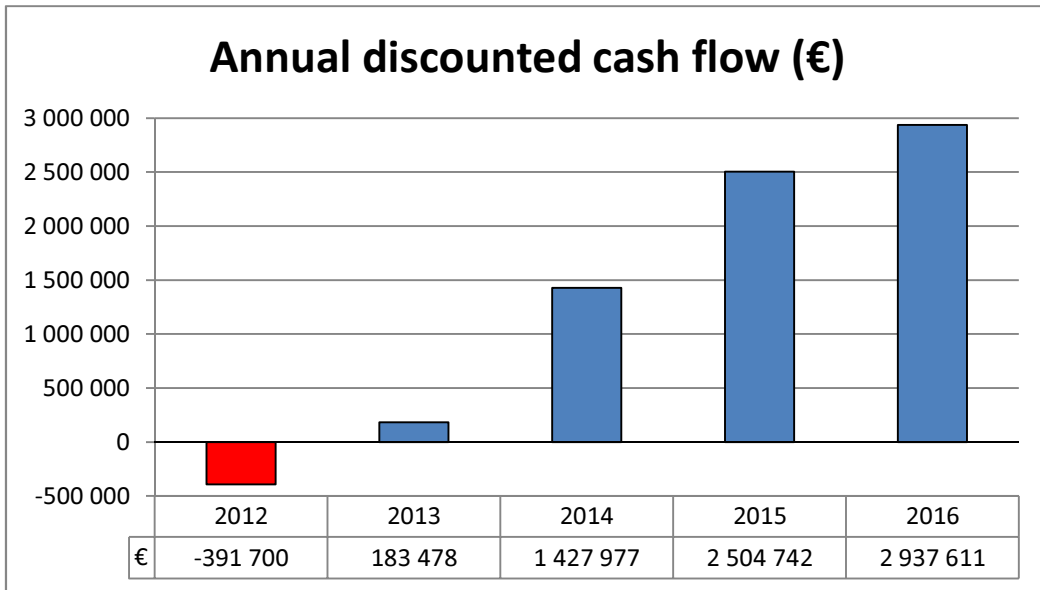


Figure 13. Total annual discounted cash flow.

Based on the described calculations for the investment and the revenue streams, the accumulated discounted cash flow is shown in Figure 14.

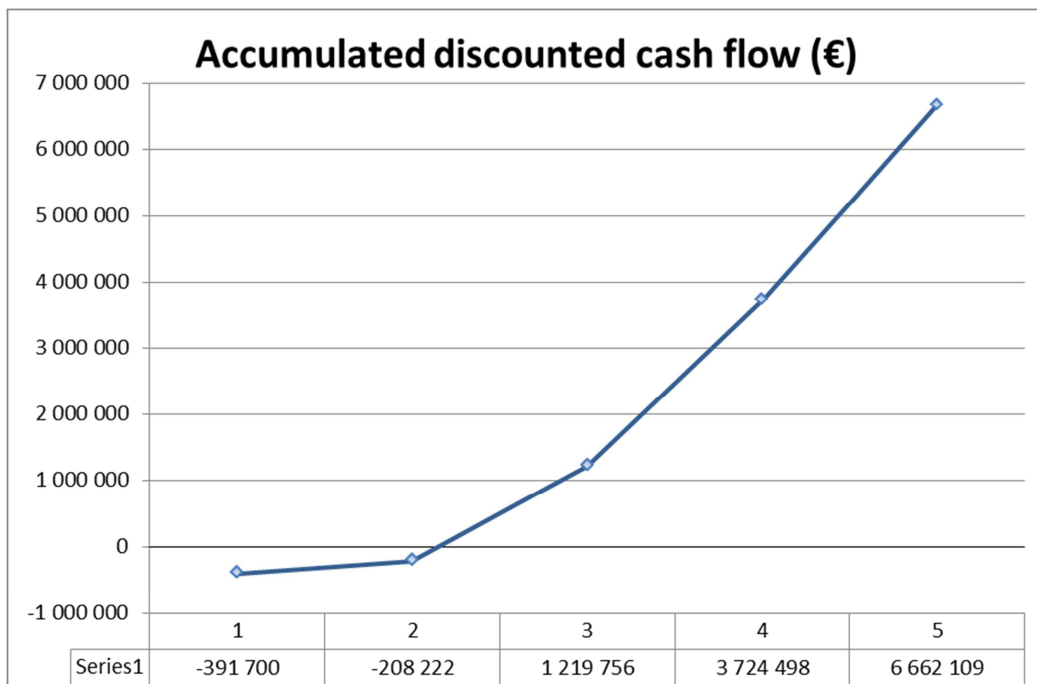


Figure 14. Accumulated discounted cash flow with a break even in 2014.

3.2. CORPORATE GOVERNANCE

Brusell Communications consist of the Swedish parent company Brusell Communications AB and its Norwegian subsidiary Brusell Communications AS. The overall business decisions are made at the BCAB board but the executive work is done by BCAS.

The technical development, and thus the industrialization, testing and user feedback are managed by CTO Anders Rudback.

The commercialization is managed by CEO Tomas Brusell in close cooperation with internal and external partners.

Revision and Book keeping is taken care of by BDO and Akonto Økonomi according to the set of rules and regulations in Norway and Sweden.

