



## Linking technology intelligence to open innovation

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### ABSTRACT

The explosive growth of the Internet has led to a dramatic increase in data sources for (competitive) technology intelligence. Appropriate implementation and use of IT tools to gather and analyze these data is of key importance for the creation of actionable technology intelligence. A strategy to optimize investments in the identified technologies becomes of paramount importance if an organization wants to match knowledge and ideas originating from outside of the organization with internal core competences. Such a strategy can create competitive advantage by effectively linking technology intelligence to open innovation.

We show how VIB, a life sciences research organization, has established technology intelligence processes to identify a multitude of external technologies of interest, which are subsequently “probed” for their potential and fit with VIB using real options reasoning, thereby supporting open innovation. Our methodology may be useful for other organizations which are considering implementing open innovation approaches.

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## 1. Introduction

Changing technology, driven forward by relentless innovation, affects everybody's business. Smart organizations do not wait for change to happen but actively monitor and take advantage of changing environments and new innovations. “Open innovation” approaches, which implement externally developed technologies or ideas within an organization, have been proposed as a remedy for decreasing product half-lives, faster technology cycles, and increased global competition [1].

To enable open innovation, innovation intermediaries such as online technology transfer exchanges, which list technologies available for licensing to interested parties, or technology brokers, who solicit new innovations by posting problems requiring a solution, have emerged to address specific technology needs. However, these intermediaries typically concentrate only on a fraction of the technology intelligence relevant to an organization's strategy.

Technology intelligence has been defined as “the capture and delivery of technological information as part of the process whereby an organization develops an awareness of technological threats and opportunities” [2].

To identify, as comprehensively as possible, all options for introducing new, external technologies/innovations in the organization, it becomes necessary to analyze large amounts of technology data [3], originating from disparate sources outside the organization. Use of appropriate IT tools and extensive data mining analyses, such as text mining [4], can generate actionable technology intelligence. Technology intelligence can have many uses (e.g. in strategy, marketing or human resources). In this paper, we will show how we have generated technology intelligence that allows for the systematic identification of externally developed disruptive technologies, which are probed for their potential value to and fit with our organization, using real options reasoning based technology investments. Our work shows how technology intelligence can be linked to open innovation in practice.

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## 2. VIB: focus on excellence in life sciences research and technology transfer

VIB (<http://www.vib.be>) is a Belgian non-profit life sciences research institute established in 1996. A total of 65 research groups, encompassing more than 1100 scientists, are distributed over six research campuses. Using advanced gene technologies, VIB researchers study a wide variety of biological processes in the human body, in plants and in micro-organisms. VIB focuses on excellence in science and in technology transfer.

Technology transfer of in-house generated inventions to external parties and start-ups has been very strong at VIB. However, the adoption of technologies developed outside VIB has been suboptimal in certain cases (e.g. the technology was acquired too late compared to the competition or the acquisition was too expensive compared to other options).

In these cases, technology acquisition decisions were frequently made on an ad hoc, reactive basis by individual research groups, who did not sufficiently consider institutional strategy and synergies or, in some cases, alternative technologies.

Such decisions could be explained as a legacy of VIB's origins and structure, as VIB was set up as a joint venture of individual research departments. Since several departments often acquired identical, expensive scientific instruments, leading to excess capacity, it became clear that an institutional technology management strategy could improve technology acquisition, while simultaneously optimizing technology adoption and spotting of new technology opportunities.

To this end, several barriers had to be overcome, such as the lack of appropriate processes to scan for novel technology opportunities and evaluate technology acquisitions from an institutional perspective, the preference for conservative risk aversion versus opportunity recognition for novel technologies, and the lack of information on the progress of technology adoptions by other organizations.

These barriers significantly slowed down the acquisition of several platform technologies, even when these technologies had already established a low-risk profile and proven their potential to early adopters in other organizations.

## 3. A framework for technology intelligence at VIB

Several life sciences technologies have had a dramatic impact on scientific productivity since their introduction [5]. These enabling technologies led to bursts of scientific discoveries, publications, patents and commercial activity.

A system to gather early intelligence on disruptive technologies and a correct timing of access or acquisition might facilitate successful adoption of these technologies, leading to a competitive advantage.

A retrospective analysis of VIB technology adoptions, as well as of VIB decisions not to adopt, identified several processes that were lacking or could be improved in order to support both external technology identification and access to the identified technologies.

In 2006, VIB's management therefore decided to support the establishment of technology intelligence processes to identify technologies of interest to VIB. However, in order to make the intelligence actionable for technology sourcing, VIB's management also decided to allocate a limited budget to facilitating access to the identified technologies.

Linking actionable technology intelligence to a technology investment strategy could potentially facilitate VIB's technology management. As the time dimension is important in technology intelligence, our aim was to identify and access fast-moving disruptive technologies in a timely manner. Early access to the right high-potential, high-risk technologies could offer VIB the opportunity to increase its scientific and intellectual property output.

## 4. Technology intelligence identifies technology opportunities

At the outset, we identified two key questions to address:

- What is possible with technology: which technologies are out there?
- What technology is valuable and needed by our organization: which technologies fit with our organization?

In order to answer the question "What is possible with technology?" we needed to gather and organize information on all current life sciences technologies (current state of the art).

These "baseline technologies" form the basis for the development of a technology intelligence process that allows for the continuous, cheap and efficient updating of the organization on technologies with accelerating growth rates as well as for the detection of signals of new, emerging technologies.

To ensure comprehensive identification of technologies developed by both recent start-ups and large companies, we perform worldwide, continuous technology scanning. In the life sciences field, there are thousands of companies that develop tools and instruments of potential interest to VIB, with the number of academic research groups being a multiple of this number. In addition to scanning for technologies, we also decided to scan for technology adoptions by other organizations (competitive technology intelligence).

Establishment of a (competitive) technology intelligence process, allowing for the collection of real-time information on all technologies of interest and their state of adoption by other organizations, requires distinct steps, defined as the 'technology intelligence cycle' (Fig. 1). Five stages can be distinguished in the technology intelligence cycle (adapted from [6]):

- Planning and management: consulting with decision makers to define which intelligence should be produced [for VIB: (new) life science technologies with disruptive potential].
- Identification of sources: locating sources for data collection [for VIB: academic literature (Pubmed), patents and the Internet].
- Primary source collection: actual capturing of the data from the sources [for VIB: use of IT tools and databases such as Thomson-ISI Web of Science, Matheopatent and Matheoweb].

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