

**Public version**

**The innovative process and the acquisition of technologies in life sciences: guidelines for the technology transfer**

Improve of research capacities of the centre of Biotechnology of Sfax in Bio-Processes for biotech applications, tying up with the European research area

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**The innovative process and the acquisition of technologies in life sciences: guidelines for the technology transfer**

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## **The innovative process and the acquisition of technologies in life sciences: guidelines for the technology transfer**

### **0. Introduction**

The project **BioProtech** aims at supporting the CBS to improve research capacities in bio-processes for biotechnology applications in food, health and environmental sectors. Through this European project the linkage to the European Research Area will be improved and enabled a bigger impact on the regional development through improved research and innovation activities in the domains of biotechnology.

In particular, the BioProtech project is organised into six work packages, five of which target the development and improvement of the CBS in bio-processes research and development, incubation, transfer and dissemination.

These goals will be achieved by implementing a set of coherent measures, such as exchange of know-how and experience, development of joint research ideas, collaboration with EU technology transfer and regional companies / incubators and training, organisation of workshops and conferences related to research and management topics, preparation of strategy report and the project evaluation as well as dissemination and promotional activities. The evaluation will be implemented by an independent Evaluation Board. The work package six deals with the project management and administration of BioProtech as a whole.

One of the main objectives addressed by Bioprotech deals with the improvement of research capacities of the Centre of Biotechnology of Sfax in Bio-processes for biotech applications, tying up with the European Research Area. The WP2 – Technology transfer and incubation – is included in this objective, with the following expected results:

- To assess the state of the art in exploitation of scientific results in life sciences.
- To build up the knowledge base for commercialisation of research results proposing a specific plan in CBS by the organisation of 3 two-day training sessions on valorisation of scientific results.
- To contribute to the regional development and to improve the national economic situation through the creation of spin-offs and start-ups starting a pilot plan.
- Promoting the activities of the existing start-ups and spin-offs.

The planned activities included in WP2 are structured in 3 Tasks:

- Task 2.1 Map technology transfer activities
- Task 2.2 Training and awareness to commercialisation of research results
- Task 2.3 Build up local customer and supporter/collaborator network,

And the expected deliverables, concerning 5 main topics, are:

- D2.1 Report of mapping of technological potential in technology transfer
- D2.2 Training session programme
- D2.3 Collection of Training session into a report
- D2.4 Technology transfer & commercialisation practical guide
- D2.5 Report on network and cluster implementation

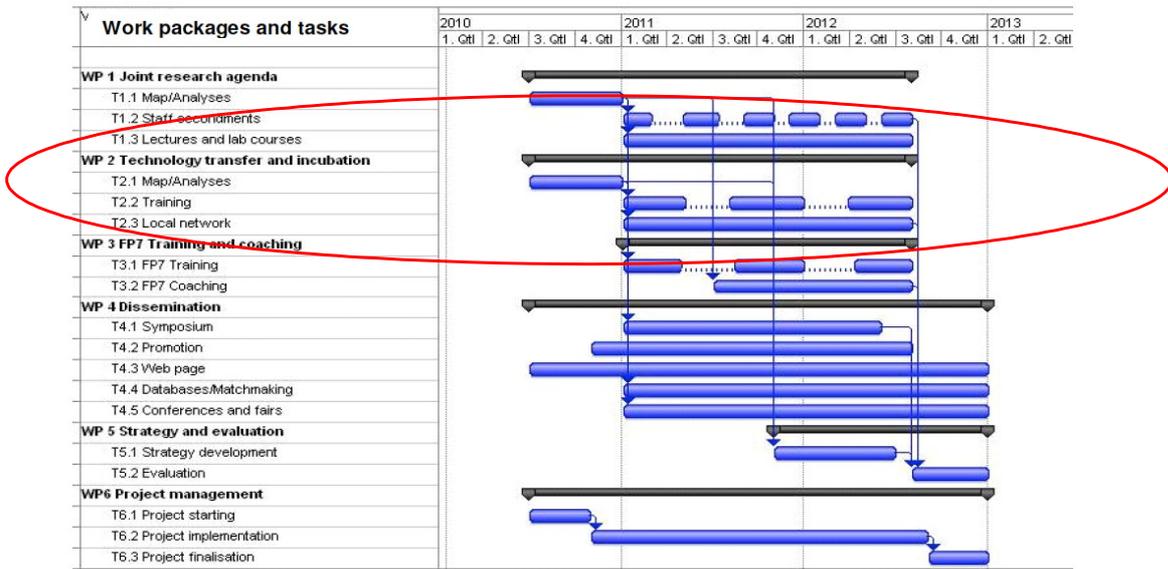
Table 1 shows some data on WP2 in terms of expected efforts from the partners.

**Table 1.** WP2: expected efforts

Work package number	WP 2		Start date or starting event : Month 1							
Work package title	<i>Technology transfer and incubation</i>									
Activity Type1	SUPP									
Participant number	1	3	4	5	6					
Participant short name	CBS	INSA	SFZ	BiPCa	UL1					
Person-months per participant:	4	1	2	5	1					

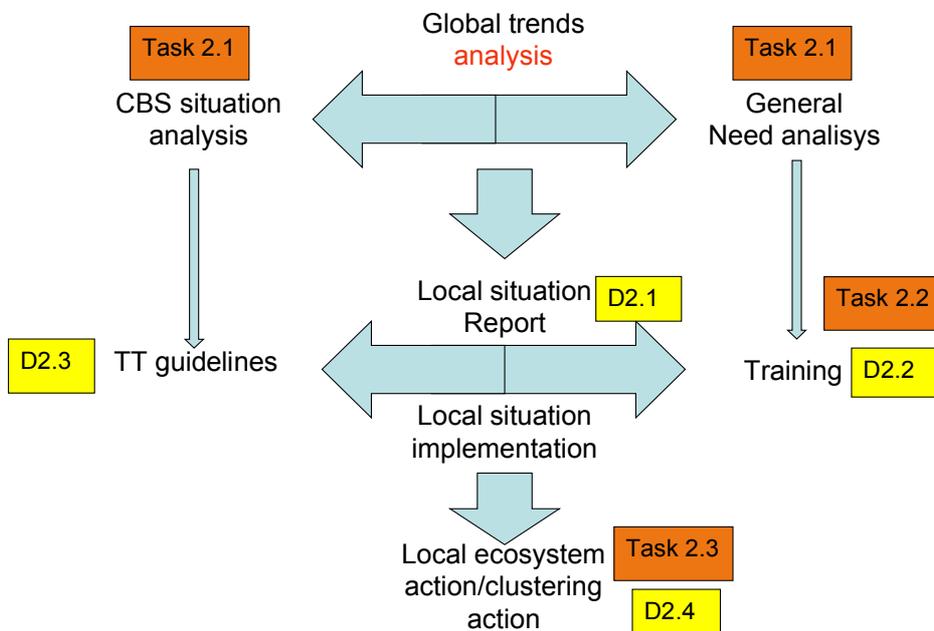
At the date of the first BioProTech meeting, the project resulted to be 4 months late compared to the original schedule, this due to a somehow late start. Table 2 shows the project timeframe and highlights WP2 and its deadlines.

**Table 2.** the WP2 timeframe



We are 4 months late in our schedule (Dec10 instead of July10)

An operational structure of WP2 is shown in Figure 1, where a detailed scheme of tasks and deliverables distribution is reported.



**Figure 1.** WP2 operational structure

## 1. Technology transfer and technology management in companies

The approach to technology transfer of CBS can be based on a careful analysis of the mode of acquisition of technology by businesses both locally and internationally.

The approach based on the phases of "technology management" inside a company allows us to identify the logical stages on which the technology transfer process can take place, regardless of the size and sector of the business organization.

Generally, the process of technology acquisition by companies takes place in the following form

In a nutshell, the phases of acquisition process can be summarised as follows<sup>1</sup>:

- Collection of internal and external signals and monitoring the environment (**SCAN**) to identify the strengths, weaknesses, threats and opportunities. In this way, either implicitly or explicitly, a "problem setting" activity is carried out.
- Basing on the collected signals, the company generates a strategic response (**FOCUS**) which allows to select from all the existing technological solutions those that the company is able to establish and operate competitively.
- Next, the organisation acquires the necessary knowledge and resources for the introduction of technological innovation in the corporate context (**RESOURCE**). This can be done, at one end, with the purchase of a machine or knowledge and – at the opposite – through internal R & D activities. More often is the case of a mix of these activities, that requires the involvement of external actors as interface / support bodies.
- Finally, the organization implements technological innovation within the business environment (**IMPLEMENTATION**)
- The last step is the analysis of actions and their evaluation in order to identify mistakes in the process (**LEARN**)

The procedures usually identified for the identification / acquisition of innovations by business organizations are also the following:

- Internal R&D activities
- Processes of cumulative learning (learning by doing)
- Replacement of staff or the introduction of new staff
- Acquisition / merger with other businesses

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<sup>1</sup> Themaguide, 1998

- Trade relations with suppliers and/or customers (eg, machinery purchase or co-makership)
- Technology transfer process that is actually a transversal process to the others.

Internal technology management actions within the organisation can be matched with Technology Transfer activities during all their phases. So the identification of the technology strategy provides the elements of **SCAN** and **FOCUS** of technology and innovation management. The analysis of the acquisition process acts at the level of **RESOURCE** and the implementation of the innovation within a product or a process acts at the **IMPLEMENT** level. Apparently this leaves out the **LEARNING** activity of learning, but in fact it is somehow "spread" on the individual sub-processes and, secondly, it should be an integral part of the management of the whole technological innovation and technology transfer macro-processes.

So the technology transfer and technology acquisition process is by definition a flexible process, impossible to be “caged” into pre-established models. It depends on the size of the organization, on the type of support that is received and on the time, place and sector where the process takes place. Anyway is possible to identify some standardized "moments" in the process of contact with the business organization.

In the case of Life Sciences, the process briefly described here is complicated by the presence of partnerships chains particularly complex, that lead to the creation of potential intermediate markets, depending on the level of development of innovation and / or technology.

It is then possible to identify three key moments (the research phase, the phase of the trial and the phase of exploitation of results and technology transfer), where it is possible to highlight the areas of potential synergy, regardless of the scientific content. It is important to state that the three “moments” have areas of overlap.

## 2. Guidelines to technology transfer

### 2.1 The phase of research result

The moment at which scientific results are achieved is the key element of the development process of any innovation. It is not the innovation itself but the starting point of a path for its verification and valorisation. In academic environments that path usually ends in a scientific publication or in a speech at a conference. This path

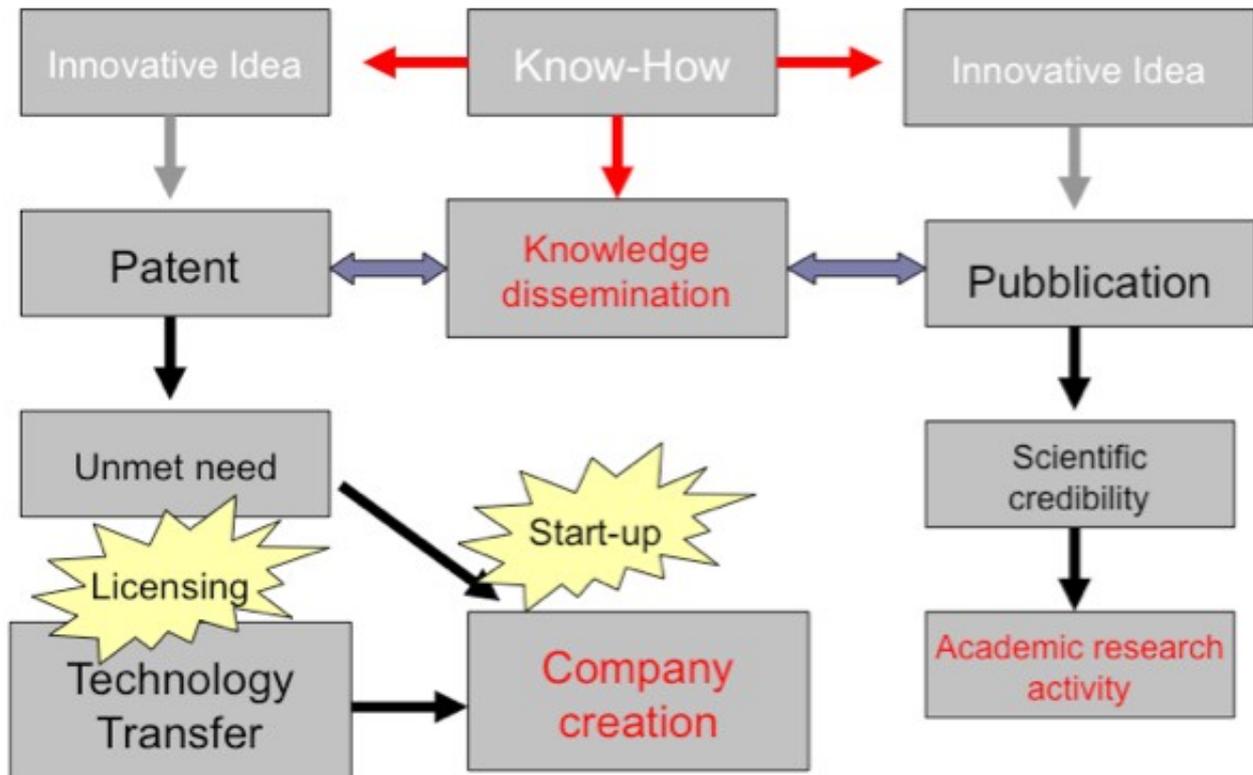
of development per se usually does not allow an operational exploitation of the result in the industry. In order to achieve this, it is usually necessary to deploy expertise and resources that are not always present in research groups, such as:

- The ability to assess the innovativeness of the invention from a patent point of view
- Skills to analyze the market interest and related valorisation paths (eg, patent and its transfer through license, start-ups creation, etc.)
- knowledge of sources of funding and expertise for their activation
- identification of potential partnerships (for research and in industry) for the development of the invention and the construction of pilot and demonstration projects

Where bodies of interface or system integration exist, they facilitate the action so the mode of operation can be simplified:

1. A scouting activity based on a mapping of the knowledge areas, of projects in progress and of the results that identifies the key variables before they are disseminated through traditional channels (eg publications), this way making their industrial exploitation extremely difficult. This activity, obviously based on the consent of the individual partners, can be based on an initial mapping (questionnaires + interviews) and a one-stop "physical" desk that can be activated at eg. once a month accompanied by a "virtual desk" always available. In parallel there will be a targeted mailing list that becomes a tool for dissemination of information and opportunities (Technology requests, Technology offers, partner searches, etc.) and, at the same time, a "virtual" entry point to the valorisation and technology transfer service.
2. Once you've identified and "extracted" the scientific result, it can be analyzed under a valorisation perspective. This activity will be implemented in close contact with the holders of the invention and aims to identify potential paths of commercial exploitation, marketing and patent strategy. It is thus to enrich the scientific result with elements of interest for the companies that could become targets for the valorisation activities or at the basis of business plans for the creation of new enterprises.
3. Hopefully after this analysis it will be possible to identify a need for further scientific activity that could lead to a new analysis from the perspective of development and valorisation.
4. The results of the valorisation analysis could then be transformed into operational valorisation strategies. These constitute real "plans" to exploit that identify the individual "steps" necessary, as an example, to the startup of a company or to the exploitation through patenting and licensing.
5. So it will be necessary to carry out an operational action for patent protection

## Development of the “know how”



FM Senatore Napoli Episode

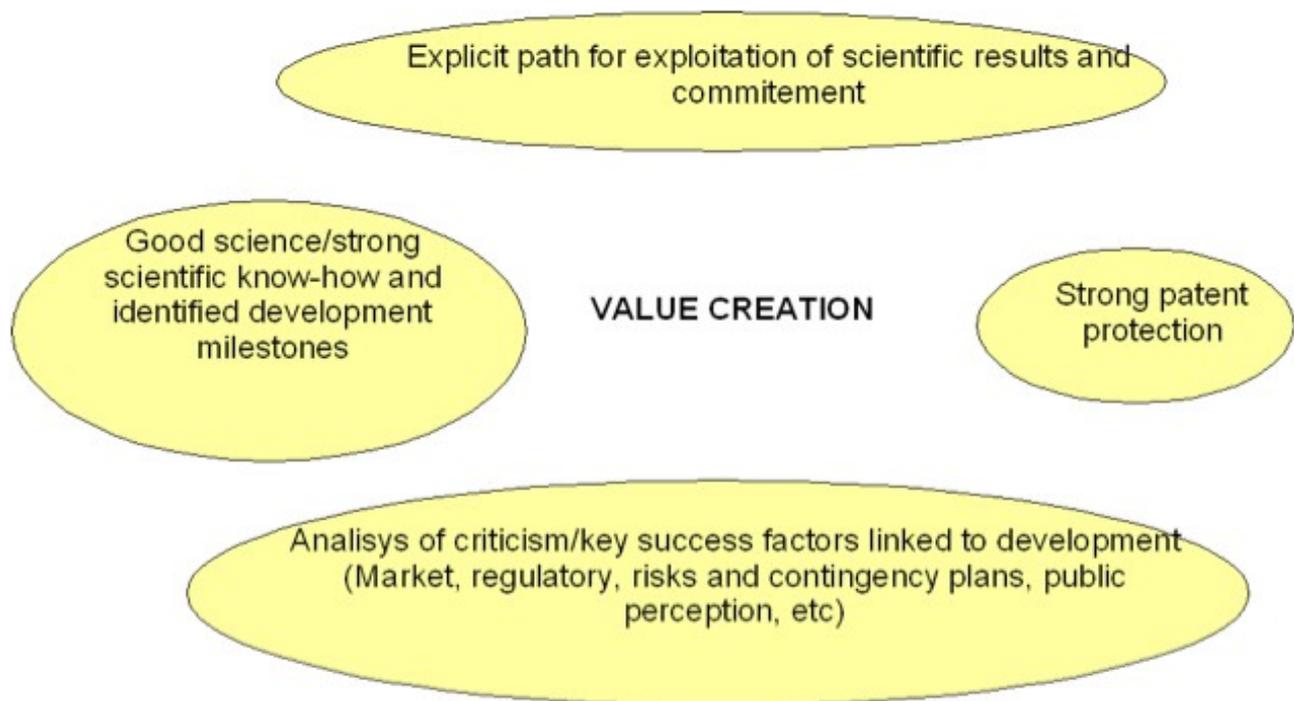
In this phase the activities are usually protected by a secrecy agreement in order to maintain adequate privacy. The ownership of innovation belongs to the discoverer and interface entity acts only as a pure methodological and operational support. All university regulations are respected and synergies with the Patent Office of the University are being exploited.

### 2.2 The phase of the trial

At this stage it is assumed that the outcome of the research has already been adequately protected and that one or more paths of development have been identified and initiated. The issues are economic and regulatory, even if a true need for continuous innovation and capitalization of what has been done exists also in this phase.

### 2.3 The phase of exploitation and technology transfer

Once the scientific result has been identified, the appropriate valorisation paths have been identified and a positive decision on the exploitation of these paths has been taken, it is necessary to put the strategy into practice. The operational solution should be built around the research result and the exploitation plan. At this stage it is necessary to create "value" around the innovative result in order to "package" for its exploitation.



In brief, the paths of development identified in phase 1 may be three:

- 1) patenting and patent marketing
- 2) Start an innovative firm
- 3) Provision of information

The latest solution, after the analysis of the valorisation opportunities, always includes the option to disclose the result without any protection. The only difference from the traditional situation is that the publication and dissemination would be done only after other routes of valorisation have been analyzed and discarded. This strategy can also be followed for reasons of image and communication.

Therefore not treating the third case, key element in the choice between the other two valorisation routes is the analysis of the real interest of the holders of innovation and of the "value" in terms of industrial development. This analysis can be achieved through the provision of expertise in setting up innovative businesses and the economic assessment of the patent using standardized instruments. Stressing the fact that the equation "a technology = a product = an enterprise" does not work, when you deal with a real interest in direct exploitation, the real economic and market return should be analysed and eventually "aggregate" innovations in order to build credible platforms. In all cases, however, it is necessary to identify partnerships (industrial, financial, technological) and start targeted innovation marketing efforts (dissemination of technology offers, participation to partnership events, direct contacts with potential customers etc) as well as analyze all the related costs and returns. This activity, which can be defined as Business Development, encompasses an active research of opportunities and is based on creating a network of local , national and international contacts.

On these issues any intermediary and interface organisation can also provide skills and knowledge to meet these goals. Operationally, the path would be as follows:

1. Following the first valorisation of the research result, an exploitation path is selected. The intermediary – on demand – activates its network in order to support the exploitation path through the identification of partnerships, communication/promotion channels, resources etc.
2. If you intend to start a business intermediary can provide both the skills necessary to start both a "package" of mentoring is the possible site of incubation

At this stage the work will still be protected by a Secrecy Agreement in order to maintain adequate privacy. The ownership of innovation is the rightful discoverer acting as the intermediary as a pure methodological and operational support. Any equity, royalties or success fee will be analyzed as well as scenarios for covering the operational costs.

Where there is no interest in commercial exploitation and the choice goes in the direction of disseminating information on the research result in parallel or in substitution to the scientific publication, it will be possible to exploit the technology transfer activities at no charge, trying to identify (in Tunisia or abroad) a company that is interested in exploiting the innovative idea in any case.

It is clear that the technology transfer process must interface in a synergistic way with the process of technology acquisition by the company.

## 2.4 The start-ups

It is clear that, if the proper conditions are there, it is also possible to take the path of creating an innovative enterprise. This goes from the recognition of market opportunities by identifying the means and the time required to achieve a result of interest and the creation of an entrepreneurial team is necessary and sufficient for this purpose. These elements should be placed in a business plan which represents the basis for both the start-up of the company and the search for potential funders and venture capitalists at local, national and international level. CBS, at this stage, might operate both as a support and as network and business development agent for the incubated companies. The activities are therefore mutually reinforcing and overlapping the technology transfer activities and constitute an important component of them.

## 3. The Technology Transfer unit

Following the guidelines explained before a Technology Transfer unit plays a central role assuring the coordination of different stages and focusing on exploitation of scientific results.

In such approach the Technology Transfer unit, from an organizational point of view is a centralized and shared service that not only has a clear positioning in the organizational flow-chart of CBS but as a common knowledge platform. As a knowledge platform has to be perceived by all scientist as a resource and from a different point of view it has to have clear strategic goals and KPI (Key performances indicators) to monitor the activity.

Advantages in centralising Technology transfer activities in a single office have the following advantages<sup>2</sup>:

- The office is focusing on technology transfer and not on unrelated college/research specific tasks
- Commercialization decisions are made based on market factors rather than internal pressure
- Technology transfer spend less time on administrative tasks
- Technology transfer will share knowledge and cooperate inside the research center and outside

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<sup>2</sup> L.A. Schoppe “Best practices in centralizing coordination and consolidation in University Technology Transfer office”, Fuentek, 2010

- Technology transfer could assure transparent and clear communication to all labs
- Technology transfer will support decision making process at each level (matrix approach)
- Technology transfer will present a unified and common TT image outside
- Technology transfer will maximise operational and financial efficiencies

To reach such goal the Technology transfer unit has to have standard tools and procedures such as:

- Standard invention disclosure form
- Standard criteria for decision making
- Standard format for evaluating technology
- Standard marketing material
- Shared marketing information
- Equivalent licensing template
- A shared knowledge sharing system (IT system)
- A marketing database
- Standard job profile
- A clear positioning in the organizational flow chart
- Standard Key performance indicators to monitor activities