



Hydrometeorological innovative solutions HYDS

Overcoming the Oedipus complex

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This case was written by Pere Losantos, UPC, and Xavier Estaran, UPC. It was made possible through the generous cooperation of company HYDS SL. The case is intended for class discussion rather than to illustrate either effective or ineffective handling of management situations. The development of the case was enabled by a grant of the European Community. Sole responsibility of the case resides with the authors.

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The Oedipus complex¹, in psychoanalytic theory, is a group of unconscious ideas and feelings which concentrate on the desire to possess the parent of the opposite sex and eliminate the parent of the same sex. According to classical psychoanalytic theory, the complex appears between the ages of three and five years, though oedipal manifestation may be detected earlier.

Established by Sempere, Sánchez-Diezma, and Berenguer in 2006 and located in Barcelona (Spain), HYDS S.A. offered innovative solutions in hydrometeorology, a science that develops predictive modelling and data processing tools to facilitate the forecasting of precipitation in the short to medium term. Emerging out of CRAHI (Centre for Applied Research in Hydrometeorology, belonging to UPC²), one of the world's leading public research centres in hydrometeorology, HYDS became one of the most innovative companies in its field.

In 2008 HYDS was focused on CRAHI markets and customers, basically regional weather and water public agencies, and large companies involved in water cycle management. However, it soon became clear that what was good for a research centre was not necessarily good for a spin off. The entrepreneurs had invested more than €200.000 and the return on the investment was not at all clear.

By using radar data input, HYDS software solutions were able to predict whether or not it would rain within the next two to six hours. But who might be interested in this kind of services? Outdoor sports organizers, farmers? One point was clear; whoever interested in these services would be completely different from CRAHI customers. So, if HYDS was to grow, its management had to come up with new approaches, processes, products and markets.

¹ http://en.wikipedia.org/wiki/Oedipus_complex

² Universitat Politècnica de Catalunya Barcelona TECH

New born and inexperienced

Daniel Sempere, a physics graduate from the University of Barcelona with a doctorate in Hydrology was the director of CRAHI-UPC. According to Cristina Aresté, who was responsible for UPC spin-off support programmes, “Daniel was intuitive, creative, very self-confident, stubborn, hardworking and results-oriented..... In 2002, he was already a researcher of international reference in the field of Hydrometeorology, a science that develops predictive modelling and data processing tools to facilitate the forecasting of precipitation in the short to medium term.”

Sempere himself explained how; “In 2002 I established the CRAHI-UPC research centre, whose mission was to provide support in the area of hydro meteorological management and forecasting. However, I knew that a university was not the best environment in which to try and transform the knowledge generated by the centre into something that could deliver business value. Of course, CRAHI had some technology transfer agreements with large public and private corporations, but Spain had plenty of SMEs who could be potential customers. Maybe these SMEs did not rely on universities, or maybe our applied research did not attract them. Could a spin-off be the right path to follow? We had the technology, we felt it was a good market opportunity that was flourishing in the US but not yet in Europe, and we had regional government funding to spread the risk. But in 2002 we lacked the most important part, an entrepreneurial team.”

Rafael Sánchez-Diezma, who carried out her doctoral research at the centre recalled how; “When I got my PhD in 2001, there were two paths open to me: an academic career or creating a company. I had always loved business, but research also attracted me. So, the best idea seemed to be to merge the two by creating a CRAHI spin off. It was a challenge because I had no training in business management.”

The third member of the team, Marc Berenguer, was a civil engineer and a specialist in the area of rainfall measurement based on radar meteorology, hydrology and hydraulics. “Rafael and Marc had been working with me for the last ten years,” explained Sempere, “I had directed their PhD theses and followed their careers. Rafael was more interested in business

management whereas Marc wanted to follow the research path. In fact, he had already planned a postdoctoral stay at McGill University in Canada, one of our strategic partners with whom HYDS had a technology transfer licence.”

Financing

Between 2003 and 2005, the three continued at UPC. Daniel headed CRAHI, Rafael was responsible for its R&D and studied business management while Marc finished his PhD. They continued to refine their business idea while assessing the opportunities available. The right moment came in 2006; “We had estimated that we needed €0.5 million to finance HYDS for the first three years which was clearly impossible, so we dropped the idea. But then the regional government launched a scheme to promote spin-offs from universities and research centres with loans of up to €100,000. Although we personally had to complement the loan with the same amount of money, we knew the time was right for HYDS.”

“After that, funding came gradually. It was not easy because the team had to match each grant provided by the government, and payments were always delayed. Although we have since had offers we do not want to risk outside capital input, so everything has come from the three initial members and others who have joined the team since”, said Rafael.

In September 2006, HYDS’ capital increased by €6,000 when Isztar Zawadzki became a share holder. “He is the Head of the J.S. Marshall Radar Observatory at McGill University (Canada) and a member of the HYDS scientific committee” observed Sempere. In May 2007, HYDS received its first regional government loan of €6,000.

In May 2007, Zawadzki and two new investors invested a further €40,000 in HYDS. One of the investors was Arnau Galí, who became its CFO. As Rafael recalled; “I was rather overwhelmed by all the commercial, R&D and business management duties, so it seemed a good time to hire someone to help with the strategy and business management. Arnau complimented the HYDS team perfectly, as he combined a scientific background with wide management and entrepreneurial experience.”

In 2008 HYDS received another €40,000 from the regional government loan. “Before getting this HYDS had to demonstrate it had achieved all the business plan goals, which was not easy,” admitted Cristina Aresté.

HYDS also applied for a new loan from the Spanish government, related to the regional grant but more focused on growth. The loan was for €350,000 on condition that the HYDS team provided between 30 and 50% of it as a share capital increase. In November 2009, the entrepreneurs came up with €120,000 and between March 2009 and May 2010, the Spanish government provided the rest.

“Summing it up, we’ve invested €220,000 in this project over three years. Maybe it’s not so much but for us, used to low university budgets, it was a bit scary” said Rafael. “Our long term debts were €240,000 at a low interest rate. Although we were offered venture capital we rejected it.”

The Industry context

”Hydrometeorology is traditionally located within the environmental sector” said Aresté. In economic terms, in 2004 the international market for this sector generated a turnover of 650 billion Euros (a third from the European Union), of which 41% corresponded to activities related to the water cycle. In recent years, this market has experienced growth of 7% to 9% in mature markets and 10% to 17% in developing markets. Many studies forecast that it will be one of the fastest growing industries this century because of the important geopolitical role of this natural resource.

The hydrometeorological subsector included all those processes and services related to water including the modeling of hydrological cycles, management, sanitation, purification, distribution, irrigation and other items. Within this subsector, major growth was experienced due to public and private investment in flood forecasting (see video on Exhibit 1) and water management. This growth was motivated by the need to mitigate the losses caused by flooding and to manage water more efficiently.

The efficiency of the investments was limited due to the lack of developed management and operation systems, although these systems required small amounts of capital compared to the overall (basically radar infrastructure) investments made, and generated added value. Consequently, part of the investment was routed towards the development of decision support tools to optimize and exploit this infrastructure. The US was the leader here due to a clear recognition of the economic impact of climate. Between 1995 and 2010, several companies were created in the US to operate services related to meteorology and hydrology. These companies used data generated by weather radar networks, satellite images and numerical prediction model outputs - freely accessible to the public- to generate value-added products aimed at consumers.

Aresté added that; “their main clients were private companies from the media, environment, energy, agriculture, and outdoor leisure sectors, and public companies related to the management of sewage, wastewater treatment, drinking water, emergency centres, town halls, traffic control... The existence of a large market for hydrometeorological products was not replicated in other parts of the world such as Europe, where national meteorological centres did not usually distribute hydro meteorological data free of charge, if they distributed it at all. The European market was not as developed as the US, which was a great opportunity for HYDS if it could get this data at a reasonable cost.”

The competitive arena

“We classified competitors into three distinct groups,” explained Rafael, “companies related to weather radars; providers of consulting and software services on hydrodynamic issues; and public research centres that create software tools in the world of hydrology and radar applications. Our main competitors belong to the first and second group, because the last generates small applications or products based on advanced research but is not really market oriented. The most remarkable work in this field takes place in the US.”

“The first group is dominated by US players such as SIGMET, RADTEC or EEC, plus GEMATRONIC and GAMIC from the EU. The hydrometeorology subsector is mostly led by government demand and closely linked to each territory and local clusters, so the entry barriers are high. Working with our own local government, an advantage when we started the

business in our region, later became a drawback when HYDS began to grow" observed Rafael. "As for companies linked to water, our competitors included HR Wallingford (UK), which specializes in consulting and research within the field of civil and hydraulic engineering and Delft Hydraulics (NL) which has over 75 years experience and employs over 350 experts.

First customers and products

In 2007, HYDS first customers came via CRAHI. These were basically regional public companies related to weather forecast services and water cycle management such as SMC³ (Catalan Meteorology Service), ACA⁴ (Catalan Water Agency), CLABSA⁵ (Sewage Barcelona Company) or private ones such as AQUATEC⁶ (AGBAR group) and ADASA⁷. There was also some income from Spanish and European-funded research projects.

The main products used by these clients were ADMET for meteorological services –mainly public companies- and HiWat for companies –public and private- involved in water management and flood mitigation. ADMET was a powerful weather radar data-processing system designed to integrate data from different sensors and data sources to produce state-of-the-art meteorological and hydrological products. Developed for operational use, ADMET was optimized for real time applications.

HiWat was a decision support system providing high quality and high resolution information about meteorological and hydrological conditions in the region of interest in order to optimally monitor rainfall evolution and water levels. HiWat facilitated water management, providing in a single system a full solution embracing data management and data quality control, data processing, product and alert generation, and visualization of data and products.

"It was not a bad start for a spin-off, but sales were not yet improving as anticipated. We were six full-time people and 2007 sales came to around €60,000. By mid 2008 were over

³ <http://www.meteo.cat/servmet/index.html>,

⁴ <http://aca-web.gencat.cat/aca/>

⁵ <http://www.clabsa.es/>

⁶ <http://www.aquatec.es/>,

⁷ <http://www.adasistemas.com/esp/noticia.php/18>

€100,000 but we felt something was not right. Our customer portfolio was not growing; it was too local and still too dependent on CRAHI activities and customers such as ACA, SCM and CLABSA” related Rafael. “If HYDS was simply doing the same as CRAHI, then what was its purpose?”

Second stage: growing up

As they concluded, the response of public companies such as ACA, SMC or CLABSA was too slow for the speed, needs and capabilities of an SME like HYDS. “It’s like this,” explained Rafael “You have a new technology or product to sell and contact a company to explain the main idea. Three months later, they call you back and say it’s interesting, but since there is currently no budget you must wait for the project to be included in next year’s budget. All in all, it can take a year from the first meeting to the beginning of the project, which can match a university pace but HYDS”.

“In mid 2008, we reviewed the situation and decided we should expand our market to include sectors other than hydrometeorology or weather radar, running our own strategy independent of CRAHI,” recalled Rafael. “Without rejecting the joint research projects with CRAHI, HYDS should cover sectors where weather information provided added value to their products. The clearest example was that of tennis or golf matches, where knowing the weather forecast for the next half an hour was vital in deciding whether or not to start a match...Unlike public or large water management corporations, this new clients would not be interested in managing complex proprietary software, but rather in an easy way to access local information at the right time on their mobile phones.”

Thus the new market segments for HYDS were identified. First, weather and water public agencies and companies requiring accurate weather information via customized applications included in their corporate systems. Second, SMEs not directly related to water or weather sectors that required a good weather forecast, properly displayed and easy to use in their daily activities.

“From a technical point of view, moving to this new market was never going to be easy” explained Rafael “since our products –HiWat (leaflet on Exhibit 2) and ADMET- run on

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proprietary applications. This meant that our applications had to be installed on the client's computers, which was not an issue for ACA or CLABSA, but was unsuitable for the new SME market. So we had to create new applications from scratch and change the production process. The first capital increase was almost gone, so we put in more money and applied for a €350,000 loan from Spanish government.”

“The new funding was used mainly to recruit R&D people and implement a quality system in software production process. In late 2008, five software developers with specific knowledge of data treatment, interaction tools, and software processes joined HYDS. We already numbered 12 people, half of them working on product development” recalled Rafael.

Introducing a software production management was one of the best decisions HYDS made. A traditional R&D centre culture in which a new project and customized application was developed from scratch for each client was not suited to a spin off selling advice and software applications. “We needed a modular approach as the number of customers in the market was supposed to increase, and we could not design a new application for each of them” said Rafael. “After some tests, we decided to implement DEV CMMI⁸ (Capability Maturity Model Integration). This system helped us achieve on-time delivery and high quality covering the lifecycles of products and services from conception-through delivery and maintenance.”

New products

The new product family developed during 2009 was the WiCast family, Weather Information for outdoor activities. “It was totally different from anything we had done before, although the platform that underpinned the application came from CRAHI research” explained Rafael. “WiCast provides improved and highly regionalized information on relevant actual and future weather conditions to people involved in outdoor activities.

These might be companies concerned with safety issues, professionals depending on special weather conditions for their work, or sport clubs providing meteorological information as a special service to their members or individuals planning their spare-time activities outside. Observations from different remote sensors are combined with forecasts from radar data and

⁸ http://es.wikipedia.org/wiki/Capability_Maturity_Model_Integration

numerical weather prediction models to generate the optimum information on current and future weather conditions in the region of interest. The information is then distributed to the end-user via leading edge technology and visualization systems.”

The WiCast family grew rapidly and since it was conceived as a modular application, was easily customized for different needs. “Imagine you are a farmer interested in knowing whether it will hail within the next six hours. This behavior is typical of Mediterranean weather, where a storm can blow up in half an hour. You get an SMS alert and quickly install the hail protectors. Wouldn’t you pay 1,000€ per year to save a €30,000 harvest?” asked Rafael.

“Then imagine you are the owner of an underwater dive boat. A typical journey take three to five hours, time enough to go from sunny to windy and stormy weather. Without WiCast, your customers and your boat may be at risk. With WiCast you’d even get the maximum wave height with which you’d have to deal. Wouldn’t you pay €1,000 per year for this?”

Aresté added that; “The application required for the dive boat required a slightly different product. The demand was there, and HYDS looked for a solution. It was closer than they thought since another UPC spin off, SIMO⁹, specializing in measuring marine behaviour was located in the same building. HYDS and SIMO established a partnership to share knowledge and platforms on a win-win agreement. This was a clear example of how incubating facilities provide synergies to open new market niches”

Reaching the market

In November 2009, the WiCast platform was ready to be sold. “Our plans were to begin to sell it in Spain during the first semester of 2010 and expand through west and north Europe in late 2010 and 2011,” said Rafael. Their main concern was that the market was composed of small service companies in the fields of leisure, agriculture, and sporting events. These companies were familiar with the local market but could add value to their product by including a new meteorological service. The problem for HYDS was how to reach this local market since, “I did not see myself travelling through Europe to deal with farmers and local underwater boat services. There had to be a different way to do it,” smiled Raphael.

⁹ <http://www.simo.cat/products.aspx>

Two options seemed feasible; the first was to redesign HYDS' organisation and replace the 50-50 split between research and management by a reduced R&D component and expanded sales department – which then only consisted of a single full-time person. The second option was to develop a franchise model in which local partners who knew the WiCast final users sector (entertainment industry, farming, tourism...) found clients in exchange for a share of the profits.

However, outdoor activities – based on WiCast products - were not the only market for HYDS. Customized applications for weather services and water and flood management still existed, although they required a huge R&D effort to keep pace with the competition. HYDS was also a strategic partner in large European Research projects such as IMPRINTS¹⁰ and was looking at the airport market, for which it was developing a new and promising application to forecast storms and snow, the main enemies of airport operations. Given this, reducing R&D as in the first option was not sensible.

“The franchise model,” commented Rafael “seemed more suitable, especially as the aim was not to act as a retailer ourselves, but to find distributors to sell our products to the final clients. However, this option would mean developing a new accounting management software programme suitable for a large network of franchisees, so that that each could manage its own dealers. Then we would lose part of the profits and a source of ideas for product innovation.”

Future trends

In June 2010 HYDS signed several franchise agreements in Europe with WiCAST applications for golf, skiing, and farming. The franchisees were SMEs in contact with larger local enterprises, and with reputation in each of the sectors. “The process we used was to identify professional users, arrange an interview to assess the market potential, actual needs and the customization needed, allow a trial period and close the sale in a second interview. The technical support was provided by HYDS to improve the franchisee selling experience and customise the client's demands” explained Rafael.

¹⁰ <http://www.imprints-fp7.eu/>

"The advantage is that the marketing costs are borne by each commercial organization. They leverage its infrastructure to introduce a new product, keeping their costs much lower than if they had to do it from scratch on their own. The benefit of franchised companies is their success rate. Since it is a fully variable income model, there are no additional costs for HYDS, although of course, margins shrink due to commissions," admitted Aresté Cristina.

Daniel Sempere had confidence in this new marketing strategy. "HYDS was born from a research centre, and inherited its processes, strategies and *tempos*. But after investing more than €200,000 of our own money we knew it was not just a *divertimento* anymore. If HYDS was to be a success, we had to split off from CRAHI. We have already redefined the markets and marketing strategy, the processes, the customers, and even the company location. In 2007, HYDS facilities were next door to CRAHI's. Today HYDS has moved to another building located 200m away, and operates on its own. No Oedipus complex, luckily."

EXHIBITS

EXHIBIT 1.

VIDEO ON FLOOD RISK MANAGEMENT

http://imprints-fp7.eu/workshop-BCN/index.php?option=com_content&view=article&id=130&Itemid=128&lang=en

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www.osun.org | Google Reader (704) | Reserva de sales | Note in Reader | bit.ly | Basic | a simpl... | Altres adreces d'interès

Español | Català | English

International workshop on the implementation of the EU Flood directive in Mediterranean areas: Tools and challenges for efficient risk management.
Barcelona, 17th June, 2010

IMPRINTS

Main | Program | Location | Material

Flash Floods and Debris Flows Risk Management. Part 1 - Living with the Risk

FLASH FLOODS AND DEBRIS FLOWS
RISK MANAGEMENT

00:03 | 16:07

European Union | Generalitat de Catalunya Departament de Medi Ambient i Habitatge | Agència Catalana de l'Aigua | CRAHI | UPC | TECNIO De tots, de competent | ETSECCPB | Departament d'Enginyeria del Terreny, Cartografia i Genètica UNIVERSITAT POLITÈCNICA DE CATALUNYA ETCG

Improving Preparedness and Risk management for flash floods and debris flow events (IMPRINTS) - EC FP7 project

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17:04

EXHIBIT 2.

WiCAST product leaflet

Can be downloaded at

http://hyds.es/files/20080709142513_5162_95f132fa-951e-45e0-b543-0cfab87d95a7.pdf

The screenshot displays a web browser window showing the HYDS website. The browser's address bar shows the URL hyds.es/products.aspx?id=2. The website header features the HYDS logo and the tagline "hydrometeorological innovative solutions". The navigation menu includes "About Hyds", "Projects", "Products & Solutions", "News & Events", "Press", "Jobs", "Home", and "Contact". The main content area is titled "Meteorological Services" and features a large image of a road winding through a green landscape under a cloudy sky. Below the image, the text describes the ADMET system: "ADMET - Advanced hydrometeorological processing system". A small 3D radar visualization is shown next to the text. The text states: "ADMET is a complete and powerful weather radar data processing system designed to integrate data from different sensors and data sources to produce state of the art meteorological and hydrological products. ADMET combines a suite of algorithms from leading research institutes (McGill University and CRAHI-UPC) that provide the basis for a number of products related to applications in the fields of meteorology, hydrology, aviation, and research. ADMET has been developed for operational use and is highly optimized for real time applications." Below this, a list of "ADMET key features" is provided, including: Modular architecture, Data integration and data management, ADMET product generator (with sub-items: Radar data processing, Meteorological products, Forecasting products, Hydrometeorological products, Thunderstorm detection, Dual polarization products), and State-of-the-art visualization application. A circular radar visualization is shown to the right of the key features list. The website footer includes a link to "ADMET brochure". The browser's taskbar at the bottom shows several open applications, including "HYDS .. Hydrometeor..." and "UPCHyds v5.doc [Modo ...]".