

# Barriers to eco-innovation

Theoretical reflections.

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## **Abstract**

**Purpose:** This paper is written as a personal evaluation of the entrepreneurial journey starting a new venture based on a new product and concept.

**Design/methodology/approach:** This is a paper designed on to analyze the past experiences of developing a product and searching for a reference customer to start a knowledge based company, using the authors personal experiences with a self-ethnographic method to evaluate of the entrepreneurial actions carried out, the interactions made as a learning process.

**Findings:** Conversion of knowledge into a practical customer case is the key to reach success in product development, the complexities to the development of an eco-product exist as stated in theory, but in this case the development of regular product was even more difficult due to the lack of social capital, knowledge and control on R&D.

**Practical implications:** The lack of social capital makes it difficult to use entrepreneurial strategies and methods. Developing a first customer case requires a lot of commitment and it means time and resources.

**Originality/value** The experience in the field of product development from a sustainability perspective on development of an eco-product and a regular product gives new insights about the systemic nature of eco-innovation and the difficulties to articulate a sustainable idea in practice.

**Keywords:** Product development, eco-innovation, customer references, entrepreneurial strategies.

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## Introduction

### ***The background***

Becoming an entrepreneur is often triggered by different life experiences; perceived desirability and perceived feasibility of an opportunity, these experiences and perceptions mark the future path of interests and influence the career choices of the entrepreneur. Fitzsimmons & Douglas (2010)

Being an entrepreneur is one of the most important and toughest jobs in the world. People willing to take risks change things and to make a difference, without entrepreneurs the world would be a very gloomy and dark place, in which the sense of development, improvement and change are quite unusual. There are places in the world in which the entrepreneurs are surrounded by very unfriendly environments but manage to create amazing products, services and organizations and change people's life for the better or for the worse sometimes.

There are many demanding tasks for the entrepreneurs of the future and one of them is to create solutions to address climate change, this is I believe the greatest challenge humanity faces now. Brown, L.(2009) All the problems we are already seeing in terms of the loss of natural resources precious to us like pure water, clean air and good fertile soils , that are the very foundations of our well being is harsh reality.

We need fresh air, clean water and we need good soils to plant our food. At this point we can't get back in time and return to total harmony with nature and change the societies back to natural practices. We can't turn back time and abandon the very system we are depending on, having all commodities and amenities of a modern lifestyle, we cannot avoid consuming more, the only thing we can do is consume different and make small choices that can bring our lifestyles onto a more sustainable path. People are already asking for alternatives to polluting products and services. This opens a huge market for new types of ecological and sustainable services and eco-products. Shindehutte (2009)

Environmental sustainability has become a global concern, but we have different views on what needs to be done in order to save the planet. I believe one of the most important things we have to do is provide ourselves with more knowledge on sustainability and most of all dare to challenge our own way of living, this is something entrepreneurs are good at. Our every day choices are important.

Alternatives must be offered on the market so people can choose easily to purchase eco-friendly and live a more sustainable lifestyle. That's why markets must become the providers of alternatives solutions and eco-innovations, but make people adopt a sustainable lifestyle, eco-products and services are not easy. There are also many problems having to use other resources to create alternatives in order to produce new things we have to use more natural resources, the major problem with sustainability today is that the public , politicians or the markets cannot address this problem as isolated issue, the approach has to be holistic, we are not there yet.

We can't turn off mass production of goods, we can't shut down polluting power plants and get rid of oil, these industries are the base on which modern societies built upon, but we have potential alternatives at hand, but sadly we are still in discord and confused about the alternatives are to replace this pollutant way of living we have had the latest 100 years. Entrepreneurship I believe has a key role in society to make the transition towards sustainable development possible; Entrepreneurs are already seeing the benefits sustainability can create not only for businesses, but also for society as whole, a new paradigm of doing business.

The great thing about creating a sustainable future is that it is an inspiring idea, something that like an elephant, is bigger than ourselves -- A little frightening, somehow magical, an exciting challenge at the very least. And in today's barren desert of materialism and secularism. People are crying out for something inspirational even sacred, to quench their thirst for meaning. Sustainability is that oasis shimmering in the horizon. It is what we call the "wow calling", the hunger for something to believe in, the eternal yearning to make a positive difference. Shindehutte et al. 2009 p 321

In order to innovate the future of a sustainable society we need social change, social innovation based on cradle to cradle thinking and also eco-innovations as Clean technologies to make a transition towards a society in which we can still satisfy our basic needs and live with amenities without depriving coming generations to do the same. Bruntland (1987)

Eco-innovations and clean technology are a way ahead for market economies to be in the path towards cradle to cradle thinking in mass production and a way of a long term sustainable development.

"The nature and scale of present-day environmental problems call for innovation as a solution. In short, it is clear that in order to improve quality of the environment without limiting economic activity, concerted efforts must be made to encourage eco-innovations." del Rio Gonzalez, Pablo. Et. Al. ( 2009)

### ***Problem definition***

Entrepreneurs that pursue opportunities face different problems specially the first year while developing a product and searching for first customer case is crucial. There are both internal and external barriers, but at the first stage of product development the problem is mainly, dependency on the external business environment and the external barriers to innovation.

- **What are the mayor hindrances to develop an eco-product?**
- **What does theory say about product development pitfalls and barriers and what is specific the problems with the eco-innovations in comparison to a regular product?**
- **How can the institutions of the innovation system facilitate the eco-product development in early stages?**

## ***Delimitations***

The study is based on a market research and industry analysis in the business plan for two business ventures showing a market for the product and concept, but there's a difference on the marketability of both business projects. The framework for product development can help to understand some of the steps towards commercialization of University research and the role of Lund University Innovation System is an important to describe the social setting and how institutions handle innovations and entrepreneurs.

## **Theoretical framework.**

### ***The framework for product development***

A product development is based on the assumption that there's a product to be developed for an existing market. A product development strategy recognizes innovativeness. Help to develop new products faster than competitors and reduces time to market. Product development is necessary because a firm can replace declining or mature products and fill a gap in the market. Söderling, Ragnar (2007)

Understanding the product development as process needs a framework. The product development is a strategy in which the organization makes a strategic use of its knowledge, customers and internal capabilities. Product development follows normally a sequence of six major stages.

**1: idea generation:** Discomfort in performance, a gap a change in the market. An expressed or unexpressed need, change in technology, an unsolved problem, and inspected occurrences can spark a new idea to develop a product. An organization assesses its opportunities carrying out using business intelligence and market analysis tools validate the problem or need in the sector and industry. Söderling, Ragnar (2007)

New product ideas a screened against the trends and market needs based on the market analysis. Small organizations can't sometimes afford expensive tools to carry out extensive business intelligence and market analysis, this poses a barrier to assess risks. However product development failure is even more costly so the small firms and entrepreneurs have to weigh the benefits of investing on a good market analysis than creating a product with small chances to be adopted by the customers.

**2: Idea validation:** At this stage the ideas for new products are validated from four points of view:

1. Technological feasibility
2. Financial feasibility
3. Benefits for the potential customer
4. Marketability of the product

The ideas are screened against these criteria and some of them discarded. Söderling, Ragnar (2007)

**3: Concept development and planning:** At this stage the product characteristics are defined, for example quality and design and packaging, as well as how the product will be manufactured, at the most efficient cost. The target market is defined, the services before, during and after the sales have to be conceptualized. Probably even cost and sales are projected. At this stage the product is tested by potential customers to get feedback about the product, leading to the development of prototypes to address specific needs in the market. Söderling, Ragnar (2007)

**4: Piloting:** At this stage the product is getting closer to a mass production. Conduct a pilot project, manufacturing small series of the product to introduce it. In some industries beta versions of software for example can be released. Getting feedback of customers on functionality and quality is a key factor to improve and make changes to the next generation of products. Söderling, Ragnar (2007)

**5: product development:** After the pilot stage, the real product development to launch production on full scale has to be done. The engineering of how manufacture is going to be possible. The manufacturing documentation has to be precise including specifications including the quality control means. The final product development is the most expensive and time consuming stage in the process, high quality of inputs and outputs is a key to success. Söderling, Ragnar (2007)

**6: Marketing and commercialization:** The product is launched on the market. Using a planned marketing channel and create a unique identity or brand. The marketing strategy must bring the unique characteristics of the product, involving at least: good price level, functionality, superior performance, novelty, service. Söderling, Ragnar (2007)

The product development framework will be used as an overall structure to discuss the implications of the entrepreneurial action and the barriers to innovation and eco-innovation existing in relation to theory in each one of these stages. Söderling, Ragnar (2007)

## ***The entrepreneurial process***

### **The methods of the entrepreneur to acquire resources**

The Resource Based View of the firm is one of the research milestones of Penrose's (1959) research to understand the role of the resources and how these were acquired by a firm to create competitive advantage.

Limitations cause different responses among firms and differences among the entrepreneurs in their ability cope with the resource constraints. Penrose (1959)

In this study the perspective on barriers to product development is the lack or the difficulty to access to both tangible and intangible resources. Tangible such as venture capital, inventories and personnel, intangible: knowhow and contacts.

### **Effectuation vs. Causation in the entrepreneurial strategy**

When the opportunity recognized the entrepreneur has to act upon it. Sarasvathy, S. (2001) means that a process of entrepreneurial exploitation and means that entrepreneurs tend exploit an opportunity in two ways. The causation as a process, the entrepreneur has already a planned list of resources that must be acquired in order to create a business. This approach is more common in entrepreneurial projects within corporations. Sarasvathy, S. (2001)

The effectuation process is based on the entrepreneur's ability to use resources that are at hand including the competencies and contacts he/she possesses. The effectuation process is of course a more explorative approach to venturing. Sarasvathy, S. (2001)

### **Bricolage: Creating something from nothing**

Firms have to survive and sometimes construct resources out of nothing. Bricolage is based on the use of getting resources that are not precious to others getting them for free or at very low price and with little effort to use them again constructing other products or services, recycling is an example of this. Nelson and Baker (2005)

Bricolage can be the use of what is at hand; materials that can be combined in Schumpeterian (1942) way to offer both new products and services that are rare and change rules of competition in a dynamic market environment.

A bricoleur can also often get away with solutions that are not state of the art, and not always comply with standards and procedures of delivering services or products, an entrepreneur can often see the opportunities working around institutional hindrances and getting away with solutions that normally are not permissible. Nelson and Baker (2005)

Bricolage helps to explore and exploit opportunities that might appear too expensive to pursue through other means. Nelson and Baker (2005)

“Third, at the extreme, her argument suggests the possibility that the same resource may be worthless (even treated as waste products) to one firm but valuable to another, especially to the extent that the latter firm can combine what was heretofore valueless with its own unique set of other resources and services.” Penrose (1959)

There are two types of bricolage the parallel and the selective, the parallel bricolage is domain in which the entrepreneur uses inputs of for example used materials scrap that is not valuable to others converting it into a new product. At the same time providing customers on markets with a valuable service, and last domain is the institutional regulations that represent an obstacle that the entrepreneur refuses to enact. The entrepreneur is willing to take risks and produce solutions that often do not comply with standards and regulations. The selective bricoleur is normally using or active one domain either on the inputs, markets or in the institutional domain. Nelson and Baker (2005)

- Inputs: materials with new uses (e.g. garbage) Involving customers in new ways (e.g. IKEA)
- Markets: provide products/services that would otherwise be unavailable to customers (e.g. Housekeeping)

- Institutional: Entrepreneurs do not see regulations as an environment constrain create space to 'get away with' solutions that would otherwise seem impermissible. Nelson and Baker (2005)

### **Financial bootstrapping**

An entrepreneur can use financial bootstrapping avoiding getting externally financed and paying expensive interests in financial markets to institutions. There are many methods for bootstrapping and there are also at least 6 types of bootstrapping entrepreneurs: Three of the methods to bootstrap are grouped in an internal mode to achieve more liquidity in the firm. The most common are the delaying entrepreneurs that normally tend to save time by delaying their payments to the suppliers and seeking to get paid as fast as possible. Wiborg & Landström (2001)

The private owned bootstrapper are helped and financed with the owners credit card or savings and minimizing bootstrapper representing the savvy entrepreneur that puts effort on increasing cash flow by minimizing stocks, putting shorter deadlines for account receivables. Wiborg & Landström (2001)

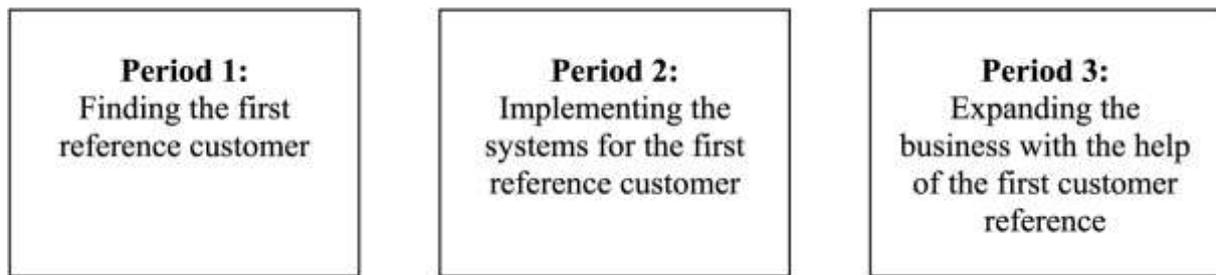
A social oriented bootstrapper conducts uses a external mode to acquire resources and bootstrap is to borrow or use services and resources that the firm from other firms or contacts that the entrepreneur can rely on, with a little or no cost for example share cars, mobile phones and offices with other entrepreneurs and companies. Wiborg & Landström (2001)

The last mode of resource acquisition is the quasi-market bootstrapping in which the entrepreneur seeks allowances and subsidies from institutions to survive and push his business ahead. Wiborg & Landström (2001)

### **The goal: Achieving first reference customer to develop the product**

The customers are many times the key to develop a product with a higher rate of adoption. The product development for business to business sectors is complex and it's crucial to get a first reference customer to proof functionality of product in the real world, without a reference from a third party, it is almost impossible to convince the next potential customer. Ruokolainen (2008)

Ruokolainen (2008) proposes is based on descriptive framework of the effect of sequential customer cases. The study of Ruokolainen (2008) explains the factors which can affect the development of a successful customer reference. The studies don't take into account the consequence of sequential cases. The entrepreneurs pursue of a customer case goes through three main periods, different factors are important to consider in each one of these periods.



**Fig. 2 Periods for the process of finding first reference customer (Ruokolainen, 2008).**

First factor in the period 1 is the Social capital needed to find the first customer reference in the Period 2 the Entrepreneur’s background plays a main role to implement the product for the first reference customer. In the Period 2 it is crucial to gain the reference customer’s commitment; this needed to enter the market and to implement the product in Period 3. Period 3 is the opportunity for the entrepreneur to gain experimental knowledge, this is necessary to enter the market Period 3 the Marketing values of the first reference customer are also needed to enter the market in Period. (Ruokolainen, 2008).

**Social capital: finding the first customer reference.**

One way for a start-up technology company to “open customers’ doors” is to use existing contacts and other associations between people and organizations i.e. social capital. Several researchers have identified (Ruokolainen, 2008). the role of social capital in setting up a start-up company the problems in getting a first customer case is also partly the result of sales and marketing difficulties specially in technology startups, there’s always a barrier of skepticism due to the high rate of failure in technology startups.

Market activities are always embedded in social relationships, institutional theory emphasize the role of trust as key factor to create social capital. Social capital is the first step of getting a customer onboard several aspects of social capital have to be considered, such as homophily, people with the same backgrounds, race and values tend to gather together. (Ruef, Aldrich and Zimmer, (2003)

In this case normally the first contacts of entrepreneur are typically found through old friends, family colleagues, ex-employers and other informal social channels. (Ruokolainen, 2005). The social channels take time to develop and often put pressure on the time the entrepreneur can expend on socializing his business and administrate it at the same time. Hirisch (2010)

**Teams to develop the customer case**

As teams develop you have to know about that sometimes conflict is part of development as Francis & Sandberg (2000) says in their article about friendship in teams, that friendship can reduce affective conflict meaning: the risk of personal conflicts and dislike that can corrode the team spirit. Francis means that cognitive conflict is more beneficial for decision making in the team than affective conflict.

### **Experimental knowledge**

The first customer gives the opportunity to learn more for the entrepreneur. A startup technology company can learn essential knowledge from the first customer.

The entrepreneur can develop further sales arguments for marketing purposes, learn project management skills and explore the business logic of an industry. (Ruokolainen (2004).

The first customer case is also for verifying a the business case, adjust the understanding improving sales arguments, support functions and readiness to solve problems, this highlights the importance of relationships between companies, instead of just economical transactions.

### **First reference customer's commitment to the business of the start-up technology**

#### **Company.**

It is necessary to have long term cooperation with the customer and get their commitment.

Complex technology development requires open communication and knowledge sharing for a better research and development of the product. There is always risk for disputes on intellectual rights in the first reference customer cases; smaller companies have gone bankrupt A small company can be drained on resources if they have to defend their legal rights with legal proceedings an essential precondition is that the agreements on intellectual property are cleared before the collaboration starts.

There's also some contradictions about the involvement of company research, companies can have benefits of lead users or pilot customers, however there's risk that customers dictate the product development for the entrepreneur and this reduces the innovativeness of the product development and research and end up as development subcontractor to its customer the commitment becomes one-sided. Commitment can also increase if the costs of product development are shared and the agreements on intellectual property are settle in good manner in advance.

#### **Background of the entrepreneur.**

The background of the entrepreneur has an effect on the potential success of the company.

Products that have relationship to the industry in which the entrepreneur worked the last time have a greater chance to grow faster. Many of the technical entrepreneurs have never worked in marketing and sales. But international experience and high level of education can help to reduce risk of failures with the first customer case. (Ruokolainen, (2008)

#### **The market value of the first reference customer.**

There's of course the assumption that large companies as first customers can be referred as high value than small ones, but if a first customer case can also be done with key industrial cluster that grows faster it can have more economic value to the entrepreneur. (Ruokolainen, (2008)

## ***Innovations and eco-innovation***

There is an extensive evolutionary literature on technological change related to drivers and barriers such approaches have been extended to cover institutional aspects, such as legislation, norms, standards and routines. The evolutionary viewpoint addressing both technological and social change in which the entrepreneur is an agent of change gives an open perspective for micro-level management, macro level economics and systemic innovation policy. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

Innovation is today one of the most important sources for development of new products innovation is difficult to describe and define. Innovation is knowledge conversion process Nonaka & Takeuchi (1995) there is clear correlation between competitiveness, continuous innovation and knowledge creation in firms.

A concrete definition on innovation for the product development perspective can be: The generation, acceptance and implementation of new ideas, products processes or services. Kanter (1983, p9) This will be used as a working definition for the context of new product development in this paper.

Innovation as core competency for product development is not to be underestimated, product development is a intricate domain, The perspectives on this paper is to understand the major barriers than innovations face and also in relation the barriers that are more specific to eco-innovation. We part from a perspective in which innovation is evolutionary process, Nelson Winter (1996) with specific needs of resources and networks. We assume also that innovation requires a learning process in the firm, influences how the entrepreneurs will allocate different resources and therefore get different outcomes. Nonaka & Takeuchi (1995)

Learning is an essential prerequisite for adaptation and success and core competencies are enhanced and transferred to the organization by organizational learning, learning from failures is as important as learning from success Nelson & Winter (1996)

### **Barriers to innovation**

Expanding the definition of innovation as described before, eco-innovation are innovations that improve environmental performance. Environmental performance comprises dimensions such as the use of resources and the impacts they have on the environment in various levels.

### **The dimension of design for eco-innovation**

At the stage of design product development that is a key process to determine cost and profitability of the product, there's always a window of opportunity to address environmental aspects such as: key materials, lean processes and energy sources to manufacture the product and how these have an impact on the environment. Eco-innovation in this case is deeply linked to cleaner production and eco efficient design as with a holistic approach focusing on the products entire life cycle and even maximizing positive impacts on the environment. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

User dimensions of eco-innovation it is know that firms develop new products to serve their own needs; some are adopted by manufacturers and entrepreneurs and sold as commercial

products. User innovation can greatly define the direction of innovations in some industries and services providers pushing them towards environmental sustainable practices.

It is then very important to know which user is capable of contributing in different stages of the innovation process and how to interact with them through user development. del Rio Gonzalez, et. al. (2009)

### **The barriers to eco-innovation**

The evolutionary perspective on innovation provides with insights about potential barriers to innovation that are both within the firm and in the firm's business environment. The external barriers can be divided into three main categories according to del Rio Gonzalez, et. al. (2009):

1. The absence key social factors and pressures to innovate from consumers and policymakers.
2. The techno economic aspects of viability of an eco-innovation, eco-innovation is often systemic and cannot be fitted in process or in a value chain without the necessity of changing a whole process or the how the value chain operates into more sustainable mode. It means costs and sometimes technological incompatibility.
3. The lack of an institutional support frame, lack of public policy, laws and organizations

The internal barriers are in the capacity of the firm to acquire knowledge about the market and also convert it into a useful asset to develop products and services creating a sustainable competitive advantage. The difficulty is to acquire financial, material and human resources to manage product development. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

In general the eco-innovations encounter a double difficulty in appear and diffuse in the market and society, eco-innovations are subject to the risk of double externality and double market failure, these externalities are: Technological change in the sense that all other innovations generate generates spillover effects that brings benefits to others while incurring all the costs. There's is market failure due to public good of knowledge and the production is expensive but the reproduction is free. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

The environmental externality meaning that eco-innovation practices lead to a reduction in environmental pressures which does not translate into a lower private cost compare to conventional practices , social benefits of eco-innovation cannot always be transformed into rents for the entrepreneur since the reduction of pollution is still not valued by the market in a broad sense. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

The lock in effect of other technologies is also a common problem for innovations and eco-innovations, people's habits and mistrust against new ways of doing things and adopting new practices that come with a innovation, this is makes a technological institutional "lock in" possible. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

Using a broad based co-evolutive view on the process of technological and institutional change has shown that clean technologies face complex barriers caused by the presence of economies of scale. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

Investment decisions are often based on earlier experiences of traditional innovations and performance of technologies. Existing technologies are deeply embedded in a wider social and technological system. This creates a set of economic, technological, social, cognitive, cultural and political barriers for innovations. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

### External factors driving eco-innovation

The new calculus: PPP People, Planet and Profit or Profit, People and Planet. The marketers have to address conflicting demands from shareholders on value maximization and at the same time requirements on CSR and customer engagement. Schindehutte et. al. (2009) means that the only way a company can survive in such demanding market conditions, is to integrate the social and environmental aspects on their strategy in order to create a triple bottom benefit the 3Ps People, Planet and Profit. People and their well-being comes always first, the second is the Planets well being, companies have to ensure environmental responsible practices to minimize their impact on nature. Profit and economic responsibility is the last point of the triad.

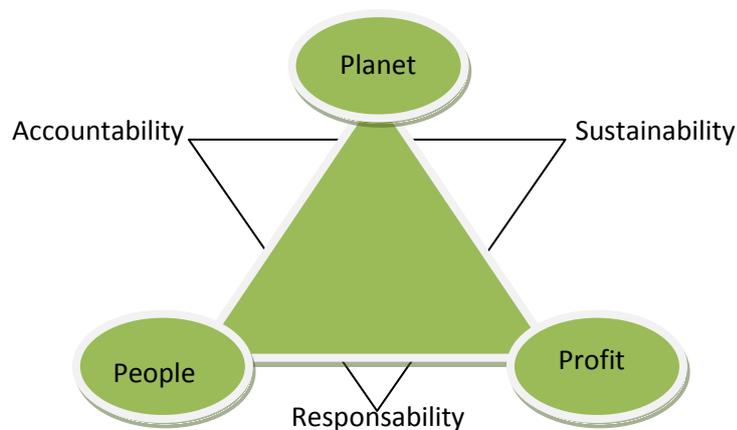


Fig. 2 Integration of company and stakeholder requirements. Schindehutte et. al. 2009 Pearson Education Inc.

Companies are starting to realize the demands of their stakeholders on social and environmental sustainability are here to stay. It's not enough to give some charity and make some green washing campaigns to look green on surface, The people have more understanding than ever about green washing and social media is a powerful tool to unveil companies with fraudulent marketing practices. It means somebody will be always watching malpractices and mischief. Companies have much more to win if they integrate responsibility, accountability and sustainability in their business practices; this means a whole new set of business ethics. Schindehutte et. al. (2009)

## **Methods**

This thesis is going to be written in “I” form because of the methodology I am using as self reflection auto-ethnography. Johannisson (2004). I am also going to interact as part of a team in which I will become “We” sometimes during the journey.

Self-ethnography is a form of participant observation the self-ethnographer sees any kind of participation as instrumental. The term of self –ethnography can give the impression that the research is only focused on the researcher himself, but the intention is to describe and analyze one´s own cultural context, the phenomena going on around oneself rather than putting oneself and one´s experiences in the centre. Alvesson, Mats. (2003)

There is a more inward looking element, the researcher goes back and forth between the social and cultural aspects of the personal experience and expose a more vulnerable self. Alvesson, Mats. (2003)

The research I am going to conduct is to refine and develop a personal theory of entrepreneurial experiences and for that it is important to use my personal experiences within the Entrepreneurship program, enacting research on the subject entrepreneurship.

“Johannisson suggested that the best way to study entrepreneurship is to try it out. Therefore, his research turned to the enactment of entrepreneurial events; this gave him the chance to stage new situations and later reflect on them using self- or auto-ethnography” Johannisson (2004).

Enactment means all the entrepreneurial ventures we have planned and tried to implement during our time in the entrepreneurship program. Moving into a more participative research that is more practical and politically relevant to how entrepreneurship works in real life.

“interactive research can help make university researchers more critical and more useful” (Johannisson 2004, p. 13). With this emphasis on enactive research, ... uses the Aristotelian notion of phronesis or practical wisdom, as the way to blur, entwine and hook up theory and practice, and to update his life-long vision that entrepreneurship is a matter of (inter)activity. (Johannisson 2004, p. 13).

The researcher cannot be only a professional stranger and study at distance if participant observation has to be complemented with an observation that is research focused. Alvesson, Mats. (2003)

## **Reliability**

The study will be a description of social facts and the analysis of a social fact against theory, social facts are not inter subjective. Meaning they are subject to personal valuation, in this study the subject that is the author is the constructor of reality, through his experiences that are in the empirical data from the learning process during a period of time in particular social setting. The study will help to construct a view on a social reality and the network of social relations that influence the outcome of the author’s actions in an explorative manner (Bryman & Bell, 2005)

## **Validity**

The external validity of is limited due to the use of samples of specific business cases based on the personal experiences of the entrepreneur, but the cases can give a wider picture of different social settings.

The value of interview statements and the capacity to reflect the reality is always going to be influenced by beliefs, attitudes, psychological traits, etc. The statements then are to be related to the interview context than to isolate experiential reality this also influenced by the cultural and social norms on how to express myself on particular topics. Alvesson, Mats. (2003)

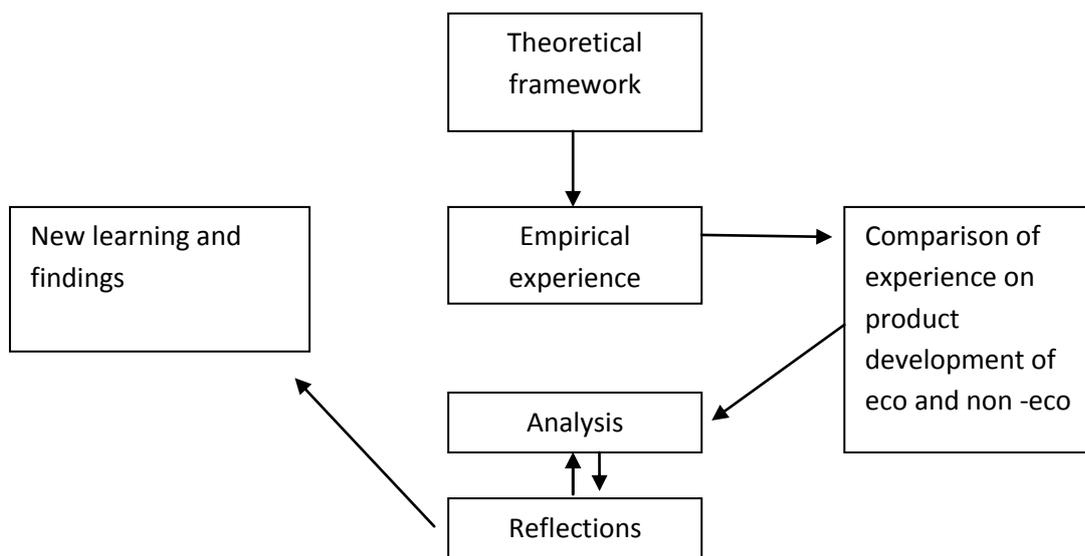
## **The social setting**

Exploring the academic world the universities can't be seeing as homogeneous organizations, this may lead to a superficial work. Departments are conceptualized as multiple cultural configurations. Alvesson, Mats. (2003)

There are always blind spots and intellectual closures shared by the people in the universities that make the task of studying a department or a combination of university and other joint organizations difficult. Alvesson, Mats. (2003)

## **My model of analysis**

To understand the context of my actions I going to use my previous experiences in the program trying to develop two types of products and businesses and compare my own process of developing a non-eco and eco-product with the empirical evidence of the meetings and actions done to reach a prototype and create a company.



**Fig. 3 My Model for analysis.**

## **Empirical experience**

**In this chapter the empirical base is my experience enacting the entrepreneurial journey in the Masters program of entrepreneurship. Describing my business projects and also the challenges I had to deal with during the pursuing an opportunity is described in selections of the learning journals I wrote.**

### ***The cTrap the non-ecoproduct***

Water-damage of buildings is common all over the world due to various causes such as natural disasters, poor construction methods and inadequate construction design. Indoor dampness is related to adverse health effects: 1,2 million of Sweden's population have respiratory problems due to the bad quality of indoor air. Getting compensation for water damages from the insurance companies is not always easy. Sometimes owners resort to judicial litigation which is time consuming. The water damage and other toxic emissions from walls and construction materials are referred to as the Sick Building Syndrome: SBS.

The invention is an adsorbing sheet (surface filter) that stops harmful emissions caused by the water-damage from spreading in the building. The product is applied on the surfaces subject to water-damage (walls, floors, ceilings indoors; frame etc). This means that people can in some cases stay in their home during remediation (they don't have to move to a hotel for example).

The cTrap is a patent pending research project that is in the stage of final product development. The initial application has been filed and received its first review in mid December 2010, the subsequent PCT application is to be filed at the end of May 2011. The initial laboratory tests, conducted at Lund University, have shown an immediate reduction in emissions at the source from samples that were covered by the prototype materials. cTrap Business Plan (2010/2011)

### ***Green Oil the eco-product***

Oil prices are increasing day by day, oil consumption has a devastating effect on the environment, and our dependency has created most of the armed conflicts on resources between all countries in the world. Oil is based on hydrocarbons and is dense in polluting CO<sub>2</sub> there is an increasing need for alternative fuels to address the scarcity of oil in the west and also to reduce the pollution.

People can save a lot of money only by using vegetable oil transforming it into biodiesel in diesel trucks and cars, but is complicated and people want simple and affordable solutions to reduce their fuel cost and also reduce pollution of the atmosphere. Green Oil is a biofuel made of used vegetable oils, filtered and converted into biodiesel that can be used in almost any diesel truck or car, with a minor adaptation on the injection system, reducing the release of CO<sub>2</sub> up to 86% in comparison to regular diesel.

Green Oil offers a Cleantech system to filter and produce biodiesel on at the clients place with a mobile filtering platform. We can recycle oil from restaurants and snack manufacturers that use vegetable oil in large quantities to process fried food.

Normally biofuel companies use fresh rape oil or sun rose oil to manufacture biofuels, it requires extensive plantations and also occupies soil that can be planted with crops for food not for fuel. We avoid this by using the vegetable oil after it has been used by humans. Green Oil Business Plan (2010)

## **Analysis of the Learning Journals**

**Learning journal data is used as an empirical base for analysis, the reflection is on experiences, meetings discussing those experiences with theory and also adding new perspectives to the theory that will lead to new conclusions.**

### **1: idea generation:**

In order to carry out extensive business intelligence and market analysis, I could bootstrap a use the resources in the libraries of Lund University and references from databases that normally cost a lot for a small business that is normally barrier to get new ideas and assess business risk. Searching for the right tools for idea generation was not a barrier for the cTrap and Green Oil projects, contrary to the theory. Söderling, Ragnar (2007)

We had already a grasp of the product prototype our researcher had developed earlier for the cTrap with three possible applications: as a wallpaper to absorb mold.

1: For the wallpaper against mold we choose to search a first customer with: Munters AB , Ocab AB, Anticimex AB, Lamon B.V., JM AB, NCC AB as idea generator and Lunda Fastigheter and Hyresgästföreningen

2: For the application as an absorbant mat on the floor in which the chemical weapon can't contaminate military personnel in contaminated buildings. In which we had to work through FMV Försvarets Materielverk as idea generator and potential first customer case.

3: For the application to absorb bad smell from burned houses under remediation in which we had to contact and MSB Myndigheten för Kris och Beredskap as idea generator a potential first customer case.

"I think the process of learning many aspects of the product and the potential usage of it has to come from the potential customer, we are taking the steps to make our customer base the co-developers of the product, I think this is real open innovation that gives real feed back if the idea is feasible to commercialize." Learning Journal Date: 2010-11-17

### **Green Oil in the idea generation stage**

We had to first the idea to just develop a fixed spot, oil filtration device in which we had to build a prototype of in someplace, but we realized that a prototype on mobile platform or

mounted on a truck is best because of logistics and the energy that the truck could generate to filter the oil with electrical pumps driven by a generator in the truck. My potential customers that we had discussions with and customer case: Lund University's environmental offices and sprinter truck fleet, R.A. Altenstam AB a small recycling company and [Öresund Miljötransport AB](#) a transportation and courier start-up.

### ***The barriers to the process product development.***

Green Oil business idea was based on an external business intelligence report and also on best practices on sustainability cases of American NGOs and also cases on biofuel research from my friend's personal experience as logistics engineer in the transportation industry. I did not have any money to put into the prototype and the rest in the prototype building.

The implications of the idea for the customer case was not really clear during idea generation because we had brief questionnaires of the needs and possible applications, when we talked with business developers in our potential customer case companies.

Barriers present during the idea generation stage of the cTrap were the lack of money for more advanced market research and own R&D, we had to get ourselves out asking everybody and going without taking a the business plan as an exact guideline but more as effectual discovery Sarasvathy (2001) while we did the market analysis. Of course we got a lot of ideas, but quick ideas not developed ones and not from sources that we could say were really knew what our ideas were because we had a catch-22 situation, due to patent issues, we couldn't describe really what the idea was good for as exact application and the companies could help us so much not knowing what we really were up to.

The implications for the Green Oils as eco-product are that it should from the beginning be a sustainable product as vegetable oil, but not only that the process of getting the oil filtered has to be equally sustainable or less energy consuming as a specific requirement from the beginning.

**2: Idea validation:** At this stage the ideas for new products are validated from four points of view:

1. Technological feasibility

The technological feasibility was a question to be answered during our journey of effectuation Sarasvathy, (2001) we had already some basic assumptions about the difficulties and the main problem for the cTrap was to narrow down patent claims , this was both an tangible barrier due to the lack of money to cover patent costs For the Green Oil project the mayor barriers were both tangible as the lack of contacts and intangible because it is concept that requires

2. Financial feasibility

The cTrap had plan to get counterpart finance and we managed to win business plans competitions to get some money to pay initial R&D costs, but not for the patents The Green Oil project had an investor but it was also money for the development of prototype for specific customer

### 3. Benefits for the potential customer

The benefits for the potential customer of cTrap are quite clear better indoor air quality as a value proposition.

The Green Oil gives our potential customers an alternative biofuel that reduces 86% of CO2 emissions.

### 4. Marketability of the product

Marketability of the cTrap was a bit difficult because of the confusion about the potential applications it could have and the issue of patent claims that were not ready to disclose more details to public.

The Green Oil was easier in some aspects to market as concept because of the triple bottom benefit it has to People, Planet but Profit was not obvious Schindehutte et. al. (2009)

Some of the ideas are screened against these criteria and some of them discarded, both the military application and the use of cTrap as absorbant for fire damaged houses was not feasible, We had get more knowledge from other potential customers to develop the product. Nonaka &Takeuchi (1995).

- My mayor learning is that it is a complex product development and there are many opportunities to turn the CTrap project into different product applications to different industries, but we have to narrow down and choose now. The other is it that is time consuming to get hold of important people for the project and to get feedback finds them and book appointments with them. Date: 2010-11-03

### **3: Concept development and planning:**

The fact is that we had still a long way to develop a working prototype for the cTrap and also due to the difficulty to find a good business case.

Product characteristics of cTrap were clear for using it as a product for water damage remediation, we had to drop the other 2 options were dropped for a military product due to the lack of interest of FMV and also the application on burned houses with MSB due to the need of meeting and also the cost of joint development they proposed to us.

The calculations we had show that the cTrap could be developed to be a cheap temporary solution at low cost. The target markets were define for water damaged houses but cost of selling the product were just assumptions on the business plan, the tests were not installed due to the patent disclosure problem, we had only tests by universities labs, so I mayor barrier was still to get a sharp external test by SP and certification to get a good start in sales.

“Having an external party like SP to test the product is one the most important steps to get a external view that can endorse the product and make easier to market and sale to professional users- we the markets are important cTrap because the only way to achieve profit with this product is producing it in economies of scale. Volumes are also important for the biofuel green oil. Besides is also to create a strategy on production and how the actual production level is going to be sustainable if we create a big demand for these products.” Learning Journal Date: 2010-12-24

The Green Oil was been developed to be a stationary oil filtering plant, but I changed the design to make it mobile and save space and energy. The design was not specified, but it was to be build with used scrap materials the cheapest way with the help of students of LTH. Saving money and also recycling other materials to make a new combination a form of bricolage in which we to resources at hand. Nelson and Baker (2005)

Our packaging and pricing was ready and we know how much a liter of biofuel will costs after the filtering in the prototype.

The market was pinpointed to be small firms with light diesel trucks who want to save money on fuel implementing this solution.

The business cases in RA Altestam AB show the cost and benefit of the idea however, the cost of switching from regular diesel to biofuel were a barrier to adopt this product, due to the downtime for conversion of the trucks and also the initial cost to operate a truck fleet on biodiesel. This was the first downturn looking for a first customer case. Söderling, R., C. (2007).

**4: Piloting:** At this stage the product is getting closer to a mass production. Conduct a pilot project, manufacturing small series of the product to introduce it. In some industries beta versions of software for example can be released. Getting feedback of customers on functionality and quality is a key factor to improve and make changes to the next generation of products.

#### **My personal experience of the hindrance or lack of resources.**

The pilot project for cTrap was to test the product in-house, under different conditions to simulate humidity, types of molds and chemical compounds that get trapped into the product, but I only had a kindergarten in Lund in which I could see the water damage and documentation, we got from Anticimex AB so we got more knowledge of the problem in real life Nonaka & Takeuchi(1995) and how to create a professional system to deal with cTrap as temporary solution. We could not apply any beta testing or give away some square meters to companies at this stage, due to the delay en certification with a third party like SP in Borås.

“ I was working to see if Anticimex AB could be an interesting partner to introduce the product into professional user market. We are seeing how the production of a larger scale can look like and of course choosing the right prototypes to manufacture in small scale to have a test series. We are also doing this to present a case on the venture cup competition customer case” Learning Journal Date: 2011-03-25

The Green Oil project was not successful in piloting in R. A. Altenstam AB, they companies CEO told that they could afford to have downtime, but the start up of my friend Oresund Miljötransport AB was an opportunity, because he converted the truck before it was going to operate, the strategy on sustainable transportation I gave him was going to be a test bed for the Green Oil and it became a successful pilot. Roukolainen (2008)

“the situation of building an AB will increase my possibilities of sharing resources such as offices, telephones internet, can even use the AB to bill biodiesel clients in the future, Winborg J. & Landström H.(2001) and also do some transportation for other companies, My friends AB that we decided is going to be called Öresund Miljötransport AB is a first customer case for green oil as project I hope it will even make easier to get more knowledge about implementation and be reference customer in the future.” Learning Journal Date: 2011-02-11

The iteration process between us and the potential customers to develop the product is not so fast as Roukolainen (2008) presents it in the software development industry, You can correct a bug in a software in minutes, but change the development of physical product takes more time, the iteration is delayed, we had a long time in between and it was also due to the lack to time and social capital we could be near our customer all the time to correct or learn more.

### **5: product development:**

The assessment on the cTrap was to have a large scale production to sale at least 770 000 sqm of the product a year to break even and have 6 million of SEK in profit after taxes, at a total turnover of 47 million SEK, showed that economies of scale didn't help so much to lower production costs. The cTrap project loses ground on the Venture Cup competition due to this estimation of costs based on a very fragile business model in my understanding.

We had also to look at the real cost of a machine to cope with industrial manufacturing and we found an interesting workshop Mobergs Mekaniska AB that gave us some ideas about manufacturing the machine to produce the cTrap.

“- I have also meet the engineers from Mobergs AB a design and engineering company specialized in prototyping of products in small series for small technology firms like us. We visited them this week to see how they can help us to build a special machine to put together the 5 different layers our product composed of. It is a bit complex system to produce rolls that can be 1,5 meters wide and can be cut out from a roll of 50 meters or more. Mobergs AB. They showed us their mechanical shop in which most of projects are produced for prototypes in series of just a few pieces to 30 pieces. The engineers can design almost any kind of machine or pieces of mechanical equipment to fit the customers need, the only thing we have to have is a blueprint or drawing of the machine and a specification to build it, but they can also provide the service of helping us to design it.” Learning Journal Date: 2011-04-01

The main tangible barriers here were of course the price of making a machine at price of about 1,2 million SEK in the budget of our business plan.

“We have to get a realistic picture of the alternative of producing the ctrap in-house and there is no machine out in the market that can really fit into the specifications we are working on, that is why we have to purchase a custom build machine for manufacture, we have calculated to 100 000 SEK for the prototype and 1,2 million SEK for a full scale production machine.” Learning Journal Date: 2011-04-01

The Green Oil project had to abandon Lund University's truck fleet project due to lack of interest and bureaucracy. I made a calculation on the benefit of conversion to continue to use the old trucks, but then again the cost of conversion and the increasing cost of maintenance of the old trucks made difficult to motivate a pilot project with University, It was a good source of knowledge about the competing alternatives to my concept. Nonaka & Takeuchi (1995).

The product development for business to business sectors is complex and it's crucial to get a first reference customer to proof functionality of product in the real world, without a reference from a third party, it is almost impossible to convince the next potential customer.

Ruokolainen (2008) and it was true in the case of the cTrap, I didn't manage to get pass through any good customer case, not having an almost market ready product to test.

I see that Green Oil was more successful in that matter I managed to convince a friend to invest in my concept and convert his trucks as high risk. We are running the one truck with oil during the last two months based on a non-standard solution a bricolage and it works well. Nelson and Baker (2005)

**6: Marketing and commercialization:** The product is launched on the market. Using a planned marketing channel and create a unique identity or brand. The marketing strategy must bring the unique characteristics of the product, involving at least: good price level, functionality, superior performance, novelty, service.

My personal experience of the hindrance or lack of resources

The cTrap project did not make it into the stage of marketing a commercialization yet, but the chances are still good at least, the drivers still exist and the market turned out to be difficult to grasp and we got only a letter of intent but no real customer case, it is almost impossible then to convince others that it works. Roukolainen (2008)

- I have also met Anticimex AB in Malmö and they told me that it can be interesting to use the product in certain cases, when the people in the building can't be evacuated, but also to cover the test holes they drill when they take samples of building materials, they are not giving any LOI until they know for sure how the end price of the product is and they want to try it. Date: 2011-03-25

The Green Oil project is the idea that became part of the one customer's project, the main advantage I found on Öresund Miljötransport AB is to have a long term test bed to show other potential customers in the future, but the owner and investor has problem he doesn't want me to sell the concept on oil filtering I develop to other competing firms. This is a competitive advantage for him at moment. However the last word is not settled and our agreement may change. At moment his taking advantage of launching a service on which there's interest for sustainable transportation among companies and citizens, I think this project can succeed with the right marketing, but at the start we have some technical problems still and we have also to invest in a good marketing strategy so this doesn't become a green wash, Schindehutte et. al. (2009)

The risks are higher for this project now. That's why I want to be in control and I became the CEO of the Öresund Miljötransport AB because I had to put some conditions to find that I want shares on the company and also a position in which I can have some control on the execution of the project.

### ***The first reference customer***

The customers are many times the key to develop a product with a higher rate of adoption. The product development for business to business sectors is complex and it's crucial to get a first reference customer to proof functionality of product in the real world, without a reference from a third party, it is almost impossible to convince the next potential customer.

Ruokolainen (2008)

Ruokolainen (2008) proposes is based on descriptive framework of the effect of sequential customer cases. The study of Ruokolainen (2008) explains the factors which can affect the development of a successful customer reference. The studies don't take into account the consequence of sequential cases. The entrepreneurs pursue of a customer case goes through three main periods, different factors are important to consider in each one of these periods.

Finding customers for a customer case were a priority from day one for both of my projects this is very important due to the complex nature of both, but mostly the a concept based idea like the Green Oil

### **Social capital: finding the first customer reference.**

One way for a start-up technology company to "open customers' doors" is to use existing contacts and other associations was to contact companies in the industry of water damage and mold remediation and Taras my colleague took the initiative to contact even the American Associations for restoration RIA and other channels to get a letter of intent, but physically we couldn't send the product to be tested by these organizations. Taras was of course working between people and organizations to gain access to contacts and social capital. (Ruokolainen, 2008).

"- I was working to see the process of mold remediation live with Taras and work on strategy to create a product for professional use that fits that kind of process. I am looking for investors for the projects and some corporations can be interested, you have to ask and try." Learning Journal Date: 2011-04-01

I was also involved in the Swedish industry of water damage remediation while I was mapping the industries value chain. I also tried to get onboard some of business development projects with different companies that voiced some interest in the beginning, but the real problem is really to have time to develop relationships, the lack of internal social capital made it even harder to access the external social capital, but the skepticism of other firms was mainly base on the problem of testing the product.

“- I am in the process of finding out how the industry works. The reason I contacted all these companies is to find out if they can be potential co creators in to launch a product and also get knowledge to map the construction industry and the value chain.” Date: 2010-11-03

“- I am in the process of finding out how the construction and mold remediation industry works. We are also working on the issue of building legitimacy for the cTrap that’s why we want a certification of third party specialist as SP.” Date: 2010-11-10

In this case normally the first contacts of entrepreneur are typically found through old friends, family colleagues, ex-employers and other informal social channels (Ruokolainen, 2008). I believe of course already embedded social relationships has a very clear role in the development of trust, I didn’t have the time and the resources to nurture all the necessary relationships to build the cTrap case(Ruokolainen, 2008).

“I have met 2 friends working with cleantech projects and also one of them is working in the building industry I have to ask then about some people that can be interesting for the board. I have called a friend Lars Tengvall with a background in the construction industry he works at NCC in leading position”. Date: 2010-11-03

I also had a greater social network in the Cleantech industry in which Green Oil was developed and in terms of friends people that shares same values about the environment and sustainability. This was lacking totally in the cTrap case. (Ruef, Aldrich and Zimmer,( 2003)

“You have to drop contacts and options that will not work for the project, sometimes even if it’s very nice to work with certain kind of people, but if the work doesn’t provide any result it is not used. The opposite can be more challenging but it can give more, coping with more demanding people that is not always agreeing with your ideas.” Learning Journal Date: 2011-03-18

### **Teams to develop the customer case**

As teams develop you have to know about that sometimes conflict is part of development as Francis & Sandberg (2000) says in their article about friendship in teams, that friendship can reduce affective conflict meaning: the risk of personal conflicts and dislike that can corrode the team spirit. Francis means that cognitive conflict is more beneficial for decision making in the team than affective conflict. Internal pressures were part of the development that flourish specially when the team has to work under pressure as the example of the development of presentation pitch for the Venture Cup Competition:

-“I have met we Lennart and Taras and our new team member Pawel to work fulltime on the speech making the presentation, it was not easy to develop this under pressure and it shows sometimes that we have different views on what has to be done and it created some clashes in the team, we could anyway manage to cool down and work in efficient manner, we are I think aware of about this kind of things happen in teams when people has to collaborate under pressure. Learning Journal Date: 2011-04-29

Adding more members to the team had also some new consequences of dealing with new styles of managing a project and the differences on focus on technical aspects and business aspects, there had to be tradeoffs all the way to make it work.

“the risk of personal conflicts and dislike that can corrode the team spirit. I think we have gone through more cognitive conflicts because we are still friends after this week and can laugh about our made mistakes and other funny happenings during the process of preparing the presentation and the speech. Francis means that cognitive conflict is more beneficial for decision making in the team than affective conflict.

**Experimental knowledge** gained and developed from the first customer reference

The first customer gives the opportunity to learn more for the entrepreneur. A startup technology company can learn essential knowledge from the first customer.

The entrepreneur can develop further sales arguments for marketing purposes, learn project management skills and explore the business logic of an industry. (Ruokolainen (2008). With the cTrap the process of finding a good customer case lead to meetings with different companies like Munters AB , Ocab AB, Anticimex AB, Lamon B.V., JM AB, NCC AB as idea generator and Lunda Fastigheter and Hyresgästföreningen as potential first customer case each one of the meetings had a process of learning about the technology the companies like Ocab AB and Anticimex AB had to try to offer a good proposal for a collaboration on the development of product, but most of the time the companies wanted to be in control by putting harder conditions on the development of product that fits their needs alone. The cTrap team didn't have a bargaining position especially not having resources to pay for joint venture. We were in first hand out there to try to find opportunities to do bricolage with the resources at hand Nelson and Baker (2005) and bootstrap as much as possible, but there was a limited social capital to access all that in social oriented mode, for the cTrap the option was a subsidy oriented mode getting money from the innovation system. Wiborg & Landström (2001)

“We are as Sara Sarasvathy say conducting an experimental journey, using the effectuation, using our knowledge and contacts to develop a business and it's product, when it comes to the product development we are also using bootstrapping methods such a subsidy oriented method in which the product development costs are paid by the innovation system. We have also the lab and other physical locations as the offices in IDEON innovation that are a subsidy. At the moment we consider ourselves as Subsidy oriented bootstrappers”. Learning Journal Date: 2010-11-24

The case in which we were near to verify our knowledge on mold in public spaces was the visit to a kindergarten in Lund that had been in the news, with repeated problems of Sick House Syndrome and children had got sick of allergies. We could not offer to try the cTrap because the real state owner Lunda Fastigheter had decided to demolish the kindergarten and move all the people to other school.

“I had met the business development team JM AB and they told me they have some interest but they want to see the actual product and they say it’s too early to get involved. I have also met some other people of the construction industry at Lunda Fastigheter and we are looking for a person for the board among people in Skanska Lennart has contacts there also.” Learning Journal Date: 2010-11-24

“we have still to work on the possibilities of creating a range of products that can address not only mold problems but odor problems. The important process is trying many types of prototypes and ask for the potential needs to a potential customer.” Learning Journal Date: 2010-11-24

The first customer case is also for verifying a the business case, adjust the understanding improving sales arguments, support functions and readiness to solve problems, this highlights the importance of relationships between companies, instead of just economical transactions.

### **First reference customer’s commitment to the business**

It is necessary to have long term cooperation with the customer and get their commitment. Complex technology development requires open communication and knowledge sharing for a better research and development of the product.

There is always risk for disputes on intellectual rights in the first reference customer cases; smaller companies have gone bankrupt

The cTrap didn’t get to formal process of a joint collaboration, most of the intents ended in the lack of commitment from the potential companies and therefore we didn’t encounter any legal problems on intellectual property, the only thing that could cause potential harm was to disclose what the cTrap was made of, because of the patent issues. (Ruokolainen, 2008).

Commitment is really a key to get the Green Oil project ahead it took two months to settle the discussion on a written collaboration agreement and letter of intent however I am not really happy with some of the terms, The owner doesn’t want me to sell the Green Oil concept to his competitors, but I can understand the owners concern about the competitive advantage But this measure can reduce my will to develop more products for him, The pilot project brings a lot of benefit for him and eventually for me because I am in the board and have got more 25% in shares of the company Öresund Miljötransport AB based on a legal constitution of the company, this has increased the legitimacy of the project and the trust between the owner and me has increased a lot. We can even bootstrap a lot assets based on this like share mobile phones and office space.

“I was in a board meeting with my friend to start Öresund Miljötransport AB I am going to be the CEO of the company and we have now to decide the strategy to get the company launched when we have green light from Bolagsverket.” Learning Journal Date: 2011-04-24

### **Background of the entrepreneur.**

The background of the entrepreneur is has an effect on the potential success of the company.. Many of the technical entrepreneurs have never worked in marketing and sales. But

international experience and high level of education can help to reduce risk of failures with the first customer case.

“- There always issues on the liability of newness and to keep the good spirit of a nascent teamwork, we have accept that we all in the group think very different about how to solve problems, but we have to agree on certainty strategies to go on otherwise it’s only analysis and paralysis.” Learning Journal Date: 2010-11-10

The backgrounds of the cTrap team were very diverse in terms of age and also occupations and education length. We had Ph D.s , Bachelors and Ph D. students from different countries. We had technical entrepreneurs that is Taras and Lennart and me and business marketing entrepreneur, I could notice that the technical people gravitated to each other better than me in terms of understanding the marvel of the applications, but we tried also to search for cases and potential customers that weren’t a success in the cTraps case.

The education in this case can’t really prepares us for the real encounter with customer and the time constraints to develop good relations that is something that has come from the individual. (Ruokolainen, 2008)

“I have observed that we as a team have also to build more trust, that’s a problem that we have so much to do and so little time to socialize, we are used to be very efficient on the meetings, but we also need to do something more relaxed to get to know each other better, Because our roles in the team are not settle yet we have a awkward situation in which Taras and me compete to lead the project ahead, but I think Taras has taken the lead know because he has more competencies that fit the nature of product development at this stage, but I can be more efficient on market and sales once we have the product ready to sale.” Learning Journal Date: 2010-11-24

Products that have relationship to the industry in which the entrepreneur worked the last time have a greater chance to grow faster and that’s what is happening with the Öresund Miljötransport AB I believe we have a better mix there because of my friends experience in the transportation industry and also his technical background as an engineer. He has already contacts leading to a faster penetration and contracts of transportation that generate money. However the Green Oil filtering platform is not what I had in mind from the beginning and only fits one customers needs

### **The market value of the first reference customer.**

The aim to take the cTrap all the way to a formal customer reference with big construction companies like NCC AB and JM AB didn’t work out, not only was the lack of social capital and commitment, but also the potential misunderstanding of the value for them, we discovered that we were addressing the wrong companies in the value chain.

Even if they had interest like Munters AB had, they didn’t manage to give us any direction or experimental knowledge to go on to a customer case that will lead to a new potential one, so we didn’t get any market value of a reference customer.

The Green Oil project had a different trajectory into the first, but I failed in managing a customer case with R. A. Altenstam AB and there were also some issues of underdeveloped trust that made difficult for them to assess the risk in my project even if I wanted to show them that it could fit in their company.

The case of Lund University it was a very hard because of the bureaucracy that surrounded the application of experimental knowledge and the creation of a test bed.

The last case with Öresund Miljötransport AB is the one that I can say had the right ingredients of social capital, gave the opportunities for application of experimental knowledge and there was mutual commitment added to that, then market value is generated in other words as even if it is also an startup we “stayed on the same wavelength”. (Ruokolainen, 2008).

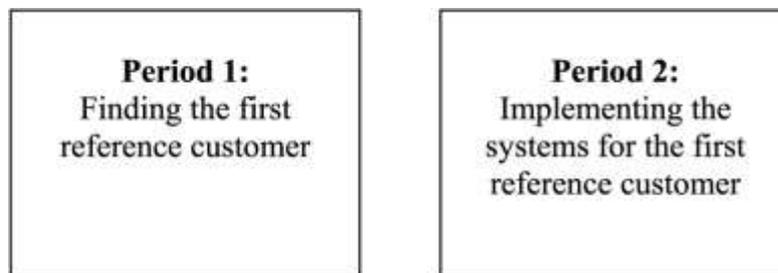


Fig. 2 Periods for the process of finding first reference customer (Ruokolainen, 2008).

The implications finally for the cTrap project is that it only reached one customer case with a Letter of Intent, but stayed in the Period 1 looking still for a potential customer case, without it is difficult to jump to next period. The Green Oil project is now in the second period according to Roukolainen (2008) in with I have implemented the customer case in the startup of my friend looking to evaluate, but it may be difficult to make it to one more customer if the rights of selling the technical solution to competitors are still in the covenants.

## ***The entrepreneurial methods***

### **Creating something from nothing**

“I am also working with people that are interested in the biodiesel as an eco innovation and can help out for free. As Nelson and Baker(2005) says I am trying to do a bricolage with resources that are at hand that include both scrap materials and knowledge for free.”

In the case of Green Oil we had to use all the ways to get a solution that works with recycled materials Penrose (1959) and the prototype was made with scrap materials as inputs, The Concept of providing a service of giving the customer an alternative biofuel is also there as market alternative that is less polluting to the environment. Finally the Green Oil concept is affected by the institutional domain because of the regulation on vegetable oil addressing the product as food and not as fuel we can still “get away” with selling the oil without paying fuel

taxes. There are no standards for how biofuel should be processed and no regulations on the chemical characteristics as for the regular diesel, but we are taking a risk because legislation can change. This is consistent with what Nelson and Baker (2005) calls for parallel bricolage.

### **Financial bootstrapping**

“an AB will increase my possibilities of sharing resources such as offices, telephones internet, can even use the AB to bill biodiesel clients in the future, Winborg J. & Landström H.(2001) and also do some transportation for other companies, My friends AB that we decided is going to be called Öresund Miljötransport AB is a first customer case for green oil as project I hope it will even make easier to get more knowledge about implementation and be reference customer in the future.”  
Date: 2010-12-03

My work as a social oriented bootstrapper was to acquire resources, borrow or use services and resources other firms, as I manage to do with Öresund Miljötransport AB with the help of contacts I can rely on, with a little or no cost, we can share the cars, mobile phones and offices and I have also the advantages to own shares and be CEO this means even more resources that can be acquired. Wiborg & Landström (2001)

In the cTrap the work as team was only based on money from grants and research grants from the innovation system I see this as subsidies a quasi-market bootstrapping in which the entrepreneur seeks allowances and subsidies from institutions to survive Wiborg & Landström (2001)

“- We to develop even more prototypes in the lab, We are also working on an application for FOKUS II funds from Innovationbron, this money will be used for the final test before the commercialization of the product.” Date: 2010-12-03

This kind of money can be good to R&D but if the entrepreneurs can live on it then it is maybe quite bad for the motivation of getting money from the market.

### **Analyzing Innovations and eco-innovation**

“As the product development process goes forward I am able to see that I am learning a lot on product development from both Lennart and Tars that are more into the technical side of the product and also to see the process of testing, it is a very steep process of learning about the traps technical design because it is important to know what is the product I am going to sell to the potential customers and also present something “Date: 2010-11-24

As stated before in the early stages of product development learning of customer and markets is crucial to continue developing a product even an eco-product. When it comes to knowledge gains it was easier to gain more knowledge on a field I am already into: Cleantech with the Green Oil project, in terms of knowledge conversion I believe that is was a successful project to create a new venture based on the knowledge I had on the subject and also the technical ability of my friend to engineer and the help of the LTH students. Nonaka & Takeuchi (1995)

The cTrap defined as innovation is still on doubt until the patent issues are settled in the taxonomy of Kanter (1983) can still be in a invention state at some point because the failure of implementation, The lack of deeper knowledge about the product and control on the R &D

made me also less motivated to market the product, but were anyway active trying to package the knowledge and sell it as consultancy also.

“There are some possibilities of doing paid consultancy to take samples of mold and test in our lab, this to give the people a second opinion about the probability of getting sick, besides the landlords own testing, but Lennart Larsson thinks that he will compete against his peers in the testing and he doesn't want that, he wants to concentrate to product development and market development I believe there must be a product that is almost ready to sell to test but we are not there yet. We don't have even the cost of the product per square meter so we can't price it.” Learning Journal Date: 2011-03-04

The Green Oil project is core competency for product development that has been developed into a service of transportation for Öresund Miljötransport AB I personally can realize that I had the specific competency resources and networks for this Nelson Winter (1996) and there the learning conversion was more successful in this case. Nonaka & Takeuchi (1995)

I believe also that as learning is an essential prerequisite for adaptation and success and core competencies are enhanced and transferred to the organization by organizational learning, learning from failures is as important as learning from success Nelson & Winter (1996) but it also based on interest and motivation.

“The project is facing a critical issue and we are low on cash to get further with the next stages, we haven't been successful in finding ways of packaging the knowledge around the cTrap and sell it before we can sell the product, the potential partners want to try the product, that is a situation of trust and we are really in situation in which we have to get a patent, get the necessary certifications to increase our credibility towards the potential customers.” Learning Journal Date: 2011-04-15

Environmental performance comprises I believe additional dimensions such as the cradle to cradle perspective which is something that is very difficult to implement onto an established organization that has norms and traditions of doing things, it proves to be true in the case of Lund University and the bureaucracy it means to create a pilot project.

At the stage of design there's always a window of opportunity to address environmental aspects the user dimension is now confirmed because Öresund Miljötransport AB is using the Green Oil technology designed with scrap materials to serve their own needs of biofuel at a lower cost than regular. Product development is a key process to determine cost and profitability of the product basically for a non-ecoproduct. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. (2009)

“I have also some engineers from LTH and the Ecosystem technology program that are taking a look how we can design a cheap filtering system for biodiesel that is made from scrap materials not new materials.” Learning Journal Date: 2011-01-28

Eco-innovation in this case has to lead to cleaner product and service and eco efficient design as with a holistic approach focusing on the products entire life cycle and even maximizing positive impacts on the environment using techniques like bricolage. Nelson and Baker (2005)

"I am also working with people that are interested in the biodiesel as a eco innovation and can help out for free. As Nelson and Baker(2005) says I am trying to do a bricolage with resources that are at hand that include both scrap materials and knowledge for free". Learning Journal Date: 2011-01-28

It is then very important according to: del Rio Gonzalez, et. al. (2009) to know which user is capable of contributing in different stages of the innovation process and how to interact with them through user development. I didn't have the knowledge to contribute with the right types of users for the cTrap, but the Green Oil project was something that was more in line with my knowledge and also knew people already that could contribute in the technical aspects of product development.

### **Analyzing the barriers to eco-innovation**

I the absence key social factors and pressures to innovate from consumers and policymakers. In the case of the Ctrap there was only the lack of the right drivers, social capital the lack of pressure from end users, our potential plan was to create a demand through the Tenants Association of Sweden to make this product known to the public as temporary solution, but Lennar Larsson our researcher had already produced some documentation that showed the interest for a solution to mold damage. There was some consumer pressure but it became clear in the industry analysis that the policy on mold and level of contamination on indoor air was not enough create a demand and needed some new policy to push the landlords to comply with harder regulations in case of mold and SBS. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. ( 2009) p. 29

The Green Oil project had a better trajectory from the market point of view the consumers interest on less polluting alternatives to regular diesel is very positive. Corporate markets are looking for alternative fuels to drive their car, truck fleets. The interest on sustainability has never been so intense, but all comes down to economic rules cost and benefit as a normal product, the economic value and the problem of switching cost for the end consumer, this is I believe a major problem that creates a "lock in" situation in old infrastructures, that can only be addressed with the right institutional support frame in combination with supportive economic subsidies to persuade the public to adopt environmental friendly products and services faster. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. ( 2009) p.29

I am in now understanding that the risk for eco-innovation are double meaning that, I may have competition on the sustainable transportation that is growing quickly, but prices can go down if everybody drives on biogas, depending of course on legislation the taxes on biofuels can be an issue that will put some serious constraints to al the transport running on biofuel now.

The social benefits of eco-innovation cannot always be transformed into profit since the reduction of pollution is still not valued by the market in a broad sense. The other risk is that market doesn't put a price on reduction of CO2 and the conversion costs of a truck so it can run biofuels. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. ( 2009)

Using a broad based co-evolutive view on the process of technological and institutional change has shown that clean technologies face complex barriers caused by the presence of economies of scale. This also applies to the development of the Green Oil as concept, the major hindrance is if everybody started to use vegetable oil to biofuel to run their trucks and cars the all the current biofuel factories would never cope with the demand, there's not enough of biomass and a high production rate in economies of scale, biofuels have proof becoming increasingly expensive to produce in large scale due to scarcity of soil to plant the sunflowers or raw materials. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. ( 2009)

Investment decisions are often based on earlier experiences of traditional innovations and performance of technologies. The investment based on earlier experiences for the Green Oil project was done this was based on trust on the competencies of other people willing to invest time and money in the project even at high risk. del Rio Gonzalez, Pablo. & Konnola, Totti. Carrillo-Hermosilla, Javier. ( 2009)

## ***Factors creating demand of eco-products.***

### **Marketing and ethics**

The strategy in Green Oil business plan is to reach a triple bottom benefit the 3Ps People, Planet and Profit the methods of bricolage Baker & Nelson (2005) and bootstrapping Winborg, J. & Landström, H. (2001) helped to achieve this vision and making a whole concept of producing and delivering based on a mobile platform that is a self-sustained energy system taking the electrical energy generated by the truck to pump and filter the vegetable oil and once converted it is used as the fuel for the truck that lowers the CO<sub>2</sub> with 86%, this system can help us to claim that the production methods and the product itself are sustainable, in the case of cTrap the only sustainable argument was that we plan to use a package made of recycled plastic, but the product and the production methods are based on very hazardous chemical products that if burned release toxins, and it can't be thrown as organic waste in the nature because it is even more dangerous after it's used.

"It is possible to package the cTrap in a recycled plastic bag, but there are no eco-friendly alternatives to the core chemical compounds , we don't know how to deal with the product once it is disposed. I am trying to find some engineers from the technical schools that can help me with my oil filtration project besides my friend; he is also engineer and is working to see if we can make a prototype." Learning Journal Date: 2011-01-21

"When it comes to marketing claims that are not true should be avoid, this will be like brainwashing for potential customer, which can have negative consequences for the reputation, It is tempting to try to green the cTrap to follow a sustainable trend and People, Planet and Profit thinking as Schindehutte et. al. (2008)." Learning Journal Date: 2011-01-14

When it comes to market the cTrap in the future they have to address the cradle to cradle issue because there always consumers that are increasingly aware of the chemical compounds in

nature and somebody will be always watching malpractices and tracking the accountability and sustainability in the business practices. Schindehutte et. al. (2009),

### **Risk and failure during product development**

The institutional setting of the innovation system is complex and also many structures make it difficult to find key contacts, and also market the project with small means and using mostly word of mouth to market my projects, but it takes time a puts pressure on the entrepreneurs abilities and capacity. Hirisch (2010)

“External factors like holidays and un-availability of people can cause a lot of delay in projects like these, there are course many ways to plan, but even having an A,B and C plan sometimes things don’t work out, but one can use the time in good manner anyway making internal improvements to the business. As Hirisch (2010) p. 399 says in his book on Entrepreneurship: There are always pressures on the entrepreneur’s time and we are trying to improve the time management, hoping this will increase, productivity, job satisfaction and improve the relationships.” Learning Journal Date: 2010-12-31

The amount of barriers to innovation is per definition potential pitfalls in which the entrepreneur can fail or the lack of drivers.

Failure is of course a question of who defines it, but not achieving the goal of getting onboard customers should be it for the cTrap, but the outcomes of both avoidable and unavoidable mistakes during experimentation. Failure I believe is part of the process of starting a business and it creates stress and multiple barriers, high uncertainty about the outcomes.

“My goals are to meet more experts on the industry of construction and get their view, I have also contact with a real state owner that can be interested in investing in cTrap, but if patent claims are not ready it may be difficult to sell the idea. I have to talk about it with Lennart Larsson.

The other is to follow Ocab AB to remediation with Taras.

For the biodiesel we have know a truck to test the fuel in place and we start with, a mixture of RME raps diesel and used cooking oil and RME raps diesel and 20% regular diesel, we will have a meeting with a company that makes biodiesel out of algae, it may be an interesting provider of biofuel solutions for the future.” Learning Journal Date: 2011-03-04

### **Conclusions**

Learning about the dimensions of eco-innovation , barriers to eco-innovation are much larger than to innovations in general, but in the specific context of my personal network and also the innovation system I learned that the process to develop an eco-product was easier, because of learning conversion that occurred within the development of the Green Oil project and also the successful customer case in Öresund Miljötransport AB, this I think a reinforcing learning conversion that creates even more capabilities to develop the idea, but it comes with a price there are business constraints to it and also limitations to its growth on the market due to the problem of economies of scale.

### **Ctrap the lack of control and cognitive limitations**

It is not easy to know if a project is going to be successful at forehand, and risk is often lack of knowledge about the outcome of an action. This means the lack of knowledge about how much risk there is, lack of control and therefore it was difficult to motivate the entrepreneur if there is not enough of faith in the product development and if there isn't such motivation it is even more difficult to search possibilities when there are more adversities to the product development, but sometimes others see an opportunity where you don't see anything.

### **Barriers developing the Ctrap**

The normal set of barriers and problems described in theory apply and from my experience it's was even harder to develop a non-ecoproduct specially lacking the proper access to contacts in the industry and also the lack of social capital cornerstones to create a good team and motivation were missing and it became more obvious during the progress that we couldn't manage to build the necessary social capital with external potential customers.

### **Barriers developing the Green Oil.**

The development of the Green Oil as product is more successful than the regular product, in this case I had the right contacts and developed social capital through friendship and used and extensive parallel bricolage to manage the lack of resources. I had access to use bootstrapping in many cases and it is also easier to do if there are developed relationships because, the systemic nature of the product is made it impossible to sell only as product, but maybe as a concept.

The institutional setting of the innovation system was also quite favorable in this case, there were more advantages in terms of promoting ideas that address sustainability and climate change within the innovation system: for example Venture Cup and other institutions that give special prizes to business ideas based on eco-innovation showing that there's is an evolution of the system from an institutional perspective on sustainable development, but with one deviation that is Lund University and it's approach to sustainable development was a very complicate matter that was an example of an institutional "lock in" situation. I can call bureaucracy, in which the University does not really promote experimentation with Cleantech projects like Green Oil as alternative biofuel for the Universities truck fleet. There's a clear lack of ambition to promote experimental knowledge to put in practice knowledge created within the University. This was a surprise for me.

### **Eco-innovation is bound to policies.**

Economic incentives and policies are important to create new opportunities for entrepreneurs. The state has power to reshape the innovations systems into cradle to cradle thinking. Using the economic policy to invest on Cleantech and cradle to cradle pioneers and also using the innovations systems will also influence the way entrepreneurs think about sustainability. The other way is also to punish the polluters by increasing law enforcement of environmental policies, that is not popular but sometimes a coercive instrument that has to push the public and companies to behave and adopt sustainable practices just to comply.

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## Appendix 1

Feedback from Venture Cup on Green Oils business plan (Swedish only)

Framställning (Layout, Språk, Formalia etc.)

### **Det här är bra:**

Komplett affärsplan med tydlig disposition och bilder. Snygg logotyp.

\*\*\*\*\*

### **Det här kan utvecklas:**

Affärsplanen är bitvis mycket svårläst pga språkliga fel., både stavfel och meningsbyggnad försvårar planens möjligheter att kommunicera affären och dess planering. Vissa förkortningar som t ex RME bör förklaras i samband med att de introduceras.

\*\*\*\*\*

Sammanfattning

### **Det här är bra:**

Affärsplanen adresserar ett tydligt behov inom ett angeläget område. Idén är tilltalande och lättbegriplig och sammanfattar väl vad man vill åstadkomma.

\*\*\*\*\*

### **Det här kan utvecklas:**

Behovet kan förtydligas ytterligare, t ex genom att kvantifiera marknaden och hur angelägna kunderna är om att hitta nya alternativ till existerande lösningar.

\*\*\*\*\*

Affärsidé

### **Det här är bra:**

Bra grundidé att utnyttja avfall som råvara. Den är lätt att ta till sig och kommunicera vidare, vilket är en styrka rent generellt. Bra också med förenklade tillståndsprocesser, vilket skapar bättre förutsättningar för genomförande.

\*\*\*\*\*

### **Det här kan utvecklas:**

Utveckla gärna grundidén med avseende på tillgång på råvara och de förväntade marginalerna i den egna produktionen/raffineringen.

Utveckla gärna även trovärdigheten i den tekniska lösningen och hur ni tänker ta er till produktion i drift.

Koncept 1 och 2 kan beskrivas bättre ur kundens perspektiv, t ex vad hur många kunder är beredda att satsa på koncept 2.

\*\*\*\*\*

Marknadsplan

### **Det här är bra:**

Bra med kvantifiering av hur stor bränslekostnaden är för små åkerier. Bra med räkneexempel på olika alternativa drivmedel.

\*\*\*\*\*

### **Det här kan utvecklas:**

En enkel men tydlig marknadsundersökning bland fler åkare skulle ge affärsplanen ökad trovärdighet. T ex hur mycket måste man spara per liter för att vara villig att investera det som krävs?

\*\*\*\*\*

Affärsmodell

**Det här är bra:**

Bra med affärsmodell som bygger på förbrukningsprodukt vilket medger repeterbara intäkter. Affärsmodellen går att utveckla till att omfatta större funktioner och tjänster, vilket är en styrka.

\*\*\*\*\*

**Det här kan utvecklas:**

Förtydliga vad ni säljer i repsektive koncept. Är det bränsle per liter, tillgång till bränsle efter behov, hela funktionen av en konverterad och driftad fordonspark? Och hur detta är kopplat till kundens kvantifierade behov.

\*\*\*\*\*

Organisation

**Det här är bra:**

Bra kombination av cleantechkompetens, koppling till forskning i samarbete med användarperspektivet från ett åkeri. Det ger goda möjligheter att omsätta teori i praktiken.

\*\*\*\*\*

**Det här kan utvecklas:**

Kan gärna kompletteras med en advisory board som ger bredare nätverk av strategiska partners.

\*\*\*\*\*

Genomförande

**Det här är bra:**

Bra upplägg med en pilotstudie som samtidigt genererar intäkter som kan finansiera utvecklingen av produktion och försäljning. Der ger förutsättningar för en sk "lean startup".

\*\*\*\*\*

**Det här kan utvecklas:**

Planen skulle vinna mycket på en mer utvecklad beskrivning av hur hela produktions- och distributionskedjan ska tas fram. Gärna med fler referenser till forskningsresultat och gällande praxis i branschen.

\*\*\*\*\*

Lönsamhet & Finansiering

**Det här är bra:**

Bra med en åkeriverksamhet som intäktsbas för att bekosta produkt- och processutveckling.

\*\*\*\*\*

**Det här kan utvecklas:**

Kalkylen skulle öka i trovärdighet om kostnader för produkt-/processutveckling fanns med och motsvarade ungefär lika stor andel som lönekostnader och marknadsföring.

\*\*\*\*\*

Risikanaly

**Det här är bra:**

Bra och rimligt komplett uppställning av olika risker med tillhörande åtgärdsplan.

\*\*\*\*\*

**Det här kan utvecklas:**

Saknar en beskrivning av risken att förlora marginaler i samband med utveckling av egna produktionsprocesser. Vad händer om man stöter på problem som gör att utvecklingsarbetet

fördröjs eller fördyras?

\*\*\*\*\*

Helhetsintryck av affärsplanen

**Det här är bra:**

En tydlig grundidé inom ett angeläget område och med en bra idé till genomförande.

\*\*\*\*\*

**Det här kan utvecklas:**

Språket skulle må bra av en genomskrivning eller kanske en omskrivning på engelska.

Den tekniska trovärdighet kan utvecklas.

\*\*\*\*\*



Lennart Larsson + René Churquina + Taras Seryy

# Business Plan

For The Venture Cup Phase 3

March 29 2011



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A project within the Master Course in Entrepreneurship at Lund University, Sweden.



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## Summary

Water-damage of buildings is common all over the world due to various causes such as natural disasters, poor construction methods and inadequate construction design. Indoor dampness is related to adverse health effects: 1,2 million of Sweden's population have respiratory problems due to the bad quality of indoor air.<sup>1</sup> Getting compensation for water damages from the insurance companies is not always easy. Sometimes owners resort to judicial litigation which is time consuming. The water damage and other toxic emissions from walls and construction materials are referred to as the Sick Building Syndrome: SBS.

The invention is an adsorbing sheet (surface filter) that stops harmful emissions caused by the water-damage from spreading in the building. The product is applied on the surfaces subject to water-damage (walls, floors, ceilings indoors; frame etc). This means that people can in some cases stay in their home during remediation (they don't have to move to a hotel for example).

The cTrap is a patent pending research project that is in the stage of final product development. The initial application has been filed and received its first review

in mid December 2010, the subsequent PCT application is to be filed at the end of May 2011. The initial laboratory tests, conducted at Lund University, have shown an immediate reduction in emissions at the source from samples that were covered by the prototype materials.



*Picture 1. First generation cTrap prototype  
The sheet can be attached to any surface with tape or nails.*

## Business Idea - In depth

The water-damage remediation standard covering Australia, Canada, Ireland, Japan, New Zealand, UK, and USA (ANSI / IICRC S500 ) states that: "Mitigation is the control of the spread of contaminants: In some water damage situations, such as those involving sewage, microbes present can include a variety of disease-causing human viruses and parasites, in addition to bacteria and fungi. When waterborne contaminants (fungal, bacterial, viral, algae) are present in the building environment, they can become airborne during the drying process and spread to previously unaffected areas within the structure. Contamination should be contained as close to its source as possible."<sup>2</sup> cTrap assists the water-damage remediation professionals in performing mitigation activities.

**Case a:** To eliminate mold and other bacterial contamination, specialists use chemicals known as biocides. "Biocides, which can be strong irritants or sensitizers, might not be appropriate for application in close proximity to building occupants who could be exposed and adversely affected. Finally, products with strong odors can be undesirable to some customers or occupants as many individuals suffer from asthma, allergies, or other conditions that can be exacerbated by the application of antimicrobials (biocides)."<sup>3</sup> These biocide chemicals include but are not limited to quaternary ammo-

mium compounds, phenolics, iodophors, glutaraldehyde. By applying the cTrap emission trap over the surfaces coated by biocides, the potential hazards to the occupants are virtually eliminated.

**Case b:** In order to effectively dry the building, water-damage professionals use air-moving equipment to dry-out affected surfaces. "Airmoving devices inherently tend to aerosolize soils and contaminants present in the environment. As water evaporates from surfaces and materials, such as floors and walls, more particles often become aerosolized, creating possible health, safety, comfort and cleanliness issues."<sup>4</sup> To minimize or control aerosolization of particles restorers can use cTrap in the final stages of drying to act as a filter or scrubber. Internal testing has shown that when used on surfaces with light water saturation (less than 25% above the normal humidity levels) application of cTrap over the surface does not increase drying time.

**Case c:** Under certain circumstances the use of air-moving equipment is not possible/advisable, in these cases cTrap combined with dehumidifiers can produce an effective drying solution.<sup>5</sup>

After a consultation and preliminary evaluation of cTrap material by SP Technical Research Institute of Sweden in December 2010 it was determined that:

**Case d:** The cTrap is effective as a temporary emission absorber from mold growth on concrete and brick surfaces, and shall be used to maintain occupancy of the mold contaminated structures until the appropriate remediation work may commence, and permit residency, as stated in case above, while the biocides are used to eradicate the mold colonies on the affected surfaces.

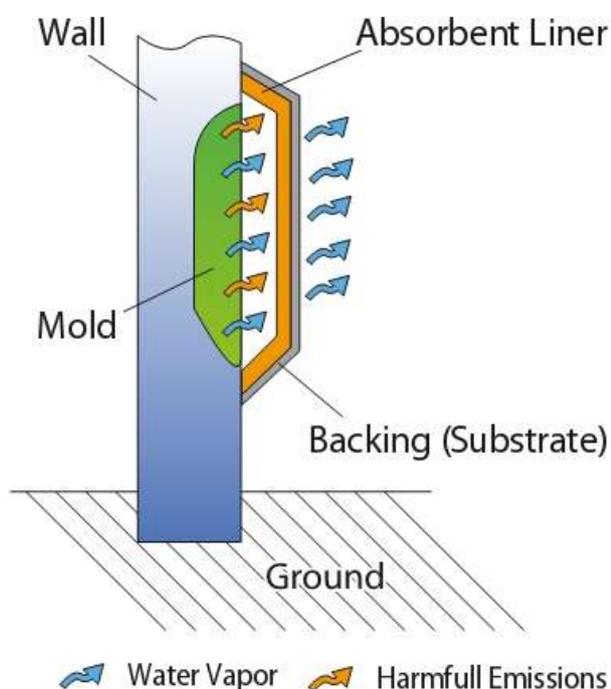


Figure 1. cTrap operating principle

Due to a very specialized nature of the product and a niche market that it will occupy, combined with the simplicity of manufacturing, it was decided that the venture will undertake the research, manufacturing, and multinational export function. The majority of the market for cTrap is in North America and mainland Europe since the construction practices favor concrete and masonry buildings both in public and private sectors.

Following successful in-house testing and integration of cTrap into the standard remediation procedure by the standard setting bodies, the demand will grow exponentially into product maturity. The presence of cTrap on the markets of developed economies with a high rate of flooding and related disasters, the demand for cTrap will remain positive in the foreseeable future.

# Marketing

## Market Description

Our primary customers are firms specializing in water and mold damage remediation, such as Ocab, Munters, Anticemex, that are required to trap the emissions from mold and other toxins from water-damaged surfaces in public buildings, houses and apartments worldwide. We are aiming at the commercial property remediation in the US, Canada, Australia, Japan, Europe and Sweden.

*Hiresgästföreningen*, the Swedish association of tenants, reports that tenant complaints concerning mold have been increasing. The complaints are filed against the landlord for delaying or not taking appropriate action to stop the mold or repair the building. Almost two to three cases are filed per week, and the resolution of disputes can take up to a year. Therefore, at least a temporary solution to SBS causing emissions is urgently required.<sup>3</sup> The use of our product allows the tenant to maintain healthy living environment while landlords prepare for the repairs.

There is a study of Uppsala University that point out that 4 of out 10 kindergartens have mould and bacteria.<sup>6</sup> By using cTrap on the appropriate surfaces, public buildings such as schools may not be required to close down for the fear of increased harmful emissions, if they have experienced mild water damage.

We aim at start the roll out of the product in the USA and Netherlands, with secondary market of Sweden, Italy, Germany and Japan. The CTO Lennart Larsson is active in international conferences with scientific researchers in the field of SBS, mold and water damage from the World Health Organization. Many prominent researchers in the field agree that cTrap is a very promising concept to trap toxic emissions. Lennart will present the concept at the International Conference on Indoor Air Quality and Climate in Austin (Texas) June 5-10 2011.

## Prospective Customers

After performing numerous cold calls to what we believed would be potential customers and getting sparse reaction, we have shifted our strategy and attempted to get the participation of the governing bodies that certify and dictate the water damage repair practices to the industry.

On December 20th cTrap team visited SP Research institute and met with their mold and water damage repair specialists. The meeting was extremely productive as it highlighted many positive aspects about our product, but also showed areas of improvement that are being addressed by the development team. Once the initial product development will be complete at our laboratories, the project will be working closely with SP to independent validate our product effectiveness.

To evaluate the export potential for our product, the team is working with Restoration Industry Association (further RIA) and Institute of Inspection, Cleaning and Restoration Certification (further IICRC) of the USA. These two bodies effectively dictate the state of the restoration procedures for general contractors in the United States and other countries. The project has been in cooperation with the technical committees of these organizations, and has received numerous positive influences for the product development goals. In particular we have secured the LOI from the RIA vice president Wade Miller (see appendix A) and have developed a positive consulting relationship with Patrick Moffett, who is one of the leading technical experts in the field of water-

damage and mold remediation in North America. He is a member of the standards committees for IICRC S500 and S520 standards, as well as the frequent publisher of industry technical bulletins and training information.

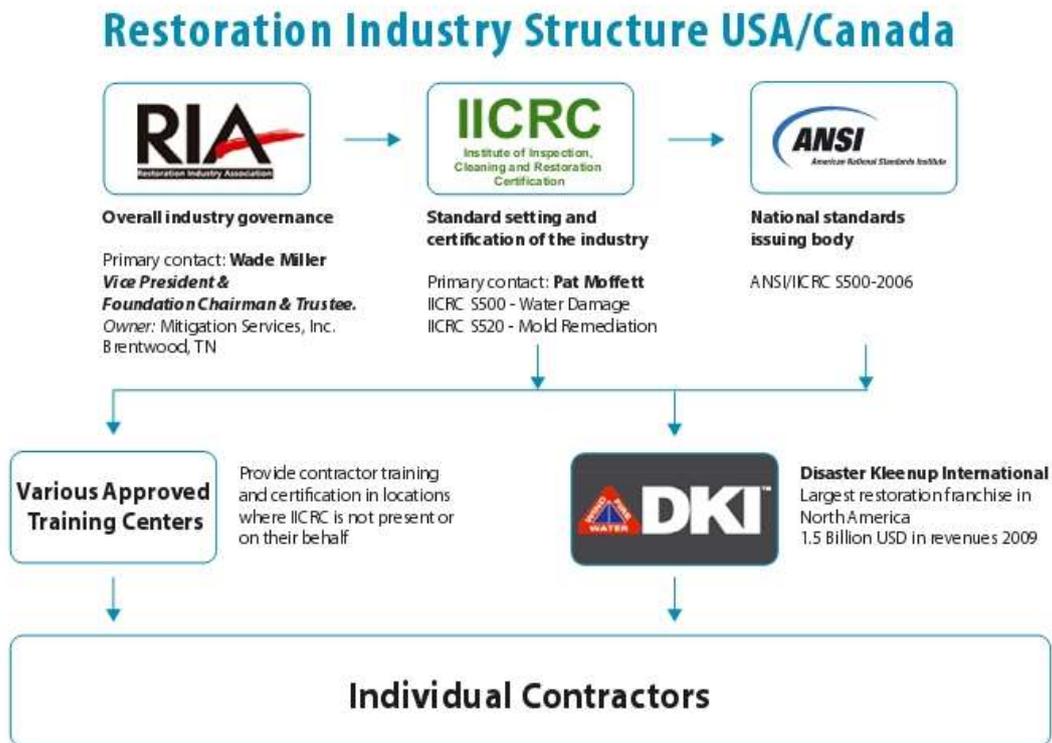


Figure 2.

cTrap has received strong interest from Lamon B.V. of Netherlands, which specializes on manufacturing and distribution of mold control agents in Holland. They have verbally expressed their support for our project subject to final prototype performance testing.

Additionally the commercialization team of cTrap has been involved with tenant's association of Sweden and several insurance companies as to ascertain the applicability of the material for the end customer. The preemptive effects of toxin elimination from the air were well received, but in most cases to achieve the full benefits, the owner would require assistance from a professional firm, unless the mold is clearly exposed on a concrete or masonry wall, with no other material installed over that wall.

According to the Harvard University study titled "The Remodeling Market in Transition Improving America's Housing 2009" the home improvement and remodeling market in 2007 the US was worth 326 billion USD with a growth rate of 15%. Of this aggregate 6% is spent on various types of disaster restoration projects ranging from floods to hurricane damage, which amounts to 19.2 billion USD.<sup>7</sup> After a more detailed analysis (see market strategy) and further research of the market we discovered that the development focus should shift to the multistory commercial structures, rather than residential construction. Based on the feedback from RIA we estimate the total market for US to be 3 500 000 m<sup>2</sup> per year, with Canada, Australia and Japan accounting for another 2 800 000 m<sup>2</sup> per year. Holland's peak market estimate based on feedback from Lamon is at 500 000 m<sup>2</sup> per year. Our estimate based on the feedback from SP, Ocab and Munters shows the annual requirement of 100 000 m<sup>2</sup> per year in commercial applications. After the first year of production we estimate the annual consumption of 760 000 m<sup>2</sup> per year, with subsequent years gaining substantially towards the peak requirement.



Our specialized expertise with the microbiology and chemistry, combined with strong manufacturing knowledge and simple product manufacturing/packaging process cTrap is best positioned to maintain the R&D and manufacturing functions, while working with country distributors to connect with the actual contractors performing the remediation procedures.

Given the specialized nature of our product and unique situations it addresses, we can expect moderate profit margins on the product itself, as well as offering commodity product margin to our country distributors.

### Market Strategy

The motivation for shifting our focus from residential to commercial properties came from the cost-benefit analysis that the team performed during the initial financial planning stages. These assumptions were strongly supported by industry representatives and our prospective customers. The results of this analysis are shown in the Table 1. The greatest benefit both for the cTrap project and end customers comes from effective applica-

Residential Case			Commercial Case		
Avg Basement Size USA	60	m <sup>2</sup>	Affected damaged area	500	m <sup>2</sup>
Avg water damage height	1	m	Avg water damage height	1	m
Perimeter length	32	m	Perimeter length	120	m
Total material requirement per job	92	m <sup>2</sup>	Total material requirement per job	620	m <sup>2</sup>
Total cost to produce cTrap for the Job	406	USD	Total cost to produce cTrap for the Job	2738	USD
Avg hotel stay in USA	103	USD/night	Office relocation expenses	1000	USD/day
Avg time to dry out difficult structures	7	days	Avg time to dry out difficult structures	10	days
Customer relocation cost	793	USD	Customer relocation cost	11000	USD
Possible economic rent	387	USD	Possible economic rent	8262	USD
Possible gross margin	95%		Possible gross margin	302%	

Table 1. Price sensitivity analysis for cTrap

tion of cTrap in the commercial properties.

Because cTrap offers a unique emission entrapment proposition with a very specific application range, we are selecting premium pricing strategy that offers lower cost and greater customer benefit as compared to the costs and inconveniences of temporary relocation.

The greatest challenge before cTrap is indisputably proving the effectiveness of the material in its intended application and consequently obtaining the endorsement of RIA and IICRC. Given the preliminary testing results on previous generation of prototypes and positive feedback from RIA/IICRC, this task is manageable but will take a certain amount of time. Additionally, during the re-issuance of the standards for water-damage and mold remediation, integration of the cTrap in the remediation procedure would secure the demand for the next several years.

The promotion for the product will be carried out through various scientific and industry conferences that are attended by our researcher. Given the industry structure this is the best method for convincing the scientific community developing the industry guidelines of the viability of our product. Since these conferences are

attended by our researchers as part of their university programs, the project does not incur additional cost for participating in these events.

Once the product has been approved and integrated into the remediation guidelines the venture will undertake additional promotion strategies to speed up the adoption of the product. This step entails the participation in various industry trade shows. This action will require an annual investment of up to 2 million SEK.

### **Sustainable competitive advantage**

Because of a unique niche for the product, regulatory guidelines and patent protection, the market is not attractive for competitors, and given a stable demand the position of the venture is secure within the foreseeable future. Yet growth is essential to successful survival of the venture. For this reason we intend to undertake product line expansion to serve additional market requirements for fire damage, heating oil contamination clean up, and other decontamination uses.

We are addressing an existing market with a new product and that's why we should be focused on product development, improving the product through the following practices:

- Customer Focus ensures that the product development addresses customer needs and changes in those needs.
- Quality is crucial to get a good reputation on the market
- Supplier Focus is also important to make sure we have control over the suppliers we should also integrate some of most important into the company.
- Good Employee Practices are important to retain and attract the best and most qualified human resources.
- Innovation and Technology are the most important factors to take the lead and be a company that works on incremental improvements of the product line.
- Information and Benchmarking are also cornerstone to always be informed with the best intelligence available on the industry and the changes in the business environment. We have also to benchmark us in relation to competitors.

### **IP details**

cTrap filed for the Swedish patent in the summer of 2010 and received the initial review in December 2010, as the result of the review, the scope of the patent was narrowed and new features have been introduced to the PCT application as to allow a more secure definition of the product. The next step in the process is to file the PCT and then for localized patents for EU, USA, Canada, Australia, New Zealand, China and Japan.

### **Environmental sustainability**

The cTrap as organization will comply with environmental norms in production and also have a sustainability policy based on the following principles:

- To comply with, and exceed where practicable, all applicable legislation, regulations and codes of practice.

- To integrate sustainability considerations into all our business decisions.
- To ensure that all staff are fully aware of our Sustainability Policy and are committed to implementing and improving it.
- To minimise the impact of all office and transportation activities.
- To make suppliers aware of our Sustainability Policy, and encourage them to adopt sound sustainable management practices.
- To review, annually report, and to continually strive to improve our sustainability performance.
- As part of this commitment, the latest implementation of the cTrap is composed of compounds that facilitate recycling and safe utilization of the material after it has exceeded its useful life.

## Business Model

After numerous debates and investigations, including a thorough value chain analysis (see Figure 2) the management team of cTrap settled on the manufacturer business model, as it allows for greater product and quality control, while capturing the greatest economic value from the activities. The simplicity of product manufacturing, ready material availability and high degree of automation in the process make the manufacturing operation simple and inexpensive. Additionally a specialised niche market makes it less attractive to large scale construction material players which precluded the licensing scenario as a primary option.

Therefore the key tasks of cTrap would be as follows:

- Product design and development
- Manufacturing
- Packaging and shipment to country distributors
- The final distribution will be performed by our country partners who are much more skilled in meeting the unique circumstances of their domestic market

The majority of the raw material supplies will come from EU, USA and China. We have received the quotes from our prototype material suppliers but are currently in evaluation of other suppliers who are closer geographically to our proposed Skåne manufacturing location.

Given the flexibility and light weight of the final product, the cTrap will be packaged in 100 m<sup>2</sup> flat rolls which will be assembled in to Euro-pallettes and shipped either in container or "Less than Container Loads" (LCL) with ocean freight forwarders. Skåne manufacturing location allows for easy sea port access either through Malmö or Ystad. The venture also intends to leverage the Just-in-Time (JIT) inventory management techniques to reduce the inventory on-hand and warehousing requirement.

## Organization

### Management Team

René Churquina has been working with business and market development in 14 start-ups in the last seven years and has a strong background in sales and public relations for technology

based firms in IT and Cleantech. René has the ability to create new strategic partnerships, execute the market strategy, generate concrete sales and organize partnerships that lead to long term revenue. René is responsible for marketing and sustainability.

Taras Seryy has over 10 years of experience in manufacturing, automotive and alternative energy segments, working as mechanical and production engineer, production manager, and proprietor, product developer, and consultant. He has over 6 years of eastern European marketing, publishing and advertisement experience. Taras is also experienced in residential and industrial construction. Has excellent knowledge of the US and eastern European markets, as well as strong financial and accounting background. Taras is the project leader responsible for sales, strategy, manufacturing, procurement, and financing.

### R&D Team

Lennart Larsson is a Professor in microbial metabolomics at the Dept. of Laboratory Medicine, Division of Medical Microbiology, Lund University. Lennart has over 37 years of technical analytical chemistry experience and 11 years of microbiology experience. Lennart is the inventor of the process and is the head of the research for cTrap. Lennart oversees the product development, purchasing and manufacturing.

Paweł Markowicz is a PhD student working full time on the active development of the cTrap materials. Powell has a very strong background in microbiology, chemistry and latest testing methodology. Pawel is in charge of product development and testing.

### Oversight

Thomas Rundqvist is the external advisor from Lund University who has managed many start-up projects and has extensive experience in managing new ventures.

The summary of the team competencies is presented in the Table 2 below.

Table 2

cTrap Team Competencies Assesment									
Team Member	Required Competencies								
	Sales	R&D	Manufacturing	Exporting	Finacial Accounting	Strategic Planing	Project Management	Negotiations Procurement	Market Contacts
Rene	++			++	+	++	+	++	++
Taras	++	+	++	++	++	++	+	++	++
Lennart		+++	+			+		++	+
Pawel		++					+		
Thomas		+	++	+	++	+++	+++	++	++

If certain technical competencies would be required, the team will source these competencies among the pool of scientists available at Lund University. External businesses competencies would be acquired on the consultancy terms. Factory personnel will be hired in the open market.

The ownership structure of the project is as follows:

- Lennart Larsson - 65%
- Taras & René – up to 20%
- LUIS – 15%

## Implementation

The key assignment for the cTrap team is to prove the established claims for the performance of the cTrap material, and than based on these facts, secure firm orders for the material from target customers as the only objective presently to securing the firm orders is the inability to effectively verify the validity of our claims towards the product performance.

Presently the team has successfully formulated a coherent market need, a well defined product and target application, established the understanding of industry structures and player. The remaining implementation objectives are presented in Table 3.

	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11
Product development	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue
PCT Filing (60 000 SEK)		Blue					
Cost Structure Optimization + Sourcing	Green	Green	Green	Green	Green		
Internal and Independent Product Testing			Light Green				
First firm order sourcing					Orange	Orange	
Finalized plant location						Orange	
Assembly machine and materials order						Red	
Production Begins							Dark Red

Table 3. cTrap pre-sales roadmap

## Financial & Profitability

The financial projections for the project are positive. With all scenarios showing positive Net Present Value at 100% per annum cost of capital, and having the break even point of no longer than two years in to the future.

The project requires the maximum financing of 1.5 million SEK under all scenarios. The majority of this sum will be raised through working capital loan, and a small equity injection. In addition, the project already secured over 300 000 SEK of financing available to cover management and R&D investment activities, thereby allowing the project to continue without external financing for one year.

The remainder of financial calculations are presented in the appendix B.

In the Chart 1 you can see our product demand forecast on which we build our calculations, the motivation

for these number is based on the information discussed in the prospective customers section, and assumes a linear growth rate of 5000 m<sup>2</sup> per month in the worst case, 10% compound growth per month for 3 years in the likely scenario until market saturation is reached, and 12.5% growth per month for 2.5 years until the product maturity, from that point on the growth will level off with an annual increase of 5-10%.

In Table B1 you can see the calculation for the assembly machine and factory output. Here the annual production of year 2012 is taken as a base, and converted to the required monthly output for the machine. The requests for quotes for the machine cost were based on this productivity figure at 75% machine load factor. The calculation assumes 54 work weeks per year and 40 hours per week of operation. If operated 24 hours a day for 5 days a week, the machine could output 3x the stated requirement. The weekends were incorporated for maintenance and potential downtime estimation.

In Table B2 you can see the calculation of the Fixed production costs based on the forecast output. The cost of the machine was based on 2 quotes received from the equipment manufacturers given the technical assignment supplied by the cTrap team.

In Table B3 we present the cost break down for 1 m<sup>2</sup> of cTrap material. The figures presented are based on the quotes from the manufacturers of prototype materials with an estimated annual use assumed in our demand forecast. The processing cost calculation is the result of calculations in table B2.

In Table B4 you can evaluate the break down of cTrap's sales and administrative expenses.

In Table B5 we present the project's income statement. The interest expense is based on the loan amortization schedule for the machine, presented in Table B6.

In Tables B7-9 we present the forecast cash flows in best, likely and worst case scenarios, along with project Net Present Value calculations. Within the calculations we assume that the material costs will remain as shown in the Table B3 at the output level of 120 000 m<sup>2</sup> per month. At lower outputs the coefficient of 1.2 is added to the material costs until the level of output of 60 000 is reached, when the coefficient changes to 1.1. There is a 10% reduction in the materials cost for the increase of 60 000 units of output per month. The remainder of the data is based on the information provided in prior tables and on the information discussed earlier in this document.

Table B10 shows the forecast balance sheet in the likely scenario.

## **Risk Analysis**

### **SWOT Analysis**

#### Strengths

- A unique solution and combination of compounds to trap emissions from water damaged buildings.
- Temporarily improves the quality of life for people with respiratory diseases such as asthma in contaminated buildings.

- People can stay at home and doesn't need to evacuate the house while the wait for remediation to be performed.
- We add value to water damage remediation businesses and also Insurance companies that can implement our solution to cope with the worst problems bad indoor air quality

#### Weaknesses

- The product has a specific application range.
- Product is largely untested
- Venture has limited industry experience

#### Opportunities

- The market is a niche market with stable and strong demand
- First mover advantages

#### Treats

- Approval within the remediation framework may be slow or difficult
- Customers can misuse the product to let people live in places with bad air quality without doing the proper remediation work.

Based on this analysis we have conducted further detailed risk assessment, presented in the table 4.

**Table 4:** Risk analysis table

	P	S	C	Implications	Action to prevent or mitigate
Technical Risks					
Product does not work as expected	1	3	3	Failure to deliver results will significantly hamper future operations	We have to ensure good design, manufacturing practices and quality control to avoid potential flaws.
Endorsements from technical committees of SP/IICRC are not secured	1	3	3	Failure to secure endorsements will reduce the sales potential	Product will have to be redesigned to ensure such endorsements
Market risks					
Product copies on the market and piracy	1	1	3	Given the specialised nature of the product, inferior copies are possible but not likely. Legal action will be taken to protect the reputation of the company.	Strong legal advisors and strong supplier relationships will help mitigate the likelihood of such outcome.
Extreme demand growth	2	2	4	Quality may suffer, and company reputation may become tarnished.	We have to manage to grow the production efficiency and exercise strong quality control standards.
Strong competitive pressures	2	2	4	Reduced sales margins and volumes.	Within limits exercise the patent protection rights, alter the product/pricing mix to maintain marketshare.

Organizational Risks					
External management is needed to maintain the growth rate.	2	1	2	Failure to make appropriate changes can damage the company. Higher personnel costs.	Try to find managers with a good track record using Connect Sweden network and other networks in the innovation system.
Foreign Exchange Risk	3	2	6	Currency exchange rate can have significant impact on the bottom line	FX hedging through financial instruments and down the road adjusting supply and retail base to be in the same currency.

In this table P - represents probability, S - severity, C - coefficient, achieved by multiplying P\*S. Scale is 1-3 with 3 being most sever or likely event.

### **Exit strategy and liquidation plans.**

Depending on the growth rate of the venture, various exit strategies will be appropriate. In the case of high growth rate where the manufacturing and distribution demands may begin to challenge the team, the preferred exit is an equity sale to an investor capable of addressing the high manufacturing and distribution volumes demanded by the market.

In the case of likely scenario, current competencies will allow the team to grow the company to maturity, and if such interest is expressed, sell off the business to an investor seeking a cash cow.

In the case of poor performance, the venture will remain a going concern, as long as its revenues cover its operational costs. Otherwise the venture will proceed to a liquidation stage, where its assets will be auctioned off and proceeds, following the creditor payout will be redistributed amongst the shareholders.

## References

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- 4 ANSI/IICRC S500 2006 Standard. p. 231
- 5 Interview with Strand, Daniella Local area manager Hyresgästföreningen Malmö about landlords and the problem with mold in flats. 2010-08-20
- 6 Bröms, Kristina Institutionen för folkhälso- och vårdvetenskap, Publicerad 2010-05-06. 4 of 10 kindergartens have mould and bacteria due to humidity in the building <http://www.uu.se/press/pm.php?id=1031> Downloaded : 2010-08-12
- 7 Joint Center for Housing Studies of Harvard University, "The Remodeling Market in Transition: Improving America's Housing 2009"

# Appendix A

## A1 Leadership of Restoration Industry Association

Exerpt from RIA website @ [www.restorationindustry.org/content/leadership](http://www.restorationindustry.org/content/leadership)

**RIA**  
Restoration Industry Association

Member Login Contact Join Now Find a Member RIA Store  
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- Membership
- News Releases
- Testimonials
- Code Of Ethics
- Quality Policy
- Leadership
- Staff

- Disaster and fire/smoke restoration
- Water damage restoration
- Rug, drapery and upholstery cleaning
- Air quality and mold ID/removal
- Mechanical systems hygiene
- And more

**LOCATE**  
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**RIA Board and Foundation Board**

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Term Ends: 2011

**A2 LOI from Wade Miller**



**MITIGATION SERVICES, INC.**  
SPECIALIZED EXPERTISE & FULL RECOVERY SUPPORT  
FOR EMERGENCY & DISASTER RESPONSE

March 25, 2011

To Whom It May Concern:

On behalf of Mitigation Services, Inc., I would like to express our support and interest in further development of the cTrap project at Lund University and their surface filter application for trapping the emissions from water damaged surfaces. We have given them input and led them to review documents in the US like the IICRC publication S520 and others in their search for greater viability.

We strongly believe that this product, subject to verification of the current claims, has the ability to simplify and improve the water damage restoration process and has very high chances to become a commercially viable product. We look forward to our continued cooperation with the cTrap development team and will provide further guidance and assistance to the developers as we are able. We also plan to introduce the team to various other colleagues of ours in the Restoration and Indoor Air Quality industry community.

Sincerely,

Wade Miller

115 Penn Warren Dr., Suite 300 • Brentwood, TN 37027  
615-309-9959 Office • 615-523-1180 Fax • [www.MitigationServicesInc.com](http://www.MitigationServicesInc.com)

## Appendix B

### B1 Machine production rates

Monthly Output	64 583	m <sup>2</sup>
Daily Output Equipment	2 870	m <sup>2</sup>
Hourly Output Equipment	359	m <sup>2</sup>
Production Rate	6	m <sup>2</sup> /min
8 hour shift 5 days a week 54 weeks per year		
Peak output at 24 per day	193 750	m <sup>2</sup>

### B4 Sales General and Administrative Costs

Management Salaries	720 000	SEK
Managers	2	
Total Management Salaries	1 440 000	SEK
Office Rent	180 000	SEK
Communication	19 200	SEK
Travel Expenses	75 600	SEK
Other Expenses	100 000	SEK
Total SG&A	1 814 800	SEK

### B2 Fixed cost of production

Covering assembly machine	1 260 000	SEK
Amortization of the machine cost 5 year straight line	252 000	SEK
Loading equipment rental	22 680	SEK
Building rental	180 000	SEK
Electricity	13 500	SEK
Telephone	4 800	SEK
Labor costs	540 000	SEK
Plant operators	2	
Total labor cost	1 080 000	SEK
Total annual production cost	1 552 980	SEK
Per m <sup>2</sup> production cost:	2	SEK

### B3 Cost break down of 1m<sup>2</sup> of the material

FX USD to SEK		6.3
	USD	SEK
Technical substrate base layer	0.453	2.854
Technical substrate layer 2	0.809	5.097
Absorbent layer	1.345	8.474
Absorbent powder compounds	0.450	2.835
Technical substrate cover layer 1	0.809	5.097
Trap coating	0.176	1.109
Yarn	0.056	0.353
Total materials cost	4.098	25.817
Processing cost	0.318	2.004
Total product manufacturing cost	4.416	27.821

### B5 Income statement 2012

Revenue Assumptions				
Annual Sales Volume	775000	m <sup>2</sup>		
Sales Price	9.72	USD/m <sup>2</sup>	61.21	SEK/m <sup>2</sup>
Less Distribution Costs	2.91	USD/m <sup>2</sup>	18.36	SEK/m <sup>2</sup>
Gross Margin	6.80	USD/m <sup>2</sup>	42.84	SEK/m <sup>2</sup>
Less Costs	4.42	USD/m <sup>2</sup>	27.82	SEK/m <sup>2</sup>
Net Margin	2.38	USD/m <sup>2</sup>	15.02	SEK/m <sup>2</sup>
Gross Income	1 848 126	USD/Year	11 643 191	SEK/Year
Less SG&A	288 063	USD/Year	1 814 800	SEK/Year
Less Fixed Production Costs	246 505	USD/Year	1 552 980	SEK/Year
EBIT	1 313 557	USD/Year	8 275 411	SEK/Year
Less Interest Expense	12 427	USD/Year	78 287	SEK/Year
EBT	1 301 131	USD/Year	8 197 124	SEK/Year
Less Taxes	345 466	USD/Year	2 176 433	SEK/Year
Net Income	955 665	USD/Year	6 020 691	SEK/Year

### C1 Cumulative cash-flow - break even analysis

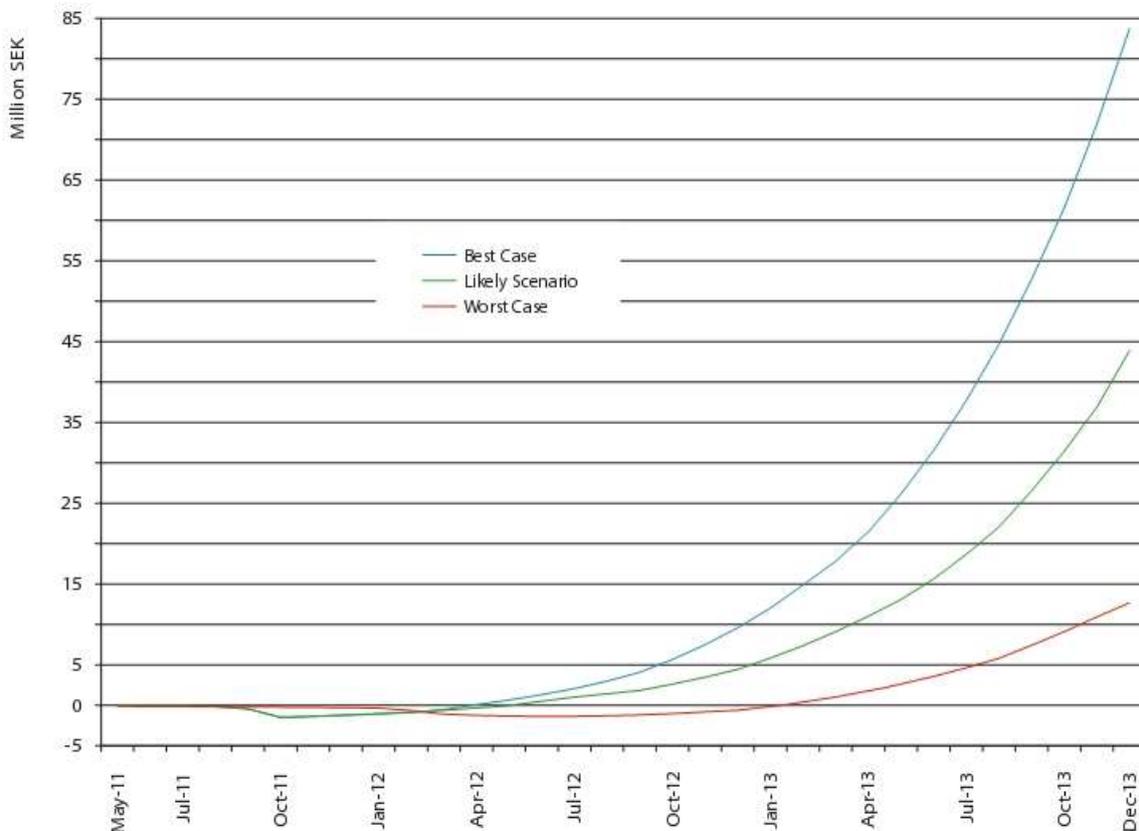


Chart B1. cTrap cumulative cash flow.

**B6 Covering assembly/packaging machine loan amortization schedule SEK**

Current Value	1 260 000
Down Payment (20%)	252 000
Loan Balance	1 008 000
Interest rate	9.00%
Loan term (months)	36
Monthly Loan Payment	32 054

	<b>Oct-11</b>	<b>Nov-11</b>	<b>Dec-11</b>	<b>Jan-12</b>	<b>Feb-12</b>	<b>Mar-12</b>	<b>Apr-12</b>	<b>May-12</b>	<b>Jun-12</b>	<b>Jul-12</b>	<b>Aug-12</b>	<b>Sep-12</b>
Principal Reduction	24494	24678	24863	25049	25237	25427	25617	25809	26003	26198	26394	26592
Interest	7560	7376	7191	7005	6817	6628	6437	6245	6051	5856	5660	5462
Remaining Balance	983506	958828	933965	908916	883678	858252	832635	806825	780822	754624	728230	701638
	<b>Oct-12</b>	<b>Nov-12</b>	<b>Dec-12</b>	<b>Jan-13</b>	<b>Feb-13</b>	<b>Mar-13</b>	<b>Apr-13</b>	<b>May-13</b>	<b>Jun-13</b>	<b>Jul-13</b>	<b>Aug-13</b>	<b>Sep-13</b>
Principal Reduction	26792	26993	27195	27399	27605	27812	28020	28230	28442	28656	28870	29087
Interest	5262	5061	4859	4655	4449	4242	4034	3824	3612	3399	3184	2967
Remaining Balance	674846	647853	620658	593258	565654	537842	509822	481591	453149	424494	395623	366536
	<b>Oct-13</b>	<b>Nov-13</b>	<b>Dec-13</b>	<b>Jan-14</b>	<b>Feb-14</b>	<b>Mar-14</b>	<b>Apr-14</b>	<b>May-14</b>	<b>Jun-14</b>	<b>Jul-14</b>	<b>Aug-14</b>	<b>Sep-14</b>
Principal Reduction	29305	29525	29746	29969	30194	30421	30649	30879	31110	31344	31579	31816
Interest	2749	2529	2308	2085	1860	1633	1405	1175	944	711	475	239
Remaining Balance	337231	307706	277960	247990	217796	187376	156727	125848	94738	63394	31816	0

## B7 Trap Cash Flow Best Case

000 SEK

	2011												YTD
	January	February	March	April	May	June	July	August	September	October	November	December	
<b>Inflows</b>													
Sales Revenue	1612	1806	2023	2265	2537	2841	3182	3564	3992	4471	5008	5609	38911
<b>Outflows</b>													
PCT application costs					70								70
Management salary						25	25	25	25	25	25	25	175
Other administrative expenses						1	1	1	1	1	1	1	7
Testing related expenses						7	7	7	7	7	7	7	49
Covering assembly machine pre-payment									252				252
Manufacturing fixed costs										17	17	17	50
Production salary										45	45	45	90
Raw material costs										929	1041	1166	3136
Interest Cost										32	32	32	96
<b>Net Cash</b>					-70	-33	-33	-33	-285	-1096	118	147	-1245
<b>Inflows</b>													
Sales Revenue	1612	1806	2023	2265	2537	2841	3182	3564	3992	4471	5008	5609	38911
<b>Outflows</b>													
Management salary	25	25	25	25	25	25	60	60	60	60	60	60	510
Other administrative expenses	31	31	31	31	31	31	31	31	31	31	31	31	375
Manufacturing fixed costs	18	18	18	18	18	18	18	18	18	18	18	18	221
Production salary	45	45	45	45	45	90	90	90	90	90	90	135	900
Raw material costs	1306	1462	1501	1509	1811	1992	2192	2411	2652	2674	2941	3235	25687
Interest Cost	32	32	32	32	32	32	32	32	32	32	32	32	385
<b>Net Cash</b>	155	192	369	604	574	652	759	922	1109	1566	1835	2097	10833
<b>Inflows</b>													
Sales Revenue	6282	7035	7890	8825	9884	11070	12399	13887	15553	17419	19510	21851	151995
<b>Outflows</b>													
Management salary	60	60	120	120	120	120	120	180	180	180	180	180	1620
Other administrative expenses	31	31	62	62	62	62	62	62	62	62	62	62	687
Manufacturing fixed costs	18	18	20	20	20	20	20	20	20	55	55	55	345
Covering assembly machine No2 pre-payment			252							252			504
Production salary	135	135	135	180	180	225	225	270	270	315	360	405	2835
Raw material costs	3559	3915	4306	4737	4737	5211	5732	6305	6935	7629	8392	9231	70688
Interest Cost	32	32	32	64	64	64	64	64	64	64	96	96	737
<b>Net Cash</b>	2446	2844	2952	3641	4700	5368	6175	6985	8021	8862	10364	11821	74179



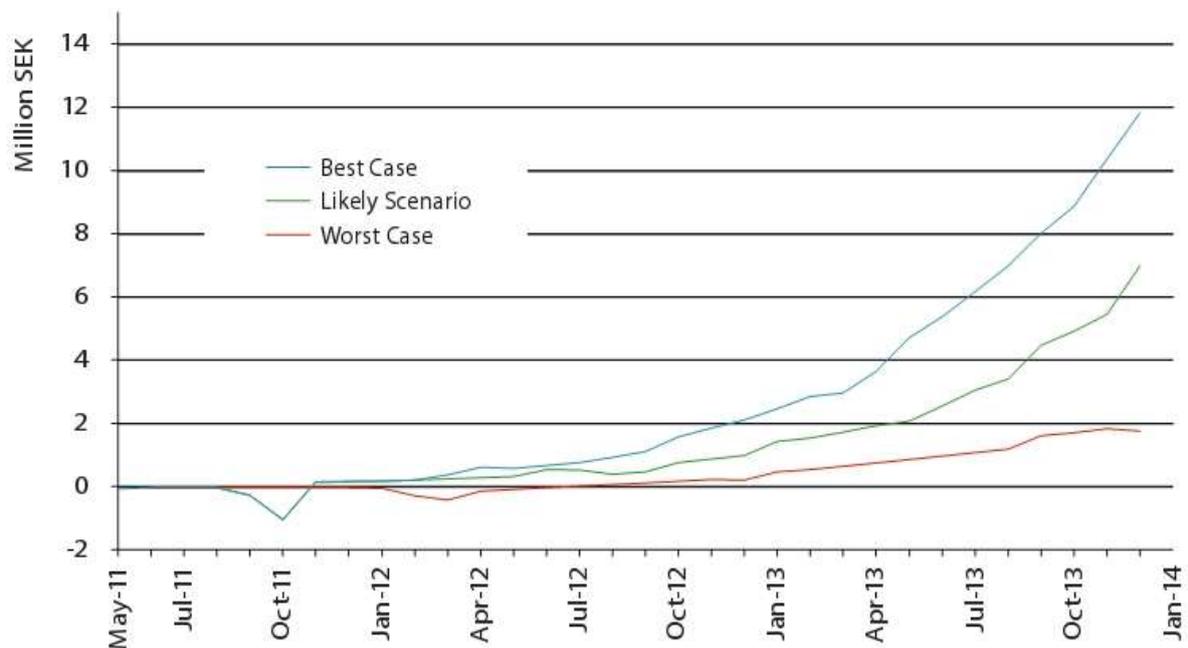
B8 CTrap Cash Flow Likely Scenario		000 SEK												
		2011												
		January	February	March	April	May	June	July	August	September	October	November	December	YTD
<b>Inflows</b>														
Sales Revenue		4881	5369	5906	6497	7146	7861	8647	9512	10463	11509	12660	13926	104378
<b>Outflows</b>														
PCT application costs						70								70
Management salary		60	60	60	60	120	120	120	120	120	120	120	120	1200
Other administrative expenses		31	31	31	31	31	62	62	62	62	62	62	62	593
Manufacturing fixed costs		18	18	18	18	18	20	20	20	20	20	20	20	234
Covering assembly machine pie-payment							252							252
Production salary		90	135	135	135	135	135	180	180	180	180	225	225	1980
Raw material costs		3235	3599	3915	4306	4737	4690	5158	5674	5948	6103	6713	6462	60101
Interest Cost		32	32	32	32	32	32	64	64	64	64	64	64	577
Net Cash		1414	1534	1715	1914	2073	2550	3042	3391	4468	4914	5455	6973	39441
<b>Inflows</b>														
Sales Revenue		1555	1711	1882	2070	2277	2505	2755	3031	3334	3667	4034	4437	33298
<b>Outflows</b>														
Management salary		25	25	25	25	25	25	60	60	60	60	60	60	510
Other administrative expenses		31	31	31	31	31	31	31	31	31	31	31	31	375
Manufacturing fixed costs		18	18	18	18	18	18	18	18	18	18	18	18	221
Production salary		45	45	45	45	45	45	90	90	90	90	90	90	810
Raw material costs		1237	1361	1497	1647	1811	1826	2009	2411	2652	2674	2941	3235	25301
Interest and loan payments		32	32	32	32	32	32	32	32	32	32	32	32	385
Net Cash		166	198	233	272	314	527	515	388	450	762	861	970	5657

		000 SEK													
		2011		2012		2013		2011		2012		2013		YTD	
		January	February	March	April	May	June	July	August	September	October	November	December		
<b>89 CTrap Cash Flow Worst Case</b>															
<b>Inflows</b>															
Sales Revenue		2464	2785	3106	3428	3749	4070	4392	4713	5034	5356	5677	5998	50771	
<b>Outflows</b>															
PCT application costs						70								70	
Management salary							25	25	25	25	25	25	25	175	
Other administrative expenses							1	1	1	1	1	1	1	7	
Testing related expenses							7	7	7	7	7	7	7	49	
Net Cash						-70	-33	-33	-33	-33	-33	-33	-33	-301	
<b>Inflows</b>															
Sales Revenue		0	0	0	428	643	857	1071	1285	1500	1714	1928	2142	11568	
<b>Outflows</b>															
Management salary		25	25	25	25	25	25	25	60	50	60	60	60	475	
Other administrative expenses		31	31	31	31	31	31	31	31	31	31	31	31	375	
Covering assembly machine pre-payment			252											252	
Manufacturing fixed costs				18	18	18	18	18	18	18	18	18	18	184	
Production salary				45	45	45	45	45	45	45	45	45	45	450	
Raw material costs				310	465	620	775	929	1084	1239	1394	1549	1781	10146	
Interest and loan payments					32	32	32	32	32	32	32	32	32	388	
Net Cash		-56	-306	-429	-156	-97	-37	22	46	106	165	224	206	-314	
<b>Inflows</b>															
Sales Revenue		2464	2785	3106	3428	3749	4070	4392	4713	5034	5356	5677	5998	50771	
<b>Outflows</b>															
Management salary		60	60	60	60	60	60	60	60	50	60	60	60	720	
Other administrative expenses		31	31	31	31	31	31	31	31	31	31	31	31	375	
Manufacturing fixed costs		18	18	18	18	18	18	18	18	18	18	18	18	221	
Production salary		45	90	90	90	90	90	90	90	90	135	135	135	1170	
Raw material costs		1846	2099	2272	2485	2698	2911	3124	3337	3227	3421	3614	3976	34970	
Interest Cost		32	32	32	32	32	32	32	32	32	32	32	32	385	
Net Cash		463	526	635	743	851	960	1068	1176	1607	1690	1818	1746	13283	

## B10 Balance sheet likely scenario 000 SEK

<b>Assets</b>	Dec-11	Dec-12	Dec-13
Cash and Working Capital	90	748	5 580
Charter Capital	50	50	50
Inventory (Raw materials and completed products)	141	444	2 089
Assembly Machine 1 (5 year equipment)	966	714	462
Assembly Machine 2 (5 year equipment)			882
Pattent (at book value, 20 year straight line)	140	133	126
Receivables	71	222	1 393
<b>Liabilities</b>			
Vendor Payments	112	324	1 292
Assembly Machine Loan	934	621	1 136
<b>Equity</b>			
Charter Capital	50	50	50
Owners Equity	362	1 317	8 103

## C2 Actial cash-flow





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and protecting your health