Suite 3

Advanced Incubator Management

10 Technology Commercialization through Incubation

Trainee Manual Part 1

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Introduction to the Training Program

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INTRODUCTION TO THE TRAINING PROGRAM

This is the trainee manual for Module 10 Part 1 – out of 11 modules in total - of *info*Dev's State-of-the-Art Business Incubation Training Program for Business Incubator Managers in Developing Countries.

*info*Dev (www.infodev.org) is a research, capacity building and advisory services program, coordinated and served by an expert Secretariat hosted by the World Bank Group. It helps developing countries and their international partners use innovation and information and communication technologies (ICT) effectively as tools for poverty reduction and sustainable social and economic development. *info*Dev is a leader in business incubation of technology-enabled enterprises. *info*Dev's global business incubation network reaches close to 300 business incubators, more than 20,000 small and medium enterprises, and has helped create over 200,000 jobs across 87 developing countries.[1]

*info*Dev has found that high quality leadership is a key factor determining the probability of success for an incubator. *info*Dev therefore seeks to increase the capacity of business incubation managers – and their stakeholders – through one-on-one technical assistance, regional and topical peer-to-peer networks, the bi-annual Global Forum on Innovation and Entrepreneurship, and its web-based networking and knowledge-sharing tool www.idisc.net. This training program was designed in direct response to repeated requests from *info*Dev's technology entrepreneurship community for an in-depth business incubation training program relevant to the developing country context.

This training program is the first-of-its-kind, drawing from the lessons, models, and examples in business incubation from across Africa, East Asia and the Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East & North Africa, and South Asia. More than 30 experts contributed directly to the writing of the training modules, and the materials were tested with more than 300 professionals in developing countries all of whom provided inputs to the final design.

This training program is designed for business incubation managers and other business incubation stakeholders wishing to increase their understanding and know-how of the business incubation process. It consists of 11 training modules ranging from basic introductory topics designed for professionals new to business incubation, to specialized topics such as Technology Commercialization and Virtual Business Incubation Services.

[1] Souce: *info*Dev activities from 2002 to 2009 - http://www.infodev.org/en/Article.473.html

The modules include:

SUITE 1 – BUSINESS INCUBATION BASICS

Module 1 – Business Incubation Definitions and Principles

This module provides an introduction to business incubation. It introduces key definitions and presents the main principles and good practices of business incubation. It aims to equip current and future incubator managers and policy makers with the knowledge, skills and understanding of the fundamentals of business incubation in order to effectively foster and encourage businesses.

Module 2 – Business Incubator Models, Including Success Factors

This module aims to illustrate various business incubator models based on practical examples of incubators from all over the world. The ultimate goal of this module is to empower current and future incubator managers with a thorough understanding of the various business incubator models and their critical success factors as well as to help them identify the best model to adopt for their own incubator to be successful.

SUITE 2 – BUSINESS INCUBATOR OPERATIONS

Module 3 – Planning an Incubator

This module, which divided in two parts, covers assessing the feasibility and designing the business model for an incubator. The first part is aimed at providing a thorough understanding of developing a feasibility study. This includes the steps to undertake a pre-feasibility study, the components that it should address, as well as how to gauge the market need and decide whether an incubator is the most appropriate solution. The second part of the module focuses on business planning to establish the incubator business model.

Module 4 – Marketing and Stakeholder Management

This module is designed to support efficient and effective communication of the incubator with key customers and other stakeholders based on a good understanding of the market place. This is important since it will help the incubator to establish and increase its reputation as a sustainable organization that fulfils its mission.

The first part of the module focuses on identifying, assessing, and reaching customers/ stakeholders, as well as potential ally organizations providing business support services to enterprises; while the second part is dedicated to defining the incubator's value proposition and engaging marketing channels.

Module 5 – Financing an Incubator

The first part of this module aims to guide current and future business incubator managers through mastering the incubator's financial data (such as costs and revenues) in order to enable them to identify the financing needs of the organization as well as to explore potential sources of financing.

Building on the first part, the second part of the module is dedicated to demonstrating, to current and future business incubator managers, how to develop a fundraising strategy and to monitor the financial performance of an incubator.

Module 6 – Managing the Incubator
This module provides current and future business incubator managers with an overview of sound management practices for a successful incubator.

The first part addresses the topics of incubator policies and governance and the second part is dedicated to operations and human resources management.

Module 7 – Monitoring, Evaluation and Benchmarking
This module aims to provide incubator managers with the required information, skills and insights to develop their own monitoring and evaluation system and to carry out benchmarking activities.

The first part of the module is dedicated to helping the incubator manager understand the added value of monitoring and evaluating the performances of his/her incubator; defining relevant and adequate performance indicators; and exploring how to monitor and evaluate, notably by studying existing tools and methodologies.

The second part focuses on empowering the business incubator manager to use the data collected through monitoring and evaluation activities to compare the business incubator's performance with those of similar organizations.

SUITE 3 – ADVANCED INCUBATOR MANAGEMENT

Module 8 – Implementing a Mentoring Program
This module provides, in its first part, a conceptual framework for gaining a thorough understanding of the mentoring process and its purposes from three perspectives: that of the business incubator, the mentor, and the mentee.

The second part of the module focuses on how to implement a mentoring program.

Module 9 – Deals and Financing for Incubator Clients
This module aims to provide a thorough understanding of the alternative sources of financing for incubator clients by notably describing programs and processes that will enable the incubator manager to assist his/her clients in accessing financing.

The first part focuses on preparing incubatees to engage in the process of accessing financing while developing the capacity of the incubator to assist incubatees in accessing financing. The second part of the training module explores financing from the perspective of both the incubatees and the incubator.

Module 10 – Technology Commercialization through Incubation

This module describes technology commercialization divided in two parts. The first relating to challenges and lessons learned associated with this process as well as how to manage expectations regarding the results of technology commercialization. This part also concerns the role of the incubator in facilitating technology commercialization in the pre-incubation phase.

The second part of this module focuses on the role of the incubator in technology commercialization in both the incubation and the growth phases.

Module 11 – Setting Up Virtual Services

The first part of this module provides a conceptual framework for understanding virtual services. It is designed for current and future business incubator managers who are considering virtual incubation either as a stand-alone business model or as part of their overall incubator service portfolio to extend their current service offering.

In its second part, the module aims to guide current and future business incubator managers and help them to decide if virtual incubation is the right solution for their incubator. The module then explores the most common challenges and how to address them.

Figure 1 groups the modules by preferred level of experience and suggested module sequence.

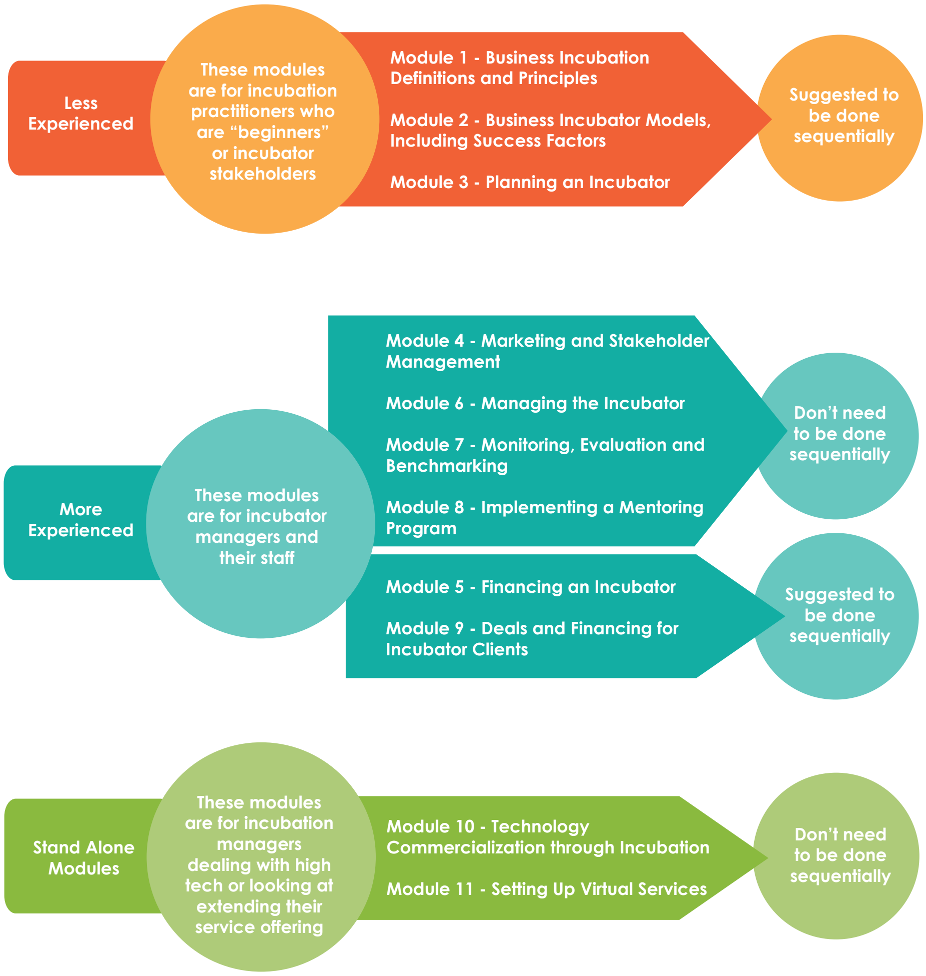

Figure 1 – Module Selection and Sequence

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Module Index

TABLES AND FIGURES

Module Objectives

At the end of the module (Part 1 and Part 2), trainees shall be able to:

- Decide whether a focus on technology commercialization is feasible given the local market conditions, the result and sustainability expectations of the incubator stakeholders, as well as the financial and human resources available for the business incubator;

- Stimulate a "flow" of technological ventures into and through the incubator;

- Develop a process for matching technological and business entrepreneurs; and

- Develop a support system and infrastructure to increase the rates of start-up, survival and growth of new technological ventures.

TRAINEE TRAINING OBJECTIVES

This module has been designed for trainees such as an incubator managers, volunteer counselors with special expertise related to technology transfer (e.g. from the incubator board of advisers) or staff members within an incubator. By the end of this training, the trainee should put into practice the above objectives will understand how to:

- Connect with sources of new technologies that have yet to be commercialized and support the engagement of entrepreneurs who may be interested in exploring the possibility of commercializing the technology;

- Engage with incubatees in developing internal expertise related to technology commercialization – engaging both technological and business entrepreneurs; and

- Identify and connect to potential sources of technology commercialization assistance within the incubator's ecosystem.

Introduction to this Module

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Key points

- Around half of all incubators focus on technology businesses.
- Technology-based incubation is different to other types of business incubation.
- Technologists and scientists are often not experienced in business.
- There is a need to forge closer ties with business entrepreneurs and technology entrepreneurs.

Some incubators are established exclusively to support technology-based ventures (e.g. BADIR ICT Technology Incubator[2] in Saudi Arabia - http://www.idisc.net/en/Incubator.278.html) whereas some mixed-use incubators include technology-based ventures among their incubator clients (e.g. Octantis[3] in Chile - http://www.idisc.net/en/Incubator.148.html). In Europe, the European Business and Innovation Center Network (EBN) records that half of the businesses supported by Business Innovation Centers (BICs) are technology-oriented, with a significant number of incubators devoted to high-tech sectors.[4]

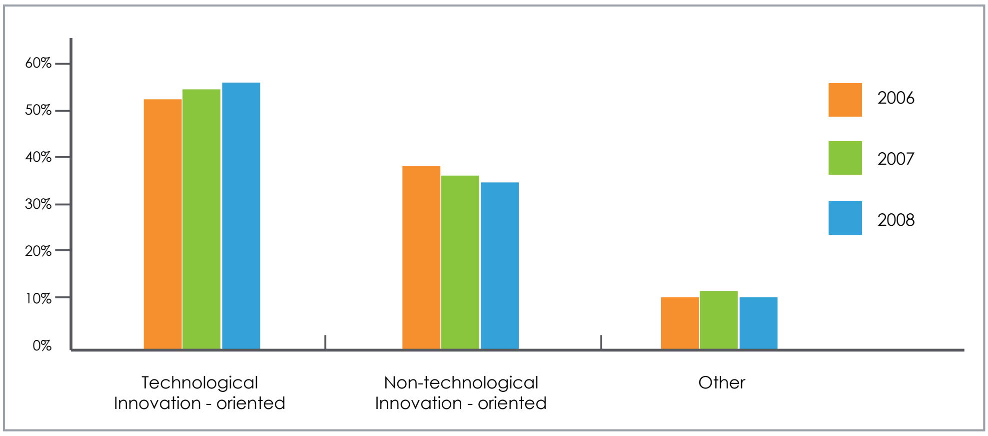

Figure 2 – Technology-Oriented Businesses Clients of BICs

In South Africa, out of 21 incubators, 9 are technology incubators - biotech, bio-medical, chemical and ICT focused.[5] In 2007, China recorded a total of 1 114 incubators, out of which 614 were acknowledged

[2] Source: http://www.badirict.com.sa

[3] Source : http://www.octantis.cl

[4] Source: BIC Observatory (2009) - The BIC Network in 2008 Facts and Figures, EBN. Available at: http://quality.ebn.be

[5] Source: S. Giddings Presentation. Incubation as a Tool for Commercialisation. Experiences from South Africa. International Technology Incubation Forum, March 2009, Saudi Arabia. Available at: http://www.ifsaudi.com/eng/contents/presentation/1SeteveGiddings.pdf

as Technology Business Incubators.[6] Incubator sponsors often include organizations (government agencies, companies and universities) that fund research and development and see incubators as one way of increasing the rate of technology commercialization.[7] The University of Guadalajara in Mexico[8] is a good example to illustrate successful technology commercialization from incubators. The University incubator incubated an enterprise called Phoenix International between 1993 and 1995. The business started by three former managers of an established computer company manufactured a ticketing machine for the New York metro and developed a plastic injection plant with Canadian partners. The business employed, in 2009, 1500 employees in two Mexican plants.[9]

Why should we treat this topic in a separate module?

Technology commercialization adds an extra degree of complexity and uncertainty that significantly enhances the challenges of incubating a successful business. Incubators that are committed to helping technological innovators and entrepreneurs face different challenges. They typically work with entrepreneurs who have highly developed technical capabilities, but who often have little knowledge or experience in building a business. Furthermore they often underestimate the difficulty of starting a business to commercialize their technology, believing in the old adage: “Build a better mousetrap and they will beat a path to your door.”

Therefore incubator managers must be adept at working with sources of technological innovation – scientists and engineers – and the organizations from which they are trying to transfer their technologies: university, government, research center and corporate laboratories. In addition they must facilitate engagement of the technological entrepreneurs with the complementary talents of business entrepreneurs and with the investors who are skilled at funding technological ventures. This challenge is illustrated in the quotation below.

[6] Source: W. Zhen Presentation. TBIs in China. A Policy Tool to Promote Innovation and Entrepreneurship. International Technology Incubation Forum, March 2009, Saudi Arabia. Available at: http://www.ifsaudi.com/eng/contents/presentation/3WangZhen.pdf

[7] Source: Technology Commercialization - The process of transforming innovative technologies developed by universities, companies and inventors into commercially viable products and services that are in market demand. Source: Competitive Technologies, Inc.

[8] Source: http://www.dip.udg.mx/cms/index.php?option=com_content&task=view&id=8&Itemid=22&lang=sp

[9] Source: C. Yammal Presentation: Technology Incubation as a Tool for Commercialisation in Latin America and the Caribbean: “a guided tour”. International Technology Incubation Forum, March 2009, Saudi Arabia. Available at: http://www.ifsaudi.com/eng/contents/presentation/2CesarYammal.pdf

Too often overlooked in discussions over research spending is a fundamental fact: We've already got an abundance of research. The next transistor, semiconductor, or breakthrough in MRI technology may already have been discovered. The problem is, we've dropped the ball on translating this science into invention. The vast majority of great research is languishing in filing cabinets, unable to be harnessed by the entrepreneurs and scientist-businesspeople who can set it free. We consider this shortfall academia's equivalent of Alaska's "bridge to nowhere". Before we can help scientists make businesses from breakthroughs, we need to understand how broken the current system is. Very few scientists [and engineers] are equipped to go into business. They do not know the difference between an S Corp and an LLC. They don't know how to navigate a state or local permitting bureaucracy. And few have a clue about marketing or managing company finances in a way that could withstand an intense audit.[10]

This module is designed to help incubator managers learn how to recognize and deal with the additional risks and uncertainties inherent in the development of technological innovations and technological ventures.

Some of the world's most successful, high growth businesses have transformed existing markets or created new markets through the discovery, development and commercialization of technological innovations. Some world-class and widely recognized technology intensive companies include notably Google. But these companies are perhaps the exception, rather than the rule.

It should be noted that technology commercialization is not the same as technology adoption. Technology commercialization is the process of transforming innovative technologies developed by universities, companies and inventors into commercially viable products and services that are in market demand, where as technology adoption is the normal cycle of *acceptance* of that technology by the market; by innovators, early adopters, early majority, late majority and laggards.

Technology commercialization remains a risky, difficult and expensive process that needs to be addressed cautiously by a business incubator manager. Building on Module 8 *"Implementing a Mentoring Program"* and Module 9 *"Deals and Financing for the Incubator's Clients"* from the overall Training Program, this module introduces incubator managers to additional approaches to counseling / coaching / mentoring and to engaging with the investment community that address the special needs of technological entrepreneurs.

[10] Source: Wadwha, Vivek and Litan, Robert E. (2009) - Turning Research into Inventions and Jobs:
http://www.businessweek.com/technology/content/sep2009/tc20090918_628309.htm

Component 1
(Part 1 Training):

Technology Commercialization in Context

COMPONENT INDEX

COMPONENT OBJECTIVES

At the end of this component, trainees should be able to:

- Understand the extra dimensions of the new venture development process related to technology commercialization;
- Appreciate the challenges faced by technology transfer professionals, and which challenges incubators can help address;
- Communicate with technology transfer professionals regarding opportunities for collaboration; and
- Work with technology transfer professionals in setting appropriate expectations for the funders and sponsors of technology transfer offices and incubators.

Key points

- Commercialization is a process that converts intellectual property into marketable products and services.
- Commercialization of technology requires different skills, funding, team and market analysis as compared to non-technology businesses.
- Incubation is a natural partner to Technology Transfer Offices.
- There are many common mistakes that commercialization professionals try to avoid.
- Keep expectations within the boundaries of what is likely; don't oversell the upside.

Section 1.1: Technology Commercialization: a Definition

Technology commercialization is the process of taking a piece of technological or scientific intellectual property (IP) – often, but not necessarily the result of university or similar research – and turning it into a commercially viable product or service that is demanded by the market.

Technology commercialization is often known as IP Commercialization or Technology Transfer. Indeed, Technology Transfer Offices (TTOs) often exist within a university or research center to help the institution benefit from the IP it has created. Some TTOs include an incubation function but many will partner with external incubators.

Developing countries are beginning to appreciate the value of such TTOs but have a long way to go before catching up with the US or European examples. As a result, currently the majority of IP for commercialization will come from individual researchers who may or may not have the support of their institutions. Incubator managers should ensure that the IP Rights are owned by the individuals – or at least that they have sole licensing rights – before progressing with any commercialization activities. *[In South Africa, for example, there is legislation whereby any IP developed from public funds, belongs to the institution though which the funds were channeled. Hence the academic/student will not be able to own the IP, but can negotiate sole licensing rights.]*

Section 1.2: Why is it different? What are the challenges?

Technology commercialization differs from other forms of business because the source of the business idea is often novel, developed by "technicians" rather than business people, unproven beyond the laboratory, untested in the market, difficult to assess in commercial terms, and hard to fund.

- Inventors of new technologies are usually extremely experienced in their technical field, but often have very little knowledge of the business environment. Such "technical entrepreneurs" will likely require connection with "business entrepreneurs" to find the right balance to take the IP from the lab to the market. Combining these different types of people also throws up challenges when key decisions need to be taken with the direction of the product.
- Ideas that work in the laboratory cannot always be converted into a manufacturable product. Prototyping and feasibility studies are more likely to be required than for non-technological business ideas.
- Assessing the market for completely new technologies is very difficult. Applied research that included partners from industry has much more of a chance of succeeding in the market than pure research. Remember, just because there is a gap in the market does not mean there is a market in the gap!
- Funding new technology businesses requires investors with an appetite for risk, or who also have experience in the technology or market where the technology is targeted. Finding such investors, especially within developing countries, is not easy and it may require the incubator to have networks beyond its local environment.

However, these challenges should not deter incubators from supporting technology commercialization as technology is the driver of many businesses and can lead to more stable employment and sustainable companies. Continuous innovation is the mantra of early 21st century business. Unless companies innovate, their competitors who are doing so will beat them to the market. And with a globalized market for many goods and services this means countries who do not innovate will not deliver the economic growth required to increase the standard of living of their population.

Section 1.3: Sources of Technology IP

Intellectual property, in the form of applied research, is developed in many places:

- Universities;
- Government-funded research centers;
- Corporate research centers; and
- Individual inventors.

The reasons these organizations choose to commercialize their technology differs, as is shown below:

REASON	UNIVERSITY	GOVERNMENT FUNDED RESEARCH CENTER	CORPORATE RESEARCH CENTER	INDIVIDUAL INVENTOR
Support economic development	Yes, as part of their role in society and providing a return on public research investment.	Yes, by providing a return on public research investment.	No	Possibly, depending on the attitude of the individual.
Generate revenue	Yes, as part of funding further research	Yes, as part of funding further research	Yes, as a return on the research investment	Usually

Table 1 – Reasons for Commercializing Technology

Section 1.4: Technology Incubation in Regions Where R&D is Limited

For countries and regions where R&D is limited or non-existent various options exist for commercializing technologies. The overall approach is the same but some special circumstances should be taken into account and particular strategies can be adopted to cater for more so called "low-tech" projects.

Seek out local inventors - As stated above, not all new technology comes from investment in R&D by research institutes. Many practical low-cost ideas come from individual inventors who are solving real-world problems. And in many developing countries, low-tech may be more appropriate than high-tech. But the issues of taking the idea and commercializing it remain the same, and this is where the incubator can significantly help. Finding an inventor is not easy but promoting the incubator and running competitions that encourage inventors to come forward could be considered. The incubator can also promote and participate in any national entrepreneurship programs. Any program that can boost the growth of entrepreneurs in a region will play a critical role because some of these entrepreneurs ultimately start new companies with a focus of bringing new technologies and ideas to market.

Another option for incubators is to propose workshops targeted at new audiences in order to introduce them to the principles of business creation. These courses, which can be packaged into one day sessions, are often called "ideation" courses.
As the name suggests, "ideation" courses are about business "ideas" and an introduction to entrepreneurship. The goal is to share practical knowledge about the process of creating and developing a business idea. The course can illustrate the "journey" from the pre-idea to the development of a business idea through to the identification of target markets, and finally to the actual launch of a product or service.

Local low-tech inventors may be responsible for discoveries and breakthrough products and technologies that markedly improve the way people live and work in certain regions (for example providing improved machinery production outputs or producing low-cost machinery to replace expensive imports, finding innovative technical solutions for regions where power sources are low or intermittent, or reducing inefficiencies). A key success for regions with limited R&D resources, but which strive to remain competitive in the global economy, is to ensure that all promising applied research (wherever carried out) is given a chance be fully developed into practical use. Incubators can play an important role in connecting inventors to potential markets. Remember, even in developed markets, investments in both marketing and R&D are necessary for superior organizational performance – the technology will not just sell itself.

Employ a sound project management approach, regardless of the level of the technology. A core team within the incubator should be set up to provide leadership, identify and validate specific technology concepts, strengthen networks, aggregate and share knowledge, and develop a communications strategy. The next step should be to assign project teams to assist the implementation of relevant projects in areas where the technologies will be deployed. These teams operate for the duration of specific technology commercialization projects to assist entrepreneurs or companies to conduct design and commercialization activities with local partners and stakeholders.

Concentrate on key sectors for the region. In many developing countries this could be, for example, agriculture and agribusiness. In some regions post-harvest losses of crops and livestock products that are of crucial importance to food security and income generation opportunities of smallholder farmers continue to be high. Technological innovation, as well as better post-harvest handling and management practices can play a significant role in reducing such post-harvest losses. Commercializing technology that can improve revenue generation for local producers or operators in a major local industry can provide many additional benefits. For example, improving access to relevant and well-designed technologies can also create opportunities to ease labor and time intensive tasks. In some cases this can release unpaid family and very low wage workers. This could create opportunities (particularly for women) to spend time on other income-generating activities.

Bring all the partners together. There is a real chance to catalyze technology commercialization processes by engaging all the key partners and promoting effective product development, commercialization, and adoption partnerships. The incubator can bring all the actors together - technology developers, private sector partners, processors, financers, and other value chain actors. It is then possible to strengthen and scale up design and commercialization practices that focus on technology adoption through early and on-going engagement of relevant stakeholders across the value chain. In rural areas this could include small producers, farmers, product manufacturers and distributors. A good example of this practice can be found in one the case studies included in this module. It describes how Kharkov Technologies, based in Ukraine, created a technology transfer network to harness the new technologies incubatees create in different fields and markets.

The stakeholder categories to consider would include:

- End Users: Engage inventors, smallholder farmers for agribusiness projects, processors, and other value chain actors early in the product design, development, and commercialization process.
- Champions: Identify and engage “champions” (local inventors, entrepreneurs, companies, who have the ability to deploy, manufacture and distribute technologies (and who have potentially a financial incentive in commercialization) as early as possible in the technology development process.
- Financial Institutions: Facilitate access to appropriate finance mechanisms depending on the stage of the product development process (e.g., prototyping and field testing, scale up manufacturing and distribution) and the need to support technology adoption by end users (e.g., microfinance).
- Technology Developers: Network with technology developers (e.g., research organizations and companies, and others that may have existing technologies that could be adapted or could develop new technology concepts.

Another option to consider is to "License-in" technology from outside the country. Many developing countries have the need for technologies that foreign IP owners have not yet considered marketing within their borders. Obtaining a license to exploit the IP within a territory is a great way to a) bring the technology into the country and b) develop a new business. Obvious sectors are medical and pharmaceutical, but others areas relating to agriculture, water management and renewable energy will also have potential. The incubator's role should be to use its international network to help entrepreneurs looking for such licensing-in opportunities.

In terms of organizational structure experience shows that organizations and initiatives that facilitate technology development and commercialization in developing countries share certain characteristics.

- Operationally lean – Operate with small staff with core technical, legal business, communication and regulatory expertise.
- Seriously networked – Leverage expert advisors/service providers who have access to customized expert services to specific projects.
- Geographically smart – Connect to partners with strong community connections, and potentially to global resources for technology knowledge support and finance mechanisms.
- Strong on managing partnerships – Negotiating agreements, technical project management, and aligning partnership incentives.

In summary, limited or non-existent R&D should not be seen as a barrier to the incubator seeking out technology-based ideas. The sources of ideas are wide ranging. With a creative approach to identifying inventors, or using international networks to find country-relevant, licensable IP that is not currently being deployed, the incubator can support entrepreneurs who wish to drive new technology into the market.

Section 1.5: Routes to Commercialization

Typically the commercialization of technology takes place in one of two ways:

- Licensing to established companies; and
- Spin-out company.

With either approach and in most cases, the inventor of the IP will share any financial returns with the organization that employs them (if they are employed). The incentives vary from organization to organization but the share to the inventor is typically between 33-50%. In developing countries IP Policies of the publically funded research institutions may not be fully developed, or in some cases may have specific restrictions (for example, in the case of South Africa cited above). Care must be taken when discussing IP to clarify the ownership and commercialization rights.

Licensing to established companies

If the licensing route is chosen then the IP will be protected (usually via a patent) and legal agreement made between the IP owner and one (in the case of an exclusive license) or more third parties who wish to use the IP in their own products. Licensing is not the subject for incubation (except where the IP owner licenses the IP to its own spin-out company). Licensing is often the route for IP that provides an incremental performance increase to an existing product or for one where the market is not big enough to justify a spin-out company. In the former case, licensing to an existing business could provide significant advantage over the competition without needing to invest in developing the IP. For more details on types of agreements, see Annex 1.

Spin-out companies

If the spin-out route is chosen then a new business is formed with the specific purpose of commercializing the IP. Usually, all rights to commercialize the IP are transferred to the spin-out, but in some cases a time limit will be placed on these rights so that the IP owner can license the IP to a 3th party should the spin-out fail to deliver within a reasonable time. The decision to spin-out should not be taken lightly. Whilst the potential upside is significantly greater than licensing, so is the effort required to reach such success. An incubator is often the natural home for a spin-out as it can provide the right environment to develop the new business.

Section 1.6: The TTO and Incubation

As mentioned above, some Technology Transfer Offices include incubators for the purpose of supporting their own spin-out companies, but in many cases a partnership enables an incubator to "pick up where the TTO leaves off". For example:

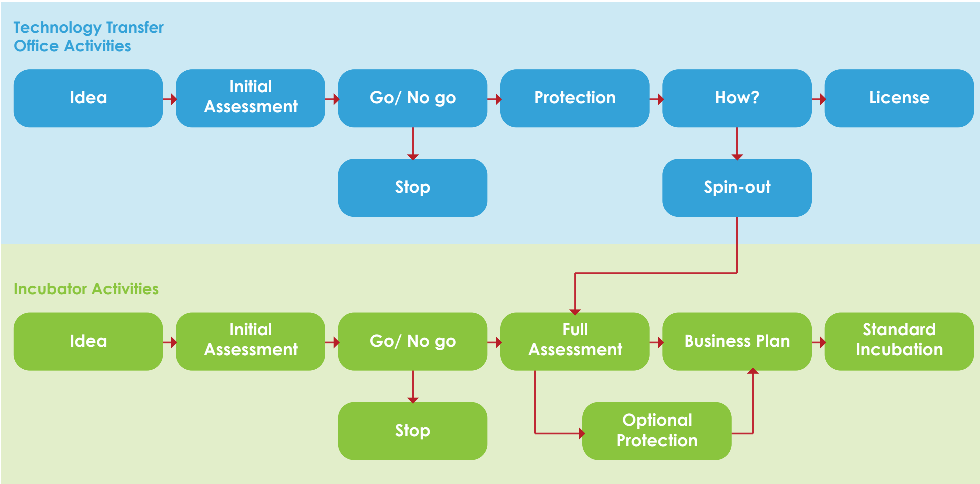

Figure 3 – The Relationship Between TTO and Incubation

Generally, the incubator will provide services that will support the individual "technical entrepreneur" – the engineer, scientist, or team who has a technology to commercialize. To create a flow of technical ventures into and through an incubator, the incubator management team and the incubator sponsors need to reach out to these sources of technical entrepreneurs and to encourage their participation in the incubation program.

When an incubator approaches organizations that might be a source of technical entrepreneurs, Technology Transfer Offices are often a good place to start. When an incubator seeks to identify technical entrepreneurs who are not affiliated with a technology-intensive organization, it will be important to engage in networks, real and virtual, in which technical entrepreneurs are involved. These may include, for example, networking meetings (face-to-face) and on-line technical forums.[11]

[11] Note: Module 4 "Marketing and Stakeholders Management" explores in detail the different sources to identify and attract the right customers and stakeholders for a business incubator.

Section 1.7: The Commercialization Process

The process of technology commercialization can be represented as linear process in the graph below; however, in many cases reality is not linear as the diagram indicates. The technical entrepreneur is the main actor at the 'IDEAS' stage.

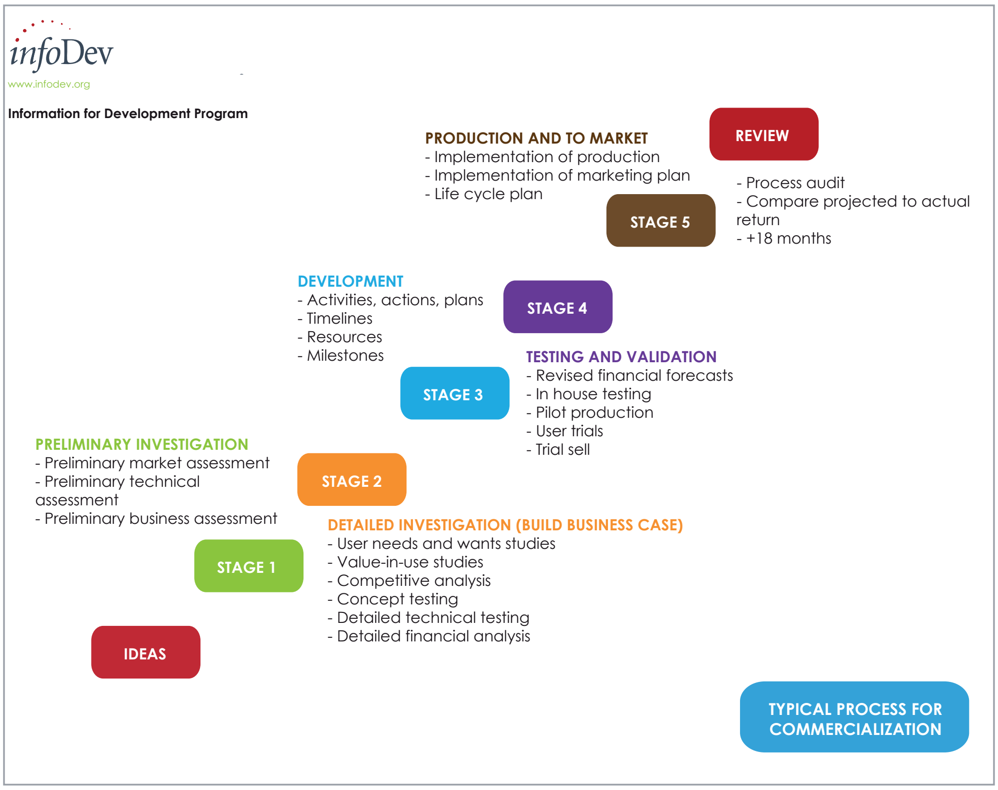

Figure 4 – The Technology Commercialization Process[12]

A technical entrepreneur often approaches an incubator in the pre-venture[13] stage, and hence the incubator may be involved in helping the technical entrepreneur to:

- Explore the market for the technology;
- Develop a prototype;
- Form a new venture to begin the commercialization process;
- Expand the business capacity of the venture to complement the technology development capacity;

[12] Source: S. Giddings Presentation - Incubation as a Tool for Commercialization, Experiences from South Africa. International Technology Incubation Forum, March 2009, Saudi Arabia.

[13] Pre-venture: Before any definition of the business has been made including market analysis, business planning, financial planning, team building etc. Only the technology idea is formulated.

- Access capital;
- Identify and pursue early adopter customers who may be willing to test the proto-type; and
- Explore the possibility of protecting the intellectual property.

Note: In many cases, the costs and length of time to secure IP protection may outweigh the benefits of such protection. Moreover, a technology may also be improved by adopting an open innovation approach i.e. companies use external ideas as well as internal ideas, and internal and external paths to market, as the companies look to advance their technology. The boundaries between a business and its environment have become more permeable; innovations can easily transfer inward and outward.

The central idea behind open innovation is that in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research, but should instead buy or license processes or inventions (e.g. patents) from other companies. In addition, internal inventions which are not being used in a company's business could be taken outside the company (e.g., through licensing, joint ventures, spin-offs).

The Global Innovation Commons is a repository of innovations – the majority in the form of patents – which are either expired, no longer maintained, disallowed or unprotected in four technology areas: agriculture, clean technologies, water and world health. The use of information is shared under a license.

Too often, incubators' stakeholders automatically assume that Intellectual Property is the only solution to pursue whereas this may not be the case. The IP route should therefore not automatically be assumed. See Section 2.3 for more on IP Protection methods.

To be successful, the technical entrepreneur must successfully complete both the technology development and business development process. It is useful to recognize the differences between ventures attempting to commercialize technology versus non-technology products and services. Both types of ventures must address risks and uncertainties related to the external context, marketing, organizational development and resource acquisition. However technological ventures have an extra dimension of risk and uncertainty related to technology development and production processes. The requirement for effectiveness in science and engineering development adds an extra layer of complexity. In addition there may be additional challenges in trying to establish a high performing team that includes technical and non-technical talent, who typically come to the venture with very different perspectives, cultures, value systems, interaction patterns, and expectations. In order to create a high-performing new venture the business and technical entrepreneurship teams must be able to communicate and cooperate effectively. Ideally the individuals on the two teams will be able to build bridges and often the lead entrepreneur must be adept at facilitating the constructive collaboration between the two teams.

Shareholders (and where appropriate the management team) of business incubators should determine as part of the incubator feasibility study whether it makes sense for the incubator to support technology commercialization. Here are some criteria that could be useful in assessing this possibility:

- Are there enough generators of technology within the area, both organizational and individual, that will generate by a continuous flow of new technological ventures through the incubator?
- What is the customer/client capacity to adopt new technologies?
- Is there a gap in the technical and business development support capacities, resources and facilities of organizations in the region currently serving technical entrepreneurs?
- If so, will the incubator be able to develop the missing capacities and resources that can address the technical and business development needs of technical entrepreneurs that might apply to the incubator, in particular with regard to expertise of the incubator staff and the incubator's extended network, and the resources and facilities that are needed to support new technological ventures?
- If the incubator also intends to support non-technology-based ventures, will it be able to accommodate the needs of all types of ventures it proposes to support?

Note: The elements above are studied in more detail in other modules of the current Training Program. Module 3 "Planning an Incubator" addresses issues concerning the incubator's feasibility, Module 4 "Marketing and Stakeholders' Management" deals with managing the stakeholders' expectations, Module 5 "Financing an Incubator" reviews the different aspects of financial feasibility and sustainability of an incubator and Module 6 "Managing the Incubator" dedicates a section to staff management, notably regarding how to recruit and retain the appropriate staff.

If the majority of answers to the questions above are positive, then the incubator's stakeholders must also determine whether such a focus is warranted given their expectations of incubatee success, the financial sustainability of the incubator, and the availability and cost of appropriate staff to have a technology commercialization focused incubator.

New technology that can be applied to incremental innovation in existing products or services, or that aligns well with the current market portfolio of established enterprises in a particular country, is most likely going to be transferred to established companies through a licensing agreement[14] (a sample of a typical license agreement is provided in annex 10 of the module). If this can be accomplished, it will likely occur between a technology transfer office and the in-licensing department[15] within a

[14] Note: A licensing agreement is an agreement between two businesses allowing one to sell the other's products or services. A licensing agreement grants a license in return for compensation in some form (e.g. a fee or royalty payment).

[15] Note: The in-licensing department manages those licenses the company buys as opposed to those it sells to other parties.

large company. Hence there is not a major role for an incubator to play in this process. However, to the extent that the incubator has been successful in developing a robust network – including potentially a group of mentors from industrial partners, it may be possible for the incubator to support the technology transfer office by facilitating connections. This can provide the incubator with a good return-on-investment of the time of the incubator manager, if it enhances the willingness of the technology transfer office to partner constructively with the incubator, and if it provides value to the incubation mentors from the company which benefits from the licensing arrangement.

The incubator may be able to provide even more significant value to the technology transfer office for new technology-based intellectual property for which there is no natural licensing target among established enterprises. For this process to produce positive results, the incubator must have access to a network of technical entrepreneurs (and business entrepreneurs who are skilled in collaborating with technical entrepreneurs). Ideally over time these individuals will develop a track record as serial entrepreneurs who have collaborated in previous technological ventures. Some incubators have access to “entrepreneurs in residence”. Serial entrepreneurs who help incubator clients while seeking ones in which to invest or become involved with management. In addition the incubator will need to have access to a portfolio of sources of capital. (See Module 9 “Deals and Financing for Incubator’s Clients” for a detailed analysis of this challenge.)

Some examples of business incubators that supported successful technology commercialization are presented in the table below:

BUSINESS INCUBATOR	SUCCESSFUL TECHNOLOGY COMMERCIALIZATION
Technology and Business Incubation Facility (TBIF) from Kigali Institute of Science and Technology (KIST), Rwanda Website: http://www.kist.ac.rw iDisc profile: http://www.idisc.net/en/Incubator.6.html	Energy, Environment and Sanitation Company Limited (ESSCO Ltd), Kigali, Rwanda produces and sells institutional cooking stoves fueled by biogas. The low carbon stoves were developed by the Kigali Institute of Science and Technology (KIST), and were brought to market by two Rwandan entrepreneurs. In Rwanda, wood accounts for about 90 % of household energy consumption. Burning wood emits carbon dioxide and growing trees absorbs it. However, once a tree is chopped for fire wood, it takes several years for it to grow to the same carbon absorption level. The collection of fire wood also causes soil erosion, leading to further adverse impacts on the environment and the livelihoods of the poor. To preserve the environment, the government of Rwanda has therefore put strict restrictions in place on cutting down trees. The biogas cooking stove is therefore of immediate value for consumers as well as for the protection of the environment and thus future generations. As of December 2008, ESSCO's stoves had been on the market for a year and a half, and the company was already earning a small profit.
Tiruchirappalli Regional Engineering College - Science & Technology Entrepreneurs Park (TREC-STEP), India Website: http://www.trecstep.com/ iDisc profile: http://www.idisc.net/en/Incubator.16.html	Innova Automation Limited focuses on bringing innovative manufacturing components with innovative applications in manufacturing. The innovation led manufacturing venture was set up by two young Indian entrepreneurs. With full support of TREC-STEP, they started their new venture at the TREC-STEP Incubator. A large company approached them for a new application, for the manufacturing of 8 strudded valve assemblies for its US supplier. This large company had failed in its attempts in manufacturing the CNC ware and appropriate tooling and had already paid a penalty of Rs. 1.7 lmln, to the US company. But within a month, the 2 entrepreneurs developed this 8 strudded valve assembly, to the great relief of the large company. The large company cheered them on their success and is now ready to fund their next CNC facility.
Casablanca Technopark, Morocco Website: http://blog.casablanca-technopark.ma iDisc profile: http://www.idisc.net/en/Incubator.63.html	FirstMile Telecom is a wireless Technologies company. Mr. Bouabe, the founder and CEO of FirstMile Telekom, is a young Moroccan engineer who spent 18 years studying and working in the ICT field in Germany. Throughout his multiple trips to Morocco, he identified the adequacy of wireless connectivity for the local market, which makes it difficult and expensive to connect them through regular cabled technologies. After assessing the products and services considered within the scope of FirstMile Telekom, Mr. Bouab officially joined the Casablanca Technopark in February 2006 after a pre-incubation period of less than a month. The company then graduated in April 2007, with a Venture Capital (2.5 million MAD (~USD 400,000)) replacing the original capital investment made by Casablanca Technopark to carry out his future development plans in international markets. As of May 2008, FirstMile Telekom was employing 25 permanent staff.

Table 2 – Successful Technology Commercialization Through Incubation[16]

[16] Note: The Success Stories section of the iDisc website provides a significant amount of examples of successful technology commercialization through incubation: http://www.idisc.net/en/SuccessStories.html

Section 1.8: Common Mistakes in Technology Commercialization

Learning by making mistakes is probably one of the most efficient ways to learn things rapidly. This section contains an article reproduced with kind permission of Z/Yen Ltd from their publication entitled *"Great mistakes in technology commercialization"* by Dr. Kevin Parker and Michael Mainelli.[17]

So what can go wrong? There are five 'Great Mistakes' which we consistently find in technology commercialization projects:

- Assuming features will be benefits;
- Using 'top-down' market analysis;
- Ducking the 'chicken gun' test;
- Failing to put someone 'in charge'; and
- Not valuing new technology fully.

Let us examine these key mistakes in a little more detail.

MISTAKE NUMBER 1 — ASSUMING FEATURES WILL BE BENEFITS

The first, and probably greatest, mistake we also call the 'no discernible user benefits' or the 'So What?' error. Technologists are justifiably proud and excited by the advances created by their efforts. But what makes an advance valuable to its users or customers? Not the advance itself, rather the new capabilities it brings. The transistor was valuable because its size enabled the invention of the portable radio, not because semi-conductors were a new and exciting technology. The personal computer is useful because it lets us write articles like this, manipulate the text, add diagrams, perform relevant calculations, and send the results around the world, not because "it has a I GHz chip and 500 Mb of RAM."

The marketing world has (for once) a useful piece of jargon: they distinguish the features of a product from its benefits. Features are intrinsic properties such as color, size, horsepower, whereas benefits are the advantages conferred by the product on the user. Features of a lathe may include hydraulic actuation and a 10-micron surface finish: benefits may be less rework, fewer manufacturing steps, and lower production costs. New technology by itself is useless unless it generates new benefits to its users. Who cared whether the Wankel engine was a novel and ingenious piece of engineering – it did exactly the same as existing motor engines. No new, marked user benefits meant that the Wankel engine was never likely to be a huge commercial success.

[17] Source: http://www.zyen.com/component/content/article/11-strategy/139-great-mistakes-in-technology-strategy-articles-2001.html

Spotting potential benefits of a new piece of technology is not always easy. It usually involves asking actual or potential users, and different users often need different things. When we review a technology for potential benefits, there are two useful tools. Our first tool is a child-like, repeated use of the question "So What?"

"We're introducing a new range of silica on silicon opto-electronic devices" "So What?" "Well, they can operate in 0C48 or even 0C192 networks'' "So What?" They're broader band networks" "So What?" They'll increase the bandwidth of the web" "So What?" "So more people will get much faster and more reliable access to the Internet".

Ah! finally, a benefit! One typically ends up with one of three types of benefit (our second tool):

- *Giving people a new capability (e.g., a portable radio);*
- *Letting them do something much better (e.g., a lathe that saves rework);*
- *Saving money (usually spending capital to reduce revenue costs).*

It never fails to surprise us how many technology projects fail to ask the "so what?" question. Asking the question involves not just some thinking time in the laboratory before throwing the technology over the wall to some marketing bodies, but research in its own right. Creative research on potential benefits and analysis of the potential value to users is often termed market research. Market research should be aimed at killing features and replacing them with benefits. Users are bombarded with features, "overkill", rather than succinct benefits. A particularly rich source of "feature overkill" can be found in most product literature, particularly in the IT sector. Classic examples are:

- *"16 valve turbo power"; "1 Mb of backside cache"; "3D shifting perspective and realistic depiction of exit wounds";*
- *"Our research institute has 1,000 practicing scientists, 500 with PhDs";*
- *"We are clearly the biggest intellectual property resource in Scotland".*

We're afraid that all of these statements can only be responded to with a resounding 'so what?' because we can't see the benefit.

MISTAKE NUMBER 2 — USING TOP DOWN MARKET ANALYSIS

If great mistake Number 1 is essentially a failure to do market research about benefits rather than technology, mistake Number 2 is doing market research badly or misreading the results. We call it top-down market research. You often hear this or read it in business plans: "the market is $10 billion a year and we can get 5%" or "the market is growing hugely and we must get in on the act". To which the only response is "really?" Statements like this assume that the market is some kind of collective institution that decides to give 30% of its business to Microsoft, 20% to IBM and 5% to us (just for being there). But markets don't work like that. Each act of purchase is a consensual act between one customer and *one supplier. What you need to know is "how many customers will benefit from our product; by how much; how many can afford it, and how many can we get to in our first year?" In other words you have to do your market research from the bottom-up and not the top-down.*

Top-down market analysis is exemplified by statements like "we think we'll only sell six computers a year - after all we know how many calculations one of our machines can do and there just aren't that many people who do that many". This statement ignores the fact that many people might find a computer useful even though they never use its full capabilities. In the 1980's, top-down market research led 5 or 6 companies in the United States to believe simultaneously that they'd get 30% to 40% of the market for hard disc drives (and 30% to 40% of the funding). Top-down research has fuelled various manias and speculative bubbles from Dutch tulips in the 1600's to the dot.com craze in 2000.

MISTAKE NUMBER 3 — DUCKING THE 'CHICKEN GUN' TEST

In 1970 Rolls-Royce, perhaps the most famous name in British manufacturing became effectively bankrupt. This state was the end of a convoluted chain of events which started when their new aircraft engine, the RB 211, failed a bird strike test. Jet aircraft engines sometimes suffer from ingesting birds and the results are usually catastrophic (sometimes for both parties); the engine fan blades can disintegrate. The task of the designer is to ensure that debris is contained and does not puncture the aircraft fuselage. Testing for bird strike 'containability' is done fairly simply: an engine is fired up on a test bed, whereupon a (dead) chicken is fired into the blades using a catapult. Rolls-Royce's problem was in assuming that their new carbon fiber blades would withstand the test and looking at it as something to be 'tacked on' towards the end of the development program. It didn't pass, and their considerable investment was worthless. Management guru Tom Peters picked up on this story and commented that the 'chicken gun' test was a kind of metaphor for new product development. It was the ultimate practical test of user operability.

To paraphrase, inventors should always try to imagine what real human beings (or birds) will do with their precious technology once they are let loose with it. That's the 'chicken gun' test. Just about all development projects have one. The trick is to spot it and address it early in the development program. Failing the 'chicken gun' test can be disastrous. Let's consider a few examples.

- *There was once an ocean liner designed to sail across the iceberg-infested North Atlantic Ocean.*
- *There was a space shuttle whose fuel tank seals became brittle in the early morning chill.*

More prosaically, things get dropped, they get put in vibrating environments, they smell, they catch fire, and they get cups of coffee spilt over them. Industrial processes fail because the catalyst can't cope with impurities in the feedstock, because people don't change the oil frequently enough, or don't pay attention in the last few minutes before finishing work for the day. In the software world, games need to work and not crash the computer when Microsoft Office is operating in another window (aren't the majority of computer games played in workplaces between 9 and 5?).

So, a smart development team will try to anticipate what the 'chicken gun' test of their product might be and check whether they can 'pass' early in the development. Once you've grasped the concept, brainstorming potential 'chicken gun' tests and figuring out ways to pass them is actually one of the most enjoyable parts of the whole development process. Just don't leave it too late.

MISTAKE NUMBER 4 — FAILING TO PUT SOMEONE 'IN CHARGE': "WHO WAS IN CHARGE? WELL, I SUPPOSE I WAS REALLY!"

The 'who was in charge' mistake is characteristic of large organizations where the project involves interdepartmental co-operation. There might be an R&D lab, a business technical team, a production department, a marketing department, perhaps even a customer beta-test site. Someone needs to be 'in charge' in order to make sure that all these activities are still aimed at the main objectives.

There is a fairly well-established, slightly dull area of business science that addresses the needs and requirements of multi-disciplinary interdepartmental projects. It's called project management. There are numerous good and usable project management methods, including PROMPT and PRINCE2, which can be used to monitor and control quite complex projects, but organizations don't always use them. Or only parts of the project use them, so that the development team (for example) delivers, on time and on budget, the wrong product because the market research group didn't communicate changing market requirements to them.

It is interesting to speculate why organizations don't use project management techniques. For a start, many R&D organizations claim a special exemption from project management on the grounds of a 'different culture'. Sensitive application of project management is often needed, but, under examination, exempt cultures typically underperform. In other organizations managers clearly have problems with the idea of staff from their department (working on a project) subordinate to a manager from another department. Still others find project protocols and responsibilities rather uncomfortable — if you are the only liquid crystal display scientist on the project then any failure in liquid crystal displays is down to you. Another reason is that projects don't fit comfortably into annualized budget processes. One stage might be a two week feasibility study, while another might be a three year Phase III clinical trial. What an organization wedded to annual budgets is saying is "I'm sorry, but you can't have any more money for your development project until this 8,000 mile diameter lump of rock on which we're standing has completed another revolution around a huge ball of hot gas 93 million miles away". Isn't that just a little arbitrary?

Commercialization projects that don't have someone in charge tend to fail because they also make one of the other mistakes mentioned in this piece - it was 'not my job' to check that those mistakes were being addressed. Examples are legion: in the defense industry, in Government IT projects, in numerous university developments, and in large companies with corporate R&D Jabs. Danger signs in a business plan include the words 'consortium', 'steering committee', 'importance of liaison', 'technology handover', 'an easy sell', 'obvious peaceful application of defense technology' or 'importance of working together'.

MISTAKE NUMBER 5 — NOT VALUING NEW TECHNOLOGY FULLY

This is the perhaps the most subtle of all the great mistakes. But it's worth expounding because it lies at the heart of the great "there's not enough money for development/there're not enough good projects to invest in" debate between inventors and investors. We believe that the problem is actually one of mutual misunderstanding about the nature of commercialization and can be summed up in a simple statement, illustrated by: "A single project does not capture the full value of most technologies".

This statement is obvious when you think about it: carbon fiber could be used for aircraft wings, disc brakes, golf clubs and fishing rods. The steam engine could be used for ships as well as trains. Microencapsulated coatings can be used for staining stolen bank notes or putting 'scratch'n'sniff' perfume advertisements into magazines. But how do we (investors) value technology? Usually by performing a discounted cash flow analysis on the first commercial project. In other words we ignore all the other potential applications of the technology. On the other hand, most inventors are only too aware of potential applications, but sometimes need a little encouragement to start developing the first project. There isn't really a 'funding gap', but there often is a severe misunderstanding between the two parties, because they are actually valuing different things.

The true value of a technology should be calculated as:

- *The net present value (NPV) of the current project arising from that technology; + plus*
- *An option to invest in all the other potential projects enabled by that technology.*

Technology is often undervalued, because potential projects are ignored in the valuation process in favor of the current project, usually because "there isn't a way to do it". However there is a way. The clue is in the word option. Thanks to the work of the economists Black and Scholes, it is possible to value a financial option (e.g., a call or put on a share) provided you know four things, in addition to general financial information such as the prevailing risk-free interest rate:

- *The current value of the underlying asset;*
- *The strike price, also known as the exercise price;*
- *The volatility in the price of that asset; and*
- *The length of time before expiry the option.*

The value is the expected NPV of the cash resulting from implementing the projects in question (often done as a Monte Carlo simulation of several scenarios).

The strike price is the capital investment which needs to be made (for example, building an early stage manufacturing plant).

The volatility can be approximated by the end-product price of the investment (for example, the price volatility of memory chips from a semi-conductor plant) or the share price beta of companies in the target industry or sometimes estimated by the effect on commodities used such as copper.

The length of time before expiry of the option is related to the technical lead (are we two years ahead of the opposition, or five?) minus the time taken to exercise the option (do the development work, build the factory, etc).

Although this sounds rather esoteric, it basically requires a feasibility study for each option and readily available math. Neither is it terribly novel; we have used so-called 'real option theory' since 1992 in valuing television franchises. Merck, the pharmaceutical giant, has been using option theory in R&D for at least seven years. It's probably the only way to put a sensible valuation on 'high-potential, but highly-diverging income estimate' projects in many biotech and dot.com businesses.

What are the consequences of not valuing technology options? Ground-breaking technologies do not get supported and developed. Examples include: Trevithick's Steam Engine, Whittle's jet engine, non-defense applications of carbon fiber, the laser, the graphical user interface (GUI), many biotech companies, and all inventions funded by one party but commercialized elsewhere.

Conclusion: "Those who cannot remember the past are condemned to repeat it." (George Santayana)

It is painful, particularly in the relentlessly optimistic field of R&D, to dwell on our mistakes. Of course these 'key' five aren't the only mistakes made in technology commercialization projects. Others that come close are the 'one-product firm', 'not recognizing the power of existing systems' or the 'who actually owns the intellectual property' mistake often seen in university spin-outs. Every project will have its own set of specific risks and potential mistakes, and there are straightforward ways of identifying them. However, this article seeks to move the 'baseline' of the process up a little. If we are at least aware of the Great Mistakes, we have a greater chance of avoiding and "enchancing" (sic) our projects.

– End of text extracted from the Z/Yen publication. –

Section 1.9: Managing Expectations

It is important to explain to program sponsors, tech transfer professionals and incubation professionals that even with favorable circumstances, technology transfer and new venture development will have a relatively low success rate.

This is matched generally by the expectations of venture capitalists who use a sophisticated due diligence process, yet select typically just a few candidates from hundreds of business plans for funding. Of those they do fund, only roughly two out of ten will be highly successful, perhaps half the remainder will provide some return on investment, and the remainder will return nothing (2:4:4 rule). Technology transfer offices and business incubators are working with nascent technological pre-ventures and start-ups, and therefore should expect the success rate to be even lower.

However, if the commitment to the technology transfer and business incubation processes can be sustained over a long time, it is possible that the processes and the people executing them will become more sophisticated and overall performance of the portfolio of activities should improve. It will always be a low probability of success activity when the unit of analysis is the individual technological venture, reflecting the number and severity of uncertainties that must be overcome. However as reported in the section that follows, the aggregate macro-economic impact over time can be highly significant.

COMPONENT CONCLUSIONS

Technology Commercialization is the overall process of transforming innovative technologies developed by companies, universities and investors into commercially viable products and services that a market demands.

Technology could be seen as the "currency" of the global marketplace, and every country should be able to deal in every denomination, in relevant and applicable research, in value-added sectors, in knowledge-based industries, and in developing centers of excellence.

The capability and capacity to commercialize technology needs to be available for the new discoveries and products that will arise from the focused and targeted research and innovation within the domain. Turning knowledge and research results into marketable technology ventures is not yet a consolidated process in the research field. Firms also find obstacles and difficulties in turning their technology solutions into promising commercial products.

Additionally, many investors do not feel comfortable with technological issues: most scientists have little experience in finance and business management; many financial advisors do not have a background in technology. The result is often poor project risk assessment, low rates of return on technology ventures and good ideas either not being supported or being poorly developed.

Some figures from the UK figures reveal:[18]

- One in seven new technology projects make it through to commercialization;
- Only half are successful once launched;
- 45% of failed projects[19] are related to late or inadequate market analysis; and
- 75% of development money is invested on projects that fail.

To address the above gaps it is necessary to develop and implement an effective approach to transform technology inventions and research results into promising marketable solutions. Technology innovations must undergo initial product concept testing and evaluation before entering the lengthier and more costly steps of development, regulatory approval and market launch.

In addition, a solid approach to technology commercialization should be designed. This aims to:

- Take a technological capability, identify and quantify market opportunities, and turn it into a business plan;
- Appraise a business plan for a technology driven venture;

[18] Source: http://www.stage-gate.net/sgi/pc/viewCategories.asp?idCategory=37

[19] Source: R. Rothwell, C. Freeman, Anthony Horsley, V. T. P. Jervis, A. B. Robertson and J. Townsend (1993) - SAPPHO updated -- project SAPPHO phase II, Research Policy, 1993, vol. 22, issue 2, pages 110-110

- Devise systematic methodologies for technology exploitation; and
- Implement the business plan.

There are a number of key facets to Technology Commercialization including:

- Exploring ways to encourage growth and productivity in value added sectors;
- Encouraging investment and research in knowledge-based industries;
- Exploring ways to encourage the growth of venture capital; and
- Working with industry to develop new markets for value-added products.

Learning about Technology Commercialization means: the essential business, legal, marketing, management and other skills necessary to take a new technology (or body of knowledge), protect it, assess its commercial potential, promote the idea to colleagues, management, licensee's or investors, and get a product into the marketplace.

Incubators that dedicate all or part of their resources to supporting technological ventures can and should develop a constructive and mutually supportive relationship with technology transfer offices. That said, both partners should recognize that they face daunting challenges, and hence the probability of success for any one technological venture will be relatively low. However, the overall impact of the portfolio of technologies and technological ventures can be significant.

Annex 2 contains a list of Tools that will help in the commercialization process. Annex 3 details how to create partnerships.

Case Studies

www.infodev.org
www.idisc.net

Technological versus business development in a technology incubator incubatee

Incubator Name: Rensselaer Polytechnic Institute Incubator Program
Sector: University-Based Technology Business Incubator.
This Case Study Examines: The start-up and early growth stage of a technology-intensive incubator company and the contrast between rapid technology developments versus lagging progress in revenue generation.
Date: December 2009

PART I

SUMMARY

Problem
Technology entrepreneurs often focus on technology development and either do not recognize or under-appreciate challenges associated with uncertainties that must be overcome in other domains. The GRASP, Inc. case study illustrates this problem. It is used in the context of this module to provide the context for practice of the Learning Plan Methodology, a tool that incubator managers can use to encourage technology entrepreneurs to see beyond the technical issues.

Solution
The Learning Plan Methodology can be used in one-on-one counseling or it can be used as an exercise in an incubatee training program. It is designed to stimulate divergent thinking[30] about a broad set of uncertainties the incubatee is facing, and to use convergent thinking to focus on the short list of the most critical uncertainties that should be addressed first. It is also a useful foundation for communicating with board members, advisers, potential investors, employees and so forth about the uncertainty reduction process that is fundamental to navigating pre-start-up, start-up and early growth.

PART II

BACKGROUND

See Annex 5 for a comprehensive case study describing the evolution of GRASP, Inc.

[30] Note: "Divergent thinking" refers to the different ways of reasoning that may apply to each uncertainty addressed.

TIMELINE OF EVENTS

The case study describes the evolution of a technological venture in a technology incubator during the late 1980s- early 1990s.

OUTCOME AND CONCLUSIONS

The Learning Plan Methodology has been used in practice by companies engaged in innovation and entrepreneurship (such as IBM, Air Products and Chemicals, Johnson & Johnson, W. L. Gore and Associates). It has proven to be very useful in exploring high uncertainty contexts in which innovation and entrepreneurship ventures are trying to figure out a path forward.

PART III

LINKS

N/A

REFERENCES

Rice, Mark P., O'Connor, Gina C. and Pierantozzi, Ronald (2008) - "Implementing a Learning Plan to Counter Project Uncertainty", Sloan Management Review

Technology Transfer Network

Incubator Name: Kharkov Technologies, Ukraine
Sector: Technology-oriented Business Incubator
This Case Study Examines: Added value of a Technology Transfer Network
Date: October 2009

PART I

SUMMARY

Problem

A Technology incubator has incubatees and a larger segment of society with technologies that are underutilized and/or not widely available on the market.

Solution

Create and utilize a technology transfer network to harness the new technologies incubatees create in different fields and markets.

PART II

BACKGROUND

Kharkov Technologies (KT) was founded in 1998 in Ukraine through a partnership between the University of Loyola College (USA) and the Institute for Single Crystals NAS (Ukraine) with financial support from the United State Agency for International Development (USAID). KT aims to develop, implement, and promote initiatives that support technology-based entrepreneurial businesses with high growth potential through an integrated package of business development services that nurture and support the commercialization of ideas and enhance the development and growth of dynamic enterprises.

KT achieves its goals through the application of targeted services, including: training programs in management, entrepreneurship, and technology transfer, financial support, incubation services, consulting services, and market research, among others.

Technology Transfer Program

KT saw that most of Ukraine's considerable scientific potential was not being applied in the private sector. Using its incubator as a starting point, KT created the Ukrainian Technology Transfer Network in 2008 to improve the exchange of information between science and industry, knowledge and practice, technology and production.

KT began its work with a study examining the dynamics of scientific research and technology and the business world. The study highlighted reasons that technologies were not being harnessed in business and industry as well as the experiences of countries that operate successful innovation economies, notably in Europe, the US, and Russia. KT then developed the methodology and materials needed to create the Network. After the need was identified and the materials were created, KT launched the Network with an international workshop, where participants were introduced to the Network and signed the Network Memorandum. The Network is also a certified participant of the Russian Technology Transfer Network, expanding its reach and connections beyond its borders.

Currently, the Network is functioning, though not at the optimal level envisioned by its founders. Fundraising has hampered its ability to operate, though it still fulfils a number of services. It develops technology profiles for requests and offers, carries out technology Assessments for innovation projects, and trains specialists. Network members and incubatees are given the opportunity to promote their ideas and projects and find business partners and investors. So far, incubatees are enthusiastic about the Network's work.

The incubator also benefits from the Network. KT is able to offer new prospective services and is given more opportunity to seek out financial support and funds for services, while connecting with incubators and networks internationally.

Lessons Learned

Establishing a technology transfer network can open an incubator to international experiences, opportunities in the science and research sector, obstacles SMEs face, and new skills and services. Most importantly, however, are the funds needed to support the Network. KT notes that the Network's success could be more pronounced and its business more profitable for itself and its clients had KT begun its search for finances in 2007. The absence of financing has put the Network in a fundraising process that hinders its ability to operate as intended. This shows that establishing proper and adequate funding is vital to a Network's ability to operate.

TIMELINE OF EVENTS

Kharhov Technologies was founded in 1998. Ten years later, in 2008, it founded the Ukrainian Technology Transfer Network.

OUTCOME AND CONCLUSIONS

Kharkov Technologies saw that there was a 'disconnection' between technology and the market in Ukraine. KT capitalized on this disconnect by establishing the Ukrainian Technology Transfer Network, aimed at bridging the gap between technology and the marketplace. A preliminary study, the creation of materials, and the kick-off workshop launched the Network. Thus far, the Network has led to international connections, new services, and lessons in how to create links across industrial and international barriers. The Network is operating and has been for a year, though currently it lacks the requisite funds to realize its full potential. Further fundraising efforts should eliminate any problems and enable the Network to fully function. This importantly shows that each Network, like any business, needs the proper financial base to be established before it can fully meet its potential.

PART III

LINKS

www.kt.kharkov.ua

REFERENCES

The material for this case study was gathered from an electronic conversation with Inna Gaguz, Director of Kharkov Technologies.

Additional supporting details may have been gathered from the following source, which can provide more information to interested readers: www.kt.kharkov.ua

Technopreneur Promotion Program

Incubator Name: TREC-STEP, India
Sector: Technology driven Business Incubator
This Case Study Examines: Technology commercialization through an innovation fund
Date: October 2009

PART I

SUMMARY

Problem
The process of realizing innovative ideas into commercial models and prototypes is a challenge for each innovator who has to evolve in what can be often a challenging environment.

Solution
A program provides innovators with financial support to enable them to overcome the innovation challenges successfully.

PART II

BACKGROUND

Tiruchiarappalli Regional Engineering College – Science & Technology Entrepreneurs Park (TREC-STEP) was founded in 1986 in the Tiruchiarappalli district of the Tamil Nadu state of India. In its initial phase, it was a Science and Entrepreneurial Park, promoting ventures in science and technology. TREC-STEP had a head start on the incubation industry, forming the first of its kind in India. TREC-STEP was founded as a joint venture between federal and local governments, banks, and academicians. Since its founding, it has graduated nearly 200 incubatees.

TREC-STEP created and is implementing in collaboration with the Department of Scientific and Industrial Research, the 'Technopreneur Promotion Program' (TePP) to support innovators to become technology based entrepreneurs, i.e. so called "technopreneurs". The TePP program provides a comprehensive financial support for the realization of new product/process ideas into actual prototypes and process models that can be potentially commercialized.

Any Indian citizen having an original idea/invention/know-how can apply to receive financial support to undertake the necessary developments to concretize its innovative idea into a market product. The grant may be awarded in two steps:

- The initial step corresponds to the "technopreneur promotion for grant" and is dedicated to contribute to the innovative venture patents, designs, scientific/technical consultancy, fabrication assistance, networking with adequate research lab/institutes and demonstration for users.

- The second step, “commercialization grant for innovation” as its name indicates, aims to support financially the commercialization of the product/process developed. The second step aims to support innovators to become successful entrepreneurs by benefiting from TREC-STEP incubation services and support.

The Application form is enclosed as an annex to the case study.

TIMELINE OF EVENTS

1986: TREC-STEP Foundation.
2008: Launch of the TePP program.

OUTCOME AND CONCLUSIONS

TePP program is currently supporting 13 projects.

PART III

LINKS

http://www.trecstep.com/model-sen/dsir.htm

REFERENCES

The material for this case study was obtained from a phone conversation with R. M. P. Jawahar, Executive Director of TREC-STEP.
Additional supporting details may have been gathered from the following sources, which can provide more information to interested readers:
http://wwww.trecstep.com
http://www.idisc.net/en/Incubator.16.html

ANNEX TO THE CASE STUDY: APPLICATION FORM FOR TEPP

Ministry of Science and Technology

INVITES PROPOSALS FROM INDIVIDUAL INNOVATORS UNDER TECHNOPRENEUR PROMOTION PROGRMME (TePP)

General Information & Application Format

The Ministry of Science and Technology has launched a novel program known as "Technopreneur Promotion Program" (TePP) jointly operated by the Department of Scientific and Industrial Research (DSIR) and Technology Information, Forecasting and Assessment Council (TIFAC) of the Department of Science and Technology (DST) to tap the vast innovative potential of the citizens of India. TePP is a mechanism to promote individual innovators to become technology-based entrepreneurs (Technopreneurs).

Who can apply?

Any Indian citizen having an original idea/invention/know-how can apply.

What proposals are eligible?

i.) Proposals from individual innovators to convert an original idea/invention/know-how into working prototype/processes. These proposals can be made by individuals or jointly with sponsoring organizations.

ii.) Interested individual(s) may apply to TePP for support giving complete details as per the enclosed format. The application should be submitted in five copies.

iii.) The proposal(s) having sketchy details/incomplete applications/applications without signature will be rejected. No correspondence will be entertained in respect of rejected proposals. The applicant, however, will be informed in due course.

iv.) The proposals involving software development/only patenting and for basic scientific research projects having no immediate commercial implications will not be accepted for consideration under TePP.

While making proposals to TePP, an innovator must ensure that the proposed idea will have possible commercial potential. Mere possession of idea(s), does not entitle anyone to avail TePP support.

v.) The proposals from the owner of a 'Start-up' company/industry may be considered for TePP support, if the annual turnover of the company/industry does not exceed Rs. 30.00 lakhs per annum.

vi.) Individuals working in organizations & having innovative ideas may apply for TePP support by furnishing a 'No Objection Certificate' from their employer.

vii.) In general, only one proposal from an individual innovator would be considered at a time. The proposals received will be subjected to departmental screening.

viii.) TePP considers financial support to the short-listed innovative and novel proposals on the basis of expert evaluation under two broad categories: (i.) 'Technopreneurship' (support limited to Rs. 50,000/-); (ii.) other category (support beyond Rs. 50,000/-, but not exceeding Rs. 10.00 lakhs). TePP selected innovators/inventors have to put 10% as cash contribution against the sanctioned amount, as their own share to the project proposals. Proof/supporting documents will be required with the application and along with the willingness towards such a contribution. The upper limits in both the cases are indicative only. It does not guarantee/ensure for the support to the tune of Rs. 50,000/- or Rs. 10.00 lakhs. The decision regarding actual support/categorization depends on the merits of the proposals and the support amount considered varies from case to case, as evaluated by the TePP Screening committee.

How TePP can help you?

Selected projects will be provided financial support to undertake the above developments, initial support such as patents, designs etc. and guidance, scientific/technical consultancy, fabrication assistance, networking with related research lab/institutes and demonstration for users as required.

Other related information:

The proposals, once rejected on technical grounds may not be re-considered. The decision of the TePP Screening Committee will be final in this regard.

Fabrication assistance/work sub-contracted required from others is considered under TePP. However, the rent of own house/own accommodation, own salary/stipend, rent of own workshop, salary of assistants etc. are not payable out of the TePP grant. The individual(s) may pay such monies from their own resources.

Canvassing in any form will result in disqualification/rejection of the application.
For further details on TePP, please visit our DSIR Website: http://www.dsir.nic.in

PROPOSAL FOR SEEKING SUPPORT UNDER TEPP
(TECHNOPRENEUR PROMOTION PROGRAM)

1.

(a) Name of the applicant:

(b) Father's name/Husband's name:

(c) Postal address:

(With Pin Code, Telephone number, Fax and e-mail address, if any)

Present:

Permanent:

(Please enclose residence certificate issued by Sub-Divisional Magistrate (SDM)/District Magistrate (DM) or a copy of ration card or any other document regarding proof of residence.)

(d) Nearest Railway Station & District Headquarters:

(e) Profession of the applicant: Technician/Engineer/Architect/Artisan/

(strike out which is not applicable) Doctor/Scientist/Housewife/student/Farmer/Any other.

(f) Date of Birth:

(g) Educational status:

(h) Experience/Employment:

Status of the applicant

(if employed in industry/any other organization 'No Objection Certificate' of the employer is to be enclosed)

(i) Annual Income as an individual:

(Are you Income Tax Payee? If yes, please give your PAN No. and copy of the latest return filed, if any)

(j) In case the application is initiated through:

an organization, please indicate Name and

address of the organization

(Please give PAN No. and details of return filed)

2. Title of the proposed project:

Brief write-up giving broad details of the original idea/ invention/ IPR/ Know how available with the individual(s), highlighting its originality/Novelty and the scientific principle involved therein.

Status of the work already carried out (if any) such as;

* literature survey/patent search
* development work done so far, if any, including involvement of agencies consultation with experts, please give details including IPR generated or ownership thereof, if any
* patenting of the innovation
* sponsored subcontracted work with any external agencies
* techno-economic / market feasibility studies / reports, if any
* consumers / users feedback, if any

(a) End product / process / output-resulting from the idea/ invention/ innovation (including specifications, performance requirements/standards it is expected to meet)

Potential major applications and users

Details of proposed project

Objectives
Duration/Time schedule
Please tick major activities to be undertaken and agencies such as
design engineering
working model/prototype development
lab/bench scale process development
research consultancy
trial and demonstration of developed product, environmental/safety measures and testing
any other
Proposed costs and time-frame*

ITEMS	PROJECT COST OWN TePP SUPPORT SHARE** SOUGHT	DURATION	ASSISTING AGENCIES (IF ANY)
R&D / Design Engineering Consultancy			
Lab/bench scale equipment/ Instrumentation/test rigs***			
Raw material/Accessories			
Fabrication (for prototypes)			
Manpower **** (Based on actual & not exceeding 20% of the total project cost)			
Testing and trials			
Travel (Based on actual & not exceeding 5% of the total project cost)			
8. Any other			
TOTAL COST			

Note:

*(i). Please indicate basis of above cost against each item in a separate Annexure.

**(ii). Please indicate the sources from which the expenditure for the project would be met. Please enclose the supporting documents.

***(iii). Please attach a list of equipment/instruments etc. and with their respective costs in a separate Annexure. Please note that as far as possible, the equipment required for the project may be on rental basis unless it is absolutely essential to purchase them. The reasons for such purchase should be given.

****(iv). This cost is only towards meeting the expenses of manpower directly involved in prototype/ process development.

Any further information/guidance required from TePP regarding external assistance, e.g., through labs/workshop/agencies? Please specify.

8. Please comment on the environmental and safety aspects of the project and related product/ processes?

9. Expected market potential (Domestic/Export) - indicate the basis:

Have you received/sought support from any other body/any other financial support: (a) for your present work and (b.) for any other work?

(if so, please furnish details)

Have you got any award for your innovation/for proposed work? If so, give details.

Any other information relevant to the project:

Suggested referees, if any:

Declaration:

I declare that all statements made in this application are true, complete and correct to the best of my/ our knowledge and belief. In the event of any information, found false or incorrect, my/our candidature will stand cancelled and all my claims will be forfeited.

Place:

Date: Signature of the applicant(s)

Using the incubator's expertise to improve and commercialize technology

Incubator Name: Villgro

Sector: Rural Business Incubator

This Case Study Examines: How a business incubator can deploy its network of expertise to improve and commercialize technology.

Date: September 2010

PART I

SUMMARY

Problem

An entrepreneur called Mr. K. Vivekanandan developed a small, lightweight, portable 3 HP pin pulverizer for grinding chili and coriander. However, initially only 20 machines (out of 100) were sold due to technical issues that could not be resolved by Mr Vivekanandan and his team. The technical problems experienced could not be overcome easily by the company alone and were threatening the discontinuation of this new technology.

Solution

Mr. Vivekanandan approached the incubator Villgro in order to request technical support. The incubator mobilized the appropriate technical expertise, tested the 3 HP pin pulverizer, indentified the problem and corrected it. A new version was released within 12 months, arresting the technical issues and leading to promising product sales.

PART II

BACKGROUND

Grinding machines for chili and coriander are often needed in rural towns in India. Chili and coriander spices are important spicing agents in south Indian cuisine and rural women often travel long stretches in search of a suitable grinder for them as access to suitable machinery is not readily available.

Furthermore machines to grind chili and coriander require high installation costs, and use a lot of power, making them unsuitable for rural areas, where sometimes a regular and continuous power supply may not always be available.

Mr. Vivekanandan had initially solved part of the problem with his machine as it was relatively inexpensive, lightweight easy to install and requiring minimal power, yet commercial success did not follow as only 20 machines (out of 100) were sold. Some of the buyers returned the machine because the chili and coriander did not pass through the filter screen and, furthermore, the machine created too much dust while grinding. Production for Mr. Vivekanandan came to a standstill and would not resume for several months, the time when he approached Villgro to ask for technical support.

Villgro has 3 criteria for the selection of innovation projects for incubation. They are the level of product or process innovation, market viability and social impact of the new product or service. Villgro assesses technology aspects at two stages: first, at the time of selection and secondly, during technology incubation.

When Mr Vivekanandan approached Villgro for technology intervention for the pin pulverizer, Villgro assessed the innovative potential of the technology, as described by its technical aspects such as specifications, parameters, design and comparison with similar technologies. The due diligence showed that pin pulverizer technology (grinding mechanism through rotor and stator) was not available in the category of less than 5 hp. In the next step, Villgro assessed the level of the technology challenge. The objective of this assessment was to see whether the technical challenge could be overcome and to see whether the company has access to technical skills (internal or external) to achieve that. At the due diligence level, Villgro held discussions with technology experts to understand the above-mentioned aspects. With their inputs, Villgro decided to incubate the technology to provide technology intervention support.

Once the technology was approved for support, Villgro searched for experts who could provide support. Villgro initiated a detailed partner search amongst its network of technology partners consisting of engineering institutes such as Indian Institute of Technology, Madras (IIT-M) and design firms. Villgro identified a food processing/food processing machinery expert willing to work on the problem. Villgro held brainstorming sessions with the expert to understand the nature and level of the challenge. Once the scope of the challenge was identified, the consultant started working on the existing prototype.

A contract was drawn up by Villgro between, the consultant and Mr Vivekanandan's company. The consultant then worked with the innovator at his premises. Initially, the consultant worked on the speed of the machine. He ran the machine at different speeds and observed the results of the grinding of products. At the same time, he modified the bearings to support the different speeds. As increasing speed resulted in better fineness of the powder, the consultant worked on fine calibration of the machine, keeping the configuration of the pin pulverizer suitably modified to withstand the speed.

Overall, 2-3 potential technical solutions were identified and the technical consultant (and with the support of the Villgro management team) proceeded to work on each of the solutions one by one. The approach was that, if a particular solution did not yield results, the next solution was tried. If all the solutions failed, the decision would have been to stop the project.

Villgro's team includes individuals with technology and management training and experience. However, for expertise in any specific area, Villgro taps into the network as mentioned above.

TIMELINE OF EVENTS

2005: Pulverizer was initially developed and distributed.

Nov 2006: With negative feedback from some segments of the market and the return of some machines by customers, Vivekanandan approached Villgro.

Jan 2007 – March 2008: Villgro approved the plan for technology intervention.

An external consultant was identified through the networks of Villgro and briefed to develop a solution. Simultaneously, the problem was posted on the Innocentive online portal (www2.innocentive.com) seeking solutions from the scientist community from all over the world. A technology solution arrived in September 2007 after analyzing the solutions given by the Innocentive community and the consultant. An appropriate solution was implemented (in this case, increasing the speed of the rotor). A prototype was fabricated by outsourcing all the key parts and then final assembly at Vivekanandan's workshop. Successful field trials testing the pin pulverizer under full manufacturing conditions was completed in March 2008.

July 2008: The first batch of pulverizers was distributed to dealers who formed the existing dealer network of Mr Vivekanandan. He convinced them about the successful modifications made in the machine and assured that the problems in the first commercialization phase of the pulverizers had been overcome. Dealers demonstrated the pulverizers to retail buyers (rural micro-entrepreneurs) and successfully sold the machines.

September 2010: 172 machines sold.

OUTCOME AND CONCLUSIONS

The consultant was engaged by Villgro for six months to work on the technical problems, based on the results of the technical assessment. If, within this time, in spite of all the efforts, the solution had not worked, Villgro would have taken a decision to stop the project.

However, the technical improvements realized by the technical consultant with support from Mr Vivekanandan and Villgro's technical team resulted in successful commercialization of the machine. The product meets rural needs, mainly by focusing on the types and amount of materials used and delivering a cost effective solution. Mr Vivekanandan had the necessary infrastructure to develop a prototype but lacked expertise to solve the problem.

Having been satisfied with the final technical performance, dealers replaced orders for the pulverizer. At the same time, Villgro provided wide exposure about the innovation through a leading newspaper. The newspaper published an article about the pulverizer, after which Vivekanandan received hundreds of queries. The sales improved 275% just in the first year.

The quality of the essential components such as the bearings and blades is constantly monitored being to avoid further problems in the future.

The pulverizer is proving to be an ideal revenue generator for rural women who are interested in increasing their domestic income.

PART III

LINKS

Villgro website: www.villgro.org

REFERENCES

The material for this case study was contributed by the current Incubator CEO, Mr Paul Basil who followed the development of the project and who is also the Founder of Villgro.

Contact details:

Paul BASIL
E-mail: paul@villgro.org
Villgro Innovations Foundation
3rd Floor, IIT Madras Research Park building,
Kanagam Road, Taramani, (Behind Tidel Park, on Old Mahabalipuram Road),
Chennai - 600113.
Phone: +91-44-66630400
Web: www.villgro.org

Technological nodes, a tool to approach technology transfer and knowledge to micro, small and medium sized companies

Incubator Name: Technological Nodes – Innova Chile (CORFO)

Sector: Technology transfer

This Case Study Examines: The network of technological nodes promoted by Innova Chile - CORFO, the Chilean Economic Development Agency.

Date: September 2010

PART I

SUMMARY

Problem (2007)

Technology transfer in Chile occurs only sporadically, rather than systematically, and it does not happen in all regions nor occurs with all types of companies. The existing technology transfer support mechanism put in place by INNOVA Chile - CORFO addresses mainly large corporate players and does not always benefit small companies.

INNOVA Chile is the department of CORFO (National Agency responsible for industrial policy) that deals with Innovation, Technology Transfer and Business Creation. The various actors including universities, research centers and companies are involved in technology transfer actions but they do not constitute a truly national, dynamic network. Specifically Micro and Small and Medium sized companies (categorized locally as MiPYME) are not easily connected to the technology transfer system, and therefore do not readily have the chance to exploit the existing knowledge. Although MiPYME represents 99% of total companies and represent 80% of employment, their contributions to GDP is 17% and they have a low level of internationalization as only 4% of these companies export goods and services (3% Medium and 1 % Small and Micro).

One of the priorities for Chile is to employ a strategy to address the innovation needs of these small companies (including technology transfer) to increase the global competitiveness of the country in its process to evolve from an efficiency based economy towards an innovation based one.

Solution (2007-2008 and 2008-2009)

To “push start” the exploitation of technology transfer opportunities to entrepreneurs, it was proposed to create a dedicated network of “Technological Nodes” providing services to more than 10.000 Micro, Small and Medium sized companies all over Chile, and via a physical presence close to small companies, across all the country’s regions. The Technological Nodes were created by using mostly existing interface organizationss providing support services to Small and Medium Sized companies. These intermediaries were provided with specialist technological transfer tools and resources from CORFO. After a needs analysis, specialist knowledge or skill was sourced via local experts from universities, clusters or industry associations – these experts provided the link between the “industry/research” communities.

PART II

BACKGROUND

Technology transfer in Chile has been successfully delivered mainly by universities to industry, but limited to large corporate organizations or very specialized types of companies (known locally as “elite”).

Chile was categorized by the World Economic Forum (Global Competitiveness Index 2008-2009, placed 28th) as a ‘transition economy’ from efficiency towards innovation. So, one of the big challenges was to increase the number of companies able to exploit knowledge and to boost SME innovation and competitiveness across the country.

There already exists a range of instruments providing support to micro, small and medium sized companies, and intermediary organizations are acting as regional operators for a range of National Programs and Services:

- SENCE – Servicio Nacional de Capacitación y Empleo, National Service for Training and Employment
- FOSIS – Fondo de Solidaridad e Inversión Social - National Fund for Social Investments & Solidarity, developing social projects
- SERCOTEC – Servicio de Cooperación Técnica – Technical Cooperation National service, providing support to Small and Micro entrepreneurs in regions
- CORFO – Corporación de Fomento de la Producción, National Institution in charge of industrial and economic development policies.

These intermediary service providers, hosted in most cases in business associations, universities or clusters, were not always committed to supporting innovation, as their core mission was often limited to general business support such as promoting business cooperation, promoting local entrepreneur projects, and providing information on government aids and grants.

Thus the Technology Nodes Network was created to support and compliment such existing institutions, with a particular focus on 'technology transfer'. The initiative increased the capacity building offer of intermediary institutions providing services to companies and also the capacity to reach a larger number of companies already connected to such institutions.

The objective of the Technology Nodes Network is to connect SMES to a short term technology transfer boosting program utilizing funds made available at a national level.

The roll out of Technological Nodes program was considered a challenge for CORFO that traditionally has worked with a limited number of intermediaries and SMEs. For example the number of companies that participate in INNOVA Chile programs on an annual basis was around 2,000 but the objective with the Technology Nodes Network was to reach more than 10,000 companies.

Technological Nodes Network characteristics:

Description of the instrument:

- Technological Node is not a new institution; it is rather a new initiative inside institutions providing services to micro, small and medium sized companies
- The goal was also to involve new institutions into bridging the gap between research and industry, by providing them with the tools and specialized human resources to do so.
- Participating service providers included experts in universities, professional training institutions, specialized consulting firms, technology centers, cluster associations, foundations and non-profit associations skilled in boosting innovation potential for small and medium sized companies.
- The means: experts from intermediary organizations were assigned to this new task, and following a technical evaluation and needs analysis of the SME, each company in the program was connected to the specialized local knowledge providers in organizations such as universities, research centers, and technological institutes.
- The selection criteria applied for intermediary organizations potentially joining the Technological Nodes Network:
    - o Experience providing business support services to Small and Medium Sized Companies.
    - o Level of companies targeted.
    - o Human resources – skill and capacity to deliver the program.
    - o Capacity to source new potential high growth start-ups (or "Innovation Projects") for INNOVA Chile – CORFO, as it was also intended to link new companies to Innovation Programs & Grants.
    - o Regional balance, to ensure the proximity of service delivery in all territories of Chile.
- Phase 1 (1st year): Creation of the network and dissemination.
    - o Duration: initially 1 year, with a full review at month 3 of the program.

This was the first occasion that CORFO ran such a 'short' program (2 years), and it was necessary to establish this early stage control with feedback on the functioning for each node, in order to react quickly with any corrective actions.

- Phase 2 (2nd year): Delivery of technology transfer projects to the targeted SMEs.
    - Financing: 80% CORFO, 20% in kind contribution from the selected intermediary organizations. The participating companies received a support service free of charge.

Initial objectives:

- To generate 100 new Technological Nodes for technology transfer across the different regions in Chile.
- Each Technological Node was given the target to provide services to at least 100 companies, and connect 100 new companies to knowledge providers.

Technology Node Service Portfolio

- Diagnosis: innovation capacity of firms.
- Information on national grants for innovation projects.
- Consultancy on project proposal preparation for national programs.
- Training, seminars and workshops on innovation.
- Networking: proactive promotion of collective actions, cooperation projects among companies and cluster initiatives focusing on technology transfer.

Results:

- 100 Technological Nodes created in Phase 1.
    - 33% from Entrepreneurial Association institutions. This was the first time such organizations had ever worked for Innova Chile-CORFO on innovation activities.
    - 33% University Departments
    - 33% Consulting Firms
- 55 % Technological Nodes succeeded to pass to Phase 2 and deliver technology transfer programs.
- >14,000 companies were involved in technology transfer activities.

TIMELINE OF EVENTS

2007 – 2008

- Phase 1:
    - 100 new Technological Nodes created
    - Generic dissemination activities to intermediaries and SMEs

2008 – 2009

- Phase 1:
    - o An additional 50 Technological Nodes were created and supported with Regional Funds (as the instrument in Phase 1 demonstrated to regional authorities its relevance, new Technology Nodes were created with other funds than INNOVA).
- Phase 2:
    - o 55 Technological Nodes presenting specific knowledge transfer programs engaged with over 14,000 companies in technology commercialization focused activities.
- Post program
    - o End of call for tenders to select new Technological Nodes.
    - o The program has evolved, following the 2-year contract and injection fixed amount of funds (80,000,000 $ Chilean peso; around 160,000 US $).
    - o Financial support from regional public actors has been secured in some regions to ensure the continuation of the Technological Node network.
    - o Follow Up - To present, the most innovative technology transfer projects (both individually but also in association or clusters) for funding opportunities in National Programs for Innovation and knowledge transfer.

OUTCOME AND CONCLUSIONS

The program was created as a pilot action, to better engage micro, small and medium sized companies with innovation support measures, and connect them to knowledge providers for technology transfer focusing on technology commercialization.
The network created has demonstrated the importance of having such a structured mechanism to 'democratize' access to innovation all over the country, with its focus on SMEs. Regional authorities are interested to keep this type of service network active and some have committed continuous support to the action.
Further support actions are needed to reach out to Chile's 500,000 micro, small and medium sized companies, Technological Nodes can demonstrated that they can access around 15,000 companies per year. Therefore, although this cannot be the unique solution to increase technology transfer activities but it has proven an extremely successful initiative.

PART III

LINKS

CORFO website: www.corfo.cl

- Technological Nodes: http://www.corfo.cl/lineas_de_apoyo/programas/nodos_tecnologicos

SENCE website: www.sence.cl

FOSIS website: www.fosis.cl

SERCOTEC website: www.sercotec.cl

REFERENCES

The material of this case study was contributed by Francisco Meneses, who was responsible at Innova Chile-CORFO for the launch of the Technological Nodes Network and Ismael Abel, expert on innovation and entrepreneurship. The information above is extracted from firsthand experience and personal involvement in the development of above tools.

Contact details:

Francisco Meneses - e-mail: fmeneses@corfo.cl

Ismael Abel – email: ismael.abel@aliasgroup.com

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http://www.badirict.com.sa

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Annex 1: Types of Agreements that can be Concluded

The legal relationship between transferor and transferee is essentially contractual in nature, which means that the transferor of the technology consents to transfer and the transferee consents to acquire the rights, the permission or the know-how in question. There are various methods and legal arrangements through which technology may be transferred or acquired, and the following overview briefly outlines the main ones.

1. The Sale or Assignment of IP Rights

The first legal method is the sale by the owner of all the exclusive rights to, say, a patented invention and the purchase of those rights by another person or legal entity. When the owner transfers to another person or legal entity all the exclusive rights to a patented invention, without any restriction in time or any other condition, it is said that an "assignment" of such rights has taken place. Similar principles and characteristics apply to the assignment of other objects of industrial property (e.g. trademarks, industrial designs) and copyright.

2. License or License Contract

The second legal method is through a license, that is, the permission by the owner of a patented invention to another person or legal entity to perform, in the country and for the duration of the patent rights, one or more of the "acts" which are covered by the exclusive rights to the patented invention in that country. When that permission is given, a "license" has been granted. The "acts" in question are the "making or using of a product that includes the invention, the making of products by a process that includes the invention, or the use of the process that includes the invention."

The license is usually granted subject to certain conditions, which will be set out in the written document by which the license is granted to the licensee. The licensee of will obviously relate one of the conditions to the payment of money or some other consideration in return for the license that is granted. Another condition might be that the invention will be used by the licensee only for the manufacture of products destined for a specific use, as, for example, the manufacture of a pharmaceutical product for use by humans but not for use on animals. Yet another condition might be that the licensee is allowed to use the invention only in specified factories or to sell the product embodying the invention only in specified geographical areas.

In a number of countries, the patent law may require that an instrument of assignment of patent rights or a license contract be presented to the patent office for registration. By the act of registration, the Government recognizes the assignee or the licensee as the transferee or holder of the rights transferred by the assignment or of the rights conferred by the license.

One of the key features of a license agreement will be the level of royalties paid by the licensee to the licensor. The exact amounts will vary depending on many factors but often the royalty rates will change over time and perhaps with different levels of volume production.

3. Know-How Contract

The third of the three principal legal methods for the transfer and acquisition of technology concerns know-how. It is possible to include provisions concerning know-how in a document that is separate from a license contract. It is also possible to include such provisions in a license contract.

The know-how may be communicated in a tangible form. Documents, photographs, blueprints, computer software, and microfilm, among others, are illustrations of tangible forms.

Examples of know-how that could be transmitted in such tangible forms are architectural plans of factory buildings, diagrams of the layout of the equipment in the factory, drawings or blueprints of machines, lists of spare parts, manuals or instructions for the operation of machines or the assembly of components, lists and specifications of new materials, labor and machine time calculations, process flow charts, packaging and storing instructions, reports on stability and environmental aspects, and job descriptions for technical and professional personnel. Such know-how in tangible form is sometimes referred to as "technical information or data."

The know-how might also be communicated in an intangible form. Examples would be an engineer of the supplier of the know-how explaining a process to an engineer of the recipient or the manufacturing engineer of the recipient witnessing a production line in the enterprise of the supplier. Another example would be training in the factory of the recipient, or at the enterprise of the supplier, of the personnel of the recipient.

The possibility that the know-how to be communicated by the supplier to the recipient might be disclosed, accidentally or otherwise, to third persons, is a very real concern to the supplier of the know-how. The provisions concerning know-how in the contract will thus cover various measures to safeguard against the disclosure of the know-how to unauthorized persons.

4. Franchise

Commercial transfer of technology may also take place in connection with the system of franchising of goods and services. A franchise or distributorship is a business arrangement whereby the reputation, technical information and/or expertise of one party are combined with the investment of another party for the purpose of selling goods or rendering services directly to the consumer. The outlet for the marketing of such goods and services is usually based on a trademark or service mark or a trade name and a special style (the "look") or design of the premises. The license of such a mark or name by its owner is normally combined with the supply by that owner of know-how in some form, technical information, technical services, technical assistance or management services concerning production, marketing, maintenance and administration.

5. Acquisition of Equipment and their Capital Goods

The commercial transfer and acquisition of technology can take place with the sale / purchase of equipment and other capital goods. Examples of capital equipment are machinery and tools needed for the manufacture of products or the application of a process. Sales and purchases of capital goods and their import into a country can be considered, in a sense, technology transfer transactions. Contracts covering the sale and purchase and the import of capital goods are sometimes associated with a license contract and/or a know-how contract. In certain instances, provisions concerning the sale and purchase and the import of capital goods may be found in the license contract or the know-how contract itself.

6. Consultancy Arrangements

The help of an individual consultant or a firm of consultants that will give advice and render other services concerning the planning for, and the actual acquisition of, a given technology can be useful, if not indispensable, for such enterprises, entities and governments that wish to acquire technology from enterprises in other countries. In such a business arrangement ,not only is help received in acquiring the technology but the experience gained and the lessons learned in engaging and working with the individual consultant or firm of consultants will be valuable knowledge that can serve to better carry out future projects.

7. Joint Venture Agreements

A joint venture is a form of alliance between two separate companies. There are two fundamental forms of joint venture, the equity joint venture and the contractual venture. The equity joint venture is an arrangement whereby a separate legal entity is created in accordance with the agreement of two or more parties. The contractual joint venture might be used where the establishment of a separate legal entity is not needed or where it is not possible to create such an entity. The different legal methods for the commercial transfer and acquisition of technology can be used in either form of joint venture arrangement.

8. The Turn-Key Project

In certain instances, two or more of the business arrangements, and hence the legal methods that they reflect, can be combined in such a way as to entrust the planning, construction and operation of a factory to a single technology supplier, or to a very limited number of technology suppliers. Thus, the "turn-key project" may involve a comprehensive arrangement of certain of the legal methods, whereby one party undertakes to hand over to his client—the technology recipient—an entire industrial plant that is capable of operating in accordance with agreed performance standards. More usually, the turnkey project involves the undertaking by one party to supply to the client the design for the industrial plant and the technical information on its operation.

Annex 2: What are the Tools Available in the Context of Technology Commercialization?

For the purposes of illustration, Europe will be discussed as an example. Innovation and creativity have been a policy focus for some time in Europe. Ministries of many countries are involved in science, technology and innovation policy, and recent initiatives have attempted to bring greater coherence to the system. Europe is also attempting to broaden the spectrum for future growth by funding biotechnology, nanotechnology and other promising areas.

The key challenge for Europe is to create an innovation system that enables its leading firms to remain at the world technology frontier, while encouraging greater innovation in other sectors of the economy. Continued support for the development of capabilities and research infrastructure in universities, and more strenuous efforts to diffuse knowledge from the public to the private sector will be important. It is also essential to ensure that the broader regulatory environment supports innovation.

Success in the entrepreneurial domain will only be ensured if Europe invests further in entrepreneurial education and training to reverse psychological barriers to business creation. This calls for increased entrepreneurship education opportunities for younger generations based on best practice. These need to be complemented by easing entry barriers for start-ups and extending business support services to reduce the risk of failure when starting a business.
To achieve this, measures have been put in place to stimulate the links between academic sector, and its results, and industry. Technology transfer is the major means that is used to create these links, and innovation networks, its tools. A network called the Innovation Relay Centres network was put in place in 1995, bringing electronic platforms, a methodology and links between people in this respect. In 2008, this network became the Enterprise Europe Network, enlarging its scope of accompanying measures.

In an incubator, the tenant companies should benefit from the different available services in order to easily find quick solutions to their technical, business or financial issues.

The incubator staff team has to master and put in place several actions resulting in better analysis of the incubatee's needs. To achieve this, the following tools can be considered:

1. TECHNOLOGY TRANSFER ASSESSMENT

An assessment is simply a systematic review of a company, its procedures and its performance (strengths and weaknesses). The information collected during an assessment can then be used to develop concrete proposals for future actions. In essence the assessment is about bringing information together to allow a company to see the "big picture", something that the company management often does not have the time or resources to do for themselves.

The focus of a technology assessment is the technological status of a company. An assessment is generally used to identify innovative technologies, processes and expertise, as well as pinpointing areas of need, where innovative solutions are required. Its focus is such that it allows needs to be identified, mainly through the exploitation or implementation of innovative technologies.

WHY UNDERTAKE A TECHNOLOGY TRANSFER ASSESSMENT?

Benefits for the Company

If successful, the benefit of the assessment to the company is clear; it will have an action plan leading to improved performance, provided the action plan is implemented with the support of an appropriate organization or by using existing in-house skills.

Limits of a Technology Transfer Assessment

It is important to realize that the completion of a technology assessment and the delivery of an action plan does not mean that all the needs of a company will be met and there will be a successful outcome. A technology assessment simply provides the structure within which a company is more likely to improve or fulfill its potential.

IS THE COMPANY COMMITTED?

For a technology assessment to be of benefit, it is essential that the company is fully committed to the process and collaborates closely with the consultant. Furthermore, the company should have the capacity to adopt new technologies and the ability to be innovative.

A COMPANY VISIT AND A TECHNOLOGY TRANSFER ASSESSMENT

It is vitally important to make a clear differentiation between company visits and technology assessments. A company visit, being the first part of the process, is just a visit (a meeting at the premises of the company/client) and can include different kind of analyses on products, markets and sales for further consultancy services. The technology transfer assessment follows a methodology and is carried out after the first company visit. Indeed an effective assessment cannot be completed without a preliminary company visit. The company visit offers the most effective way to assess whether a company would benefit from the assessment process. It will also give the assessment improved focus. Issues or problems identified during the visit can then be investigated more fully during the assessment. As the assessment is both time-consuming and (consequently) expensive, it is important that the consultant is highly-selective when undertaking assessments. The company visit allows the consultant to collect basic company information that can be used to prepare for the assessment. This information should include:

- Name of contact person for future correspondence;
- Basic company details: number of employees, date established, approximate turnover;
- A description of what the company does, manufactures , and the products/services it provides;
- The processes the company uses;
- The technology the company uses;
- Details of any international/export markets;
- The markets or sectors it supplies or works in;

- An analysis of the company's level of innovation;
- An analysis of the company commitment to the TT process;
- Why is the company interested in being assessed?

STRUCTURE OF THE TECHNOLOGY ASSESSMENT

Pre-visit / Preparatory Work (0.5 days)

The consultant should first research the company and the sectors in which it is active. The consultant should be aware of company's products, processes and markets. Most of this background information can be gathered from the company's own publicity material and website, if one is available. Information on the sector in which the company is active should also be gathered so that trends etc. can be considered when visiting the company.

Company Visit (1-1.5hrs)

The company visit allows the consultant to get an overview of the company, its products and markets, its R&D capability and its technology portfolio. The company visit is normally conducted with the General Manger or Managing Director of the company.

Pre-audit assessment (0.5 days)

Although the information collected during the company visit is general, it still should be sufficient to allow a pre-assessment of the company to be made. The information can be used to make an assessment of some of the company's challenges, its needs, the technology or expertise it possesses etc. thereby ensuring that the assessment has the appropriate focus.

Technology Assessment (1 day)

The technology assessment is a comprehensive exercise and will involve more interviewing more staff than just the Managing Director or General Manager of company. Section heads to shop floor employees could be included in the consultation process. One of the keystones of a technology Assessment is a SWOT analysis. This strength/weakness analysis is a self-assessment by the company of its position within an impartial framework provided by the auditor. Essentially the analysis helps the company and the expert to understand the history and the current market position of the company, including its successes and failures. As a result of establishing the company's position, the expert can focus on defining the necessary innovations required and the technologies that could be exploited to improve the company's performance and market position. For more information on SWOT analysis see Annex 1. The following are some of the aspects and questions that a technology assessment could consider and address:

- How is the company organized?
- Existing products & markets?
- Product mix / product life-cycle analysis?
- Level of technology?
- Technological resources / know how?

- Market position & competitors?
- Existence / analysis of marketing plan?
- Strategy - market share / local – exports?
- Competitors' analysis / sector analysis / opportunities – threats?
- Distribution networks – problems?
- Use of information technologies?
- Product development?
- Methodologies & procedures?
- New products, time frames for development & introduction of products?
- Research & Development?
- Resource allocation?
- In house or external?
- Areas of interest?
- Sources of technology?
- Innovation Capabilities?
- Innovation successfully introduced and methodology?
- Barriers to innovation?
- Search for innovation, (technology watch)?
- Quality control and standards?
- Transnational cooperation?
    - With other companies?
    - With research organizations?
    - With Universities?
- Participation in R&D programs?

Although there are a certain number of points that must be covered by the technology assessment it is important that the collection of information is achieved through consultation via discussions and not presented as a series of questions. More detailed and comprehensive information will be gathered if those being interviewed do not feel as if they are being interrogated. Therefore, a checklist should be produced to help guide the technology assessment and ensure that no important areas are overlooked.

Assessment & Action Plan (Up to 1 week)

The information and opinions collected are analyzed and a report is produced for the company. The report should contain the following elements:

- Overview of company / activities
- Overview of sectors / markets
- Identification of strengths / weaknesses / opportunities / threats

A provisional action plan: The action plan will be defined largely on the basis on the results of the SWOT analysis. The expert, in conjunction with the company, will define what the technology targets or vision should be for the company. The expert will then develop an action plan or a road map; the strategy for reaching the target or vision defined. The action plan will usually highlight the services the consultant can offer to help the company achieve its vision. The action plan should have:

- A time frame
- Clear milestones
- An estimated budget
- List of expected deliverables
- Identification of potential problem solvers (technology or service providers)

Follow-up (dependent upon the action plan)
If the expert can offer the majority of services to help a company reach its identified goal, then follow-up activity will be part of the expert's ongoing commitment to the company. The follow-up activity may, for example, include the widespread promotion of an innovative technology in a particular country; consequently a number of missions may have to be organized.

OUTCOMES
In terms of an assessment, there could be one of two outcomes (or potentially a combination):

- The identification of technologies that could be transferred to other regions or markets.
- The identification of technologies, products, markets that could meet the needs of the company.

Depending upon the level of the technology assessment, other outcomes could include:

- The development of structured plan for the sustainable growth of a company;
- A detailed assessment of a company's technology portfolio and plans to exploit this potential resource;
- An identification of possible sources of funding, both national or internationally, for innovative technology development; and/or
- Identification and signposting to sources of innovation financing including business angels or venture capitalists.

A technology assessment can be performed at any stage of the development process. However, it is strongly recommended to start it from the very beginning. The expertise needs will thus quickly be identified and the search for these missing elements can start at an early stage.

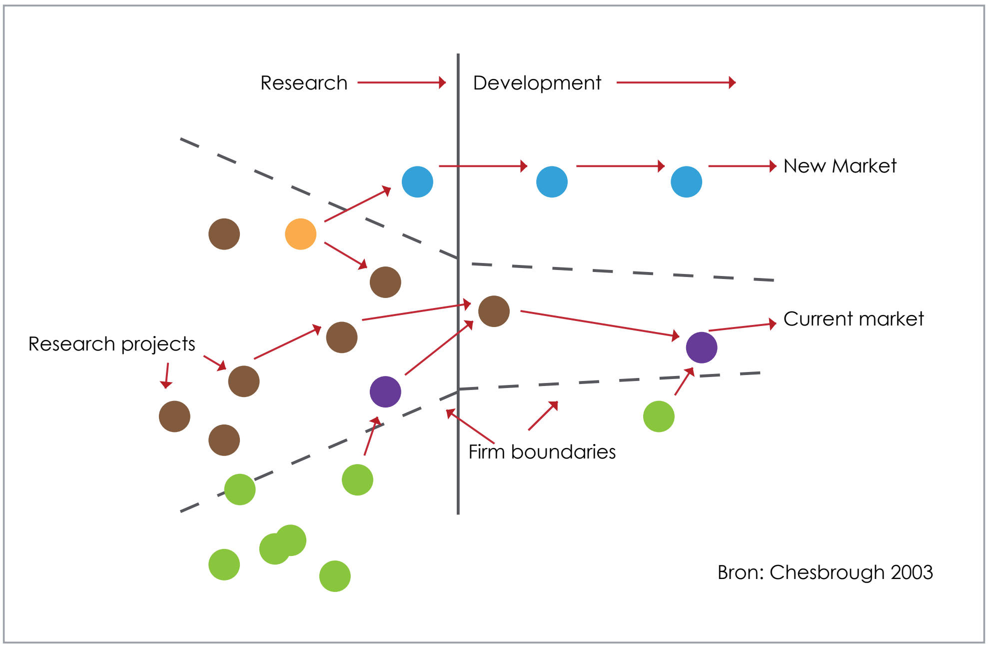
At the end of the main development process, the same operation can be performed in order to identify any expertise which is still needed which could be different from the first stage needs (additional needs can appear in the meantime). The main aim is to identify which are the technologies that have been developed and that can be exploited internally or externally. This last operation can be achieved using a technology transfer.

Beside the linear Stage Gate innovation model used on Figure 4, the process can also be described via the open innovation model. It is very important to understand that compared to the Stage Gate model, within the open innovation model steps can be bypassed by external input and support. Research by Sethi and Iqbal[31] (2008) has shown that adherence to rigorous gate controls can harm the development of new products by introducing project inflexibility, which is the increasing inability to acquire new information and incorporate it successfully into the project after its approval at the initial stages. If project inflexibility is high, then firms are faced with a situation in which they cannot make major changes to the project after its approval. Trott and Hartmann[32] (2009) propose that both the Stage Gate and open innovation models are fundamentally linear approaches in which the forwards trajectory of the technology denies the potential for the feedback or feed forwards of information. They propose that future models should incorporate feedback in order to overcome the implicit linearity of contemporary technology management techniques.

The figure below illustrates the different technology transfers activities that can be considered, and at which stage of the development process. As shown by the diagram, technology can be exported to other companies during transfer from the research step to the development step (as indicated by the yellow/orange circle crossing the "firm boundary"). At the same time, missing IP can be imported from external sources (as indicated by the light green/blue circles crossing the "firm boundary" into the company).

[31] Source: Sethi, S. and Iqbal, Z. (2008) - Stage-Gate Controls, Learning Failure, and Adverse Effect on Novel New Products. Journal of Marketing, 118-134

[32] Source: Trott, P. and Hartmann, D. (2009) - Why Open Innovation is 'Old Wine' in New Bottles. International Journal of Innovation Management, 13, 4, 715-7



2. TRANSLATION OF TECHNOLOGY NEEDS/OFFERS INTO STANDARDIZED PROFILES

Once the technologies have been identified as missing or exploitable by a third party, the partner search can start using different platforms or connections on a regional or international level.

In order to make the technology or expertise understandable by any party, some rules and standards have to be used. The keys to success of such a technology profile generally rely on the fact that it should be immediately attractive, not only to specialists but to any professional, even those coming from a different sector.

However the first condition for achieving technology transfer is detailed and accurate information about the technology, and its dissemination to interested parties. Innovative technologies can be transferred if we know first what technologies already exist, and also what needs are expressed by potential users. Individuals, and often companies, rely on limited knowledge of demand based on their own experiences or market understanding. This limit may reduce the potential likelihood of finding customers for the technology so it is important to think beyond traditional methods of knowledge gathering. The diffusion of information about technology is a crucial step in technology transfer.

This information should concentrate on two issues:

- Information about existing technologies; and
- Information about the needs in this area - the potential market.

One thing is very important to understand at this stage: When we speak of publishing technology profiles, we do not just talk about a publication in a database, we talk about communication. Communication is delivering a message from a sender to a receiver. All communications have a sender and a receiver, and sometimes one or more transmitters. The targeted entities can be of several types:

- Companies;
- Research centers;
- Regional Development Agencies;
- Chambers of Commerce; and
- Universities.

This means the receivers are generally specialists, but not always in the field of the sender. One mistake often made by 'transmitters' when they write the profiles is to write a profile as if their target was their client. They fear to be perceived as technologically incompetent and incapable of demonstrating a high level of sophistication in the description of their technology profiles. Another problem is the senders do not understand the market sufficiently well to know how to describe their technology in terms of the benefits if offers to the target audience rather than its features. As a result they are not understood by their different targets who often lose interest in their profiles due to their technical complexity.

Contrary to what many believe, most transfers of technology do not happen between specialists in the same industry. A computer engineer does not necessarily know much about biotechnology, nor are biotechnologists necessarily computer experts. But, they may need each other's technology, and need to work together to solve a problem.

In conclusion, transmitters and recipients are the 'targets'. As a consequence, as a good transmitter, technology profiles should respect the following guidelines:

- Stay simple and accessible;
    - o Avoid jargon.
    - o Avoid formulas, references, etc.
    - o Use a language understandable by most people.
- Focus on the most important need;
    - o What does the target, your client, need exactly, and why?
    - o What need, in which area, meets the technology offered by you?
- Organize your message;
- Put the information in the right place;
- Stay concise by going straight to the point;
- Be yourself better informed than your targets will be;
- Do not use keywords that relate to the needs of your customer, but to those of the recipient;

- Avoid:
    - o Advertising language (slogans, claims, etc.)
    - o Marketing terms.
    - o "Business speak".
    - o Acronyms (if used, explain them).
    - o The use of first / second person (I, me, you).
    - o Philosophizing – stay factual.
    - o Generalization – explain the precise need or benefit as much as possible.
    - o Guesswork –provide figures relevant to your target.
- Confirm the transmitter's commitment and motivation:
    - o Involve him/her in the drafting of the profile.
    - o Get the maximum possible documentation: photographs, diagrams, specifications, and so on.

Annex 3: How to Disseminate Partner Searches and Create Efficient Partnerships?

As mentioned before, once the key competencies or technologies of the incubatee that could be transferred have been identified, the process of technology transfer can begin with the support of the incubator. This requires support from the incubator to the project by applying a specific methodology.
Technology transfer services given by incubators can be divided into at least three general levels: Typical activities and services relating to technology transfer and research and technological development (RTD) exploitation might include but would not be restricted to the following:

- Awareness: e.g. promotion of the services through target mail shots, information technology means, publications, seminars or visits. Publication of technology opportunities or needs in relevant media.

- Contact: e.g. technological assessments/ technological surveys or sectoral group meetings for the identification of local needs or opportunities to be exploited. Organization of technology transfer events, workshops, open days, seminars. Participation at exhibitions, direct contact with SMEs/ organizations and other pertinent players. Development of databases of the requirements of local companies and their opportunities to be offered.

- Assistance: e.g. search for external technologies to match the identified needs, or search for needs that fit the local opportunity. Dissemination of technology profiles and partners search for exploitation of the identified technologies through cooperation. Networking and joint national or international activities. Assistance in the preparation and conclusion of agreements and on technology-absorption / technology exploitation plans.

Technology transfer is a very complex multidisciplinary topic. Many innovation policy approaches have not been successful because they did not use a holistic approach to understand this complexity. A holistic approach of facilitating technology transfer and commercialization means that enhanced technology transfer training has also to be extended to NETWORK BUILDING and EXTENSION OF SCIENTIFIC-TECHNOLOGICAL NETWORKING and FACILITATING HORIZONTAL/VERTICAL LINKS BETWEEN ENTERPRISES. In order to achieve these additional goals within a training scheme, the classical and important topics of technology evaluation, technology transfer and technology commercialization have to be combined with 'soft' factors of technology transfer, like how to access technologies, how to describe technologies and technology demands, how to use technology markets and implement open innovation policies and, last but not least, offering escape routes for every failed technology commercialization approach.

This means a technology, for example, that is not getting very promising data out of the technology evaluation can still be of value for a totally different third company. This is not only true for another company that is working in the same technology field as the one that could not exploit it, but also for a company that is working in a totally different sector. Additionally the holistic approach would, even after a successful evaluation of the technology, try to exploit it in other different sectors with open innovation approaches and networking with all players. Networking is becoming a key topic within the whole process of technology transfer; being important for finding the right solution for the client without any limitation to geographical borders, sectors, combining all necessary players with support on the whole value chain of technology transfer, since otherwise the risk of failure is too high.

Once the key expertise or technologies have been identified as missing or exploitable, this information has to be translated into an understandable format in order, for instance, to be transferred to another sector. Different channels exist to match the demand and the offer:

1. PARTNER SEARCH DATABASES OR TECHNOLOGY TRANSFER NETWORKS

The first channel consists of publishing the technology profiles on technology transfer platforms existing in Europe and elsewhere. These platforms generally use common standards aiming at describing in an efficient way the necessary elements needed by the reader in order to understand the expertise proposed or needed, the objective of the proposer and the specifications describing the technology.

Moreover, several elements can enrich the profile to make it more efficiently accessible through search engines. Technology transfer platforms generally use a common web based tool allowing users to exchange profiles, ideas, and/or initiatives.

In general terms we can state that a technology profile is composed of the following fields:

- Title
- Abstract
- Main Description
- Specifications
- Innovative elements
- IPR protection
- Description of the proposer
- Roles of the potential partners
- Kind of agreement envisaged (licensing, manufacturing, etc.)
- Technology keywords
- Market or sector keywords
- Contact details

Advantages of working with a technology transfer platform:

- Same standard for everyone
- Complete information set for a first contact
- Common set of keywords(taxonomy) used by every organization
- Automatic matching of profiles
- Automatic sending to the companies

- Automatic matching of profiles sent via e-mail

Note: Examples of technology networks or platforms that can be used to identify partners are mentioned below. It has to be stressed that just a database will normally not facilitate technology transfer. Therefore technology transfer is often described as "contact sport". A well working network can offer a state of the art IT portal combined with personalized services. Therefore matchmaking is often made by technology transfer network members acting as "InnoMediaries". These InnoMediaries are matching their own clients' needs or opportunities, that they have seen in databases or they got from their own personal contacts. It is very rare that technology transfer success stories are just made by database matching; the personal support during the process is able to increase the success rate significantly.

One of the networks that is successfully implementing this IT and Expert support approach in more than 45 countries, is the Enterprise Europe Network[33] (EEN). [Another strong support network is the Association of University Technology Managers[34] (AUTM).]

Enterprise Europe Network

The Enterprise Europe Network brings together business support organizations from across 45 countries. They are connected through powerful databases and are particularly active in Europe and have built effective partnerships already with 18 other countries. With more than 570 member organizations the EEN is physically close to where the European SME businessare based. The SME will be assisted on the spot, or put in touch with a specialized branch in its region.

With hundreds of new company profiles added every week, EEN's business cooperation database is one of the worlds largest. When an SME gets in touch with the EEN Network, a profile describing an offer or request is inserted into the database. The SME then receives updates on companies interested in the same kind of cross-border business.

Note: The Enterprise Europe Network is a network that is normally only covering countries within EU-27, but because of the success, and the predecessors IRC and EIC, the methodology is copied in 18 countries outside Europe. All these countries have joined the EEN and the number of new members is still growing because this approach is so successful compared to other models.

Matchmaking events in 45 countries are also organized where entrepreneurs can meet potential business partners in person. Meetings are scheduled for the SME. As said previously, matchmaking events often take place at international fairs, which helps keep travel and accommodation costs down.

[33] Source: http://www.enterprise-europe-network.ec.europa.eu/index_en.htm

[34] Source: http://www.autm.net

European Space Agency (ESA) Technology transfer Network

Over the past 35 years, the European space industry has gained considerable expertise in building, launching, controlling and communicating with satellites. From this long experience in how to overcome the hazards and problems created by such a hostile environment, many valuable new technologies, products and procedures have been developed.

Today, this expertise is improving our daily lives by providing a wealth of innovative solutions for products and services here on Earth although developed originally for use in space. Groundbreaking European space technologies are becoming increasingly available for development and licensing to the non-space industry through the process of technology transfer.

In the framework of its research and development activities, ESA spends some €250 million each year and, recognizing the enormous potential of the know-how developed within its R&D activities, set up a Technology Transfer Program in 1990 to exploit the technologies developed as part of the European space programs.

ESA's Technology Transfer Program is largely carried out by a network of technology brokers across Europe and Canada under the auspices and support of ESA's Technology Transfer and Promotion Office. The task of the brokers is basically threefold:

- To identify technologies with potential for non-space applications;
- To ascertain the technological needs and requirements of the non-space sector; and
- To match available technologies with the non-space needs and subsequently provide assistance in the transfer process.

An important aspect of ESA's Technology Transfer Program is the European Space Incubator (ESI). ESI, together with its associated network of European Space Incubators (ESINET – managed by EBN) is designed to help start-up companies wishing to exploit space-based technologies and expertise get off the ground by providing them with premises, assistance and first stage funding.

National Tech Transfer Networks and Open Innovation Accelerators (OIAs)

TechnologieAllianz is a successful example of a national university network for technology transfer that exists in perfect alliance with other networks like EEN. TechnologieAllianz unites patent marketing agencies and technology transfer agencies in a single network – a nationwide association representing over 200 scientific institutes. TechnologieAllianz provides enterprises and intermediaries with access to the entire range of innovative research results from German universities and non-university research institutions

There are also so called Open Innovation Accelerators.[35] Nowadays a great variety of methods and tools exists for integrating external actors in an open innovation process. Many of these approaches have

[35] Source: The Market for Open Innovation: Increasing the Efficiency and Effectiveness of the Innovation Process. By Kathleen Diener and Frank Piller. RWTH-TIM Group 2010

been focused on the customer or user as a source for collaboration and value creation. Today however, we can also observe a further class of emerging internet-based tools which integrate different kinds of external actors, a few of them are listed below. Some of those OIAs are very close to the market with their services and business incubators can learn from their service portfolio or build partnerships.

• Idea Crossing	www.ideacrossing.com
• Idea Connection	www.ideaconnection.com
• Ideas To Go	www.ideastogo.com
• Idea Tango	www.ideatango.com
• Ideawicket	www.ideawicket.com
• InnoCentive	www.innocentive.com
• Innovation Framework	www.innovation-framework.com
• Invention Machine	www.invention-machine.com
• LEAD Innovation Management	www.lead-innovation.com
• NineSigma	www.ninesigma.com
• Openad	www.openad.net
• Redesign Me	www.redesignme.org
• Sitepoint	www.contests.sitepoint.com
• Spigit*	www.spigit.com
• Venture2	www.venture2.net
• Verhaert	www.verhaert.com
• VOdA	www.vo-agentur.de
• Wilogo	www.Wilogo.com
• Yet2.com	www.Yet2.com.com
• Your Encore	www.yourencore.com

Most of the accelerators take advantage of a virtual environment and base their work on online communities. Intermediaries in the field of open innovation regard themselves predominantly as contributors to the early phases of the innovation process (“Fuzzy front end”, FFE) by supporting the process of idea generation and idea evaluation. The Fuzzy Front End is often the tricky “getting started” period of new product development processes. It is in the front end where the organization formulates a concept of the product to be developed and decides whether or not to invest resources in the further development of an idea.

Grass roots Innovation networks and Grassroots Innovation Business Incubators

Grassroots innovations are essentially solutions generated by people at the grassroots levels to address persistent problems, the solutions to which are either not available or not affordable by a large section of the consumer masses in developing countries like India.

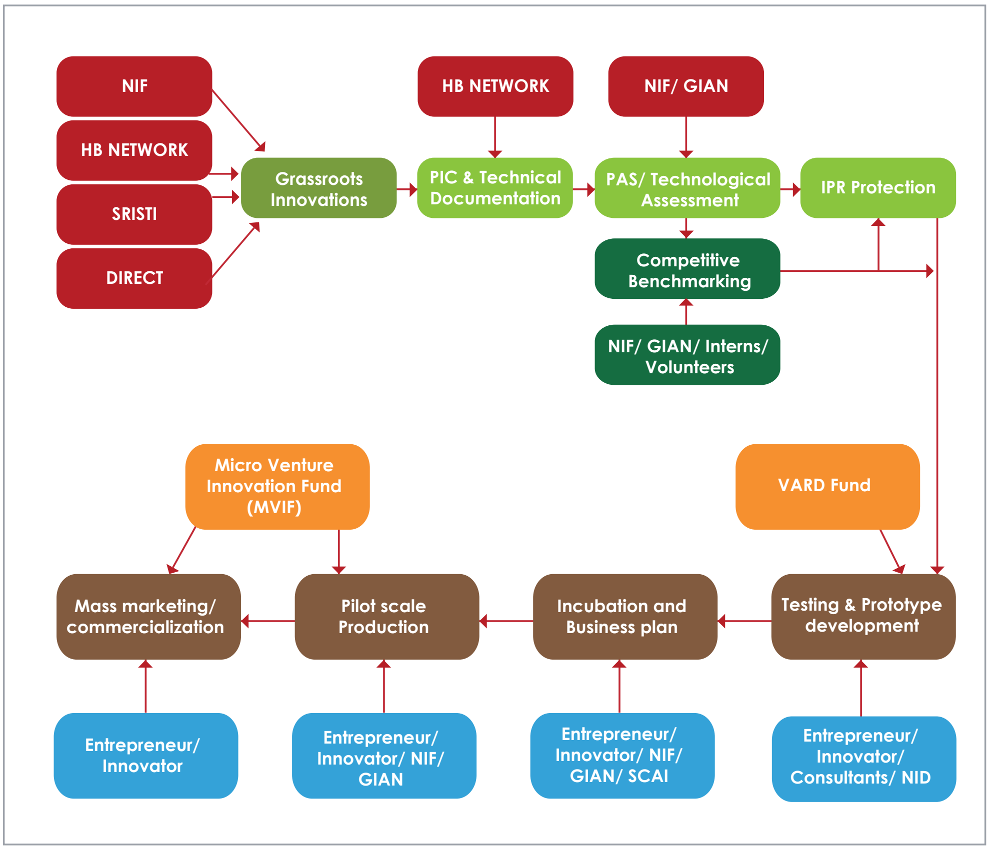
These innovations, therefore, capture an unmet need of a large section of the population and building a value chain around these innovations to take them to market holds the potential of wealth creation in a truly sustainable and equitable manner.

Grassroots Innovation Augmentation Network[36] (GIAN)

The objective of GIAN is to build the value chain around these innovations with the end objective of making these available to the masses through the market mechanism or otherwise.

Especially in India different grassroots are known and GIAN India's first technology business incubator which is focused on incubating and commercializing grassroots innovation.

GIAN incubates high potential grassroots innovations into market ready products through a well-established incubation process and using its strong and decentralized network. The incubation path followed by GIAN is as shown below (see website for more details):



[36] Source: http://www.gian.org/

GIAN is well connected on national level, but also with Asian and Pacific Centre for the Transfer of Technology (APCTT) and the Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI). On national level also the National Innovation Fund (NIF) is playing an important role to support grassroots innovations.

The primary objectives of NIF are:

- To help India become an innovative and creative society and a global leader in sustainable technologies by scouting, spawning and sustaining grassroots innovations;
- To ensure evolution and diffusion of green grassroots innovation in a selective, time-bound and mission oriented basis so as to meet the socio-economic and environmental needs of society;
- To provide institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations as well as outstanding traditional knowledge and helping their transition to self supporting activities;
- To seek self reliance through competitive advantage of innovation based enterprises and/or application of people generated sustainable technologies at grassroots level;
- To build linkages between excellence in formal scientific systems and informal knowledge systems and create a knowledge network to link various stakeholders through application of information technology and other means; and
- To promote wider social awareness, and possible applications, of the know-how generated as a result of these initiatives in commercial or social spheres and encourage its incorporation in educational curriculum, developmental policies and programs.

HoneyBee Honey Bee Network is a crucible of like-minded individuals, innovators, farmers, scholars, academicians, policy makers, entrepreneurs and non-governmental organizations (NGOs). A Network having presence in more than seventy five countries, what has made Honey Bee Network tight knit and efficiently functional is its philosophy. GIAN mentioned before is also a member of HoneyBee.

Beside India there are also Grassroots Innovation Networks in Uganda[37], but they are not as advanced regarding their services and national or international connections.

2. CONTRACT RESEARCH

Contract Research allows businesses to use the facilities and expertise of research institutes for their own commercial benefit, but at a price. A university will benefit from direct funding, new resources and access to applications for the research. Companies benefit from access to state-of-the-art research and the best researchers without having to include them on the payroll (indeed many of the researchers

[37] Source: http://www.giultd.org/

would not want to work for a company anyway). Contract research is increasingly seen as the way to support research funding at universities because of this win:win situation.

3. PARTNERING EVENTS

Partnering events are often the best way to create quick links between several parties in order to define potential collaborations between them. Participants are invited to network collaboratively using specific rules arranging pre-defined meetings. These meetings are organized based on the keywords chosen by the participants and the expressions of interest that are provided.

Brokerage events at fairs

Brokerage events are mainly organized at trade fairs, exhibitions or conferences, although some are organized as stand-alone events. Using another event as a host for a brokerage event can bring added value for the companies in the form of free entrance to the fair, inclusion in the fair's catalogue and the opportunity for extra meetings to be organized with other companies attending the event.

The most essential element of any brokerage event is the catalogue of technology profiles. This document is used to match companies and organize meetings. As well as being produced in a paper format, it is also extremely useful to have an on-line electronic version available. The latter increases flexibility, allowing profiles to be submitted closer to the event and for any changes to be made quickly. Interest in a technology profile can also be instantly registered. Generally the paper version of the catalogue must be finalized and printed 4-6 weeks before the event to allow enough time for matching and further company recruitment to take place.
Allowing half an hour for each meeting, the maximum number of meetings per company is approximately six per day. It is also important that time be left for 'last minute' meetings to be organized on the day of the event.

For a brokerage event to be successful there must be a sufficient number of technology profiles for companies to choose from. Most brokerage events have a minimum of 150 meetings organized between companies, this equates to approximately 50 companies attending an event.

SMEs missions

SME missions bring together small groups of SMEs for prearranged, transnational, face-to-face meetings. SME mission meetings can take place in a number of different locations including company premises, hotels, at a brokerage event or the local Embassy. The most productive location is generally company premises.

Generally no more than five companies will travel, with each company having approximately 3-6 meetings. SME missions normally last two to three days, simply because this is the maximum period of time that most representatives can afford to spend away from their companies. As part of the mission, visits to relevant research organizations, government departments or exhibitions can be organized. As well as bringing added value to the mission, these give companies a useful overview of the economic potential of the country or region being visited.

WHEN? The networking effect starts from the beginning.
The role of the incubator as a booster of the networking effect.
Technology commercialization should be considered from the very beginning of the project. The key elements that should identified and followed up should be as follows:

- Identification of the technology platforms;
- Potential partners that could join the project as it develops; and
- Identification of local and international actors that could liaise with the additional services to be provided by the incubator in the framework of the project.

When considering technology commercialization, the incubator should stick to a certain methodology that will help to identify the technologies missing or to be exploited and the complementary services needed by the incubatee:

- Technology Assessment;
- Identification of the technology profile;
- Identification of potential partners:
  - o Via networks
  - o Via brokerage events
  - o Via technology watch
- Support in terms of IPR issues;
- Supports on financial issues; and
- Support in contract negotiations.

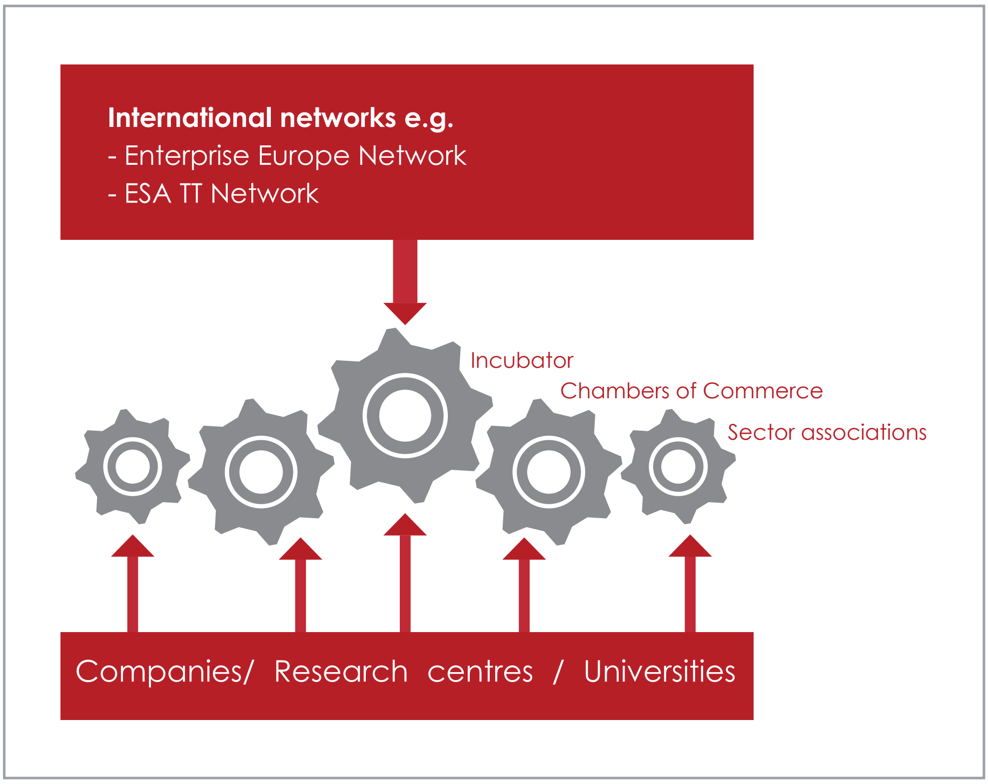
In order to set up and offer all these services, the incubators have to intensively collaborate with local or international players such as:

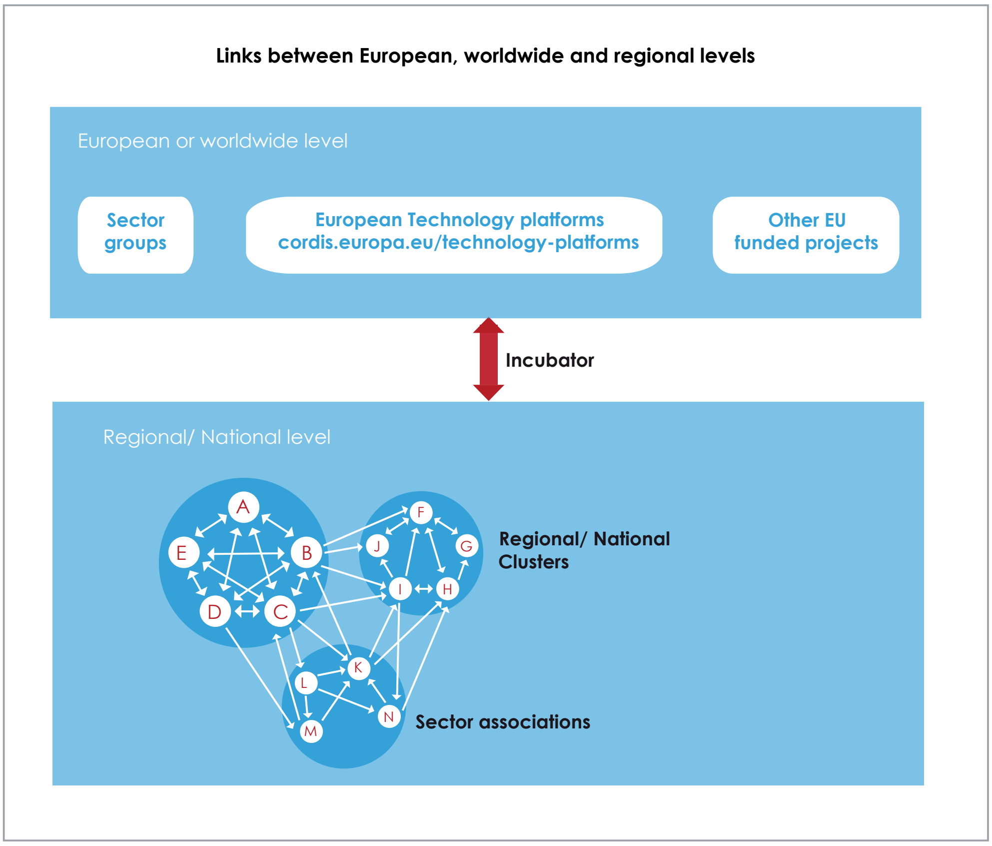
- Regional development agencies;
- Clusters;
- Chambers of commerce;
- Sector associations;
- Universities; and
- Research centers.

On an international level, the incubator can collaborate with:

- International networks;
- Technology platforms; and
- Donor funded projects.

The next figure illustrates the different levels of action that the incubator has to put in place in order to enable its incubatees to benefit from these services:




Links between European, worldwide and regional levels
European or worldwide level
Sector groups
European Technology platforms cordis.europa.eu/technology-platforms
Other EU funded projects
Incubator
Regional/ National level
A
B
C
D
E
F
G
H
I
J
K
L
M
N
Regional/ National Clusters
Sector associations

Annex 4: Technology Watch

TECHNOLOGY WATCH – PRINCIPLES METHODS AND SOURCES

We can define Technology Watch (TW) as the systematic procedure of capturing, analyzing and exploiting useful information for strategic decision making in a company or organization.
This chapter describes what Technology Watch consists of and its relation with other similar disciplines, like strategic planning, knowledge management and especially competitive intelligence, to which it is inseparable.

It has to be mentioned that Technology Watch is a very useful exercise for any innovative company at almost every stage of a company's lifecycle. Depending on the intensity required it can be achieved with in-house resources (established companies), but also offered by business incubators as a service for incubated companies. It is a very valuable element of training activities in order to make companies fit for the phase after the incubation period.

Then we will examine how to apply Technology Watch techniques to Specific Web Positioning processes (SEO) and Search Engine Marketing (SEM). The sources of information, its analysis and its exploitation will be specific to the SEM-SEO processes. The final section will highlight free resources, both information sources and the computer programs/software freely available on the Internet.

2. DEFINITIONS

Technology Watch (TW)"consists in systematically capturing, analyzing, disseminating and exploiting useful technical information for the watch and growth of a company. Watch must be ready for any scientific or technical innovation susceptible to creating opportunities or threats." (Escorsa, 2001a)

The main application of Technology Watch is to obtain technical information to make decisions in a company's production department. However, the watch processes are also applied to commercial decision making processes. In these fields, the terms Commercial Watch, Competition Watch or Surrounding Watch are often used, even though Technology Watch is also used, becoming the commonly used term.
Here we will use "Technology Watch" in the generic sense, comprising both technical and commercial information.

TW is inseparable from Competitive Intelligence, and often both terms are used "Technology Watch - Competitive Intelligence (TW - CI).

Between the two disciplines, there is a key difference: while TW focuses on the search and capturing of relevant information to make decisions, Competitive Intelligence refers to the same process, but with the emphasis on creating new information, often implying the capture of new information in order to better understand it.

“Competitive intelligence is a systematic and ethical program for gathering, analyzing, and managing any combination of Data, Information, and Knowledge concerning the Business environment in which a company operates that, when acted upon, will confer a significant Competitive advantage or enable sound decisions to be made.” Source: Society of Competitive Intelligence Professionals (SCIP)

“Competitive Intelligence” is more often used than “Technology Watch,” but in the Spanish literature the opposite occurs: “Vigilancia Tecnológica” is more common than “Inteligencia Competitiva”.

This section will focus on the search and capturing phases of the information, and thus mainly use the term “Technology Watch”.

TW is closely related to a company’s Strategic Planning, which provides an action framework focused on the activity by defining critical factors that must be “watched”.

The following actions are taken in the strategic planning:

- Analyze the internal and external activity of a company;
- Identify the Strengths, Weaknesses, Opportunities and Threats (SWOT Analysis);
- Create a strategy plan with short and mid-term aims; and
- Relative to the previous points, define the critical watch factors.

Moreover, TW is complemented with Knowledge Management processes. While TW searches and creates information previously unknown to the company, the management of the knowledge is focused on internal information.

“Knowledge management documents or makes the most of the company personnel’s experiences, looking at the past and making sure that this knowledge is shared through the intranet and electronic email. Intelligence [TW] mainly looks at the information foreign to the company. It hopes to foresee: To capture weak signals - what is starting to occur, which obviously must be assimilated as soon as possible - thus it hopes to detect opportunities and threats.” (Escorsa, 2001)

Thus the management of knowledge is mindful of the internal flows of information with the aim of promoting the effective exchange of information and safeguarding the company’s internal documentation. At the same time, Technology Watch searches for and creates information external to the company, which at a given percentage allows for the making of decisions, becoming internal information / knowledge that finally becomes part of the knowledge management.

3. THE TECHNOLOGY WATCH PROCESS

The first phases of the TW process are the following:

- Identify and analyze the company’s information needs defining the Critical Watch Factors (CWF);

- Search and obtain the necessary information for tracking the CWF;
- Evaluate and analyze the information obtained;
- Internally disseminate the results; and
- Use the information in the decision making process.

These five phases are executed continuously and cyclically. Often the decisions made imply the existence of new CWF, starting a new cycle.

In the following sections we will apply this generic process, useful in any type of company, to the specific case of SEO-SEM processes and services.

4. INFORMATION NEEDS AND CRITICAL WATCH FACTORS

There are two key external information needs a company has:

- Technological information needs: Know the technological changes that could affect the company as soon as possible; and
- Commercial information needs: Know what the competitors are doing and follow any changes in the general commercial environment.

From these two types of needs we can specify the Critical Watch Factors (CWF) as external company factors critically affecting its competitiveness. Each activity, even each company department, can have specific CWF that depend mainly on the defined strategic plan.

For a good TW design, the CWF must be defined as specifically as possible. For example, a SEO-SEM company could have the following CWF:

Technology CWF

- The specific information on what type of SEO practices are restricted by Google.
- Changes in Page Rank algorithms.
- Changes in Google, Yahoo, Live´s algorithm order.
- Nuances in the service features in search engine marketing.
- Appearance of new specialized search engines.

Commercial CWF

- What is the profile for users who are interested in our services but are not yet clients?
- What is our target?
- Is our service truly what our clients need? Could we offer additional services?

- Which search engine is the leader in the search engine marketing sector and what is their market share?
- How do the Internet users behave?
- What new concepts, services, companies….are there any in our sector?

Specific CWF for SEO-SEM campaigns

- In what directories can I register the positioned webpage?
- Are there new domain names registered related to the page positioned?

These are the most general and typical factors. Each company must define a few more relative to their strategy plan and specific needs.

There are three types of competitors in the competitive watch section and for the specific case of the SEM-SEO companies:

- Classic competition: SEO companies that compete with us offering the same or similar services;
- SEO competition: Web pages that compete with others in search engine positioning with specific key words; and
- SEM competition: Web pages that compete with others in search engine ad positioning with specific key words.

Each one of these cases requires the definition of specific CWF:

Classic competition:

- What campaigns do our key competitors carry out?
- What products and services do our competitors offer?
- What guarantees do our competitors offer?
- What prices do our competitors offer?

SEO competition

- What incoming links do our competitors have?
- What Page Rank do our competitors have?

SEM competition:

- Who are our direct competitors?
- What CPC (maximum cost per click) do our competitors have in specific key words?

5. SEARCH FOR THE NECESSARY INFORMATION FOR TRACKING THE CWF

After having identified the CWF, we must specify what information sources we will use to track and continue defining the procedure to obtain this information constantly and periodically, applying some of the following tools:

- Service alert;
- Webpage software monitoring;
- An adding agent;
- Search agent;
- Search engine, multi-search, metasearch, news search, weblog search;
- Subscription to an RSS channel;
- Data mining procedure;
- Bibliographic database;
- Patent database;
- Distribution list;
- Some invisible web databases.

The information sources can be formal or informal, in various supports (paper, digital…) or none at all, like through conversations. In this article we focus on the digital sources freely accessible through the Internet, such as:

- Bibliographic databases of specialized journal articles;
- News articles accessible through news search engines;
- Patents and standards accessible through patent search engines or databases;
- Company databases and web pages;
- Statistics;
- Blogs accessible through blog search engines;
- Congress, conference and seminar acts; and
- Distribution lists.

Informal information sources, like conversations with clients, suppliers, competitors, employees, partners and investors can be valuable information sources, but two things must be kept in mind:

- They must be formalized, written down or recorded as soon as possible to avoid losing them. Any sort of description must at least have the following sections:
    - o Who?

- o When?
- o Where? and
- o What?

- They must often be validated through other sources

Once the pertinent CWF and information sources are identified, each CWF must be associated to specific information sources and each source to a specific procedure to exploit it using specific tools and services. For example:

- CWF: SEO practices that can be restricted. Information source: Google homepage. Tool: Monitor changes.
- CWF: What products and services do our competitors offer? Information source: Competing company's homepage. Tool: Monitor changes, adding agent.
- CWF: What nuances are there in terms of Google's Page Rank? Information source: Specialized weblogs. Tool: Data mining.
- CWF: What incoming links do our competitors have? Information source: Search engines. Tool: Search engines.

6. INFORMATION ANALYSIS

To make decisions, it is not enough to just have proper and accurate information. It must be evaluated and analyzed to select which elements are most pertinent. It is useless to obtain large amounts of data if one is unable to process it for further use.

The final result of a TW process is a report providing quality data and information which has been evaluated and which is relevant for making the specific decision.

As we have indicated, the specific procedure to write-up this report is:

- Identify the information need;
- Define the critical watch factors (CWF) relative to this need;
- Define the information source for each CWF;
- Choose the correct tool to systematize the information capturing for each CWF;
- Install and / or configure the tool according to the CWF requirements;
- Execute the tool and obtain the information;
- Valuate the information obtained;
- Intellectual processing of the valuated information: comparison, understanding it; to
- Finally write the report.

This is the theoretical procedure. The actual practice could be different because of the following:

- A final report is not always necessary. Often, the company's dynamic makes them unnecessary for final report status since decisions must be made quickly or because the information obtained is insufficiently clear, and is not worth the resources to write up the report.
- The previously described phases are not executed completely or they do not follow the indicated sequential order. For example, defining the CWF before specifying the information need, relative to the data obtained and its processing, new CWF can be detected that are incorporated into the system. The use of tools can also be expanded by changing the configuration of services already used or by incorporating new computer programs.
- For TW to be effective and profitable, a flexible design is required that allows for the constant recreation of each of the phases, without losing control of the process or information obtained.
- Even though there are few CWF, it is easy for a large amount of information to be generated quickly. Access to this information must be easy and flexible. The solution would be to create a repository of all of the useful TW information, applying the following guidelines:
    - o All of the encoded information in a homogeneous format (HTML, PDF…)
    - o Accessible through an information retrieval system, like a classic search engine, a desktop search engine or a document database.

In this context, three specific moments must be distinguished:

- Periodic review of the information in alerts, adders, RSS channels, monitors, search engines, databases, and so on.
- Store the information in a repository.
- Exploit the repository to make decisions and improve the system itself.

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Annex 5: Grasp, Inc
Case Study

Note: In order to prepare for the Learning Plan Methodology exercise for which this case will be used, the trainer may wish to recommend that trainees review the appropriate abridged case study depending on the amount of time available (annex 6 is a 8 page summary and annex 4 is a 4 page summary). Also table with the Learning Plan Methodology template is provided as annex 8.

GRASP, Inc.

David Baker Wood III Class of 1996 prepared this case under the direction of Professor Mark P. Rice as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Professor Mark P. Rice revised the case and created an abridged version in 2009.

Introduction

"Things are going great," thought John Cerveny, Director of Marketing for GRASP, Inc. "We have just finalized our last funding round, Randy Field should be starting next week as our new salesperson, and the new location in the Rensselaer Tech Park is perfect. All we need to do now is close a few of the sales we have on the table and we will be on our way."

[John Cerveny, Director of Marketing for GRASP, Inc.]

Cerveny had begun his association with GRASP during his final semester of a Masters of Business Administration at Rensselaer Polytechnic Institute through work on a term project for technical marketing class. Cerveny, as a member of a team of three students, developed a sales and marketing plan for the fledgling Company. During the crafting of the plan, Cerveny became aware of the potential the robot GRASP was developing; its low cost, high accuracy design was sure to be a winner with industry.

The first two years had been quite exhilarating. Sales were slow to come, but more companies than Cerveny could contact continued to show interest in GRASP's product, a robotic arm with a patented three-pronged hand (end effector). The end effector, which contained a variable gripper to handle small parts on an assembly line, enabled manufacturers to achieve high precision placement of components on an assembly line at a reasonable cost. Though the GRASP robot was not suitable for every assembly task because of the limitations of the end effector, where appropriate, few other devices could surpass the GRASP robot's performance.

Product

The GRASP robot is a low cost, high precision assembly robot which is highly repeatable as well as easy to use and maintain. CLAMP (closed loop assembly micropositioner) is an end effector (end-of-arm tool) mounted on the GRASP robot. The robot's manipulator (arm, links and joints) executes large-motion commands, and the CLAMP end effector (which is in effect a small robot) executes the fine positioning motions needed to bring the robot into position to pick up (dock with) the work-piece and perform the appropriate manufacturing tasks.

With CLAMP, the manipulator becomes simply a transfer device to move the end effector from docking site to docking site. Manipulator accuracy, traditionally a large problem and thus expense for other robots, is no longer a strict requirement, and the manipulator's components can be configured and sized to large, gross motions. Fine-positioning accuracy is handled by the end effector. Because the motions of the end effector come from small moment arms, it is easier to keep to tighter tolerances and meet the required accuracy.

CLAMP is constructed from off-the-shelf components, and is controlled by an IBM PC/AT computer using a three-axis motion control card. The CLAMP end effector is connected to a mounting plate by a compliant coupling, which allows for limited 3-D translations and rotation. The mounting plate is in turn attached to the robot.

When the CLAMP end effector docks with the worktable, it forces two conical tips on its locating legs into conical and wedge locating receptacles on the worktable's surface, until they are seated. A third locating leg, which is a conical tip with a flattened nose, is forced to rest against a flat surface on the worktable. The three legs fix CLAMP in 3-D space.

Players

Steve Derby, President and CEO

Derby, an associate professor at Rensselaer Polytechnic Institute in the Mechanical Engineering Department specializing in Robotics, founded GRASP at the age of 33. Derby had received his B.S., M.S. and Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute. Derby's calculating and professorial nature provided thoughtful direction for the growing company.

Derby's first foray into entrepreneurship in 1982 had been a software robot teaching tool which was developed as part of his doctoral studies. This software enabled students to experiment with robots without the cost associated with maintaining a physical robot. Derby called this product GRASP also, and even though his main focus was obtaining a Ph.D., he was able to sell a small number of copies of his software program.

John Cerveny, Director of marketing

Cerveny, an engaging, charismatic individual, joined GRASP at the age of 26 after finishing his Master of Business Administration at Rensselaer Polytechnic Institute (RPI) with a concentration in Technical Marketing. He had also received a Bachelors of Science in Industrial Engineering from RPI four years previously. Before and during his MBA studies, Cerveny worked as the Executive Director of the Independent Student Coalition, a New York State lobby organization focused on promoting the interests of the 200,000 students attending non-profit, non-state administered institutions of higher learning in New York State.

Cerveny had quickly agreed to join GRASP when the offer was presented to him by Derby. Developing the plan to market the GRASP robot had been an intellectually challenging exercise, but he knew that the real work was in the implementation of the plan. He felt the opportunity would allow him to further develop the marketing and management skills he had obtained through his previous position.

John McCarthy, Engineer

McCarthy, a talented, hard working mechanical engineer, was the first employee of GRASP. His knowledge of both robotics, learned as a graduate student under Derby; and machining, developed while working in his father's machine shop, provided the foundation for the development of the GRASP robot. McCarthy was also a graduate of Rensselaer Polytechnic Institute, obtaining a Bachelors of Science in 1987 and a Masters of Science in 1988 both in Mechanical Engineering.

Derby had little concern for McCarthy's lack of work experience. McCarthy had grown up working in his father's machine shop, enabling him to have an in depth knowledge of machining and the electronics associated with machine design. Further, Derby was aware that McCarthy had financed part of his college through buying, fixing up, and selling Ford Escorts. Derby felt that McCarthy's structured learning during his M.S., unstructured knowledge of machining, and his demonstrated entrepreneurial flair made him the perfect employee for Derby's start-up venture.

Albert Santos, Software Engineer

Santos, a talented, quiet software designer, was the final member of the original team. Santos, 26 years old, brought to the team not only a talent for software design, but two years experience in the robotics industry as a programmer for a large automation systems integrator. Derby first met Santos during his graduate studies at Rensselaer Polytechnic Institute in Computer Science, which he completed one year after graduating with a B.S. from Rensselaer. Derby reconnected with Santos during the summer of 1989 in a chance meeting, which led to the talented programmer joining the GRASP team.

Santos' flair for developing solid, user friendly programs helped the company develop the reputation of having simple, easy to use software. Once after overhearing Cerveny and McCarthy speaking about the benefits a demo disk would provide in the Company's sales effort, which they estimated would take months to develop, Santos quietly went to work developing the software. Working late into the night, Santos delivered the product to Cerveny the following morning. "His skill is only matched by his work ethic. I hadn't even asked him to estimate the time it would take to develop a demo, and there it was on my desk in the morning," remembered Cerveny.

Randy Field, Director of Sales

Field, an outgoing, energetic salesperson, was introduced to the company by a "cold call" from an executive recruiter early in 1991. With over ten years experience as a sales manager of a large industrial automation wholesaler, Field provided the sales management skills GRASP required to establish a significant sales pipeline. Though his previous experience centered on selling components for robotic systems, Field stated he was confident that he could adapt his skills to the new product line.

Development Phase: 1987-1988

The Art

The idea for the three prong end effector came to Derby while mowing his lawn during the summer of 1987. "It just came to me, wham," he often remarked. Designs like the one he envisioned had been effectively used in other machine applications, but no one, until Derby, realized the advantages of coupling the technology with robotics.

Derby submitted the idea to the Patent and Intellectual Properties Department at Rensselaer. Rensselaer, like most other universities, maintains the first right to patent any technology generated by members of the faculty, since the institution supplies funding for research through overhead and salaries of researchers. With the GRASP end effector, Derby argued that Rensselaer was not entitled to rights to the art, since it had not been generated while he was working and it was not related to his current funded research. Rensselaer accepted Derby's argument and decided to forego its rights to the technology.

Financing

With Rensselaer's decision not to pursue the patent process, Derby individually filed his patent and began developing a plan to produce the first prototype of his envisioned robot. Derby's first efforts to secure financing for a prototype of the robot were successful. Given the patentability of his design and widely reported corporate interest in robotics, Derby was able to easily attract friends and family to invest in a prototype. Over the next few months, almost $225,000 was raised to form the company.

Derby was especially happy to be able to fund the company using investment from friends and family. This enabled Derby to share the economic return GRASP would bring among people that he cared about, and he wouldn't have to worry about attracting outside investors to finance the project. Several of the larger investors, including a friend who had experience running a large, growing construction business, were interested in serving as members of the Board of Directors. As a result, Derby did not have to waste time looking for people to fill board seats.

Developing the Team

With financing in hand, Derby approached McCarthy to implement his end effector on a simple robotic arm. Creating the first prototype took McCarthy most of the summer and fall of 1988. While McCarthy constructed the robot, Derby worked to get a better understanding of the commercial potential of the robot. His knowledge of the industry told him that his robot was timely, given the tremendous growth expected in the assembly marketplace, but he wanted to try and quantify demand. He accomplished this through the use of a simple questionnaire, mailed to over 200 former students and professional contacts which described the robot and its functionality, asked whether the respondent's company would be interested in such a device and, if yes, asked approximately how many units the respondent's organization would be likely to purchase. Response was quite positive. Over 60 people returned the questionnaire, of which 37 felt their organization would buy over 50 robots of the type described.

Given the high level of potential orders shown by the respondents of the survey, Derby felt certain that the economic opportunity for his device was quite strong. Based upon this information, Derby leased space in Rensselaer's business incubator, and took a one semester sabbatical to directly oversee the initial growth of the company.

Realizing that he did not have the training to develop an effective marketing plan for GRASP, Derby solicited help from Rensselaer's School of Management, leading ultimately to Cerveny's involvement in the company. Cerveny, along with two other students, developed the marketing plan for GRASP as part of team project for one of their classes. Their research found that there was currently no supplier in the robot industry with the ability to provide highly flexible robots at low cost to the highly diverse and fragmented end-user markets.

Derby was impressed by Cerveny's intellect, maturity and enthusiasm for the GRASP robot. Further he realized that he would not be able to continue teaching and actively marketing the robot, so he decided to hire Cerveny as the Company's Director of Marketing and Sales. When presented with the opportunity to join GRASP during the spring of 1989, Cerveny quickly accepted.

The final member of the team joined the company a few months after Cerveny. Santos was working as a programmer for a large systems integrator, a firm that specialized in designing, constructing, and servicing work cells for production robots. Having worked with Santos during his master's thesis on robotic programming, Derby knew that Santos was a top notch programmer who could design and develop the software program that would be needed to control the GRASP robot in a production setting. After meeting with the whole team, Santos was impressed with both the product and the people, leading him to join GRASP during the final months of Derby's sabbatical.

Initial Marking: 1989 - 1990

Transition

With his team in place, Derby returned to his full-time job as a professor at Rensselaer, working for GRASP 20% of the time. The team would continue to work on developing and marketing the robot. Derby wasn't sure when he would return full-time to the business, but he was convinced from his experience with the company during his nine month sabbatical that he could manage the company while maintaining his associate professorship.

Derby's transition to a full-time academic and part-time CEO was facilitated by Cerveny. Cerveny was a natural born leader with a business skill set developed at Rensselaer, enabling him to take over the day to day functions of the business. Derby was pleased that Cerveny was willing to step in and help the company with day to day administration, without Derby having to direct him to do so.

Cerveny was aware that Derby planned to return to teaching and welcomed the opportunity to try out the new skills he had acquired in his MBA Program. Administration was cutting into some of his time as the Director of Marketing, but with Cerveny filling in for Derby, GRASP would not have to increase the personnel costs.

Marketing

Though Cerveny spent some time dealing with management tasks, his main focus was sales and marketing. His market research showed that there was great potential, but limited awareness of the GRASP robot and its unique end effector among potential customers. Developing product and brand identity would be his primary task.

Besides press releases and demonstrations to corporate officers and government officials who visited Rensselaer, Cerveny felt that participation in major trade shows would create awareness and stimulate demand for the robot. However, he was also aware that they did not have the resources to maintain a major presence at any of the trade shows.

Cerveny remembers: "We decided that we need to find a unique way to demonstrate the abilities of the CLAMP to provide precise positioning for a given assembly task. It was easy to come up with a task that the robot could accomplish better than other robots, but one that would create flash at a trade show initially eluded us. Finally, we thought about tasks that any two year old could do, but a robot couldn't. That led us to developing a work cell that stacked two Legos[tm] - one on top of the other. Any child could do this, but standard robots were incapable of it.

"It was a great hit. We handed out over 1700 bright yellow blocks imprinted with our name and phone number at the first show and generated over 100 leads. Over the next three months I followed up on the leads, and we developed several prospects, including a large automotive manufacturer. They had an assembly task for which our GRASP robot and CLAMP end effector were perfectly suited. It involved placing a steel plate within a cylinder at very tight tolerances. The task was very time consuming for humans, and other robots were unable to accomplish it at all. We are still working on the sale today, though; the automotive manufacturer who is interested in purchasing our system has a very long development cycle."

"Given the response from the automotive manufacturer, we decided to attend an automotive robotics trade show in the spring of 1990. Here we used the same Lego demo and interest was again high. I again worked to qualify the leads and arrange product demonstrations, but it became increasingly obvious that, without help, I couldn't follow up on all the leads we were generating from the trade shows. During the summer of 1990, I got a call from a head-hunter who said he had an experienced robotics sales manager who was looking for employment. After several discussions with Steve Derby, we decided to make Randy Field an offer. I think Randy will bring the industry knowledge and the experience we need to close some of these leads."

Technical Advances

McCarthy continued to refine the end effector and the control systems of the robot. One issue that had been raised during the trade shows was that the motors used in the end effector, stepper motors, were not favored by end users. End users preferred servo motors, a newer but functionally similar technology. So McCarthy redesigned the robot to allow for the use of servo motors, increasing the production costs by $10,000, but the redesign did not create any engineering difficulties. By the summer of 1990, McCarthy and Derby were happy with the GRASP robot and CLAMP end effector enough that they felt that the prototype was complete. Design and manufacturing of a production model began soon after.

Moving to the Next Level

With the increased staffing, the current office space at Rensselaer's Incubator Centre on campus began to look quite small and unprofessional. Derby and the GRASP Board of Directors decided that the company should make the move out of the Incubator and into the Rensselaer Technology Park. With the new offices, higher staffing levels and increasing marketing budgets, management decided that it was time to raise an additional $600,000 to get the company to break-even. The search for more capital began with the largest initial investor committing to an additional $200,000 in financing.

Looking Forward

Cerveny moved forward in his chair and paused briefly. "Everything is in place. We have financing; we have someone to follow up on all these leads; we have a new, more professional office in the Tech Park. We have all the components that we need to build our success.

"With the replacement of the stepper motor, technically, the product is shaping up just great. Really, the stepper motor was not even a true technical issue. The stepper and servo motors function in exactly the same way. Steve and John just weren't familiar enough with the market then to understand that end users prefer servo motors.

"From a marketing standpoint, I couldn't be more pleased that the Board has decided to allow the additional expense of a salesperson. Field should be a great addition to the team. Not only is he the other person I need to fully cover this diverse market, but his industry contacts can help us speed up the sales cycle. It's funny. I never really thought of the sales cycle as being an issue for our product. From the initial contacts with all the companies that have seen the robot, I assumed that we would have sales by now, but these manufacturers just are not moving as fast as we hoped. I hate to throw out a number, but I think the sales cycle could be as long as twelve month - not that we will really know until we sell one, but all in due time.

"Generally, the business is doing fine. With the planned infusion of capital, we should be able to make it to well past break-even. I do get concerned about our new level of expenses related to the move to the Rensselaer Technology Park and the addition of a high-powered salesperson, but we all know that it is time to act."

John settled back in his chair. "Clearly it is time to perform. We have all the pieces falling into place. I know that I am not officially running the show," he winked, "but still I wonder what I need to do to get us performing at the high level that will drive our success."

Annex 6: Grasp, Inc Case Study Abridged

(8 Pages)

Introduction

> *"Things are going great," thought John Cerveny, Director of Marketing for GRASP, Inc. "We have just finalized our last funding round, Randy Field should be starting next week as our new salesperson, and the new location in the Rensselaer Tech Park is perfect. All we need to do now is close a few of the sales we have on the table and we will be on our way."*
>
> *[John Cerveny, Director of Marketing for GRASP, Inc.]*

Cerveny had begun his association with GRASP during his final semester of a Masters of Business Administration at Rensselaer Polytechnic Institute through work on a term project for technical marketing class. Cerveny, as a member of a team of three students, developed a sales and marketing plan for the fledgling Company. During the crafting of the plan, Cerveny became aware of the potential the robot GRASP was developing; its low cost, high accuracy design was sure to be a winner with industry.

The first two years had been quite exhilarating. Sales were slow to come, but more companies than Cerveny could contact continued to show interest in GRASP's product, a robotic arm with a patented three-pronged hand (end effector). The end effector, which contained a variable gripper to handle small parts on an assembly line, enabled manufacturers to achieve high precision placement of components on an assembly line at a reasonable cost. Though the GRASP robot was not suitable for every assembly task because of the limitations of the end effector, where appropriate, few other devices could surpass the GRASP robot's performance.

Product

The GRASP robot is a low cost, high precision assembly robot which is highly repeatable as well as easy to use and maintain. CLAMP (closed loop assembly micropositioner) is an end effector (end-of-arm tool) mounted on the GRASP robot. The robot's manipulator (arm, links and joints) executes large-motion commands, and the CLAMP end effector (which is in effect a small robot) executes the fine positioning motions needed to bring the robot into position to pick up (dock with) the work-piece and perform the appropriate manufacturing tasks.

With CLAMP, the manipulator becomes simply a transfer device to move the end effector from docking site to docking site. Manipulator accuracy, traditionally a large problem and thus expense for other robots, is no longer a strict requirement, and the manipulator's components can be configured and sized to large, gross motions. Fine-positioning accuracy is handled by the end effector. Because the motions of the end effector come from small moment arms, it is easier to keep to tighter tolerances and meet the required accuracy.

CLAMP is constructed from off-the-shelf components, and is controlled by an IBM PC/AT computer using a three-axis motion control card. The CLAMP end effector is connected to a mounting plate by a compliant coupling, which allows for limited 3-D translations and rotation. The mounting plate is in turn attached to the robot.

When the CLAMP end effector docks with the worktable, it forces two conical tips on its locating legs into conical and wedge locating receptacles on the worktable's surface, until they are seated. A third locating leg, which is a conical tip with a flattened nose, is forced to rest against a flat surface on the worktable. The three legs fix CLAMP in 3-D space.

Players

Steve Derby, President and CEO

Derby, an associate professor at Rensselaer Polytechnic Institute in the Mechanical Engineering Department specializing in Robotics, founded GRASP at the age of 33. Derby had received his B.S., M.S. and Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute. Derby's calculating and professorial nature provided thoughtful direction for the growing company.

Derby's first foray into entrepreneurship in 1982 had been a software robot teaching tool which was developed as part of his doctoral studies. This software enabled students to experiment with robots without the cost associated with maintaining a physical robot. Derby called this product GRASP also, and even though his main focus was obtaining a Ph.D., he was able to sell a small number of copies of his software program.

John Cerveny, Director of marketing

Cerveny, an engaging, charismatic individual, joined GRASP at the age of 26 after finishing his Master of Business Administration at Rensselaer Polytechnic Institute (RPI) with a concentration in Technical Marketing. He had also received a Bachelors of Science in Industrial Engineering from RPI four years previously. Before and during his MBA studies, Cerveny worked as the Executive Director of the Independent Student Coalition, a New York State lobby organization focused on promoting the interests of the 200,000 students attending non-profit, non-state administered institutions of higher learning in New York State.

Cerveny had quickly agreed to join GRASP when the offer was presented to him by Derby. Developing the plan to market the GRASP robot had been an intellectually challenging exercise, but he knew that the real work was in the implementation of the plan. He felt the opportunity would allow him to further develop the marketing and management skills he had obtained through his previous position.

John McCarthy, Engineer

McCarthy, a talented, hard working mechanical engineer, was the first employee of GRASP. His knowledge of both robotics, learned as a graduate student under Derby; and machining, developed while working in his father's machine shop, provided the foundation for the development of the GRASP robot. McCarthy was also a graduate of Rensselaer Polytechnic Institute, obtaining a Bachelors of Science in 1987 and a Masters of Science in 1988 both in Mechanical Engineering.

Derby had little concern for McCarthy's lack of work experience. McCarthy had grown up working in his father's machine shop, enabling him to have an in depth knowledge of machining and the electronics associated with machine design. Further, Derby was aware that McCarthy had financed part of his college through buying, fixing up, and selling Ford Escorts. Derby felt that McCarthy's structured learning during his M.S., unstructured knowledge of machining, and his demonstrated entrepreneurial flair made him the perfect employee for Derby's start-up venture.

Albert Santos, Software Engineer

Santos, a talented, quiet software designer, was the final member of the original team. Santos, 26 years old, brought to the team not only a talent for software design, but two years experience in the robotics industry as a programmer for a large automation systems integrator. Derby first met Santos during his graduate studies at Rensselaer Polytechnic Institute in Computer Science, which he completed one year after graduating with a B.S. from Rensselaer. Derby reconnected with Santos during the summer of 1989 in a chance meeting, which led to the talented programmer joining the GRASP team.

Santos' flair for developing solid, user friendly programs helped the company develop the reputation of having simple, easy to use software. Once after overhearing Cerveny and McCarthy speaking about the benefits a demo disk would provide in the Company's sales effort, which they estimated would take months to develop, Santos quietly went to work developing the software. Working late into the night, Santos delivered the product to Cerveny the following morning. "His skill is only matched by his work ethic. I hadn't even asked him to estimate the time it would take to develop a demo, and there it was on my desk in the morning," remembered Cerveny.

Randy Field, Director of Sales

Field, an outgoing, energetic salesperson, was introduced to the company by a "cold call" from an executive recruiter early in 1991. With over ten years experience as a sales manager of a large industrial automation wholesaler, Field provided the sales management skills GRASP required to establish a significant sales pipeline. Though his previous experience centered on selling components for robotic systems, Field stated he was confident that he could adapt his skills to the new product line.

Development Phase 1987-1988

The Art

The idea for the three prong end effector came to Derby while mowing his lawn during the summer of 1987. "It just came to me, wham," he often remarked. Designs like the one he envisioned had been effectively used in other machine applications, but no one, until Derby, realized the advantages of coupling the technology with robotics.

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Developing the Team

With financing in hand, Derby approached McCarthy to implement his end effector on a simple robotic arm. Creating the first prototype took McCarthy most of the summer and fall of 1988. While McCarthy constructed the robot, Derby worked to get a better understanding of the commercial potential of the robot. His knowledge of the industry told him that his robot was timely, given the tremendous growth expected in the assembly marketplace, but he wanted to try and quantify demand. He accomplished this through the use of a simple questionnaire, mailed to over 200 former students and professional contacts which described the robot and its functionality, asked whether the respondent's company would be interested in such a device and, if yes, asked approximately how many units the respondent's organization would be likely to purchase. Response was quite positive. Over 60 people returning the questionnaire, of which 37 felt their organization would buy over 50 robots of the type described.

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Initial Marking 1989 - 1990

Transition

With his team in place, Derby returned to his full-time job as a professor at Rensselaer, working for GRASP 20% of the time. The team would continue to work on developing and marketing the robot. Derby wasn't sure when he would return full-time to the business, but he was convinced from his experience with the company during his nine month sabbatical that he could manage the company while maintaining his associate professorship.

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Cerveny was aware that Derby planned to return to teaching and welcomed the opportunity to try out the new skills he had acquired in his MBA Program. Administration was cutting into some of his time as the Director of Marketing, but with Cerveny filling in for Derby, GRASP would not have to increase the personnel costs.

Marketing

Though Cerveny spent some time dealing with management tasks, his main focus was sales and marketing. His market research showed that there was great potential, but limited awareness of the GRASP robot and its unique end effector among potential customers. Developing product and brand identity would be his primary task.

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Cerveny remembers: "We decided that we need to find a unique way to demonstrate the abilities of the CLAMP to provide precise positioning for a given assembly task. It was easy to come up with a task that the robot could accomplish better than other robots, but one that would create flash at a trade show initially eluded us. Finally, we thought about tasks that any two year old could do, but a robot couldn't. That led us to developing a work cell that stacked two Legostm - one on top of the other. Any child could do this, but standard robots were incapable of it.

"It was a great hit. We handed out over 1700 bright yellow blocks imprinted with our name and phone number at the first show and generated over 100 leads. Over the next three months I followed up on the leads, and we developed several prospects, including a large automotive manufacturer. They had an assembly task for which our GRASP robot and CLAMP end effector were perfectly suited. It involved placing a steel plate within a cylinder at very tight tolerances. The task was very time consuming for humans, and other robots were unable to accomplish it at all. We are still working on the sale today, though; the automotive manufacturer who is interested in purchasing our system has a very long development cycle."

"Given the response from the automotive manufacturer, we decided to attend an automotive robotics trade show in the spring of 1990. Here we used the same Lego demo and interest was again high. I again worked to qualify the leads and arrange product demonstrations, but it became increasingly obvious that, without help, I couldn't follow up on all the leads we were generating from the trade shows. During the summer of 1990, I got a call from a headhunter who said he had an experienced robotics sales manager who was looking for employment. After several discussions with Steve Derby, we decided to make Randy Field an offer. I think Randy will bring the industry knowledge and the experience we need to close some of these leads."

Technical Advances

McCarthy continued to refine the end effector and the control systems of the robot. One issue that had been raised during the trade shows was that the motors used in the end effector, stepper motors, were not favored by end users. End users preferred servo motors, a newer but functionally similar technology. So McCarthy redesigned the robot to allow for the use of servo motors, increasing the production costs by $10,000, but the redesign did not create any engineering difficulties. By the summer of 1990, McCarthy and Derby were happy with the GRASP robot and CLAMP end effector enough that they felt that the prototype was complete. Design and manufacturing of a production model began soon after.

Moving to the Next Level

With the increased staffing, the current office space at Rensselaer's Incubator Center on campus began to look quite small and unprofessional. Derby and the GRASP Board of Directors decided that the company should make the move out of the Incubator and into the Rensselaer Technology Park. With the new offices, higher staffing levels and increasing marketing budgets, management decided that it was time to raise an additional $600,000 to get the company to break-even. The search for more capital began with the largest initial investor committing to an additional $200,000 in financing.

Looking Forward

Cerveny moved forward in his chair and paused briefly. “Everything is in place. We have financing; we have someone to follow up on all these leads; we have a new, more professional office in the Tech Park. We have all the components that we need to build our success.

“With the replacement of the stepper motor, technically, the product is shaping up just great. Really, the stepper motor was not even a true technical issue. The stepper and servo motors function in exactly the same way. Steve and John just weren’t familiar enough with the market then to understand that end users prefer servo motors.

“From a marketing standpoint, I couldn’t be more pleased that the Board has decided to allow the additional expense of a salesperson. Field should be a great addition to the team. Not only is he the other person I need to fully cover this diverse market, but his industry contacts can help us speed up the sales cycle. It’s funny. I never really thought of the sales cycle as being an issue for our product. From the initial contacts with all the companies that have seen the robot, I assumed that we would have sales by now, but these manufacturers just are not moving as fast as we hoped. I hate to throw out a number, but I think the sales cycle could be as long as twelve month -- not that we will really know until we sell one, but all in due time.

“Generally, the business is doing fine. With the planned infusion of capital, we should be able to make it to well past break-even. I do get concerned about our new level of expenses related to the move to the Rensselaer Technology Park and the addition of a high-powered salesperson, but we all know that it is time to act.”

John settled back in his chair. “Clearly it is time to perform. We have all the pieces falling into place. I know that I am not officially running the show,” he acknowledged, “but still I wonder what I need to do to get us performing.

Annex 7: Grasp, Inc Case Study Abridged

(4 Pages)

Introduction

> *"Things are going great," thought John Cerveny, Director of Marketing for GRASP, Inc. "We have just finalized our last funding round, Randy Field should be starting next week as our new salesperson, and the new location in the Rensselaer Tech Park is perfect. All we need to do now is close a few of the sales we have on the table and we will be on our way."*
>
> *[John Cerveny, Director of Marketing for GRASP, Inc.]*

The GRASP robot is a low cost, high precision assembly robot. The CLAMP (closed loop assembly micro-positioner) is essentially the hand on the end of the robot arm. The robot arm executes large-motion commands, and the robot hand executes the fine positioning motions needed to pick up the work-piece and perform the appropriate manufacturing tasks.

Steve Derby, an associate professor who specialized in robotics at Rensselaer Polytechnic Institute (RPI) in the Mechanical Engineering Department, founded GRASP at the age of 33. Derby had received his B.S., M.S. and Ph.D. in Mechanical Engineering from RPI. Derby's first foray into entrepreneurship had been developing a software robot teaching tool, which enabled students to experiment with robots without the cost associated with maintaining a physical robot.

John Cerveny, during his final semester of the MBA Program at Rensselaer Polytechnic Institute had been a member of a three-person team in a technical marketing class that developed a sales and marketing plan for GRASP. Cerveny, an engaging, charismatic individual, joined GRASP at the age of 26 after finishing his MBA with a concentration in Technical Marketing. He had also received a Bachelors of Science in Industrial Engineering from RPI four years previously. Before and during his MBA studies, Cerveny worked as the Executive Director of the Independent Student Coalition, a New York State lobby organization focused on promoting the interests of the 200,000 students attending private universities.

John McCarthy, a talented, hard working mechanical engineer, was the first employee of GRASP. His knowledge of both robotics (learned as a graduate student under Derby) and machining (developed while working in his father's machine shop) provided the foundation for the development of the GRASP robot. McCarthy was also a graduate of RPI, earning a Bachelors of Science in 1987 and a Masters of Science degree in 1988 -- both in Mechanical Engineering.

Albert Santos, a talented software designer, was the final member of the original team. Santos, 26 years old, previously had spent two years in the robotics industry as a programmer for a large automation systems integrator. Derby first met Santos during his graduate studies at RPI in Computer Science, which he completed one year after graduating with a B.S. from Rensselaer. Santos' skill in developing solid, user friendly software programs helped the company develop the reputation of having simple, easy to use software.

Randy Field, an outgoing, energetic salesperson, was introduced to the company by a "cold call" from an executive recruiter early in 1991. Field had over ten years experience as a sales manager of a large industrial automation wholesaler, and GRASP hoped that he could provide the sales management skills required to establish a significant sales pipeline. Though his previous experience centered on selling components for robotic systems, Field was confident that he could adapt his skills to the new product line.

The idea for the three prong end effector came to Derby while mowing his lawn during the summer of 1987. "It just came to me – like a bolt of lightning," he remarked. Designs like the one he envisioned had been effectively used in other machine applications, but no one, until Derby, realized the advantages of coupling the technology with robotics. Derby submitted the idea to the RPI's Patent and Intellectual Property Office. He argued that RPI was not entitled to rights to the art, since the idea had not been generated while he was working at RPI and it was not related to his currently funded research. Rensselaer agreed, and allowed him to patent the technology at his own expense.

Derby's first efforts to secure financing for a prototype of the robot were successful. Given the patentability of his design and widely reported corporate interest in robotics, Derby was able to easily attract friends and family to invest in a prototype. Over the next few months, almost $225,000 was raised to form the company. Several of the investors, including one who managed a large and growing construction business, agreed to serve as members of the Board of Directors. As a result, Derby did not have to waste time looking for people to fill board seats.
Derby's knowledge of the industry led him to believe that his robot was timely, given the projected growth of the component assembly market, but he wanted to try and quantify demand. He mailed out a simple questionnaire to over 200 former students and professional contacts. In the questionnaire he described the robot and its functionality, and asked whether the respondent's company would be interested in such a device. Over 60 people returned the questionnaire, and 37 felt their organization would buy over 50 robots of the type described. Based upon this information, Derby leased space in RPI's business incubator, and took a one semester sabbatical to directly oversee the initial growth of the company.

Once he had his team in place, Derby returned to his full-time job as a professor at Rensselaer. He continued to work for GRASP 20% of the time, and under his part-time direction, the team continued to work on developing and marketing the robot. Derby wasn't sure when he would return full-time to the business, but he was convinced that he could manage the company while maintaining his associate professorship.

Though Cerveny spent some time dealing with management tasks, his main focus was sales and marketing. In addition to issuing press releases and conducting demonstrations for corporate officers and government officials who visited Rensselaer, Cerveny participated in major trade shows in order to create awareness and stimulate demand for the robot. After each trade show, Cerveny followed up on the leads. One of his prospects, a large automotive manufacture, had an assembly task for which the GRASP robot and CLAMP end effector were perfectly suited. It involved placing a steel plate within a cylinder at very tight tolerances. The task was very time consuming for humans, and other robots were not precise enough to accomplish it at all. Cerveny continued working on the sale, discovering to his frustration that the automotive manufacturer who was interested in purchasing the system had a very long development cycle.

Cerveny was concerned that he was unable to follow up on all the leads that the company was generating from the trade shows. During the summer of 1990, he received a phone call from a head-hunter who said he had an experienced robotics sales manager, Randy Field, who was looking for a new position. After some discussion, the GRASP team decided to make Randy Field an offer.

With the increased staffing, the current office space at Rensselaer's Incubator Center on campus began to look quite small and unprofessional. Derby and the GRASP Board of Directors decided that the company should make the move out of the Incubator and into the Rensselaer Technology Park. With the new offices, higher staffing levels and increasing marketing budgets, management decided that it was time to raise an additional $600,000 to get the company to break-even. The search for more capital began with the largest initial investor tentatively committing to an additional $200,000 in financing.

Looking Forward

John Cerveny reflected on the company's progress.

"Everything is in place. We are about to close on our next round of financing; we now have Randy Field to follow up on all these leads; and we have a new, more professional office in the Tech Park. Technically, the product is shaping up just great. It seems like we have all the components that we need to build our success. However I must admit that I never really thought that the long sales cycle would be an issue. From the initial contacts with all the companies that have seen the robot, I assumed that we would have sales by now, but these manufacturers just are not moving as fast as we hoped. I'm beginning to think that the sales cycle could be as long as twelve months -- not that we will really know until we sell one. However, with the planned infusion of capital, we should be able to make it to break-even. I do get concerned about our new level of expenses related to the move to the Rensselaer Technology Park and the addition of a high-powered salesperson, but we all know that it is time to act."

Annex 8: Learning Plan Methodology Table

CATEGORY: **TECHNOLOGY / PRODUCT / SERVICE**					
Key TECHNOLOGY / PRODUCT / SERVICE Known that Define the Opportunity	**Description of Key TECHNOLOGY / PRODUCT / SERVICE Known**				
TECHNOLOGY / PRODUCT / SERVICE Uncertainties	Description of TECHNOLOGY / PRODUCT / SERVICE Uncertainties	Priority	Assumptions	Proposed Tests / Actions: Include as appropriate the measurement criteria; tasks; resources needed; timetable; and assignments for each test.	Status -- including outcomes of Learning Loop Evaluation process

CATEGORY: MARKET					
Key MARKET Known that Define the Opportunity	**Description of Key MARKET Known**				
MARKET Uncertainties	Description of MARKET Uncertainty	Priority	Assumptions	Proposed Tests / Actions: Include as appropriate the measurement criteria; tasks; resources needed; timetable; and assignments for each test.	Status -- including outcomes of Learning Loop Evaluation process

CATEGORY: RESOURCE					
Key RESOURCE Known	**Description of Key RESOURCE Known**				
RESOURCE Uncertainties	Description of RESOURCE Uncertainty	Priority	Assumptions	Proposed Tests / Actions: Include as appropriate the measurement criteria; tasks; resources needed; timetable; and assignments for each test.	Status -- including outcomes of Learning Loop Evaluation process

CATEGORY: **ORGANISATIONAL**					
Key ORGANISATIONAL Known	**Description of Key ORGANISATIONAL Known**				
ORGANISATIONAL Uncertainties	Description of ORGANISATIONAL Uncertainty	Priority	Assumptions	Proposed Tests / Actions: Include as appropriate the measurement criteria; tasks; resources needed; timetable; and assignments for each test.	Status -- including outcomes of Learning Loop Evaluation process

Annex 9: Teaching Notes For Grasp Case Study

Prepared by Prof. Mark P. Rice (Last revision: January, 30th, 2010).

What are the key issues facing the company?

1. Need for immediate financing.
2. No sales.

Given a few minor reservations, Cerveny is very optimistic about GRASP's prospects. Put yourself in Cerveny's position. How do you assess the situation?

Strengths	Weaknesses
Technical: • They have a working prototype, and it has incorporated changes requested by industry. (Servo versus Stepper motors) • They have a proprietary position.	Technical: • But is the product ready to sell? • But doesn't the patent cover only the end effector. Is there any protection with respect to the robot itself? That's where most of the revenue resides.
Market: • Derby has a network of former students and industry contacts. • Positive feedback from initial market survey. • 1986 market = $590M. • Strong interest	• Is the feedback legitimate? Can anyone in his network make a buying decision? • The assembly robot share of the market is growing, but in 1990 it is still only about $120M. And will GRASP be able to sell assembly robots or end effectors only? What is the size of the end effector market? No info on how fast this market is growing. • In spite of success in generating lots of leads, they still haven't closed their first order and are unsure of the sales cycle.
Financing: • Succeeded in attracting significant startup financing. • Now in the hunt for $600K.	• Did they get too much money too early too easily? What is the value added to the firm of getting friends / family dumb) money? • What will investors in the second round look for? Sales. Management team. They have ramped up expenses and appear to be desperate for cash. Need money this month. Not enough time to develop financing alternatives. Not a good negotiating position. • No evidence that they understand the financial dynamics of their business. They are operating on blind faith that the orders will come and they will make enough money to become profitable.

Strengths	Weaknesses
Management team: • Young, bright mix of technical and business talent. • CEO has useful network. • They have finally hired some professional sales help. Technical team looks like it can invent and do prototype development.	• No start-up experience. Limited work experience. Are they out of their league? • But is it getting him to decision makers. Does the CEO know how to utilize this network to benefit his company? • CEO is part-time. No mature management of day-to-day operations. • CEO has assembled a board of friends and family and the board is not getting the job done for him. • New sales guy is unproven. The latched on to first guy presented to them by a headhunter. They are comfortable with him because he is an engineering type. He hasn't sold these products. Will he be too little too late? • Can the technical team develop a finished product that will satisfy GM? No evidence that they are prepared to go into production.

What should Cerveny do now?

1. Confront Professor Derby. We need a full time, experienced COO.
2. We need sales now. Move beyond responding to sales leads and focus on closing some sales.
3. Establish milestones to test assumptions about the business. Give the company and its investors a reason to continue.
4. Look for alternative ways to generate revenue, e.g. (1) the university market that might purchase the system for robotics laboratories; (2) consulting; (3) partnering with additional companies besides Robot Technologies.
5. Reduce expenses. Get out of the Tech Park and back into the Incubator or into Professor Derby's barn.

Epilogue

GRASP failed to generate any sales and failed to raise additional capital. The company went bankrupt, and the assets were auctioned. The lead investor bought the assets for $10,000. Professor Derby went back full-time to the mechanical engineering faculty, and has continued to be an inventor and entrepreneur. John Cerveny became the director of Marketing for a start-up venture developing fuel cells, and both he and the fuel cell company were successful. The company turned out to be one of the few "spectacular" failures in the history of the Incubator Program. In hindsight, the company did not have adequate senior entrepreneurial leadership; did not have a strong enough board of directors;

did not recognize that good marketing is not the same as effective sales; was unable to identify new markets for its products and services when it's initial target market (the automobile manufacturers) adopted a freeze on capital expenditures because of the economic downturn; and raised initial funding to easily and was unable to raise additional investment.

Annex 10: Standard License Agreement[38]

Notes: (1) Information that must be filled in by the parties to the agreement and will vary from case to case is enclosed in brackets ("[]"). (2) For some sections, the parties will select one or more, but usually not all, of the paragraphs within that section. Where this is the case, there is an instruction in Bold Italics.

This License Agreement (this "Agreement") is made effective as of [date] (the "Effective Date") between [Publisher, - Address of Publisher, City of Publisher, State of Publisher, Country of Publisher Postal Code of Publisher] ("Licensor") and [Licensee, Address of Licensee, City of Licensee, State of Licensee, Country of Licensee Postal Code of Licensee] ("Licensee").

In consideration of the mutual promises contained herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

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[38] Source: http://www.library.yale.edu/~llicense/standlicagree.html

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- Public keys/Certificates. Authorized Users shall be identified and authenticated by means of public-key and X.509 certificates.
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- Implementation of Developing Security Protocols. Licensee and Licensor shall cooperate in the implementation of security and control protocols and procedures as they are developed during the term of this Agreement.

X. TERM

This Agreement shall continue in effect for [length of time]- commencing on the Effective Date.

XI. RENEWAL

This agreement shall be renewable at the end of the current term for a successive [length of time] term unless either party gives written notice of its intention not to renew [time period] before expiration of the current term.

XII. EARLY TERMINATION

In the event that either party believes that the other materially has breached any obligations under this Agreement, or if Licensor believes that Licensee has exceeded the scope of the License, such party shall so notify the breaching party in writing. The breaching party shall have [time period] from the receipt of notice to cure the alleged breach and to notify the non-breaching party in writing that cure has been effected. If the breach is not cured within the [time period], the non-breaching party shall have the right to terminate the Agreement without further notice.

Upon Termination of this Agreement for cause online access to the Licensed Materials by Licensee and Authorized Users shall be terminated. Authorized copies of Licensed Materials may be retained by Licensee or Authorized Users and used subject to the terms of this Agreement.

In the event of early termination permitted by this Agreement, Licensee shall be entitled to a refund of any fees or pro-rata portion thereof paid by Licensee for any remaining period of the Agreement from the date of termination.

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Except for termination for cause, Licensor hereby grants to Licensee a nonexclusive, royalty-free, perpetual license to use any Licensed Materials that were accessible during the term of this Agreement. Such use shall be in accordance with the provisions of this Agreement, which provisions shall survive any termination of this Agreement. The means by which Licensee shall have access to such Licensed Materials shall be in a manner and form substantially equivalent to the means by which access is provided under this Agreement.

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XVI. INDEMNITIES

Each party shall indemnify and hold the other harmless for any losses, claims, damages, awards, penalties, or injuries incurred by any third party, including reasonable attorney's fees, which arise from any alleged breach of such indemnifying party's representations and warranties made under this Agreement, provided that the indemnifying party is promptly notified of any such claims. The indemnifying party shall have the sole right to defend such claims at its own expense. The other party shall provide, at the indemnifying party's expense, such assistance in investigating and defending such claims as the indemnifying party may reasonably request. This indemnity shall survive the termination of this Agreement.

XVII. ASSIGNMENT AND TRANSFER

Neither party may assign, directly or indirectly, all or part of its rights or obligations under this Agreement without the prior written consent of the other party, which consent shall not be unreasonably withheld or delayed.

XVIII. GOVERNING LAW

This Agreement shall be interpreted and construed according to, and governed by, the laws of [Jurisdiction Convenient to All Parties], excluding any such laws that might direct the application of the laws of another jurisdiction. The federal or state courts located in [Jurisdiction Convenient to All Parties] shall have jurisdiction to hear any dispute under this Agreement.

XIX. DISPUTE RESOLUTION

In the event any dispute or controversy arising out of or relating to this Agreement, the parties agree to exercise their best efforts to resolve the dispute as soon as possible. The parties shall, without delay, continue to perform their respective obligations under this Agreement which are not affected by the dispute. (Include all that apply; delete those that do not)

- Mediation. In the event that the parties cannot by exercise of their best efforts resolve the dispute, they shall submit the dispute to Mediation. The parties shall, without delay, continue to perform their respective obligations under this Agreement which are not affected by the dispute. The invoking party shall give to the other party written notice of its decision to do so, including a description of the issues subject to the dispute and a proposed resolution thereof. Designated representatives of both parties shall attempt to resolve the dispute within [time period] after such notice. If those designated representatives cannot resolve the dispute, the parties shall meet at a mutually agreeable location and describe the dispute and their respective proposals for resolution to responsible executives of the disputing parties, who shall act in good faith to resolve the dispute. If the dispute is not resolved within [time period] after such meeting, the dispute shall be submitted to binding arbitration in accordance with the Arbitration provision of this Agreement.

- Arbitration. Any controversies or disputes arising out of or relating to this Agreement shall be resolved by binding arbitration in accordance with the then current Commercial Arbitration Rules of the American Arbitration Association. The parties shall endeavor to select a mutually acceptable arbitrator knowledgeable about issues relating to the subject matter of this Agreement. In the event the parties are unable to agree to such a selection, each party will select an arbitrator and the arbitrators in turn shall select a third arbitrator. The arbitration shall take place at a location that is reasonably centrally located between the parties, or otherwise mutually agreed upon by the parties.

  All documents, materials, and information in the possession of each party that are in any way relevant to the claim(s) or dispute(s) shall be made available to the other party for review and copying no later than [time period] after the notice of arbitration is served. The arbitrator(s) shall not have the authority, power, or right to alter, change, amend, modify, add, or subtract from any provision of this Agreement or to award punitive damages. The arbitrator shall have the power to issue mandatory orders and restraining orders in connection with the arbitration. The award rendered by the arbitrator shall be final and binding on the parties, and judgment may be entered thereon in any court having jurisdiction. The agreement to arbitration shall be specifically enforceable under prevailing arbitration law. During the continuance of any arbitration proceeding, the parties shall continue to perform their respective obligations under this Agreement.

XX. FORCE MAJEURE

Neither party shall be liable in damages or have the right to terminate this Agreement for any delay or default in performing hereunder if such delay or default is caused by conditions beyond its control including, but not limited to Acts of God, Government restrictions (including the denial or cancellation of any export or other necessary license), wars, insurrections and/or any other cause beyond the reasonable control of the party whose performance is affected.

XXI. ENTIRE AGREEMENT

This Agreement constitutes the entire agreement of the parties and supersedes all prior communications, understandings and agreements relating to the subject matter hereof, whether oral or written.

XXII. AMENDMENT

No modification or claimed waiver of any provision of this Agreement shall be valid except by written amendment signed by Authorized representatives of Licensor and Licensee.

XXIII. SEVERABILITY

If any provision or provisions of this Agreement shall be held to be invalid, illegal, unenforceable or in conflict with the law of any jurisdiction, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby.

XXIV. WAIVER OF CONTRACTUAL RIGHT

Waiver of any provision herein shall not be deemed a waiver of any other provision herein, nor shall waiver of any breach of this Agreement be construed as a continuing waiver of other breaches of the same or other provisions of this Agreement.

XXV. NOTICES

All notices given pursuant to this Agreement shall be in writing and may be hand delivered, or shall be deemed received within [time period] after mailing if sent by registered or certified mail, return receipt requested. If any notice is sent by facsimile, confirmation copies must be sent by mail or hand delivery to the specified address. Either party may from time to time change its Notice Address by written notice to the other party.

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City of Licensor
State of Licensor
Country of Licensor
Postal Code of Licensor]

If to Licensee:
[Licensee
Address of Licensee
City of Licensee
State of Licensee
Country of Licensee
Postal Code of Licensee]

IN WITNESS WHEREOF, the parties have executed this Agreement by their respective, duly Authorized representatives as of the date first above written.

LICENSOR:
BY: ____ DATE: ____________________
Signature of Authorized Signatory of Publisher
Print Name:
Title:
Address:
Telephone No.:
E-mail:

LICENSEE:
BY: ____ DATE: _____________________
Signature of Authorized Signatory of Licensee
Print Name:
Title:
Address:
Telephone No.:
E-mail:

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