



NUMALIS

France, www.numalis.com

Based on the PhD thesis of the co-founder, this start-up worked with academia to validate its software, took advantage of a graduate placement scheme and received business coaching from a local incubator

Executive Summary

This is a relatively new company which was established in 2015 to transform one of the co-founders' PhD thesis into a marketable product. The SME makes critical embedded computation software. The software is designed to help programmers write calculations. In simple words, it works like 'spell check' software but instead it checks the codes of the programmes and indicates where there might be a problem of accuracy or stability performance and gives suggestions on how to change the code to solve the problem. The software is developed with the collaboration of some partners from academia and currently its main target market is the defence and aerospace sectors. Numalis currently employs six people.

CASE N°: FG48

SECTOR: SERVICES

TECH INTENSITY: HIGH-TECH

LIFE CYCLE STAGE: START-UP

INNOVATION VECTORS: PROCESS, SERVICE

OI PARTNERS: PSR, BUSINESS INCUBATOR, INDIVIDUAL EXPERTS

KEYWORDS: Software, computations, defence, aerospace, programming, academic partnerships

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The logo for Numalis, featuring the word 'numalis' in a lowercase, blue, sans-serif font. The letter 'n' is stylized with a curved top.

BACKGROUND

The SME was established as a follow-on from the groundwork developed by Arnault Ioualalen during his PhD thesis. Arnault and his PhD supervisor co-founded the company when they realized the scope of their potential product and the fact that it did not yet exist on the market. The defence and aerospace industries were selected as a first target market as their potential was considered to be the most promising, and with fewer players in these markets it was easier to enter and manoeuvre with a strong network of people.

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

Since the technology is the result of a PhD thesis it is based on very recent and novel research. The founders (the inventor and his PhD advisor) saw a huge potential to develop the concept further and benefit from partnerships with academia to make it available for industry.

The product was based on academic work with no previous IP to impede market entry. To make it more ready for market uptake, Numalis received help from a business incubator, where they received coaching for start-ups: developing the business model, formulating strategies and making marketing and communication plans, etc.

OPEN INNOVATION TRAJECTORY

Concept development

The concept developed is a product quite similar to a 'spell checker' in Microsoft Word, but instead of being an aid for written text it helps programmers in writing calculations and codes. The product aims not only to save precious time for the programmers but also to facilitate the process of making complex coding and computations. Over the last twenty years several major accidents opened the eyes of the major industrial actors to the risks involved in computer-calculated floating-point arithmetics.

The precision of computer-made numerical calculations and the errors caused by floating-point arithmetics have been identified as being at the origin of those accidents. The software that Numalis has created is designed to point out errors in codes and also to offer solutions to solve the problem of inaccuracy.

Together with a network of reputable scholars in this field, the co-founders decided to convert their research work into a product fit for the market. The company entered into a partnership with the Université de Perpignan Via Domitia, a French university, to work on developing the new product.

As the founders had their roots in academia, they needed to acquire business skills, especially for operational matters and marketing. Realizing the importance of this expertise, they applied for assistance from a local business incubation centre. They were assigned a business developer who was paid by a local government agency to coach start-ups in handling all aspects of the business: business model design, finding the right partners, dealing with human resource issues, making financial decisions or developing market and communication plans.

The development process, IPR and competition strategy

To embark on the development process, Numalis firstly secured the IP on their invention – the coding behind the software. The next steps involved getting business support for their start-up and establishing some R&D collaborations to validate and test their invention. They are currently in the test pilot stage and have a number of corporations that are willing to try their product in-house.

On the R&D collaboration side, the Numalis founders took time and care in selecting who to work with. They entered into an initial agreement with the Université de Perpignan. This was formalised to begin with through a typical collaboration contract. The collaboration was purely scientific in nature with no operational component. Numalis wishes to maintain their IPR and they do not allow external source code to contaminate their own. They are not interested in sharing the IP either.

Following the initial agreement, Numalis and Université de Perpignan began to extend their collaboration by applying the French "Allègre Law", which permits a researcher who is still in the academic sector to work part-time with a start-up

that has a direct connection with his/her area of research. Currently, the SME and the University have such an arrangement which allows the researcher to work inside the company for 20% of his/her time.

Since Numalis is still working intensively in the development phase, they are very active in R&D. They have found that collaborations with academia are often focused on H2020 project proposals, but this is not at all in the interest of Numalis since the time lag between proposal preparation and receiving the funds is too long (up to one year); such an approach does not fit with the short-term strategy and requirements of a start-up. For this reason they are very careful about agreeing to such collaborations.

Other forms of collaboration are either related to Numalis' ecosystem, e.g. the region or the city for validating their business model and bringing them new questions or requests, or organizing events, etc. There are also business partners who are interested in piloting the software in their companies. To address large corporations, Arnault has found the best advice is to find a champion – someone who can be your “white knight” inside the large company and who is really interested in your offer; someone who probably is not the person who will be signing the contract but who will defend your position and the joint project. Finding someone to break down the fences and build an internal R&D programme which allows you to move forward is a huge asset. Numalis has tried this bottom-up strategy with large corporations by establishing a relationship with key engineers who can help them build a reputation inside the company.

Numalis has filed patents in France and in the USA (where it plans to extend its business soon). They also have a PCT application with the European Patent Office.

The ownership rights and underlying issues are decided up-front in the collaboration agreements with their partners. When entering into a contract with an R&D partner, Numalis specifies who will own how much of the resulting intellectual property. The contract also gives Numalis the priority right to buy the IP at a pre-determined price. This safeguards Numalis' interests in case the IP becomes crucial for its success.

As far as competition is concerned, Numalis is the only company which offers such a product that automatically generates optimized code. According to the CEO, the main competition comes from the empirical knowledge of some developers who do manually what their software offers automatically.

Commercialization and follow-up

Numalis is currently focusing on the aerospace and defence sectors where there is a strong market requirement for their technology. Their customer base within this sector is relatively small, and being first to market makes it easier to capture the attention of potential clients. At present they have been concentrating on the French market, but are looking to roll out to the United States once they are more established.

Since the company's offer is not specific to any particular sector – it can be suitable and useful for any company reliant on complex computations and programming – Numalis envisages a future where they could scale up to enter many other sectors, not just aerospace and defence. However, this is still a way into the future for the SME.

As the company is a software editing business, they are very keen to keep the technology in-house. Their strategy is currently to sell a license for use of the software to the customer, and then a subscription for the maintenance. This way they have recurring revenue streams.

The company is relatively new and is aspiring to grow. This means it is looking to increase its human resources and financial support. The company is aiming to raise capital to expand its business. To finance such an amount, Numalis is looking for investors with a long-term commitment. After raising these funds, the company plans to seek government R&D grants which require them to have matching funding.

Numalis is receiving advice and guidance from a business incubator to help develop their marketing strategy. Currently, the company prefers to sell the product itself in order to earn a name in this niche area.

Since the company was established recently their prime focus is on their specific software in the niche markets of aerospace and defence. In the future, the company also plans to expand into other markets as well as into different geographical regions such as the United States. To move to full commercialization, Numalis is looking to attract VC investors, as well as business angel backing to provide them with improved market insights.

BUSINESS IMPACT

Since the company is new, it is mainly focusing

on its current product to become successful. However, this experience has led to an effective knowledge of network management and of the operational side of the business.

The company has learned how to identify new market opportunities through working with external bodies and experts. The company has also developed experience of how to approach new partners and customers. The company now has a clear understanding of which kind of partners to approach and what to look for when identifying the right partner, be it from academia or industry.

Numalis currently offers a demonstration version of the software online via their website. Customers who want to use it more extensively can contact them to purchase a license and have to pay a periodic software maintenance fee. The main impacts so far for the company have been in terms of gaining reputation and market presence within the aerospace and defence sectors through their collaboration with other end users or local ecosystem clusters.

scientific validation since Numalis does not want to share their IP. However, they are clear that if the collaboration agreement is very well-defined and the collaboration is not about their main product, then they are prepared to share the secondary results. Nevertheless, their priority is to defend their own unique value proposition.

LESSONS LEARNED

This case shows how ideas from the academic world can be translated into real world products with great success. The founders have collaborated with R&D centres to test, validate and extend their academic knowledge to improve their software, and with a business incubator network to receive help in developing their novel ideas into a viable business model and to create a unique competitive position in the market.

Main lessons learned:

1. Business incubators can play a critical role in identifying and accessing new market opportunities.
2. When collaborating with academia, due diligence is very important. It is imperative to see who can deliver within a short time, rather than waiting for a funding proposal to be approved.
3. When collaborating with other companies, it is important to look for a white knight inside the firm who is really interested in the SME's technology and will also defend it, even if he/she is not the person responsible for signing the contract. Such an approach will help in gaining access to large companies' facilities and establishing longer-term relations with them.
4. For the most part, the OI collaborations with R&D centres have been focused on