



# MED-DIAG

France, pseudonym

A research-based start-up benefits from a government-run technology transfer programme and R&D carried out by the French national aerospace research centre.

## Executive Summary

MedDiag is a start-up company incorporated in April 2015 to exploit the research work of two academics who have developed an innovative method for diagnosing early-stage cancer of the bladder, the fourth most common cancer among men in France. The company's experience with open innovation is typical of high-tech, research-based start-ups which depend on external collaborations to complete their product development.

**CASE N°: FG54**

**SECTOR: MEDICAL DIAGNOSTICS**

**TECH INTENSITY: HIGH-TECH**

**LIFE CYCLE STAGE: START-UP**

**INNOVATION VECTORS: PRODUCT, SERVICE**

**OI PARTNERS: PSR, INDIVIDUAL EXPERTS, LEAD CUSTOMERS & USERS, CROWDSOURCING**

**KEYWORDS:** Diagnostic device, machine learning algorithms, government sponsored technology transfer, research-industry collaboration

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- INNOVATION CHALLENGE & MARKET OPPORTUNITIES
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## BACKGROUND

MedDiag was incorporated in April 2015 in France to develop and commercialize the research work which is the outcome of collaboration between a urologist (Pierre) and a researcher (Pascaline) at a Paris-based molecular science institute. The technique which they developed consists of a specific and proprietary method of preparing, staining and observing urothelial cells associated with an image processing algorithm of urinary cytology slides which have been scanned in white light and in fluorescence.

The two researchers are co-founders of the company along with Alexander, the CEO, who takes care of the operational management. Thanks to a French law which regulates the working time of researchers in the public sector, the two founders/researchers are allowed to work one day per week for MedDiag with their salary paid by their employers. Alexander, who had been involved in the project since 2013 when asked to carry out due diligence on Pierre and Pascaline's patent, was brought into the new company as CEO at the request of the firm's private investors (28 in total). MedDiag currently employs 14 people.

The company is currently carrying out clinical trials in 13 hospitals and clinical laboratories in France and Belgium. After receiving certification for their diagnostic device, MedDiag aims to start sales in 2020 with a possible IPO by 2025. Until then, the company's development work is funded by the €1.5 million raised from private investors and an investment of €450 000 by a French public investment bank, among others. After commercializing their innovation for the diagnostics market, the company may investigate selling it for screening campaigns, for example in companies where the incidence of cancer of the bladder is higher because of the environmental risks associated with the firms' production.

## INNOVATION CHALLENGE & MARKET OPPORTUNITIES

The collaboration with the French national aerospace research centre was triggered by a visit to MedDiag by the SATT, one of the 14 regional research-industry technology transfer accelerators set up by the French government to facilitate more and better commercial uptake of publicly funded

research. The visit/audit by the SATT to determine the potential research needs of MedDiag led to a research order worth some €600 000 for the research centre to develop machine learning algorithms to interpret the company's diagnostic test for cancer of the bladder. Under the terms of their IP agreement, the research centre retains the patent rights of the technology developed (paid by the SATT) while the SATT owns the license and the company is offered a sub-license for their bladder cancer diagnostic application.

The market opportunity of MedDiag's cancer detection equipment lies with the large clinical laboratories and hospitals where pathologists carry out the diagnostic work on the urine samples prescribed by urologists or general practitioners. In the first instance, the company is focusing on the French and Belgian markets. Since this is an early-stage detection method which involves no pain for the patient and has both the potential to save patients' lives and costs for the health insurance funds, the new technology has a distinct advantage over other diagnostic methods.

MedDiag will be remunerated on the basis of each test carried out with the diagnostic equipment that the company installs for use by the clinical laboratory.

## OPEN INNOVATION TRAJECTORY

### Concept development

The developers of the early-stage cancer diagnostic device needed to automate the analysis of the images of the cells which are produced with white and fluorescent light so that the pathologist examining the cells can make a reliable diagnosis. As it requires considerable algorithm power to process the images, the company management concentrated its search for these skills in a specialized research lab.

MedDiag was supported in its search for the right expertise by the SATT, the academia-industry TT agency for the Paris region. It was an ideal match: a young start-up in search of finance and new skills and a public TT agency with a mission to commercialize the outputs of the region's universities and public research labs. Thanks to SATT, the company was introduced to the French national aerospace research centre with specific research skills in machine learning using algorithms.

## The development process, IPR and competition strategy

The main challenges are twofold and inter-related. The collaboration, which started in 2016, has revealed that the research lab does not have the same notion of time as the company (e.g. it took up to 6 months to obtain a missing signature). In addition, the research lab is not capable of flexibility when it comes to planning and budget. The external research provider is used to working to a fixed, long-term planning, whereas the business plan of the young company changes almost on a monthly basis. It has proved difficult to share concerns about the product and the market with a research lab which is entirely focused on the research.

Under the SATT scheme, the research being carried out by the research centre, according to the specifications of MedDiag, is funded by a government subsidy. Under this arrangement, the research centre will have the right to file a patent, while the SATT TT agency will be the owner of the license and MedDiag will be granted a sub-license for their field of application.

The USP of MedDiag's technology is that it can detect potentially cancerous cells in a urine sample which would indicate the presence of early-stage cancer of the bladder. It has the advantage of being simple and non-invasive for the patient (a urine sample vs. a cystoscopy), a potential life saver (cancer of the bladder is the fourth most common cancer among men in France) and a money saver for health insurance funds (€1 000-€3 000 for an early-stage cancer treatment vs. €30 000 for treating a stage 3 or 4 cancer).

## Commercialization and follow-up

MedDiag is carrying out tests of its device with 12 clinical laboratories and hospitals in France and Belgium. This is indispensable for gaining acceptance among the pathologists who are the users of the device, while an awareness campaign to "sell its benefits" is being carried out among urologists and medical practitioners who are likely to prescribe the test.

In their push to enter the market as soon as possible, the company has invested considerable resources in hiring staff specialized in algorithms to work in tandem with the research provider. In the near future additional marketing/sales staff will be hired to promote the diagnostic device to clinical laboratories and specialized doctors.

The future clients of MedDiag are large centralized clinical labs (carrying out some 40 000 tests per

annum) as well as hospital laboratories (carrying out a sizeable but smaller number of tests). These are the opinion leaders to convince about the added value of the new diagnostic device. In parallel, though, the CEO intends to deploy a significant marketing effort to raise awareness of the test and its benefits among urologists and other medical practitioners. Additional marketing and sales staff will be hired to carry out this function.

## BUSINESS IMPACT

The collaboration with the research centre has allowed MedDiag to acquire indispensable knowledge and skills in the field of machine learning algorithms to complete the development of their first major product, and thereby to reach the market faster. As a result of this collaboration, which has been sponsored through a major nationwide research-industry transfer programme, the company will obtain the exclusive right to use the technology in its field of application by way of a sub-license granted by the SATT technology transfer accelerator.

Thanks to the research collaboration with the research provider, MedDiag is perfecting its application of machine learning algorithms for interpreting the images of cells derived from applying fluorescent light to the urine samples. The negotiation of the research collaboration taught the company management about the importance of being clear about their objectives and expected results when dealing with an external research provider.

As the product is not yet on the market, it is not possible to quantify the impact of the open innovation collaboration on the business. However, the contribution of the research provider to the functionality of MedDiag's diagnostic device is fundamental for the launch of the product and the viability of the company.

## LESSONS LEARNED

This case is a good example of the research-based start-up for which open innovation is almost second nature. The product idea is itself based on the outcome of substantial research work, which acquires complementary technology from another source in order to scale up to a full working model. The case also demonstrates well the sophisticated business model of the SATT technology transfer

agencies in France which were set up to pool the research strengths of a larger number of regional universities and public research organisations and to give critical mass to their commercialization efforts. Thanks to the stimulus of public funds, a research organization is awarded a substantial research contract, the commercial results of which revert to the TT agency which in turn raises income from the sale of sub-licenses to cover its original investment.

The MedDiag case highlights the classic divergence of interest, objective and notion of time between the research provider (motivated by doing interesting research following its own timescale) and the company driven by a business-minded management team which is keen to get its product onto the market as fast as possible.

### Main lessons learned:

1. Be clear from the outset about what you want to achieve with a research provider; if not they may not have the flexibility to adapt the research agenda to the business's changing needs.
2. Research organizations and start-ups do not have the same notion of time.
3. It is difficult to give orders to partners in an open innovation arrangement when dependent on a publicly funded programme.
4. Government-sponsored programmes have an important role to play in stimulating open innovation between companies and research providers.
5. It is important to have a CEO with good business aptitude and experience who can take care of driving the business while the researchers develop the product. Such an arrangement also reassures investors.
6. Working with opinion leaders is indispensable for gaining acceptance for a new product.