LES AMIS DE
l'École de Paris

http://www.ecole.org

**Technological Resources and Innovation seminar**

Organised thanks to the patronage of the following companies :

Air France
Algoé[2]
ANRT
ArcelorMittal
Areva[2]
Cabinet Regimbeau[1]
Caisse des Dépôts et Consignations
CEA
Chaire "management de l'innovation" de l'École polytechnique
Chambre de Commerce et d'Industrie de Paris
CNRS
Conseil Supérieur de l'Ordre des Experts Comptables
Danone
Deloitte
École des mines de Paris
EDF
Entreprise & Personnel
Fondation Charles Léopold Mayer pour le Progrès de l'Homme
France Télécom
FVA Management
Roger Godino
Groupe ESSEC
HRA Pharma
IDRH
IdVectoR[1]
La Poste
Lafarge
Ministère de l'Industrie, direction générale des Entreprises
PSA Peugeot Citroën
Reims Management School
Renault
Saint-Gobain
Schneider Electric Industrie
SNCF[1]
Thales
Total
Ylios

[1] For the "Technological resources and innovation" seminar
[2] For the "Business life" seminar

(liste at january 1, 2008)

# LTU TECHNOLOGIES : CONVERTING TECHNOLOGY INTO A BUSINESS PRODUCT

by

**Chahab Nastar**
Founder and managing director, LTU Technologies

May 23rd, 2007
Report by Élisabeth Bourguinat
Translation by Rachel Marlin

## Overview

LTU Technologies is an editor of image recognition and visual content management software. It originated as a start-up from INRIA (*Institut National de Recherche en Informatique et en Automatique* : French National Institute for Research in Computer Science and Control) in 1999 and has been part of the Japanese group Jastec since 2005. It started out in as a research project during a prosperous economic period, and became an industrial product after a number of difficult years. Its story illustrates the challenges which face the researcher who attempts to create an innovative company on the basis of his research work. These include taking the plunge despite the disapproval of some colleagues, finding one's first clients who are not what one originally envisaged, raising the necessary funds, knowing how to adapt to certain situations, dealing with the consequences if planned redundancy is judged to be necessary, deciding between concentrating on an element which appears to be essential and looking for new applications, and holding one's course despite outside interference. The success of LTU Technologies was made possible by a buy-out which took place under favourable conditions and which allowed the team to continue its development with new resources.

# TALK : Chahab Nastar

After I graduated from the *École des Ponts et Chaussées* in 1991 (an engineering *grande école*), I started a thesis on the automated analysis of medical images at the INRIA centre at Rocquencourt near Paris. By examining wall motion of the left ventricle, I attempted to discover if it was possible, by automated means, to detect abnormal wall motion which might indicate a future myocardial infarct. Following this research, I completed a post-doc at the MIT Media Lab in Boston on image recognition taken from photographs originating in photo booths.

In 1995, I was recruited as a researcher at INRIA in Rocquencourt and devoted myself to the indexing of images, which at the time was becoming popular because of the development of the Internet. Two years later, I began a project with about fifteen researchers and PhD students who were interested in this area. This team was called Imedia (indexation multimedia) and it still exists today.

I started thinking about creating my own company in 1998, but it was not until 1999 that LTU Technologies was born. A few months later, I left my research job at INRIA and became head of LTU. I remained CEO of LTU Technologies until 2005 when the company was bought by Jastec, a Japanese company quoted on the Tokyo stock exchange. I am now the managing director. A representative of the mother company is president.

## Image indexing

Image indexing is similar to an information search using a search engine. It is like trying to find a needle in a haystack. To do it, one extracts features of an image such as its shape (the contours of the subjects which are depicted), texture and colours. The subject the image represents (such as a child, a horse or a wardrobe), is put to one side. The visual characteristics of the image are coded in a compressed way in what is called its 'digital signature' or 'index'. Some people refer to this as the image's DNA. This description is both precise and concise and can be used to compare images.

*The search for stolen objects*

One of the major areas where this technology is used is in police investigations. The Central Office involved in the fight against the trafficking in cultural objects (*Office central de lutte contre le trafic de biens culturels)* is an office of the French criminal investigation department which uses our software to find stolen pieces of art. Investigators take photographs in antique shops of objects which they suspect have been stolen, and look for similar images in the database which has been compiled from photographs taken by people who have been robbed of similar objects. Even if the two photographs have been taken from different angles or with different lighting, the software is capable of matching the two sources of the image, including those objects which have been partially restored from the time that they were stolen and their re-sale.

Of course, software is merely a tool and it is up to the police officer to decide whether the object should be confiscated. However, the investigators' work is made a great deal easier. Even though the current database only contains a few hundred thousand photographs, and as yet there is no organisation managing international cooperation, this software is undoubtedly a source of progress because a manual search of the database is inconceivable.

*Commercial uses*

Another use concerns the electronic trade. The PPR group has an electronic commerce (e-commerce) site, Shopoon.fr, which, as a result of our software, acts as a sort of sales assistant capable of informing customers of the availability of articles similar to those requested. For example, if the object requested is a T-shirt, the software searches on the Internet for other

models which have the same features, colour or shape. Unlike other Internet applications, however, it does not deal with the price of the article.

## Entrepreneurial spirit

I undoubtedly caught the enterprise bug when I was working at the MIT Media Lab in Boston. The professors and PhD students are extremely dynamic and there is not the same insurmountable divide between the worlds of academia and industry as there is in France. A student can work on his thesis in the morning, and have a visit the same afternoon from a laboratory sponsor presenting a marketing demonstration of his research. On the other hand, manufacturers cannot tell laboratory teams which subjects to study. In exchange for their financial sponsorship, they simply have the right to visit what is supposedly 'the laboratory of the future'. For someone like myself who comes from the French research world which has an excellent reputation, but has difficulties with its practical applications, this approach was very formative.

Back at INRIA, having realised the potential uses of our technology, and profiting both from the boom in digital photography and from the arrival of search engines available to individual clients on the Internet, I was frustrated that our industrial partners were not prepared to be more involved. They did not share the confidence we had in the potential of our technology, and were more interested in keeping up with technological applications than in technological transfer.

When we went to international conferences, we realised that we had reached a very advanced level by comparison with others. I knew how to deploy an extremely motivated team which was ready to take risks and I was encouraged by several mentors who convinced me that creating a company was not very difficult and that I would be allowed to do so. A fellow student who had completed his thesis at the same time as myself, had gone to England and set up his own company which was doing well : this also encouraged me. Laurent Kott, the INRIA representative in charge of technological transfers was in favour of the transfer of technology. Although there was no business incubator at INRIA, he allowed us to use the laboratory computer equipment in the evenings to develop our business project. Paradoxically, far from harming research in the laboratory, it boosted it.

I ought to mention Jean-Marie Hullot, an INRIA graduate who founded Next with Steve Jobs in the 1980s. I contacted him using the INRIA alumni network and outlined our project. Not only did he think it was terrific and thought that it arrived at exactly the right time, but also said that he was ready to be a business angel for it. I was hesitant about managing the company not having had any managerial training. However, he explained that the management of a technological company was not very different from that of a research team, at least in the early stages, and that if I had any entrepreneurial instinct, everything would be fine. I therefore decided to take the plunge.

## Two institutional clients

When we created the company, we already had two clients. In 1999, when I was interviewed by the newspaper *Le Monde*, I explained that one of our lines of research was the recognition of paintings by the grand masters. It was relatively easy to identify a Mondrian, but recognising a Picasso was a little more difficult because of his different periods. A few days later, I was contacted by a policeman. He had read the article and found it fascinating but he was not at all interested in grand master paintings. He worked for the police department involved in uncovering paedophilia rings and asked me to use our technology on the Internet or on hard disks to identify paedophile pictures.

This request marked a very important stage for us. Today, our software is used in the fight against paedophilia by the French, American and Italian police forces. This request allowed us to make a market-oriented approach which was much more in tune with the needs of the market and which required us to adapt our technology to satisfy those needs, rather than adopt

an approach based on using the kind of services that technologists thought they could best offer.

We also met our second client by chance. We had decided to file for a patent. Some time later, I was contacted by the INPI (*Institut national de la propriété industrielle* : French National Institute for patent rights). I assumed that our application was either incomplete or that there was a problem, but after some initial misunderstandings, I realised that the INPI was very interested in our technology and how it could be linked to previous research carried out on patent rights especially for brands, drawings and models.

## The activity begins

Our first two clients seemed a little too conventional and too remote from developments on the web. Therefore, we based the main part of our business model on e-commerce and web content syndication (when a section of a website is made available for other websites to use), key terms in the jargon at that time.

Furthermore, we chose e-commerce in ASP (Application service provider), in other words we hosted our applications on our own servers and rented them out to our clients, according to the principles of the new economy.

We had no difficulty in raising funds because the first few months of 2000 were favourable for developing a technological business. The investors competed with each other and we obtained five million Francs as an initial sum.

We then began to develop our product and employed a team mostly of technicians. Our aim was to create a tool capable of identifying similar objects sold on eBay. Indirectly we succeeded as we managed to sell our technology to iBazar which was subsequently bought by eBay.

## Storm on a clear day

A few months later, in March 2000, the Internet bubble burst followed 18 months later by the terrorist attacks of September 11th 2001. This period marked an abrupt halt in our development. Our clients disappeared or no longer had the budget for this type of project. Our two venture capitalists seemed to be much less enthusiastic than they had been.

We were able to be very reactive because we were not a large organisation. We maintained our strong evaluation and in October 2000 we managed to raise an additional 32 million Francs but we changed our market. During the summer, I had drawn up a new business plan which abandoned e-commerce and focussed instead on our wonderful institutional clients in criminal investigation, protection and security which were fashionable at that time. We also decided to abandon our hosted applications and sell the standard software consisting of CD-ROMs, manuals and a helpline. This change was less expensive for our clients and most importantly, it was better suited to their needs for security and confidentiality.

However, we continued to spend a great deal of money. We opened an office in California because ‘that is where you have to be’. Nowadays, because of our contracts with the US police, our American headquarters are in Washington. This makes much more sense. However, at that time, we were still looking for a spectacular deal instead of being more sensible and trying to publicise our technology, find a market and repeat sales.

## The planned redundancy scheme

From 2002 onwards, we started experiencing difficulties. The company employed 35 people but the turnover was inadequate and decreasing. The cash register were emptying, slowly but surely.

Over a period of months, I tried to raise funds for a third time, but the investors had become very cautious. These same investors, who in 2000 had sent us emails begging us to let them invest in the company were now refusing to reply to our messages. Nobody seemed to be interested in our technology and our virtual evaluation was plummeting. The fund raising, which was almost complete, collapsed at the last minute as a result of the sudden withdrawal of one of our investors.

Because I knew that I could not find any new clients at such short notice, I decided to restructure the company. This was a very tough time for me because we had recruited a very high calibre team. I never thought at the time that I did the interviews that it would come to this. The number of employees quickly fell from 35 to 12.

Nevertheless, this decision saved the company partly because our costs were dramatically reduced and partly because it gave the remainder of the team and myself a jolt. Up to this point, we had more or less remained technologists, trying to find uses for our wonderful product, but now we adopted a different approach. Firstly, having found a suitable client, we had to satisfy all his demands, and make a made-to-measure product which could be sold to his partners and competitors.

Although 2002 was an extremely depressing and difficult year for me, it was the best year of my life from a learning point of view because during that year I am convinced that I became an entrepreneur, two years after I created the company.

## Restarting the activity

Shortly after failing to raise funds for the third time, we got a lucky break. In August 2002, because the number of our R&D engineers had increased on a regular basis, we were entitled to a large research tax credit cheque in the form of a cheque which was extremely fortunate.

Shortly afterwards, we found our first suitable client. The US customs were very enthusiastic about our software and gave us their required specifications which we followed scrupulously. We gained a few important contracts in this area both in Europe and the United States. At the same time, the INPI ordered more business from us. The accounts started to balance.

By 2004, the company had become stable. We signed a contract with the FBI during the Gulf War. We won this contract despite competition from both an American and a Canadian company. The competition lasted for months, but we won it hands down despite hostility from the US towards France, demonstrating that the Americans are pragmatic. We started recruiting and increased the number of employees from 12 to 20. Our technology was being recognised and our package was right both in terms of what it could do and what the market wanted. By counting on a few prestigious clients, we were able to sign a large number of contracts, for example with the French and Italian police force.

## The consumer product

In August 2004, a New York investment bank contacted me to ask if I was interested in a Japanese company's strategic investment in LTU. I was very surprised, but I agreed to discuss it. The bankers explained that they were looking for an investment in the area of 'rich media' and that they had narrowed the field down to about one hundred companies, only one of which existed outside the US : ours. Discussions took place behind closed doors and included the president of Jastec International. Two months later, we talked again. They had eliminated half the contenders and wanted to ask me, always by telephone, a few more precise questions.

Two months later, we were one of the remaining ten. So we had a meeting. One month later, the number was down to the final three. I was invited to go to Tokyo to meet the directors of Jastec who wanted to buy our company.

Jastec is not a 'keiretsu' (a business group) but an independent start-up created 35 years ago. Its founders are still the majority shareholders. It is a classic computer service company which has one thousand employees all of whom have CMMI (Capability Maturity Model Integration) level 5 certification. Its turnover is about 150 million Euros which is generated almost entirely in Japan.

I found the buyout proposition not only surprising – because we had no activity in Japan – but also risky for them. We had been approached despite the fact that we had no project of this nature and we did not have any rival offers. When I telephoned a French industrialist who, the previous year, had expressed interest in our technology, and told him that we were the target of a foreign acquisition, he simply said 'it's a shame. I really don't have the time to talk at the moment.'

I had misgivings about both the cultural shock and the existence of a hidden agenda. When I went to Tokyo I asked the people in charge 'what synergies are you looking for ? Are you hoping to sell services which could be used with our products ?' and they replied 'Not necessarily. Do you think that you could sell your products in Japan ?' This only added to my confusion.

The fact is that the buyout of LTU Technologies was purely capital-intensive. The Japanese said 'we will buy your company, but you must not change any of your activities or your markets or your managers.' My Japanese representatives explained to me that this buyout would enable them to gain access to the international stage, to acquire a small technological 'nugget' which appealed to them and to show off the prestigious clients whom we had acquired. This decision was also marginally motivated by a certain love of all things French. According to the president of Jastec, 'there is a feature common to both the Japanese and the French : sophistication', and he greatly appreciated it. The buyout was completed in March 2005. In the end, this operation was a sort of fairy tale, including because it was lucrative for the LTU Technologies' shareholders.

# DISCUSSION

## From researcher to CEO

**Question :** *Often when a researcher creates a company, he takes on the job of scientific director and gives the position of CEO to someone else. Why did you prefer to take on this role yourself ?*

**Chahab Nastar :** In the beginning, I thought that I would be more suitable as the technical director and I intended to give the job of CEO to one of the three co-founders, the friend who created a company in England. However, he was not a unifier and some members of the team did not have confidence in him. The two other people who were most actively involved were both post-docs and they devoted themselves to development. Getting the company off the ground meant that we had to hire engineers, assess CVs, conduct interviews, and design various applications for different markets for the products, all of which were tasks which I assumed were relatively similar to those undertaken by the R&D director. Finally, not only was I the oldest but I had also managed the team project at INRIA, two elements which, despite everything, were important and gave me a certain legitimacy. I asked Jean-Marie Hullot for advice and he reassured me that I was perfectly capable of being CEO and I trusted his opinion.

Initially, I felt a bit frustrated. I had the impression that I was wasting my scientific and technical talents in this very operational role. Having said that, it was very important to have a real credibility when explaining our technology to our investors and future clients. Thus it was valuable to be familiar with these scientific aspects.

## Continuity during the turbulence

**Q. :** *The direction taken by your company shows a great facility to react to external circumstances. You began with e-commerce. One of your clients was the FBI. You later adopted a 'technology push' approach (where technology determines development, contrary to a market or consumer pull) and now you are concentrating on products. How have you managed to face up to these changes of orientation and maintain a certain continuity despite the problems ? In the case of Digital Airways, whose story was presented in this seminar series[1], very strong friendship and even family ties between the founders enabled them to overcome changes in orientation. Conversely, the company NovoCiné, chose to recruit a new person to make the change every time there was a new direction and this disrupted the team's unity.*

**C. N. :** Originally, we made a classic mistake : we retained a very wide spectrum of applications and had several irons in the fire. As time goes by, this lack of focus on a particular product becomes a problem, particularly for the engineers who do not know how to develop the product. Employees need not only a good salary and a pleasant work environment to feel part of a company but also a credible business project. When we decided to devote our time to criminal projects, most of the employees were relieved. Some people, however, left the company as they thought that these applications were 'not trendy enough'.

When it became necessary to devise the redundancy scheme, I reassured the employees who stayed with the company were reassured that there was not going to be another wave of job losses in the future. I also improved internal communication. We were a smaller team and it was easier to voice our concerns, share our successes and become more open.

**Q. :** *Did the three founders have the same vision for the future of the company ? Did you have the intention of selling off the company and sunning yourselves in the Seychelles as in the advertisements for the lottery, or did you intend to invest in this company for the long term ?*

[1] Philippe Silberzahn, *Digital Airways, a French start-up which equips the world's mobile phones,* Les Annales de l'École de Paris, Vol. XIII.

**C. N. :** We did not have a fixed vision and we never sat around a table to discuss it. Personally, I could never look further ahead than six months or a year. However, we all had a pride in the job, which is associated with technologists, in other words, the desire to change our research into tangible, commercialised products. This necessarily meant that we viewed the company in the long-term.

## The role of the venture capitalists

**Q. :** *Did the venture capitalists who backed you, give you good advice when the crisis hit ?*

**C. N. :** I had thought that the venture capitalists would give me a great deal of advice, contacts and even business opportunities. I was lucky to have quite pleasant and sympathetic partners, but I cannot say that they gave me anything other than financial support. First and foremost, an entrepreneur has only himself to rely on.

## Assistants and former colleagues

**Q. :** *Have you kept in contact with the assistants you made redundant ?*

**C. N. :** This may seem a bit of a paradox, but I continued to be very close with most of them. Everybody, even those who had to leave, knew that redundancy was inevitable. I did all I could to help them find new jobs, recommending them to other companies. It often proved successful and they were grateful. Nobody lodged an appeal against me in an industrial tribunal.

**Q. :** *What sort of relationship have you managed to keep with your old team at INRIA ?*

**C. N. :** When I left INRIA, I took a large part of the team and all of the technology which we had developed with me. My successor had to start from scratch. Due to our fund raising, we had a much larger budget than we were ever able to have at INRIA. From this point of view, our relationship was delicate. At the beginning, I suggested that we work together on problems which we had encountered and which were still unsolved. This did not lead anywhere. Generally speaking, we still have not really established any partnerships with the research world. However, we are in the process of preparing some technological transfers.

**Q. :** *From what you have said, when you left INRIA, your old team was nothing more than an empty shell. Although your technologies proved to have applications which were in the process of being tested on the market, it would have been more sensible for INRIA to disband the team and assign researchers to other projects.*

## The new projects

**Q. :** *Have your new shareholders allowed you to launch new projects ?*

**C. N. :** Once the transaction was complete they reinvested in a sufficiently substantial way to allow us to resume our R&D activities which had been neglected in order to devote our energy to selling our products. Since that time, we have developed and sold new products notably in the area of video images and site-sharing like YouTube. Now we are turning our attention to copyright protection, content filtering and automatic video tagging in relation to fixed and video images. 2007 should represent an important benchmark year when these technologies, which are still not very widespread, will start to become accessible to Internet users.

**Q. :** *These days there are increasing numbers of video surveillance cameras on the streets, especially in Great Britain. Does the amount of these images represent an enormous market for you ?*

**C. N. :** We specialise more in investigations using images than in the treatment of images used in video surveillance. Some companies try to pinpoint suspicious behaviour in recorded images in order to sound an alarm at the time it takes place. This is not our area of expertise any more than is the identification of car number plates. It is true that some techniques have a common basis, but we work on databases and not on real time images. Some requests are beyond our scope. One day, some Americans asked me to find Osama Bin Laden by comparing the topographical data of Afghanistan with the mountains visible in the background of video clips of him shown by the television channel Al-Jazeera. We constantly have to select what we are capable of doing and what is still too complicated, and especially, what is profitable and what is not.

**Q. :** *In France, we often have excellent start-ups with wonderful technologies, but they find it difficult to increase in size and tend to be bought by Microsoft before they are able to grow into large companies. Will you be able to move with the market if it explodes ?*

**C. N. :** We are taking part in the Quaero initiative, financed by the *Agence de l'innovation industrielle* (French agency for industrial innovation), on an important project dealing with the content of multimedia structures. We can be proud of this approach taken by the authorities but if we really want to see the emergence of large companies, we first have to solve the problems of the initial investment first. In France, one rarely invests more than 12 to 15 million Euros in an IT company, whereas more than 70 million Euros were invested in Yahoo ! and Google. The potential development of a company is proportional to the sum invested in it.

## The competition

**Q. :** *Who are your rivals ?*

**C. N. :** We have relatively few rivals, which is a shame because we spend a great deal of time educating the market and explaining our technologies and what they enable us to do, which makes the sale cycles extremely long. However, this may well change because Google has just bought one of our rivals, Neven Vision, which might suggest that this technology, which is still not very widespread, will have significant growth.

**Q. :** *Have you protected your patent rights ?*

**C. N. :** We have only taken out a few patents because of lack of time and resources. Our Japanese partners are very aware of this and will probably encourage us to take out more patents. I have the impression that apart from mathematical equations and computer techniques, the most important aspect is the last small adjustment which enables the application to function perfectly and which is never discussed in international conferences or scientific articles. We are extremely keen to perfect this know-how.

## Contacts with the research world

**Q. :** *You have progressed from the status of researcher to that of CEO. What will the next step be ?*

**C. N. :** I am learning a great deal from my current experience. As a former researcher, it is the aspect of learning which I appreciate the most. I am particularly interested in the development of technological transfer from the academic world to the industrial sphere.

**Q. :** *If Jastec decided to dismiss the managing director of LTU Technologies, would you go back to INRIA ? Would you embark on the creation of another company ?*

**Q. :** *This might be a new challenge for you, to return to the research world and be part of the cross-fertilisation between two worlds where there is little communication.*

**C. N. :** I could most certainly go back to INRIA and, since I know the two worlds, I would certainly be useful in making the link between them. In fact, I said to Laurent Kott that I would gladly discuss my experience with INRIA graduates who are now entrepreneurs if this could be of any use. The INRIA management has always been very supportive. Some research colleagues admired my approach but others thought that I had crossed the yellow line. I have heard it said that I had succumbed to the 'allure of industry' which implies that creating one's business as a researcher is akin to some kind of prostitution. As far as I am concerned, what I liked most about this experience was simply building something with a team, based on a very exciting problem, by working hard and refusing to give in, as we were taught in the classes preparing us for the entrance exam to the *grandes écoles.*

## Buyouts by foreign companies

**Q. :** *The buyout of Gemplus by a company working for the CIA and of Genset by the Swiss group Serono caused feelings to run high in our country. Some government departments would like to be able to prevent buyouts of 'nuggets' which are the result of long and patient investments by foreign companies, especially American or Asian ones. What is your view ?*

**C. N. :** The transaction coincided with the Alain Juillet government bill concerning the control of foreign investments [cf. http://www.apce.com/pid2823/investissements-etrangers.html] and we were very worried that it would not be passed. Was our technology strategic for French defence ? We thought that it could be well integrated across the board, but because the law was vague and there was no official ruling, we did not know what to expect : being excluded, or, worse still, being banned purely and simply from selling our company, with no alternative ?

I should say that I had some reservations about selling my company to foreign buyers, but looked at from another point of view, if we had experienced financial difficulties later on and had to declare bankruptcy, we would have had to make all the employees redundant. Before I signed with Jastec, I negotiated that the R&D activity should stay in France for at least three years. I met no objections, and this reassured me that there was no hidden agenda. Today, I do not know whether we are a French or a foreign company. The capital belongs to the Japanese, but the activity and the jobs are here and we pay tax in France as well as in the United States where we have a wholly-owned subsidiary.

Presentation of the speaker :

Chahab Nastar : He is a graduate of the *Ponts et Chaussées* engineering school (1991), and has a Ph.D. in computer science (1994). He worked at the MIT Media Lab in Boston before founding and managing a research team working on image indexing at INRIA (*Institut national de recherche en informatique et automatique*). He created LTU Technologies in 1999 by transferring the results of the research carried out by his team at INRIA. He is currently Scientific Director of "Business Objects".

Translation by Rachel Marlin (rachelm@tiscali.fr)