THIS PAGE SHOULD BE DESTROYED BEFORE THE FINAL SUBMISSION OF YOUR BUSINESS PLAN

The template should be adapted to your business project, not the other way around! It is supposed to help you, not make things more complicated.

We suggest that you follow the template even if, for the time being, some of the sections contain only partial information or summary statements. Once you have finished the first draft of your plan, reviewing it will allow you to finalize these sections with further details.

We also suggest that you eliminate tables and lines in tables that you do not need. Sometimes it may make more sense to erase a table and replace it with a written statement.

Your business plan should be 20 to 30 pages long. We suggest the following distribution of pages, but it may vary somewhat, depending on the type and complexity of your project:

Project summary: 1 page

Chapter 1: 3 to 4 pages

Chapter 2: 3 to 4 pages (include a more detailed market study in the appendices if necessary)

Chapter 3: 3 to 4 pages (include a more detailed marketing study in the appendices if necessary)

Chapter 4: 3 to 4 pages (include a more detailed operational plan in the appendices if necessary)

Chapter 5: 2 pages for explanatory notes (appended financial statements)

Chapter 6: 1 to 2 pages

Appendices: no limit

Some supporting details for your business plan should be included in the appendices. For some projects, it may make more sense to present the appendices in a separate document.

I use this doc

Tactus Scientific Inc./SENSORICA

AFFILIATES

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BUSINESS PLAN

DATE OF CREATION OR UPDATE

Last modified on July 18th 2012

PROJECT SUMMARY

The scientific world is in constant demand for innovative precision instruments of a high quality. Faced with international competition, researchers are more than ever on the lookout for devices providing productivity gains, that are user friendly, plug and play, and affordable. Tactus Scientific Inc. encompasses the market knowledge in the scientific instruments sector to meet the needs of researchers in terms of advanced equipment.

Our first product, the Mosquito Scientific Instrument System, is a technological marvel blending ease of use, measurement accuracy and robustness, unmatched by other suppliers. It is based on a miniature ultra-precise force sensors, the Mosquito. In Phase l, the Scientific Instrument System will be used by researchers in biology and physiology for tactile sensing of single living cells, to determine if they are healthy or to determine the effects of experimental treatments. The Scientific Instrument System is used in research on muscles, on cardiovascular, respiratory and digestive diseases, as well as in studies on cancer, diabetes and infectious diseases. It is now being tested for the first time in two hospitals in Montreal (Royal Victoria and Montreal Heart Institute), before being distributed worldwide.

In Phase ll we'll approach the biotech and pharma market, which exhibit similar needs as in the biology and physiology research segment.

In Phase lll, SENSORICA affiliates will focus on applications in the industrial and medical device markets, where the current detection technologies are limited by their sensitivity and their reliability. Our fiber-optic technology is adaptable and offers a great path for miniaturization. For example, we anticipate that it will give the sense of touch to robots to enable them to perform meticulous assembling tasks and assisted surgery.

Our first targeted market (scientific instruments market and more particularly instruments used in physiology), is of 1.3G$ / year globally, large enough to develop our value network’s capabilities with financing requirements not exceeding 100 K$. Providing for a 2014 turnover

of 495K$ and above 20% net margin, we use this market as a springboard, giving our young network a solid foundation to propel it to new heights.

Tactus is an affiliate within **SENSORICA**, which is an open, decentralized, and self-organizing *value network*, defined by a concentration of interests in sensing and sensemaking technology. Tactus is also very active in designing and developing the SENSORICA value network.

SENSORICA can be seen as an open network for design, research, and development. Tactus considers it as a pipeline of innovation and design. SENSORICA brings together researchers and designers with producers/manufacturers. In that sense, Tactus considers SENSORICA as a network of suppliers and manufacturers.

The role of Tactus within SENSORICA is to offer an understanding of specific segments of the market, to channel activity within the network towards the creation of solutions to problems/needs perceived within these market segments, and to insure the transfer of these solutions towards the consumer.

Products, markets and sales

Tactus specializes in sensing applied to physiology, pharmaceuticals, robotics and medical devices. At this moment, Tactus drives commercialization efforts of the *Mosquito displacement/force sensor* (see also project page). The first market segment targeted is ***research instruments***, and more specifically its niche in ***physiology***. Under Tactus' influence, the *Mosquito Scientific Instrument* was designed around the *Mosquito displacement/force sensor*. This instrument will help researchers in academia and in private labs to study biomechanical properties of various biological systems, from the tissue level to the sub-cellular level.

The Mosquito Scientific Instrument is now being installed at Montreal Heart Institute (affiliated with University of Montreal, in Montreal, Canada) and at Royal Victoria Hospital (affiliated with McGill University, in Montreal Canada) for testing and characterization. These

projects will move the Mosquito Scientific Instrument from the prototype phase to the product phase, and will make it ready for commercialization during the fall of 2012. Until the end of this year (2012), sales of this product alone, in the physiology niche market, are expected to mount to 30K .

Tactus is also very active in opening new markets for the Mosquito sensor, in pharmaceutical research, robotics, and medical device. The penetration of these markets is expected in 2013, 2014 and 2015 respectively. We project sales of 225K in 2013, 495K in 2014 and 670K in 2015, from this product alone, in all these markets combined.

The Mosquito project has generated other spin-off products that can be commercialized by Tactus, as well as by other SENSORICA affiliates. See entire list of products and services here.

Costs and funding for the next year (Sept 2012 to August 2013)

Costs	**$ (CAD)**	**Funding**	**$ (CAD)**
capital assets: lab and prod. equipment	$40,000.00	cash advance	$8,955.00
inventory: 3 Mosquitos for demos and trade-shows	$9,000.00	STA (Tiberius)	$20,000.00
conference fees and travel	$7,000.00	trade show grant (MDEIE)	$3,500.00
local travel expenses	$3,230.00	grant - fondation du maire	$10,000.00
web infrastructure: website,...	$2,000.00	grant CQE (Loto Quebec)	$5,000.00
salaries	$66,325.00	loan - SIJ	$90,000.00
insurance	$2,400.00		
rent	$7,500.00		
TOTAL	**$137,455.00**	**TOTAL**	**$137,455.00**

Past funding (before Sept 2012)

Tactus, in collaboration with other SENSORICA members have raised funding for the development of the Mosquito Scientific System, a total of $100,742.00. Note that only a portion of these funds are used by Tactus.

Source	Sum	Date
CDEC Rosemont (Transf. and prod. first prize)	$10,000.00	3/9/2012
CQE Montreal final (Innovation first prize)	$2,500.00	5/1/2012
ENGAGE (Philippe Comtois)	$23,242.00	5/14/2012
Fondation du maire	$10,000.00	5/14/2012
STA (Tiberius)	$20,000.00	6/18/2012
PJE(Jonathan)	$20,000.00	6/28/2012
TOTAL	**$85,742.00**	

Contributions to the Mosquito Scientific Instrument project as of Sept 02, 2012.

The Mosquito Scientific Instrument project has costed in total $62.034.14, including time, financial and material contributions. Tactus has contributed to the development of the Mosquito Scientific Instrument project 39.09%. All other SENSORICA members combined have contributed 60.09%. The 39.09% contribution of Tactus was split into 84.69% in time and 15.31 % in cash. Tactus has made no material contributions for this project.

Contributor	Total time contribution[1]	Total material contribution	Total financial contribution	Total tangible contribution[1,2]
TOTAL	1,596.20	$375.00	$5,792.14	$62,034.14
%	90.06%	0.60%	9.34%	
Only Tactus	630.45	$0.00	$2,279.41	$24,345.16
%	90.64%	0.00%	9.36%	39.24%
All Others	965.75	$375.00	$3,512.73	$37,688.98
%	89.68%	0.99%	9.32%	60.76%

Assumptions for this table:

1. an average of 35$/hour was used to calculate the Total value contributed.
2. the calculation algorithm works by inclusion, all projects that are sub-project of the Mosquito project, according to the Back Office Catalog are counted for, with the

same weight.

TABLE OF CONTENTS

1 PLANNING AND GENERAL MANAGEMENT

1.1 Mission

Tactus Scientific Inc. designs innovative and high quality detection instruments for the scientific, industrial, and medical sectors.

SENSORICA is committed to the design and deployment of intelligent, collaborative, democratic and open sensing and sensemaking systems, which allow us and our communities to optimize interactions with our physical environment, to realize our full human potential.

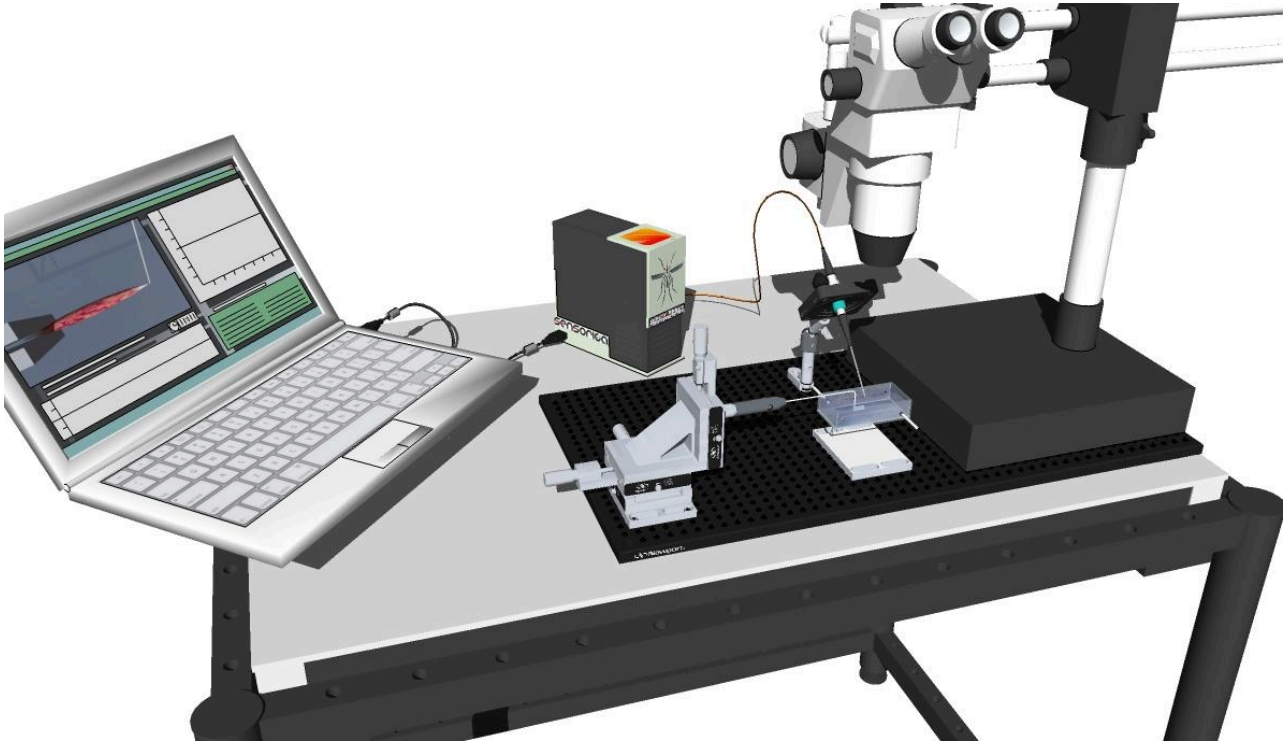
1.2 Offer

Tactus Scientific Inc. offers integrated solutions for measuring and characterizing dynamic biomechanical properties of biological systems, from organs to sub-cellular structures. The *Mosquito Scientific Instrument System* (Mosquito I, Phase I) is a scientific grade instrument used in physiological and medical studies. Different types of transducers can be included with this system.

- The *Mosquito joint-type transducer* (currently in **optimization** phase)
- The *Mosquito poking transducer* (currently in design phase)
- The *Mosquito intrinsic transducer* (currently in design phase)
- The *Mosquito constriction transducer* (currently in design phase)
- The *Mosquito evanescent wave transducer* (currently in conceptualization phase)
- The *Mosquito radial transducer* (currently in conceptualization phase)

The system is also provided with all necessary components for sample manipulation, a container for physiological media in which experiments are performed, a visualization system, and software for data acquisition, visualization, conditioning and analysis.

3D graphical representation of the Mosquito Scientific Instrument System



3D graphical representation of the Mosquito displacement/force sensor

Technical and operational advantages

- ultra-small transducerm(diameter <125 microns)
- virtually unlimited length of delivery fiber
- high sensitivity (<1 um and 1 microN)
- wide range of forces to measure (>200 microN)
- high temporal resolution (us-ms)

- electronics has small footprint
- robust, user friendly and high throughput
- insensitive to magnetic fields
- material can be plastic or glass to accommodate attachment to various surfaces
- open software [modular, customizable, free updates]
- available expertise for installation, training and service

See Mosquito I description document [NOTE: this document will be included in Annex]

Technology flyer document [NOTE: include in appendix]

Mosquito II

Will be more tightly integrated with other laboratory experiment (eg pump, micromanipulators).

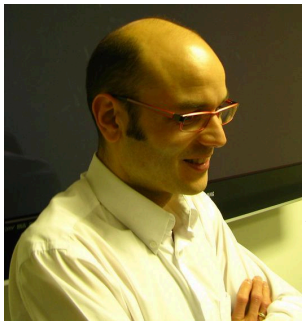
Mosquito III

Improved sensitivity by a factor of 10, thanks to fiber optics developed by Dr. Skorobogatiy from École Polytechnique de Montreal. The development cost will be partially funded by NSERC (grant ENGAGE). This will allow more accurate measurements with optical fiber-based transducers less than 50 microns in diameter. The Mosquito III will also be connected to the Internet. This will allow remote control of the device in the spirit of real-time remote collaboration. It will also allow remote monitoring of performance in order to improve service, to prevent potential system failures, to remotely solve software failures or make updates to the software, and to know when the client needs to change the the tip of the optical fiber.

SENSORICA offers open sensing and sensemaking solutions and covers multiple market domains: biomedical, robotics/industrial, medical instruments, sports, as well as agriculture and food.

1.3 Promoters and business team

François Bergeron



Graduated in 2006 with a PhD in Nuclear Medicine and Radiobiology, University of Sherbrooke, François Bergeron has experience in academic and industrial research, in the fields of life sciences and health. Following his postdoctoral studies at Sherbrooke University and this Research Engineer position at CEA in Grenoble, France, he decided to add business training to his scientific experience. During his MBA at HEC Montreal, he enriched his business skills in performing consulting assignments in market development with the Canadian industry. Convinced that the future of our society depends on innovation, Francois brings to Tactus expertise in science, knowledge management and its willingness to work for the development of an innovative company. Fan of cold-calls and direct sales, it will be primarily responsible for the sale of Mosquitos.

Ivan Pavlov

Co-inventor of the Mosquito sensor with Tiberius Branstaviceanu, Ivan Pavlov holds a bachelor's and a master's degree in human and animal physiology (2005). He has extensive expertise in the development and testing of lab equipment and has done research on muscle biomechanics. Ivan also has industry experience as a graphic designer. Ivan had worked with Professor Dilson Rassier at McGill University, as a research assistant. Pr. Rassier is a world leader in muscle physiology. Ivan has also participated with Tiberius Brastaviceanu in the development of the **Penguin**, a state of the art instrument used in physiology, which constitutes a major advance in this field, before the invention of Mosquito. Scientific publications describing the Penguin have established the reputation of Ivan and Tiberius in the academic scientific community, which is adding to the reputation of Scientific Tactus in this same environment.

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1.3.1 Division of responsibilities

Name	Roles
Francois Bergeron	sales (70% of the time), management (20%), manufacturing assistance devices (10% - the first year, then a technician takes over)
Ivan Pavlov	business development for the company and R & D (40%). Years 2 and 3 after sales service (60% of the time), R & D (40%)
***	***
***	***

1.3.2 External resources

Tactus Scientific Inc. has developed its own network.

Research and Development

- **Massabki Maroun**, opto-electronics engineer, director of business development at Optech, a network of CEGEPs working with Tactus Scientific on the development of the Mosquito Scientific Instrument and other biomedical devices.
- **Maksim Skorobogatiy** researcher specializing in fiber optic Polytechnic, working with Tactus Scientific for the development of new optical fibers.
- **Louis Renaud**, biomedical engineer and former entrepreneur, Industrial Technology Advisor (ITA) NRC-IRAP. Tips for developing markets, sharing its network, access to finance IRAP.
- **Dilson Rassier**, researcher of biomechanics at McGill. Brings market knowledge of scientific instruments and applications in physiology.

Finance and Accounting

- **Alexander Chesnot**, Auditor at National Bank, more than 10 years of experience in accounting and financial management consulting.

Sales and Marketing

- **Christian Wopperer**, business development for technology companies in Business Innovative Centre of Montreal (CEMI).
- **Robert Deziel**, business development at Micropharma, pharmaceuticals.
- **Alain Ajamian**, director at CCG, business development, pharmaceutical et life sciences products.

Strategy

- **Incubator** (CTS Campus Technology Health): provides funding to find and expand the business network.
- **Daniel Bazan**, the Rosemont-Petite-Patrie. Management Consulting.
- **Jean-Marc Bigras**, civil engineer, over 20 years experience in management of manufacturing at Quebecor.
- **Denis Karegeya**, Fondation du maire, management consultant
- **Lydia Bukkfalvi**, Management Consulting, Centre d'Entrpreneurship HEC-Poly-UdeM
- **Selmen Horchani**, SAJE/STA, open enterprise, open innovation consultant

Legal

- **Azemard Estelle**, lawyer and director of IT company. Experience in legal advice.

Tactus Scientific Inc is an affiliate within SENSORICA value network.

SENSORICA is composed of individuals, organizations and other value networks (see network affiliates). Tactus Scientific Inc., which is a classic organization, a corporation, is an affiliate and an ***active contributor*** within SENSORICA (see Organizational structure document). There is reciprocity within SENSORICA: other affiliates contribute to the success of Tactus, and Tactus contributes to the success of other SENSORICA affiliates. It is important to understand how human resources are allocated within SENSORICA.

About roles within SENSORICA

SENSORICA is built on three pillars: a **value system**, a **reputation system** and a **role system**. The ***value accounting system*** records and evaluates every affiliate's contribution. The ***role system*** incites voluntary subordination and it is important for self-organization. The ***reputation system*** incentivizes *good* behavior within the network and helps to focus attention. It plays an important role in the creation and the flow of value within the network by filtering participants for adequate tasks. The value, reputation and role systems interact with each other.

The **reputation** of each affiliate is the result of peer-evaluation, by all other affiliates, taking into consideration the role played. The evaluation focuses on performance, behaviour, drive, etc. The reputation is connected to the value system and affects the ability of an affiliate to extract value from the network. The **role** of affiliates within the network is emergent (not assigned). After more than one year of existence of our network, it turns out that affiliates optimize their involvement/participation by choosing roles that match their individual profile (match their skills and other resources they can offer/share). The link between role, reputation and value puts pressure on affiliates to chose to participate in roles that are more likely to result in a higher evaluation score, i.e. to chose appropriate roles, which in the end leads to a better allocation of resources. We can say with confidence that all our affiliates have acted rationally in choosing their roles within the network.

NOTE: These roles were not assigned, they emerged (over time) as a pattern of activity from the history of involvement of every affiliate.

Role and Responsibility	**SENSORICA affiliates**
Business development	Francois Bergeron, Steve Bosserman, Tiberius Brastaviceanu
Research & Development	Tiberius Brastaviceanu, Jonathan Olesik, Ivan Pavlov (Tactus), Optical Fiber Systems, Philippe Comtois,
Product Design	Daniel Brastaviceanu, Ivan Pavlov
Production	Optical Fiber Systems
Value network building	Kurt Leitner, Steve Bosserman, Tiberius Brastaviceanu, Bob Haugen
Support services	Emilly Brender, Francois Bergeron

Outreach	Tiberius Brastaviceanu, Steve Bosserman

1.4 Corporate structure

1.4.1 Legal form of the enterprise

Tactus Scientific Inc. is a corporation registered in Quebec, Canada, in May 2011.

(insert copy of documents in annexe)

SENSORICA is a network, a non-registered association supported by ACES/CAKE, a non-for-profit registered in Quebec, Canada. It can be understood as a *open space* for cooperation; a loose analogy would be as a flea market. Is can also be understood as an infrastructure, or a coherent set of tools to support sharing and cooperation for the creation and the distribution of value; a loose analogy would be all the physical objects and tools used in a flea market. SENSORICA is a self-organizing network. It is meant to be very dynamic. Its projects are meant to become swarms. SENSORICA operates on the long tail of contributions, therefore the relation of affiliation (between all participants) must be very flexible in order to allow a large number of affiliates to contribute in large and small amounts. It is also meant to be very adaptable. Framing it within a legal structure would make it stiff, not scalable, less adaptable.

1.4.2 Division of ownership

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SENSORICA uses ***fluid equity***, i.e. the percentage of surplus (to be redistributed) is adjusted in real time for each affiliate, according to the value system. The equity reflects the cumulative value (different forms of capital amalgamated together: time, materials, financial,

social, etc.) one affiliate has contributed with to a particular project.

The value accounting system records and displays in real time every affiliates contribution to different projects.

[a graphs of equity will be included in the final version (form this spreadsheet) with the date, because they are changing every day]

1.5 Company objectives

SMART: specific, measurable, achievable, realistic and time-bound)

	Sales and Marketing	Operating	Financial projections
2012	**Mosquito I marketing campaign:** - diffusion of 1 white paper (by Nov) - number of local potential customers visited: 1 per week, starting in November, 8 clients in 2012 - number of Mosquito sales: 2 (Mosquito I) - front-shop website in operation (before Dec)	**technological maturation:** - optical fiber coating (before year ends) - constriction transducer (before year ends)	**sales (Mosquito only):** - 30,000 $ before end of the year
		product development: - robotic hand, hockey stick, flow sensors prototypes	**net benefice:** - -7,000 $ (negative in 2012)
		supply chain: - securing at least 2 CNC shops (by end Sept) - securing at least 2 opto-electronics supliers (by Oct)	**loan:** - SIJ: 90,000$ (by Oct) - Prêt à Entreprendre: 90,000$ (by Oct)
		manufacturing: - being able to manufacture at least 2 Mosquito I per month, meeting all quality specifications (before Dec) - being able to manufacture at least 60 transducers per month, meeting all quality requirements (before Dec)	**grant:** - ENGAGE with Maksim 25,000$ (by Nov)
		infrastructure: - scalable value accounting system - materials management system	**strategic alliances:** - collaboration with Maksim Skorobogatiy (École Polytechnique de Montreal), already started, needs to consolidate after ENGAGE grant

			- collaboration with CEGEP Andre Laurendeau (by end of Sept)
2013	**Mosquito II marketing campaign:** - diffusion of 1 white paper (by July) - market development: exportations in the US (50%) and Europe (10%) - number of cold calls per day: 10 - number of Mosquito sales: 13, including sales in the pharmaceutical market: 4	**production and R&D capacity:** - match expected demand for 2014	**sales (Mosquito I and II):** - 225,000$
		acquisition of tools and equipment: - investments of 64,000$ in production and research tools ----- CNC (prototyping and production) ----- 3D printer (prototyping and production) ----- optic bench ----- lasers, splicer ----- chemical workspace	**net benefice:** - 52,000$
		technological development: - intrinsic transducer fabrication (depends on collaboration with Maksim, expected by Feb)	**grant:** - NRC-IRAP: 90,000$ (matches one loan we have) - Team grant FQRNT (Maksime and Philippe)
		compatibility: - redesign the transducer to be compatible with its use in biotech pharma	**strategic alliances:** - team grant part 2 (FQRNT): 50,000$
		space improvements: - doubling working surface	**strategic alliances:** - Canadian Space Agency: 50,000$ co-development contract - CPCI purchase of 2 mature prototypes
		human resources: - hiring a secretary	**cost reduction:** - Mosquito I cost reduction from 20 % to 10% - Mosquito II cost reduction from 20 % to 10%
		product development: - one medical device (catheter) and 2 flow sensors (gas and liquid)	

		manufacturing: - being able to manufacture at least 4 Mosquito I per month, meeting all quality specifications - being able to manufacture at least 2 Mosquito II per month, meeting all quality specifications - being able to manufacture at least 110 transducers per month, meeting all quality requirements	
2014	Mosquito III marketing campaign: - diffusion of 1 white paper - number of cold calls per day: 20 - number of Mosquito sales: 23	**production and R&D capacity:** - match demand expected for 2015	**sales:** - 495,000$
		acquisition of tools and equipment: - investments of 60,000$ in production and research tools	**net benefice:** - 113,000$
		compatibility: - redesign the transducer to be compatible with its use in medical applications and industrial applications	**strategic alliances:** - team grant (FQRNT): 50,000$
		human resources: - hiring 1 salesman and 1 mechanical engineer	**strategic alliances:** - one distributor in the US and one in Europe
		manufacturing: - being able to manufacture at least 8 Mosquito I per month, meeting all quality specifications - being able to manufacture at least 8 Mosquito II per month, meeting all quality specifications - being able to manufacture at least 8 Mosquito III per month, meeting all quality specifications - being able to manufacture at least 200 transducers per month, meeting all quality requirements	**cost reduction:** - Mosquito III cost reduction from 20% to 15%
		compliance: - FDA approvals for medical devices	

Open spreadsheet

1.6 Timetable of activities

See Appendices.

2 MARKET STUDY

2.1 Secondary data

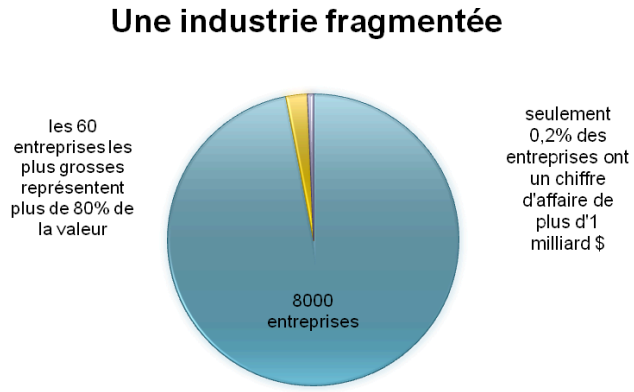
This section concerns the ***Scientific Instrument System*** as well as **other applications of the *Mosquito force displacement/force sensor***. We will present three main market sectors, in the same order in which we will approach them.

Note: this analysis was performed according to our market knowledge (internal data - most of us have experience in laboratory research), based on data found mainly in external databases like Orbis, Market Share Reporter, Gale (Highbeam Business) and from the annual reports of different companies cited in the text.

2.1.1 Scientific laboratory equipment sector

This is the first market sector we will address with the *Mosquito Scientific System*, because of our collective knowledge and know how and because of our reach, through our professional network. The *Mosquito displacement/force sensor* was actually designed for this segment, to be integrated within the *Mosquito Scientific System*.

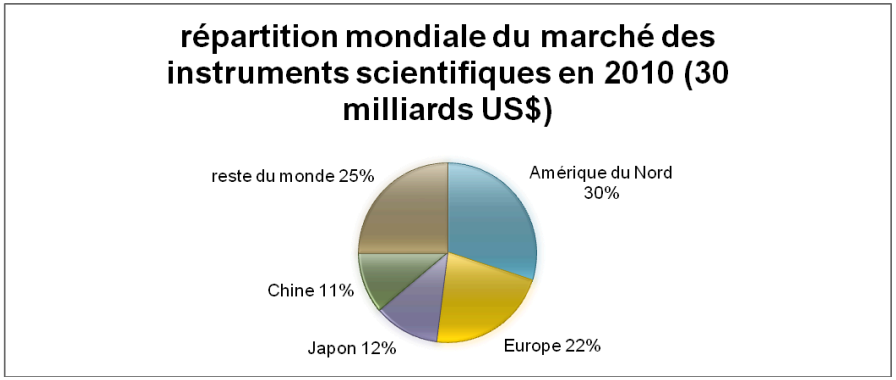
The companies operating in this industry develop, manufacture and sell precision scientific instruments, used mainly in academic research laboratories, hospitals, pharmaceutical and manufacturing plants of high technology products. This industry is international.



NOTE: change this figure to English

The scientific instruments sector has generated worldwide revenues of over $ 30 billion in 2010, from which about one third is in the United States. This sector includes close to 8000 companies but is dominated by a handful of very large innovative companies. Only 16 companies out of 8000 (around 0.2%) had a turnover of over 1 billion USD, the top five of these companies alone accounts for one third of the market, and the 60 largest companies weigh more than 80% of the total value of this industry.

This industry is a fragmented, competitive, with high pressure for innovation and a high standard for entry. It is also characterized by high margins, it allows a multitude of small and medium businesses to prosper by being highly specialized (niche markets).



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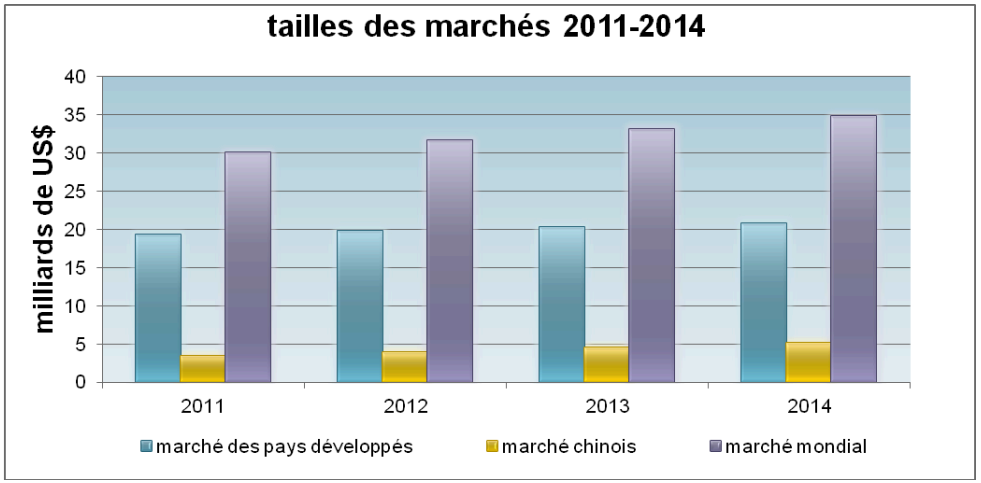

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In developed countries, it is expected that the growth of this market does not exceed GDP growth (an increase from 2% to 3%) for 2011-2014[1]. The growth of this market is very well correlated with public and private spending on R&D, and generally follows the GDP in developed countries. However, the prospects of investment in R&D in Asian countries (mainly China but also Korea) are much more attractive, where growth budgets for R&D will be 15 to 20% per annum in the next 5 years[2]. In total, the growth of Asian R&D spending could lead the growth of the world market by 5 to 6% per annum in the coming years.

Key success factors

- Large sales force (1/3 of employees are in sales and marketing in large companies).
- Promotion: publications, trade-shows/ international scientific conferences, influence of opinion leaders.
- Significant internal R&D (R&D budget 11% of sales) and/or acquisitions and/or collaboration with academic researchers.
- Very high quality for materials and services to justify the high prices.

[1] http://www.marketresearch.com/RNCOS-v3175/Analytical-Instruments-Forecast-6429916/
[2] http://www.marketing-chine.com/analyse-marketing/la-chine-le-laboratoire-du-monde

Factors affecting demand

- R&D spending in public research institutions (political decisions)
- Increasing research for new drugs by pharmaceutical companies
- Needs to test the new industrial products
- Demand for more efficient equipment and for improved the productivity of research laboratories
- Risks to public health / environmental concerns
- Need for industries to comply with new environmental regulations

Trends and market developments

- Stable market in developed countries, small but steady growth in international markets. attributed mainly to Asia.
- Offshore production to lower-cost labor (Mexico and Asia) for simple devices.
- Demand for versatile and user friendly products.
- Closer cooperation with the academic world.
- Mergers and acquisitions to fuel the need for innovation and cost reduction.

Sub-sector analysis : scientific instrumentation in the field of physiology (Phase I)

Tactus is first positioning itself for the scientific research in physiology, which includes medical research in research labs and in hospitals (clinical diagnosis). This is the segment in which Tactus (and other SENSORICA members) have a strong expertise and a large social capital (reach through our social network). The *Mosquito displacement/force sensor* is already meeting the needs in this segment.

Who are the clients ?

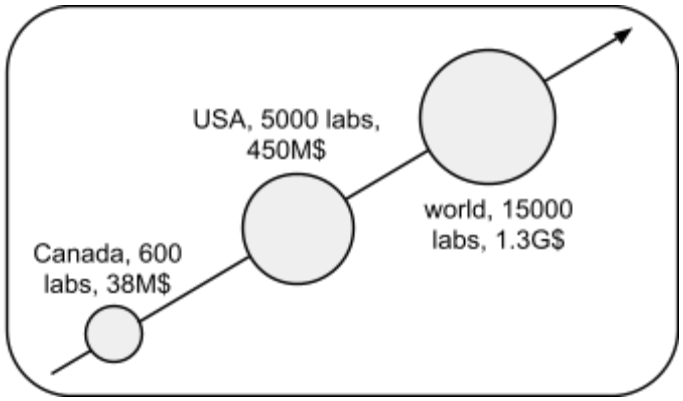
Targeted customers in this segments are researchers, professors and medical researchers. They work in universities, research institutes and university hospitals.

Buying behaviour

Some of us have been buyers, working in academic research labs. We know the purchasing behavior of researchers. They often want the best quality and better services at any cost, buying peace of mind. They are therefore very committed to the reputation of a brand and tend to remain loyal. The high switching costs also encourage them to be loyal. They are also heavily influenced by leaders of opinion (that is to say, the most renowned researchers in their field) and can even switch brands to buy the same equipment as they use.

They are primarily motivated by productivity gains offered by our Mosquito, which will accelerate their research in order to publish more, and thus to increase their chances of being funded. They are also concerned by the versatility offered by the Mosquito, which allows them to push their experiments further than with other available devices (measuring a broader spectrum of contraction force, from a single cell to a small piece or tissue).

How many are they?



Labs in physiology in the entire world and market sizes for scientirfic instruments used in physiologie et biophysics

In Canada, the number of university research labs in biology (biology and biomedical research) is estimated at 10,250[3], from a total of 25 000 research labs. Of these 10,250 laboratories, 5% are physiology labs[4], which gives about 500 labs across the country. These 500 laboratories are our Canadian market segment, plus a portion of 10,250 biology labs that perform physiological experiments. Only 1% of 10,250 labs represents 100 additional potential customers, bringing the total to about 600 Canadian labs.

Globally, the number of physiology laboratories is estimated at 15,000.

Market potential

The Canadian public research budget in physiology and biophysics was estimated at $380 million in 2010[5]. We can safely estimate[6] that

[3] Statistiques Canada – Statistiques des sciences No 88-001-X

[4] Publications canadiennes-1996-2005, CRSNG

[5] Publications canadiennes-1996-2005, CRSNG

[6] Annual expenditures in lab equipment are on average $80K per researcher. Multiplied by 500 labs in Canada, gives a budget comparable to the

10% of this budget is spent on purchases of lab equipment, which is is $38M. This represents the size of the Canadian market in physiology research. In all, and given the part of Canadian research in the world (3% in 2010), the world market segment for research instruments in physiology is estimated at $ 1.3 billion.

We expect to sell 2 Mosquitos I ($ 15,000) in North America until December 2012, using the method "of market share", expecting hardware renewal every 5 years, and assuming that 1% of the 5600 North American laboratories who renew their equipment buy a Mosquito. These sales will generate a turnover of $ 30 000 in 2012.

30 000 $ in 2012

Another method of calculation: no advertising and simply by word-of-mouth, we already have two clients/testers. Three other parties are interested as soon as the first two customers, who are testers, have demonstrated the qualities of the Mosquito. The goal to sell 2 units in 2012 seems realistic.

year	real number of clients	% of market	total number of sold units	Mosquito I	Mosquito II	Mosquito III	real potential market in $ (nb clients. x % estimated x price)
2012	5600	1.00%	2	2	0	0	$30,000.00
2013	5600	1.00%	13	10	3	0	$225,000.00
2014	5600	2.40%	23	10	11	2	$495,000.00
2015	5600	3.50%	26	6	12	8	$670,000.00

open spreadsheet

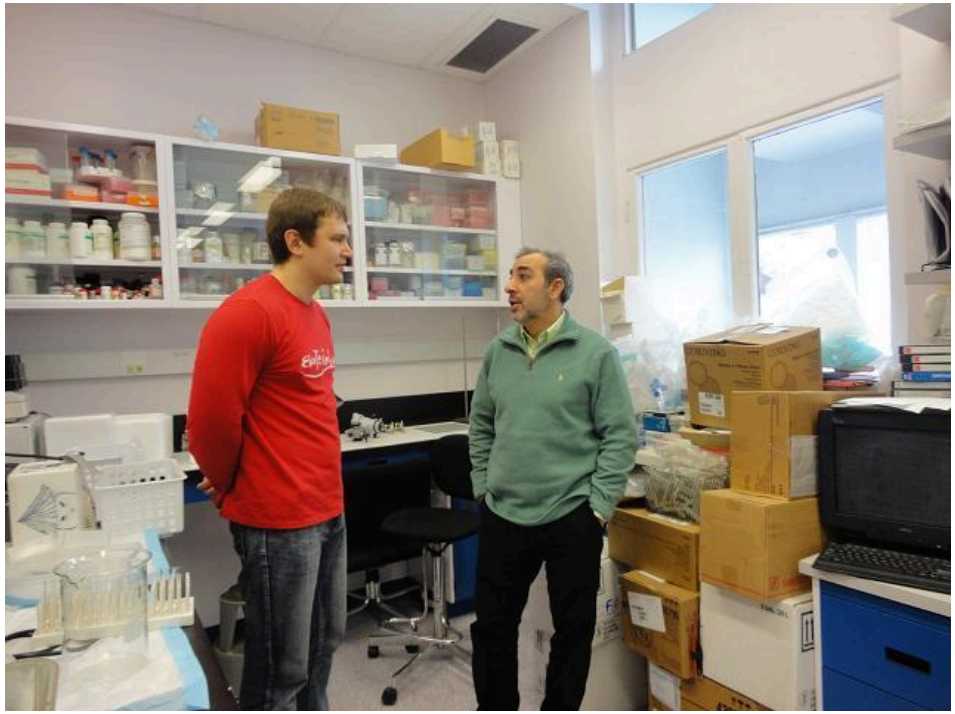
Details on our first customer/tester

previous calculation.

The Mosquito has attracted the attention of Professor Sabah Hussain as early as April 2011. Collaborating with Dilson Rassier's lab, where Ivan and Tiberius worked, he had heard about the invention of the Mosquito. Dr. Sabah Hussain is a physician and researcher at the Royal Victoria Hospital in Montreal. He is active in research on cardiovascular diseases and intensive care related to these diseases. Dr. Hussain Research already works with conventional instruments used in research in physiology. He is always looking for superior performances and he seems very eager to test the Mosquito, which is thinks would make an excellent alternative. SENSORICA members will install a Mosquito in his laboratory during the month of September 2012. The research team of Dr. Hussain will test the unit and suggest improvements.

Dr. Hussain will pay buy the Mosquito at cost price, parts and labor needed for manufacturing as well as for the installation and training. Although the immediate financial benefit is minimal in this operation, SENSORICA obtains a series of advantages:

- Testing of the Mosquito in a recognized physiology laboratory,
- Publicise the Mosquito to 650 other researchers from McGill via the internal newsletter,
- Publication of results obtained with the Mosquito, which explicitly mention the name of the device and of SENSORICA (and Tactus Scientific Inc.). Publications are important marketing tools and serve to connect our product with leaders of opinions.
- Access to a clinical environment, link with the diagnostics industry and intensive care.



Ivan with Dr. Hussain in his laboratory

Our first partner/tester, Dr. Hussain, MD and researcher at McGill University, is a specialist in cardiovascular disease. His team needs to accurately measure the contraction of heart cells under different experimental conditions in order to develop a treatment against sepsis, the infection is widespread in the human body, particularly damaging when it touches the heart. However, existing devices are fragile and difficult to use. The Mosquito will allow Dr. Hussain's team to easily measure the contraction of heart cells, routinely. This team will deduce how cells respond to new experimental treatments, and may help improve patients' lives!

Dr Hussain has already wrote a letter of support for *Tactus Scientific* (NOTE: include in Annexe).

Details on our second partner/tester

Professor Philippe Comtois of Montreal Heart Institute, in collaboration with a medical team from the same institute, is looking for a device to test the stiffness of cardiac arrest patients with vascular brain injury (stroke), in order to develop a diagnostic method of stroke prevention. We have obtained an ENGAGE/NSERC (~24,000$) grant with Dr Comtois to purchase Mosquito parts and to test it for 6 months. The tests will be complementary to those offered by Dr. Hussain because they cover a different scientific application. They will show to the scientific community that the Mosquito is useful for diagnosing heart disease.

Dr. Philippe Comtois, our colleague and member of SENSORICA, is a researcher at the Montreal Heart Institute. He seeks a device that can easily measure the contraction of heart cells, in order to develop a protocol to determine the type of surgery best suited for patients who experience cardiac problems.

From left to right: François Bergeron, James Elber Duverger (student), Tiberius Brastaviceanu, Ivan Pavlov and Dr. Philippe Comtois

Other potential clients

Dr. Anne-Marie Lauzon from Meakins-Christie Laboratories, McGill University, has manifested interest for the Mosquito[7]. She is now waiting for the Mosquito to be validated by the scientific community before she commits to buy one. This validation will be performed by our customers/testers/partners. The first positive results obtained by Dr Hussain and Dr Comtois will be available in Autumn 2012.

Recently Ivan Pavlov had established a connection with Urals State Medical Academy (http://www.usma.ru/), Professor Felix Blyakhman, Ph.D, head of Biomedical Physics and Engineering Department.

Competition: academic market

In the scientific instrumentation market, the main competitors are entrenched and deliver reliable products that have long been recognized by researchers. However, they are also perceived by customers as little innovative and overcharging for their products. Moreover, these companies are poorly connected with the medical market, which is lucrative but requires special approvals.

Characteristics of the direct competition

	Aurora Scientific	World Precision Instruments	Danish Myo Tech	Kerr Scientific
quality of products	average (fragility of designs)	good but not very innovative	good but not very innovative	
quality of services	good	average in Canada because	average in Canada because lack of	

[7] See announcement on SENSORICA website

		lack of representives	representives	
product line	large	large	large	small (only one product)
clients	international, academic, industrial	international, academic, industrial	international, academic, industrial	
distribution	international, 2 offices (Ontario and Ireland) + distributor in Japon	international	international	
price	high prices	high prices	high prices	average- low
marketing tactics	congrès	congrès	congrès	
main strength	well entrenched in physiology and biophysics labs	well entrenched in Europe	the largest line of products for the physiology market	good design
main weakness	high prices, fragility of designs	not innovative	not innovative	limited use, for a precise application

See more criteria to complete the analysis

Inspirational competitor(s)

Kerr Scientific: very nice product design, well-focused, small and lean company, nicely presented.

Conclusion

Tactus / SENSORICA offers an excellent product, one that is more robust, handy, easy to use (plug and play), having fewer moving parts and fewer parameters to adjust. Moreover, the Mosquito optical detector doesn't interfere with electromagnetic radiation and can function under medical imaging.

From our own experience in the field, the Mosquito produces a higher quality information about the sample and saves a lot of time for experimentation. This translates into increased productivity for researchers and their students.

2.1.2 The pharmaceutical and biotech sectors (Phase II)

We are just starting to explore this market. Our product, which is mostly designed for applications in physiology, can be easily and rapidly

customized for the biotech and pharma segments.

This section is underdeveloped, taking into consideration the fact that our energy goes in developing the first market, Phase I.

Main sources of information used: discussions with people we know from this sector and the following databases:

- Canadian Life Sciences database
- Industry Canada
- Investissement Québec
- Montreal in vivo
- Ernst & Young

The most common causes of death in the world are, in order of importance, cardiovascular disease, cancer and diabetes. These diseases are also the subject of the biggest spending on pharmaceutical research. They have a significant impact on the integrity of biological tissues and the Mosquito is particularly suitable for the development of drugs that will combat them. We anticipate that the Mosquito will meet important needs in the segment of the pharmaceutical and biotechnology research.

The market for pharmaceutical and biotechnology R&D is the largest R&D market in the world, with a volume of 110$ billion in 2008. In the United States, in 2010, this sector included about 1700 companies that spent just over 17$ billion in R&D.

In Canada, although R&D spending in this industry has diminished after 2007, the pharmaceutical and biotechnology industry ranks second (after the information technology) in terms of R&D activity, with expenditures that totaled 200$ million dollars in 2009. Ontario and Quebec are the two provinces most active in research with 47% and 43% of spending by private companies. The sector employs more than 2,000 researchers in Canada in almost 300 companies. Over half of these companies are located in Quebec and over 30 in the Montreal area. The majority of these companies are active in research for cardiovascular diseases, cancer and diabetes[8].

[8] Montreal in vivo : http://www.montreal-invivo.com/fr/

Table : key numbers in the pharma/biotech sector

	world	US	Europe	Canada	Quebec (estimations)
number of companies	>5000	>1700	>1800	>300	>75
R&D spending in 2010 (G$)	110	17	3,4	0,2	>0,1
number of employees in R&D	100 000 (estimation)	60 000	25 000	2 000	500

Sales potential

70 000 $ in 2013

The North American sector for pharma/biotech research comprises over 2000 companies. As a first approximation, we estimate that over 60% (so 1200) of these companies are potential customers of SENSORICA (and its members), since they are active in research for cardiovascular disease, diabetes and cancer.

Assuming a hardware renewal every 5 years, and assuming that 1% of the 2000 North American labs who renew their equipment buy a Mosquito, we can predict the sale of four devices per year in the second year of operation (2013). These sales will be shared between the Mosquito I (15,000$) and the Mosquito II (20,000$), which will generate a contribution to turnover of 70,000$ in 2013.

	real nb. of clients	estimated %	Nb of units sold	potential market ($) (nb ind. x % estimation x price)
2013	1200	1.5%	4	70 000$
2014	1200	2%	6	105 000$

Growth

Similarly to what was predicted in the academic market, slow growth of investment in R&D is expected in developed countries (growth around GDP growth, i.e. 2-3%). Also, more sustained growth is expected in emerging markets, including Brazil and China.

Conclusion - Impact on Tactus/SENSORICA

In the scientific instrumentation market the main competitors are entrenched and deliver reliable products that have long been recognized by researchers. However, they are also perceived by customers as little innovative and overcharging for their products. Moreover, these companies are poorly connected with the medical market, which is lucrative but requires special approvals.

2.1.3 General conclusion on market study for Phases I and II

Given our estimates, we predict sales of 29 Mosquitos in North America from 2014 in academic and pharmaceutical markets, with market shares of 3% and 1.5% respectively. Sales growth will be supported by building our sales and service sub-networks in January 2014.

Sales estimates for the Mosquito

	2012	2013	2014
academic market	2	13	23
pharma market	-	4	6
total	2	17	29

2.1.4 Robotics and automation industry sector (Phase III)

We are just starting to explore this market segment. Recently we have straighten our relations with a few local (Quebec, Canada) players in robotics (RobotiQ, Kinova) and surgery robotics (Neurotouch), who help us customize our sensors to better suite the needs in this industry. It seems that our force is in micromanipulation, pick and place applications of very small and fragile objects (see project page).

This section is underdeveloped, taking into consideration the fact that our energy goes in developing the first market, Phase I.

The manufacturing industry is in need of automation and therefore in need of sensing technology for displacement, force, pressures, in need of small, fast and accurate sensors. By offering a robust, fast and accurate force sensor, we anticipates that we'll be able to meet important needs in these industries.

The robotics and automation industry is a global industry with a size of 9G$. It is also a fragmented industry, with more than 200 manufacturers[9] with international presence. The biggest players are FANUC (Japan, 5.7G$ income), KUKA (Germany, 1.3G€ in revenues), ABB (Sweden and Switzerland, 32G$ of income but only 8% in robotics) and Yaskawa Motoman (Japan, 3.9G$ with 30% in robotics).

The main buyers of robots are in Asia, where there are more than half of robots purchased in 2008 (mainly in Japan, Korea and China). Next is Europe with 31% of purchases (Germany, Italy, France mainly) and North America, with 15%.

This industry is divided in 3 principal segments:

- Industrial robots: for auto plants, electronics, rubber/plastic, in food processing and manufacturing of metal products,
- Professionals robots: surgical robots, defense/security/rescue, inspection, logistics/construction
- Domestic Robots: assistance for the disabled, cleaning robots and toy robots.

[9] http://www.therobotreport.com/index.php/industrial_robots/P100/

It is expected that this industry will experience an annual growth of over 15% in four years, thanks to the booming market for domestic robots and attractive growth segment of professional robots.

Key numbers[10]

segment	size in 2010	units sold (thousands) per year	expected size in 2014	yearly growth until 2014
industrial	4,7G$	>110	6 G$	+ 6 %
professional	3,3G$	>13	4 G$	+ 22%
domestic	1 G$	>1500	5,4 G$	+ 60%
total	**9 G$**	**>1600**	**15,4G$**	**+ 15%**

Key success factors to become a part (sensor/transducer) supplier

- Reliability
- Energetic autonomy
- Capacity for innovation
- Improved quality/price ratio

We anticipate that our technology will meet important needs for the robotics industry. Kinova, a Montréal-based manufacturer of robotic arms, expressed a keen interest in its technology, to give the sense of touch to their robotic devices. We are aware that the road is long

[10] World Robotics 2011

before we can penetrate this market. We intend to continue to meet with different players in this industrial sector. In June 2012 we also met with Robotiq (near Quebec city) to discuss applications of our optical fiber-based force sensing technology.

Quebec has several high-performance robotic companies and most international companies are also present here. Louis Renaud, from NRC, offered to put us in contact with some of these companies in robotics.

Competition – force, pressure and displacement detectors in this industry

The following table summarizes the advantages and disadvantages of some industrial sensors compared to ours ("+" means advantage and "-" indicates absence of a given characteristic or a weakness).

competitor	technology	technical advantages and inconveniences
Tactus/SENSORICA	optical fibre	+precision, +range +robustness, +size, -pressure detection on large surfaces
Honeywell	piezo	- precision, -size, -electromagnetic sensitivity
Samba	optical fibre	+precision, -range (impossible to detect displacement)
Opsens	optical fibre	+precision, can't measure lateral displacement
Luna innovation	optical fibre	+precision, can't measure lateral displacement
Piezo	piezo	-precision, -size, -electromagnetic sensitivity

2.1.5 Conclusions

Tactus/SENSORICA already has the means to succeed in the markets we target in Phase I and II. It is expected that these markets generate

a quick return. We'll leverage our success in Phases I and II in Phases III and IV.

2.2 Primary data

Direct survey of potential customers, we have put together a web form and we have already distributed it to a limited number of potential customers. Dat is still coming. See webpage.

2.3 SWOT analysis (strengths/weaknesses/opportunities/threats)

Strengths	Weaknesses
# Good potential for innovation (if critical mass is reached, hyperinnovative) # Low overhead (we share resources, we use unused capacity) # Open products (value for the customer, long life and continuity of products) # Global penetration (the network is global) # Ethical (no exploitation, can improve the brand) # Connected to a greater cause (a new p2p economy, the empowerment of the individual) # Motivating (related to members, helps innovation and production) # Within SENSORICA increasing capacity and acquisition of new technology goes through affiliation (network growth), which means very low front costs	# Losing markets because of copiers. # Manufacturing system needs to be setup and tested # Service system needs to be setup and tested # Penetrating markets already occupied # Educating the consumer to deal with a value network # Access to classical funding (incompatible with the classic command and control paradigm)
Opportunities	**Threats**
# Expand in other sensing branches. # Organic growth, almost unlimited if the infrastructure supports it. # Alternative funding - crowdfunding. # Attract high quality human resources independent, motivated and resourceful contributors. # Become the developmental focus of the p2p economy.	# From members: vandalism (bee aware before we reach a critical mas, put in place repair mechanisms), sabotage (competition can infiltrate and sacrifice themselves as members), cupidity # From competition: big corporations can attack us using IP protection, can copy and after sue us. Their market penetration is large and can do damage.

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2.3 Competitive advantage

Tactus / SENSORICA offers an excellent product, one that is more robust, handy, easy to use (plug and play), having fewer moving parts and fewer parameters to adjust. Moreover, the Mosquito optical detector doesn't interfere with electromagnetic radiation and can function under medical imaging. Furthermore, the Mosquito Scientific Instrument produces a higher quality information compared to other similar products, and it saves 50% of the time required for experimentation. This translates into increased productivity for researchers and their students.

The Mosquito hardware is open source, which allows greater freedom for customization. It is also a modular product, which makes it adaptable for a diverse field of applications and updatable with new features. The Mosquito runs on open source software, which is maintained by Tactus, members of SENSORICA as well as other users. The open source nature of the Mosquito nurtures a dynamic community around it, which provides more value to the customer. Users can rapidly find answers to their problems and can support each others.

The design and manufacturing process are transparent, which makes the Mosquito an ethical and sustainable product, because it is always under the scrutiny of its users.

2.4 Positioning

Tactus within its SENSORICA ecosystem has access to highly skilled engineers and scientists, which allows it to offer high end instrumentation, very well-suited for scientific research.

3 MARKETING PLAN

Sales objectives (Mosquitos in academia only)

number of Mosquitos	year
2	2012
13	2013
23	2014

open doc to make changes

Budget for sales and marketing

	2012	2013	2014
sales	$30,000	$225,000	$495,000
revenue for sales	$0	$48,000	$89,700
costs for conferences	$0	$7,000	$10,000
traveling	$0	$2,560	$3,240
promotional materials	$2,110	$2,000	$4,000
total budget sales and marketing	$2,110	$59,560	$106,940
% sales and marketing	7.03%	26.47%	21.60%

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The sales and marketing is expected to stabilize around 20% in 2014. In the beginning, Tactus/SENSORICA favors direct sales in Quebec, Ontario, Northeastern U.S.. Customers are visited in person at their laboratory. In parallel, we'll establish global distribution channels. Our marketing strategy is based on the visibility gained from test customers. Dr. Hussain Scientific makes Tactus known at McGill University. Dr. Comtois facilitates access to the University of Montreal. Professor Blyakhman opens doors for Tactus in the emerging Russian market.

Our technological competitive advantages (ease of use, robustness) will be put forward by using promotional materials (brochures, website), which will show the results obtained by all researchers using our Mosquito sensor. Researchers are very sensitive to the opinions of their peers.

3.1 Product strategy

Products designed by SENSORICA have very special characteristics. They are:

- **open**: there is no intellectual property behind any of our products, see Product Licensing.
- **perpetual**: i.e. not planned for obsolescence, modular, easily updated/improved, long life.
- **compatible**: all our products are built on open standards and are interoperable, forming an ecosystem of products, including also products made by other open communities.
- **ethical**: all our products are fair, they are designed and manufactured within an environment that empowers the individual and rewards fairly every contribution.
- **sustainable**: all our products are ecological
- **low cost**: the cost of our products will be low (they are based on open technologies and open standards), and their prices will reflect their costs; we want to provide access to our products to players in emerging markets.
- **ecosystem of products**: a family of products that reinforce each others.

References

Technology flyer document [NOTE: include in appendix]

SENSORICA Product design philosophy document.

How to play the open game in the present and future economy (written by Tiberius Brastaviceanu on *Multitude Project* Blog)

3.2 Location and distribution strategy

First year (2012)

During the first year, Tactus/SENSORICA will distribute the Mosquito sensor in Canada, using our personal connections in the scientific

fields of physiology, biology and medicine. Projected sales will be primarily located in Quebec and Ontario, which are the two provinces most active in research. In the case of sales in eastern Canada and northeastern United States, one of three partners will travel by car, train or plane (whichever is most convenient and most economical) to deliver and install the Mosquito in person. If travel is too far to be performed in the same day, the person will sleep at the hotel. Long distances will be covered by plane. Travel costs are set aside, which include $1,500 for a flight every 2 months to meet with clients in North America. It is estimated that this amount is sufficient because the cost of a ticket to Dallas, for example, or Vancouver, is $800. That leaves money to cover the hotel expenses, meals (with customers) and taxi. To reach other continents Tactus/SENSORICA will use his knowledge of networking and collaboration over the Internet to consolidate and expand its distribution network and service, as mentioned in the introduction to this section.

Second year (2013) and beyond

Gradually, far away customers will be contacted through distribution partners. They are independent dealers who represent products of several companies at the same time. They may not be very motivated to sell our products, at lower prices, if they can sell more expensive products from other companies. We must find the right people. We are already searching for good distributors for the Mosquito sensor in the United States. We've already contacted Sailing Scientific, a company specializing in the distribution of laboratory equipment used in physiology.

3.3 Price strategy

The cost of our products will be low (they are based on open technologies and open standards, and sunk and front costs are kept low through collaboration and resource sharing), and their prices will reflect their costs; we want to provide access to our products to players in emerging markets.

3.3.1 Base price of the Mosquito sensor

The cost of the first Mosquito sensor is about $3,000 U.S. dollars. This is an estimate including the cost of parts, hours of assembly, test and calibration, as well as the cost of installation at a customer in Montreal. Gross margin is 80%. The proposed price for the first Mosquito sensor is $15,000 USD. This price includes the touch sensor, electronics and software. We are planning to seed the emergent markets with our products at a lower price, by offering promotions.

3.3.2 Price of the Mosquito Scientific System

The Mosquito Scientific Instrument System includes the Mosquito sensor as well as other accessories around it such as mounting brackets of the Mosquito on a table, the bath in which the sample is deposited, etc. which are not provided. However, Tactus /SENSORICA provides a list of recommended hardware that the customer can easily acquire. This entire auxiliary equipment costs less than $ 5,000. In sum, the customer gets a complete and functional system for less than $20,000. Tactus has been able to test that the proposed price of $ 15,000 is not too high. Customers are less sensitive to price up to $50,000 for this type of equipment (primary data).

3.4 Communications strategy

See list of potential customers. [NOTE: include in appendix]

3.4.1. Local

From fall 2012 test results of the first Mosquito sensor will be available and will be communicated to academic laboratories and pharmaceutical and biotechnology companies in Quebec.

Means used

- meeting requests with academic researchers and pharmaceutical companies in Montreal, Sherbrooke, Quebec (network of personal contacts, contact tracing by LinkedIn, sales pitch over the phone, sending e-mail information).

- visits of university laboratories every 2 months in Sherbrooke, Quebec, in Montreal. Visit pharma and biotech companies interested. Distribution of brochures describing all the Mosquito and scientific results he has achieved.
- Powerpoint presentations about the Mosquito (and about our services) in labs of interested customers (Montreal, Sherbrooke, Quebec).
- On site demonstrations of our Mosquito.
- Provide access to use a Mosquito to a researcher for free, for one month (demo).
- Participation in local conferences.
- Example: ACFAS Annual Meeting in May in Montreal (booth for 5 days at $1,200, 5,000 French scientists expected)
- Networking in biotech and pharmaceutical associations (eBiotech network, François Bergeron is a member) at least once a month,
- Social networks (*LinkedIn*, *ResearchGate*). Tactus benefits from the experience of Emily Breder and Tiberius Brastaviceanu in social media.

4.1.2 International

Tactus integrates a good experience in social networks. We are already very active on various professional and academic networking sites like *LinkedIn* and *ResearchGate.* Moreover, we are also setting up a network of exchange and collaboration, primarily for scholars and graduate students in the field of physiology, which will also be open to other firms serving the market of research instruments. This network will be called "Open Community Physiology." Tactus, as a founding member of this network, will assume the role of lead facilitator. This position makes Tactus visible within the community, and provides access to critical information about the needs of researchers and their students.

In addition, Tactus uses social networks to develop distribution channels and points of services on other continents. For example, the founders have built personal relationships with researchers in physiology from Brazil, who have shown interest in our technology. Moreover, SENSORICA members help establish other connections on other continents

Export strategy

- Participation in international conferences (see timeline in the goals)
- Realization of a professional website
- Government programs of export assistance:
    - PAE (programme d'aide aux entreprises): Vitrine technologique - 40% financed,
    - Similar programs to Developpement Economique Canada

4 OPERATING PLAN

4.1 Operating strategy

Function	Tasks	Duration	Overseen by	Executed by
General management	financial planning, market study,	indefinite	all others	Francois Bergoron
	network weaving and animation	2 days /week	all others	Tiberius Brastaviceanu
R&D	optics	1 day/week	all others	Tiberius Brastaviceanu
	electronics	5 days/week	all others	Jonathan Olesik
	mechanics	3 days/week	all others	Daniel Brastaviceanu
	chemistry	1 day/week	all others	Francois Bergeron
Marketing	networking in academia	2 hours/week	all others	Francois, Ivan Pavlov
	meetings, presentations	3 hours/week	all others	Francois Bergoron
	social media	4 hours/week	all others	Tiberius Brastaviceanu
Sales		5 days/week	all others	Francois Bergoron, Ivan Pavlov
Production	manufacturing	indefinite	all others	Tiberius Brastaviceanu, Jonathan Olesik, Ivan Pavlov, Frederic
	suppliers	indefinite	all others	Jonathan Olesik, Tiberius Brastaviceanu
Administration	paperwork, bank, accounting	6 hours/week	all others	Francois Bergoron

4.2 Production process/service delivery

Tactus is helping to build a SENSORICA labonline network. Our first lab is at Centre des Technologies de la Santé (CTS): 5795 Avenue De Gaspé, Montreal (Québec) H2S 2X3, near Rosemont metro. Open page. Rental of premises 200 pi.ca for $470 per month.

In 2014 we are planning to double our space, and rent will go to $940.

4.2.1 Production cost of Mosquito I

The cost of production of the Mosquito I is about $3,000. This cost includes hours of assembly, test and calibration of the Mosquito, and the cost of parts necessary for its manufacture and its packaging. Parts count for 2/3 of the cost.

4.2.2 Production process Mosquito I

Mosquito I is manufactured and packaged in 6 steps which are well understood and are continuously improved. Five copies of the Mosquito I are made by one person in about 36 hours (5 days at 8 hours per day). Each one is made Mosquito 12 hours (see process below). The production capacity in 2012 is 2 Mosquitos per month meeting all quality specifications. Our manufacturing capacity for transducers (a consumable in our system) should get to 60 transducers per month by the end of 2012.

Manufacturing is done according to these steps

part	step	raw materials	tools needed	equipment needed	individual in charge
lever	optical fiber coating	chemicals, glass fiber (lever)	optical fiber cleaver, optical fiber stripper, alcohol, wiping tissue, Mosquito (for monitoring)	optical fiber coating device	Francois, Tibi
joint	shrinking	lever, glass fiber (delivery), polymer tube	optical fiber cleaver, optical fiber stripper, alcohol, wiping tissue, scissors, polymer tube holder,	shrinking device	Francois, Tibi
transducer	connectorizing and assembling	ST/UPC corning connector, joint, epoxy, capillary	microscope, Dremel		Francois, Tibi

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For production visit Manufacturing on SENSORICA
For services visit Service system of SENSORICA

4.3 Resources required

4.3.1 Information

New markets: robotics, medical and industrial. We'll use the NRC, CEIM, CDEC, CTS, and the SAJE. We are also acquiring our own primary data, by meeting with different players in these different industries, and by networking at "Fondation du Maire", ETS, Chambre de commerce, etc.

Quality norms and certifications: professional advice, "Fondation du Maire"

FDA: professional advice, "Fondation du Maire"

4.3.2 Human

Tactus will hire a secretary in 2013, and a mechanical engineer and a salesman in 2014. SENSORICA is considered an innovation pipeline, which means that most R&D and design will be performed within SENSORICA.

4.3.3 Suppliers

See table in appendices - **Purchases and supply chain**.

Some light manufacturing/assembling will be done by Tactus and by Optical fiber Systems Inc. (member of SENSORICA). We are also actively looking to establish collaborations with manufacturers/integrators.

4.3.4 Material and financial

Like other SENSORICA members, Tactus contributes to R&D projects and production financially and materially.

We are planning to purchase some equipment and tools for R&D, prototyping and production starting at the beginning of 2013.

- 3D printer ($5000) - rapid prototyping and small volume manufacturing
- CNC ($5000) - rapid prototyping and small volume manufacturing
- Optics and photonics lab equipment - optical bench, optical fiber characterization, measurement tools...
- Chemistry lab equipment - fumes hood, cabinet, working table, and other tools...

4.3.5. Infrastructure

We are working hard to reinforce SENSORICA's infrastructure, which supplies innovation to Tactus. Work on a second version of our *value accounting system* has already begun. We are organizing a crowdfunding campaign to accelerate this development.

At the same time, we feel the need to build our *normative system* and a *legal framework* around SENSORICA. At this moment we still don't have the expertise nor the resources required for this task. We are trying to develop a collaboration with McGill and HEC.

5 PROJECTED FINANCIAL STATEMENTS

CALCULATION ASSUMPTIONS

All years:

Raw materials 20% of the sale price and decreasing to 10% for the Mosquito I , II in 2013, and to 15 % for the Mosquito III in 2014. This margin includes the cost of the warranty to our customers (estimated at 3%)

Corporate taxes 30%

End of the fiscal year to 30 April.

Investment in production equipment and tools: 10% of sales. This rate is consistent with the third quartile of Canadian business industries in manufacturing navigational, measuring and control of medical instruments (NAICS code 33451).

Wages of R & D are eligible for tax credits SR & ED federal and provincial government, which reimburses up to 82% of salary.

Year 2012

Registered sales: Mosquito I: $ 15,000 unit, 2 units

Loans: a 90 000$ loan from Société d'investissement Jeunesse and a 90 000$ loan from Prêt-à-Entreprendre.

Grants to business (except R&D tax credits): **STA grant** from June 2012 to May 2013. Canada Economic Development Grant and MDEIE for technological showcase: $ 7000.

Production salaries: paid to Jonathan Olesik (NRC-PEJ grant, confirmed, 4167 $/ month) from July.

Sales salaries: not paid in 2012.

Advertising and promotional tools: 2000 $ for a professional website.

Travel expenses: not in 2012

Meal/representation expenses: not in 2012

Promoter's salary: to Francois Bergeron (promoter, from September, 4000$/month),

Administration salary: not in 2012

Rent and Electricity: 408$ / month as contract signed at CTS

Insurance: 200$ per month, following the contract signed.

Telecommunications: 50$ per month. this includes only internet. We use our own mobile phone and phone on IP.

Professional fees: 4000$ for lawyer and accounting services.

Financial charges: 5$/month from the contract with have with Desjardins.

Office furniture and Office equipment: no expenses after the 422 $ and 312 we already spent. We bring our own furnitures and equipment.

Production equipment and Production tools: as stated above.

Computer equipment and Software: no more expenses forecasted for this year.

Year 2013 and 2014

Registered sales in 2013: I Mosquito: $ 15,000 unit, 10 units sold, Mosquito II unit: $ 25,000, 3 units sold.

Registered sales in 2014: I Mosquito: $ 15,000 unit, 10 units sold, Mosquito II unit: $ 25,000, 11 units sold, Mosquito III: 2.

Grants to business: NRC-IRAP matching grant, matches one of the previous loans: 90 000$ in April 2013.

Production salaries: paid to Jonathan Olesik 4167 $/ month.

Sales salaries: to Ivan Pavlov, 4000$/month.

Advertising and promotional tools: 1000 $ every 2 months for professional brochures, flyers and promotional material that will be distributed at trade-shows and visits to potential customers.

Travel expenses: 270 $ per month (travels + nights in local area, Sherbrooke, Québec, New-England) plus 7000 $ trade-show expense in (total trade-show cost is 14 000$ but half is supported by a grant) plus 1500 $ every 2 months for worldwide sales travels.

Meal/representation expenses: 100 $/month for networking events.

Promoter's salary: to Francois Bergeron (promoter 4000$/month),

Administration salary: hiring a secretary in Septembre (3500$/month)

Rent and Electricity: 816$ / month as we expect to have twice space.

Insurance: 500$ per month, considering we doubled the size of the office.

Telecommunications: 300$ per month including mobile phones and internet.

Taxes and permits: 500$ per month, mostly custom fees for importing parts and equipment.

Professional fees: 5000$ for lawyer and accounting services.

Financial charges: 20$/month.

Office furniture and Office equipment: no expenses after the 422 $ and 312 we already spent. We bring our own furnitures and equipment.

Production equipment and Production tools: as stated above.

Computer equipment and Software: 2000$ in May 2013 (two more computers).

5.1 Project cost and financing

At the date of incorporation our starting costs were very low for a tech enterprise (less than 3000$) because we started at home with the minimum of equipment. After, we were joined by Sensorica members like Jonathan Olesik who shares with us their material. Our sources of financing are mainly loans and grants. We are expecting at least one of 2 loans of 90 000$ (Société d'investissement Jeunesse or/and Prêt-à-Entreprendre). The fact to be a tech company with a working prototype and applications in the scientific and medical is positively received by theses programs. Additionally, we are eligible to R&D grants, in the form of R&D provincial and federal tax credits and NRC-IRAP grant program which finance industrial R&D.

5.2 Sales and sales breakdown

Our sales assumptions and projections are explained into more details in the market study section. Basically, the initial Mosquito sales will

be to our local academic network. Later on, we forecast an increase of sales due to development of our brand awareness in the scientific community, attributed to sales & marketing efforts (white papers, conferences, trade-shows, sales travels, demos and scientific papers citing our products, social networking...). Breakdown of sales shows contribution from Mosquito I, our initial and current product, and Mosquito II and III, coming to market respectively in 2013 and 2014. Payment conditions are the one practiced in academia: payment is made when the order is placed and payment default is almost zero given that purchases are made on available research grants.

5.3 Purchases and purchase breakdown

For the Mosquito I the cost of good sold is composed of 3 categories: electronics, optics, mechanical/structural parts. For each component we try to secure at least 2 suppliers. We are currently looking to diversify our optics supply, giving priority to local companies (OE Land in Lasalle) but also buying from China when no alternative is available. As we use standard telecom optoelectronics, we can easily switch from one supplier to another. We don't have open accounts at our supplies so we pay when ordering.

5.4 Cash budget

We made the assumption to obtain two loans (at zero interest rate) in autumn 2012. At the same time, we expect the start of the Mosquito sales from November 2012. In parallel is added a grant from IRAP. The loans and IRAP grant sum is $ 270,000. As a consequence, the closing cash for 2013 and 2014 seems very comfortable, and allows to do without a line of credit during the forecasted period. At the end of the simulation (April 2014), excess liquidity is 294,560, only $ 24,000 more than the amount of money received loans and grants, which can be explained from two different ways. First, this could show that this type of aid is almost mandatory for the development of such a project. However, one can note that we only take into account the sales of scientific instruments in the academic market but that we actually plan to reach customers in the pharmaceutical segment and also sell in the robotics and medical markets. Sales in these markets have not been simulated. They will bring additional revenue but will also need to be supported by investments.

Second, from another point of view, one could argue that there is an under-utilization of the grants and loans that we intends to get. Indeed, the money raised could be invested much more aggressively into the development of new products and new markets, sales and marketing.

In this way, a much more important return on investment would be obtained. In reality, we envision greater investments to support our sales in the scientific instrument market and in the medical and robotics field. However, today we are not able to quantify these investments.

6 RISK ANALYSIS AND ALTERNATIVE STRATEGIES

Market risks

1. New competitors / reaction of existing competitors: strong probability.

It's likely that a competitor will sooner or later reach the same level of detection performance with another type of detector. For this reason partnerships of development for the Mosquito II have already begun. It is essential to constantly innovate.

2. Insufficient demand: average probability

Researchers needs for scientific equipments are rapidly evolving . Opinion leaders from different scientific fields influence the use of a technique rather than another. Tactus is always looking for new scientific methods and needs, by attending scientific conferences and listening to the researchers' problems, including using social networks and traditional networking. If the demand becomes weak in the scientific market, Tactus will accelerate its diversification into new markets such as robotics and medical markets.

Internal risk

3. Cost overruns: low probability

The Mosquito is sold at a lower price compared to the competition. In the event of cost overruns, the price of Mosquito II and III will be increased. This probability is low because there is always non-monetary value exchange within the SENSORICA network (sharing of tools, equipment, space), which reduces costs for R&D, design and even some manufacturing.

4. Copycats: average probability

Tactus does not have the means to pursue competitors who copy its technology. Our field is very dynamic, within a year a new technology loses its competitive advantage. Our strategy is innovation speed and being first to market rather than protection. The SENSORICA value network is expected to meet this requirement.

5. Development delays: average probability

Innovation involves a great deal of uncertainty in the development of new devices. To minimize this risk, Tactus initiates collaborations with partners from research and development (universities and colleges), which give access to a great deal of expertise and a lot of technical resources. Tactus seek to work with the best technical resources available to limit its developmental delays.

Delays can also naturally occur within SENSORICA, which is open and decentralized. We need to put in place better project management and workflow tools, linked to the value system, in order to help SENSORICA members to find their niche within the ecosystem, and to incentivize their contributions. Moreover, in order to stabilise the stream of production SENSORICA needs to reach a critical mass, to become statistically stable. This is not the case presently.

6. Poor reliability of devices: low probability

To minimize the uncertainty about the quality of its products, Tactus also collaborate with universities during the pre-marketing phases to gain access to resources that can help improve their products.

7. Misunderstandings and problems that could jeopardize internal relations, hinder collaboration within the network: low probability.

A shareholders' agreement will be established to ensure the business continuity of the company.

These problems can also occur within SENSORICA. We realize the need of a normative system for the network, and of a legal framework around SENSORICA. We are trying to establish a collaboration with McGill and with HEC to make this happen.

8. Difficult start due to under-capitalization: strong probability

Seek alternative funding like crowdfunding, peerlanding and peerbacking. These alternatives are well suited for SENSORICA.

APPENDICES

- Detailed CV of each promoter
- Timetable of activities
- Market study dash board (bibliography)
- Survey questionnaire and results
- Letters of intention – Invoicing
- Shareholders' agreement, if applicable
- Commercial lease, if applicable
- Actual income statements, if applicable
- Any other relevant document

Timetable of activities

Year	Month	Important tasks and goals
2010	Jan to Dec	- R&D for the Mosquito optical fiber-based sensor.
2011	Jan	- official Launching of SENSORICA value network
2011	Feb to Sept	- presentation of the Mosquito prototype to various researchers from McGill University, including Dr. Sabah Hussain and Anne Marie Lauzon. Several researchers have shown interest in the Mosquito. - exploration and production of market market research to potential customers.
2011	Mars	- Incorporation of Tactus Scientific Inc.
2011	Nov	- signing of the collaboration agreement with the hospital and selling McGill (laboratory of Dr. Hussain) for technology validation and use of the Mosquito for scientific research.
2011	Dec	- agreement in principle for the installation of a second Mosquito at the Montreal Institute of Cardiology, with Professor Philippe Comtois.
2012	Feb	- first prize ($ 10,000 scholarship) contest Innov'Action of the CDEC Rosemont. - filing of a grant application to the Foundation of the Mayor of Montreal.
2012	Mars	- CDEC Rosemont, competition first prize for Transformation and Production, $10,000
2012	May	- CQE Montreal, first prize for Innovation, $2,500)
2012	May	- ENGAGE grant obtained with Philipe Comtois at Montreal Heart Institute, for the testing of the Mosquito sensor
2012	May	- agreement in principle to collaborate with Dr. Felix Blyakhman, from Ural State University, Russia
2012	May	- Fondation du maire, obtained $20,000 grant
2012	Jun	- obtained SAGE/STA grant
2012	Jun	- CQE Quebec, R&D first prize $5,000
2012	Jun	- obtained SAJE $20,000 for 6 months for electrical engineering position
2012	Aug	- ENGAGE grant submitted with Maksim Skorobogaty at Ecole Polytechnique de Montreal for the development of new ultra-sensitive optical fibers, for the fabrication of the next generation of the Mosquito sensor
2012	Aug	- installation of the Mosquito sensor and experimental setup at Montreal Heart Institute
2012	Sept	- installation of Mosquito at McGill at our first client, Dr. Sabah Hussain, who will try and use the product and allow Tactus Scientific / SENSORICA to publish results of measuring cellular contraction. - performing tests in the laboratory of Professor Hussain.
2012	Sept	- presentation for the Canadian Spatial Agency - presentation for Neurotouch
2012	Oct	- publications of preliminary results of the test Mosquito. - beginning of the sales campaign in Montreal, Sherbrooke, Quebec.
2012	Nov	- initiation of technological development Mosquito II in collaboration with the CEGEP André-Laurendeau (estimated cost $ 60,000, mostly in wages, tax credit-eligible and supported by NRC IRAP).

2012	Nov	- first sales of Mosquito I (price $ 15 000).
2013	all year	- sale of 10 Mosquitos I ($ 15,000) and 3 Mosquitos II ($ 25,000). - Technological development: Mosquito III (estimated cost $ 60,000, mostly in salaries, eligible for tax-credits).
2013	April	- marketing campaign Mosquito II - (price $ 25,000).
2013	Jun	- manufacture of demo versions of the Mosquito III test by potential customers.
2013	Oct	- R&D for industrial applications (robotics). - Sales campaign Mosquito III (price $ 35,000).
2014	all year	- sell 10 Mosquitos ($ 15,000), 11 Mosquitos II ($ 25,000), 2 Mosquitos III ($ 35,000). - technological improvement Mosquito (Mosquito IV, estimated cost $ 60,000, mainly salaries). - Development

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Purchases and supply chain

Module	sub-module	part	items	supplier	manufacturer	link	price	units
Mosquito sensor	transducer	lever	optical fiber	FIS	Corning	open page	$0.13	per meter
			mirror	SENSORICA	SENSORICA	open project page	?	per unit
			chemicals: Nitric Acid [70%] HNO3, Silver solution, Glucose solution, Distilled water, Wetting agent, Tin	diverse	diverse	see doc for process	?	?
		joint	shrinking tube	Advanced Polymers, Inc.	Advanced Polymers, Inc.	open page	$0.42	per inch
		transducer delivery fiber	optical fiber	FIS	Corning	open page	$0.13	per meter
		transducer connector	ST Unicam	FIS	Corning	open page	$14.45	each
	optical layer	mating sleeve	ST-to-ST sleeve			open page		

		delivery fiber	optical fiber	FIS	Corning	open page	$0.13	per meter
		connector	ST Unicam	FIS	Corning	open page	$14.45	each
		laser+isolator	LD(with ISO) with ST/UPC	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	$46.00	each
		detector	PD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	$20.00	each
		coupler	WDC	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	?	each
		isolator	ISO	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	?	each
		cisculator	Circulator(Light irreversible component)	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	$520.00	each
		laser(+isolator) + detrector + coupler	WDC + PD + LD(with ISO) with ST/UPC	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	WUHAN SHENGSHI OPTICAL TECHNOLOGY CO.,LTD	open page	$100.00	each
	electronics layer	amplifier	?	?	?	open page	?	
		filter	?	?	?	open page	?	
		ADC	?	?	?	open page	?	
		interface	?	?	?	open page	?	
Micromanipulation system	actuator	piezo xy	piezo cylinder	Boston Piezo Optics Inc.	Boston Piezo Optics Inc.	open data sheet	$130.00	each
		piezo z	piezo stack	StemInc	StemInc	see link	$247.00	each
		glue	?	?	?	open page	?	
	controller	box	?	?	?	open page	?	

		voltage converter	?	?	?	open page	?	
		?	?	?	?	open page	?	
		?	?	?	?	open page	?	
		?	?	?	?	open page	?	
		?	?	?	?	open page	?	
		?	?	?	?	open page	?	
Experimental environment	sample transducer contact	glue	MyoTak Glue	Lonoptix	MyoTak Glue	open page	?	
Experimental environment	bath	bath	bath	SENSORICA	SENSORICA	open page	?	

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