CASE STUDIES ON INTELLECTUAL PROPERTY:
FROM INNOVATION TO BUSINESS

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CASE STUDY-1

FROM UNIVERSITY TO INDUSTRY:
SUCCESS THROUGH INNOVATIVE RESEARCH AND IP PROTECTION

Name: Borean Pharma A/S
Country / Territory: Denmark
IP right(s): Patents, Trademarks
Date of publication: July 23, 2010
Industry: Pharmaceuticals and Biotechnology

Background

Borean Pharma A/S (Borean) is a private biopharmaceutical and protein engineering company based in Aarhus, Denmark. The company was established with the objective of developing a new generation of pharmaceutical protein products. Borean’s competitive advantage lies in its proprietary technology, which enables it to develop a new generation of highly efficacious protein-based compounds with potential therapeutic applications.

Borean Pharma started as a university spin-off project; the founders of Borean – Hans Christian Thogersen and Michael Etzerodt – developed the technological platform of their science-based company in the Laboratory for Gene Expression at the University of Aarhus. A number of research projects relating to the structure and function of modular proteins were initiated from this laboratory.
In 1993, the founders, in cooperation with Cheminova A/S Denmark, commercialized the first established elements from Borean’s technology platform. Together with Cheminova, they established the first spin-off company, Denzyme ApS, which was later developed and acquired by Cambridge Antibody Technology Ltd., a British firm. In 2001, the founders, their counterpart in Cambridge and the pre/seed-investor NOVI A/S agreed to unite all the elements of the technology platform of Borean Pharma to jointly endeavor to raise venture capital for the establishment of a biotechnological company.

**Research and Development**

Borean has now embarked on a mission to create the next generation of protein-based pharmaceuticals to combat major human diseases. Its scientific research aims at developing therapeutic protein products which may replace or supersede antibody products in pharmaceutical applications. In early 1990s the company came up with a revolutionary idea of folding and unfolding proteins until they take a desired shape that can be used for therapeutic purposes.

Borean is aiming at achieving the optimal utilization of its competitive position through the establishment of selected strategic partnerships with pharmaceutical companies for specific products, which at the outset are expected to be within the cancer therapy area. The new generation of pharmaceutical protein products represents a considerable potential as these products, in the long term, are expected to be the successors of the antibody-based technology that currently constitutes the basis for the majority of the pharmaceutical protein products presently under clinical development.

**Financing**

The Danish Invention Center supported the scientists from 1997 until the actual spin-off in 2001. During this period, the Center provided financial support and guidance on drafting the business plan, gathering
market information and identifying investors. The firm has been backed by an investment syndicate consisting of Forbion Capital Partners, Aravis Venture, BankInvest Biomedical Venture, East-Jutland Innovation, INCUBA Venture and NOVI. Other investors include Cambridge Antibody Technology, Ltd., Aarhus University and the founders themselves. Borean successfully raised venture capital amounting to 10.7 million Euros in 2001, and a total of 5.5 million Euros in a series of equity financing in 2005.

**Patents and Trademarks**

Borean’s initial patent applications were filed with the assistance of the Danish Invention Center, financed by the Danish Ministry of Trade and Industry. The company holds a number of pending patents and international patent applications. It has also filed a patent application with the USPTO. The trademarks of the Borean Pharma word and logo are also protected in many countries including the United States.

**Partnerships**

The management of Borean focuses on strategic partnerships with selected firms for different aspects of its operations, including financing, research and product development. To ensure the optimal utilization of its competitive position, Borean has been seeking partnerships with other pharmaceutical companies, particularly those working in cancer therapy. In 2007, Borean concluded an agreement with Eden Biodesign Ltd., an expert provider of development and manufacturing services for new biopharmaceutical medicines, under which Eden will manufacture MBP-DC-SIGN, a novel therapeutic candidate for the treatment of a range of cancers, for Borean to use in key preclinical studies.

**Business Results**
Borean has established its potential as a strong and reliable player in the global biomedical market within the relatively short history of the company. Borean’s new generation of pharmaceutical protein products possess huge potential and are expected to be the successors of the antibody-based technology that currently constitutes the basis for the majority of pharmaceutical protein products.

Future products of Borean are expected to achieve a strong position in the marketplace, as they represent next-generation products, succeeding many therapeutic antibodies which are facing logistic and commercial barriers such as scarce production capacity, high development and production costs and inherently low design flexibility of the antibody framework. The company believes that it can unleash the true potential of biopharmaceuticals by providing efficacious and cost-effective protein-based antibody analogues.

The sustained growth of the company has been reflected in its organizational structure. Starting as a small, university spin-off, Borean now has a well-structured management and about 30 staff members. Borean currently occupies approximately 1,500 square meters of laboratories and offices. The facilities include fully equipped and classified laboratories for molecular biology, fermentation and cell culture facilities, protein purification and characterization.

**From University to Industry: Success through Innovative Research and IP Protection**

Two key factors played the crucial role behind the success of Borean. The firm’s competitive advantage comes from its innovative research work leading to its current proprietary and technological position. At the same time, in order to secure value addition, Borean is highly focused on protecting its IP. These two factors have enabled Borean to develop a new generation of highly efficacious compounds and antibody analogues with strong market potential.
CASE STUDY-2

INGENIOUS SIMPLICITY:
USING LIGHT TO CLEAN DRINKING WATER IN DEVELOPING COUNTRIES

Name:        Dr. Ashok Gadgil
Country / Territory:   India, United States of America
IP right(s):   Patents
Date of publication:  July 23, 2010
Last update:    September 16, 2015
Industry:       Durable Household Products

Background
The provision of safe drinking water has been one of the developing world’s most fundamental challenges. This challenge is made even more difficult and pressing by natural disasters such as the 2004 Asian tsunami. With disease spreading during the post-tsunami period, survivors desperately needed access to safe drinking water. In some ravaged communities in Sri Lanka and the Southern Indian state of Tamil Nadu, emergency relief came in the shape of an innovative water disinfection unit, the UV Waterworks (UVW). This robust device kills pathogenic bacteria, viruses and parasites in water from any source, using nothing more than ultraviolet (UV) light from an unshielded fluorescent lamp powered by a 40-watt power source.
The brains behind the UVW is Indian-born physicist Dr. Ashok Gadgil, who began searching for a way to purify water cheaply in developing countries after an outbreak of “Bengal cholera” which killed tens of thousands of individuals monthly in the summer of 1993 in North India. The application of the UVW has the potential to resolve the crisis of potable water that many developing countries have faced for ages.

**Research and Development**

Dr. Gadgil wanted to find a way to design a water disinfecter that was both robust in performance, and efficient in operation. Based on his experience in India, Dr. Gadgil knew that although the problem of disinfecting water was complex, the solution needed to be simple and inexpensive. The treatment had to be quick, so it needed a fairly high flow rate. The maintenance had to be easy and low cost so even the poorest communities could use the device.

The ability of UV light to kill bacteria and viruses has been known to scientists since the early 1900s. However, UV technology was traditionally rather expensive, and only recently has it become affordable enough for disinfection on a large scale.

**Schematic design of the UVW as submitted in PCT application PCT/US1997/013528 (Patentscope® search)**

Dr. Gadgil thought that UV technology might have the potential to be used for his desired water treatment device. He observed that others who tried to develop a device using an immersed UV-generating lamp did not succeed, because of frequent lamp fouling, and complexity and cost of maintenance. Suspending the lamp above the surface of the water a novel elegant solution and attaching an aluminum reflector above the hanging light directed back the light that would otherwise be lost. As simple as it may appear, the development of the UVW took quite a number of trial-and-error processes, required working through the hydrodynamics and radiometry of the UV light, and laboratory
testing with water seeded with E. Coli at different levels of turbidity. It took a couple of years in all. The device developed by Dr. Gadgil can treat approximately 15 liters of water a minute. Each unit can deliver safe drinking water for a village of 2,000 for under US$2 per person per year, including amortized capital costs.

**Financing**

At the beginning, obtaining funding for the research project on UVW was quite difficult. However, Dr. Gadgil did not give up, and after some efforts he received funding from a project manager in the United States Agency for International Development (USAID) as well as seed funding from a couple of private foundations. Later on, field testing was supported by the United States Department of Energy. Direct expenses were covered through this funding. On the other hand, funding for salaries was much harder to come by. So, he mostly worked on his own time (evening and weekends), with lots of help from volunteer students and volunteer scientific colleagues, and used the funds for supporting students and for hardware.

**Patents**

Initially Dr. Gadgil considered putting up his design on the internet for all to use freely, but his employer, the University of California/Lawrence Berkeley National Lab (UC/LBNL) thought differently. LBNL’s Technology Transfer Department (licensing and patent officers) convinced him of the advantages of patenting. He realized that even in the case that he does not want to benefit from his invention, patenting would protect against badly manufactured copies which would not be as functional as the genuine ones. LBNL’s patent attorneys also informed him about Patent Cooperation Treaty (PCT) system to protect the invention abroad. Following this guidance, the UVW PCT application was filed. In accordance with the conditions of Dr. Gadgil’s employment contract, UC/LBNL owns the patent rights
of the UVW. The invention is protected in many countries including the United States and the member countries of the European Patent Office. Subsequently, Dr. Gadgil has filed international patent applications for a number of other inventions.

**Licensing**

The performance and feasibility for practical use of the UVW system prompted about a dozen companies to approach UC/LBNL, each asking for an exclusive license. Following due processes for entering into contracts, UC/LBNL’s Technology Transfer Office selected Water Health International (WHI), a United States company working on the provision of safe drinking water, as the licensee for the UVW system.

**Business Results**

Hundreds of UVW systems are now being used around the world in some 15 countries including India, Mexico, and the Philippines. The systems developed by WHI are modular so they can be used in different ways, for example, as community water systems in remote villages; as water refilling stores, owned and operated by local entrepreneurs in urban centers; or as household systems, which can also provide water for hospitals or schools.

WHI is also making available, on a cost-recovery basis, UVW systems for tsunami relief. The emergency relief unit costs US$10,000 and include UVW, tanks and pumps, multiple filters, electronic level indicators and electrical controls, shipping, installation, commissioning, training of local community, and parts and maintenance for five years. The invention has brought Dr. Gadgil numerous awards since developing the original technology in 1996. He received the 2004 Health Award from the Tech Museum of Innovation, California. In 2006, the Museum of Science and Industry in Chicago
included Dr. Gadgil among 40 eminent artists and scientists whose work embodies the spirit and creativity of Leonardo da Vinci.

**Success Based on a Bold Initiative and Business through IP Protection**

Dr. Gadgil’s research success was based on his courage to dream about an innovation with high aims. At the same time, together with UC/LBNL, he has been able to turn the invention into a good business through the protection of its IP.
Background

Fossil fuels are the source of most of the electricity consumed in the United States: burning coal, natural gas and oil generates over 70% of total electrical power. However, burning these fossil fuels produces oxides of nitrogen (NOx) and/or oxides of sulfur (SOx) that must be removed from emission streams to avoid air pollution, acid rain and smog.

Current technologies to remove NOx, SOx and Hg (mercury) (for example “Selective Catalytic Reduction” and “Flue Gas Desulfurization”) are expensive to install and operate, remove only about 90% of oxides emissions and generate hazardous waste.

In 2000, EnviroScrub Technologies Corporation, a Minnesota corporation, currently headquartered in Escondido, California, was established with the specific goal of becoming a world leader in the lucrative business of removing NOx, SOx, and Hg pollutants from the combustion of common fuels and industrial emissions.
Its clean-air technology inventions include a new dry-capture technology called the “Pahlman Process”, which removes as much as 99% of emissions at a low cost and without generating hazardous waste.

**Research and Development**

EnviroScrub Technologies has developed and patented various inventions and made remarkable progress in the development of clean-air technology. Its most remarkable development is the Pahlman Process™ technology, which was acquired by the company at an early stage of development.

Based on a hybrid form of MnO2, a black mineral powder, developed by EnviroScrub Technologies’ research and development team, the Pahlman Process technology removes NOx and SOx pollutants through a single, dual or multi stage dry process, making it more efficient than any other system currently on the market.

Initial capital and operating costs for this “dry scrubbing” system are estimated to be less and slightly higher, respectively, than those of existing conventional solutions. In addition, instead of generating hazardous materials and associated handling and disposal problems, it yields marketable industrial by-products that can be sold into the fertilizer, chemical and/or explosives industries.

A demonstration unit built on a 48' semi-trailer that can be transported virtually anywhere in the U.S. or Canada gives potential customers an on-site demonstration of the dry Pahlman Process technology.

**Patents**

EnviroScrub Technologies has a coherent and active patenting strategy. It has obtained several U.S. patents and other national and regional patents as a result of using the international patent filing system established by the Patent Cooperation Treaty (PCT) for its Pahlman
Process pollutant removal technology, as well as for production and regeneration of its proprietary sorbent compounds and for water filtration applications.

The company credits WIPO’s PCT system with helping it secure broad international patent protection for its technology. It cites two features of the PCT that were of particular significance in its choice to use the system: the quality of the international search and examination reports produced under the PCT and the deferral of certain national phase fees until the 30-month and 31-month deadlines.

Other PCT benefits include its simplicity and convenience by virtue of its single procedural mechanism for filing patent applications with effects in several countries. It also incorporates several fail-safe and user-friendly measures which allow the user opportunities to correct mistakes.

EnviroScrub Technologies has entered and completed the national phase under the PCT system in a number of countries, including through the European Patent Office and the Eurasian Patent Office. It was granted its first patents covering countries within the Eurasian region, in October 2003. This patent grants EnviroScrub Technologies protection in the Russian Federation, the world’s fifth largest coal-consuming nation.

**Partnerships**

EnviroScrub Technologies has raised several million U.S. dollars from private investors and is dynamic in developing, commercializing and licensing its dry Pahlman Process technology to power generating and industrial companies worldwide. It has entered into strategic partnerships with key companies in the energy industry such as Minnesota Power and Air Cure.
Global marketing of the technology, which is expected to cover developing countries as well, especially those that are reliant on fossil fuels, such as India and Nigeria, is organized with Nooter/Eriksen who have signed licensing agreements with EnviroScrub Technologies.

A significant portion of EnviroScrub Technologies’ financial resources are invested into research and development with academic research affiliates of institutions such as the University of North Dakota (recognized internationally for its expertise in advanced energy systems) and the University of Minnesota-Duluth (renowned for its applied research in minerals and other natural resources).

Protecting Technology in all Markets through one-stop-shop International Patent Filing

Through PCT applications, EnviroScrub Technologies secured international protection for its innovative technology, which in turn enabled it to safely start looking for markets and partners in order to commercialize the Pahlman Process technology on a global scale.

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**CASE STUDY-4**

**A PRESERVE FOR DEVELOPMENT**

Name: Abdellahi Ouldali  
Country / Territory: Mauritania  
IP right(s): Patents  
Date of publication: July 21, 2010  
Industry: Food Products

**Background**

Having been brought up in a poor family in a small village in Mauritania where date palms abound, Abdellahi Ouldali, unschooled and unemployed, invented a recipe in 1987 for the manufacture of a date preserve using only fruit, without any added sugar or preserving agents. Abdellahi gave a few pots away to family and friends as gifts and it quickly became a big hit in his village.

Noticing this popularity, Abdellahi’s father gave him the idea of producing a larger quantity and marketing it. With no financial reserves, Abdellahi went off in search of a business associate who could lend him the funds with which to purchase the ingredients, packaging material and equipment necessary to make the product and build up a distribution network.
Arriving in the capital of Nouakchott, Abdellahi found that it was not so easy to find an associate willing to provide the necessary means to set up the little business that he dreamed of.

Faced with no means of livelihood, he decided to distribute a few pots of his preserve as he had done in his village. He collected empty pots in rubbish bins, sterilized them and then filled them with the date preserve in a little workshop. Gradually he became known in the area, and started to sell more and more to small shops and groceries. One day he received a large order from a supermarket, which made his preserve even more popular. This allowed him to quickly find an associate who was prepared to provide the financial means to meet the growing demand for his preserve.

**Patents**

Though Abdellahi’s success brought him the associate he sought, he did have some misgivings. He knew that future success hinged on the financial assistance of the associate, but he knew that disclosing his recipe to a partner would be risky because they could easily take it away from him. He also knew that increased sales would catch the eye of his competitors. He was afraid that they would take advantage of his recipe by copying and selling it, perhaps even at a lower price.

Unsure of what to do, Abdellahi approached the Mauritanian Ministry of Industry and a number of friends and professional advisers on the subject. They advised him to protect his manufacturing processes under intellectual property (IP) law, and to do that by approaching the African Intellectual Property Organization (OAPI). Abdellahi learned from OAPI that as long as his preserve manufacturing processes showed sufficient inventiveness, it could be patented.
Abdellahi understood that without a patent, anyone could develop an identical or equivalent invention, patent it and then prevent him from marketing his preserve or charge him royalty fees for using their patent. He also felt that without a patent, disclosing his recipe and manufacturing process to anybody would be risky. However, if he had a patent, he could license it while retaining ownership. Taking these considerations into account, Abdellahi knew that he needed to protect his IP. He hired the services of a consultant to help determine that the manufacturing process for his preserve was truly inventive and subsequently filed a patent application with OAPI in 2000.
Background

Tribeka Ltd. is revolutionizing the way people buy and sell digital content. The company has created the SoftWide® technology which allows customers to walk into a store, choose from a wide range of software or digital entertainment products, and instantly walk away with a secure copy, identical to the traditionally distributed version.

Tribeka's SoftWide system is revolutionary because it is “virtual”: it operates by taking advantage of Tribeka’s licensing agreements with digital content publishers to manufacture their products to factory standards on-demand and on-site.

This allows SoftWide to eliminate stock and its associated problems (inventory, out-of-stock situations, unsold or obsolete products) and
take full advantage of display space, whilst minimizing physical distribution costs and the potential for technical piracy or physical theft. By exploiting these advantages to the full, the system allows retailers, publishers and customers to reap the financial benefits.

**Patents and Trademarks**

The SoftWide platform manufactures physical packages of digital content “on demand” and/or “just in time”: as soon as a customer makes a purchase in a retail outlet using the SoftWide platform, the system automatically and instantaneously obtains authorization from Tribeka’s remote control center via secured license release and starts in-site replication of the product. The software or digital entertainment content is pressed onto disc and the final package can even be personalized for gifts. The entire process, including the printing of a user manual and color inlay, all to factory quality, is completed within minutes.

At present, the platform is capable of delivering PC, Macintosh, mobile/smart phone, DVD and audio book products. Similar technology for console games is being developed.

To protect their ingenuous manufacturing, distribution and retailing technology, the company has taken out several regional and international patent applications covering secure production, audited manufacture, shrinkage protection, ordering facility and distribution of digitized information on demand and at point of sale.

Tribeka notes that “the costs of patenting our innovations were not too large, especially given the collateral benefits we realized because of our patents (investor and partner confidence, increased staff, and eventual licensing revenue). In our case, the total patent costs have been about 2.5% of research and development (R&D) costs to date”.

In addition to its patents, the company also holds three registered trademarks in the United Kingdom.
Business Results

Tribeka is growing fast and has secured licensing agreements for worldwide distribution with more than 250 leading software and digital content publishers including ABBYY, Activision, Atari, AVG, Corel, CyberLink, Eidos, McAfee, Microsoft, Oxford University Press, Roxio, Symantec, Take 2 Interactive and Xara. Their SoftWide technology is used in Europe, Australia and the United States and is in the process of being deployed in South Africa and several Asian countries. Retailers who have adopted the platform include Carrefour and Tesco.

SoftWide has received numerous awards including several Wall Street Journal Europe Innovation Awards, three Deloitte European Retail Solutions Awards and was designated “Innovator of the Month” by the Association of Competitive Technologies (ACT). Tribeka founder and CEO Daniel Doll-Steinberg has gained widespread recognition as an entrepreneur, advises the British Government and European Commission on innovation and small/medium-sized enterprises (SME) policy, and is a regular speaker on innovation and the values of intellectual property (IP) and its protection.

Early IP Registration as Invaluable Means of Attracting Investment

Timely IP protection proved to be the key to successfully bringing the SoftWide platform to market: “Protecting our IP early in the process gave our investors a higher level of confidence in our ability to monetize on SoftWide, and helped us to draw in high-level partners to offer products for PCs, Pocket PCs, and phones. Their investment enabled us to hire the staff necessary to finish developing our technology and bring this innovation to market. By protecting our IP,
we gave investors the confidence they needed in our technology and our company”, sums up Tribeka.

Their IP is now proving invaluable to Tribeka as it licenses SoftWide to retailers worldwide: it will ensure that they both profit from this revolutionary technology.