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# University-Industry R&D projects: Knowledge Transfer and Interactive Learning

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## Introduction

Today, technological knowledge is seen as a significant innovation factor, allowing for long term economic growth and business competitiveness. In order to access this knowledge, a portfolio of sourcing strategies is available to the firm: knowledge creation through internal R&D departments, knowledge sharing with suppliers or market relationships, and also transfer from knowledge institutions such as public and private research centres. In this thesis, we recognize that University is a central source of knowledge but we question the general belief that knowledge is per se flowing between private and academic sphere through the conduct of University-Industry relationships.

*Collaborative research: "Defining and conducting R&D projects jointly by enterprise and science institutions, either on a bi-lateral basis or on a consortium basis" (Debackere and Veugelers, 2005)*

In fact, we aim at identifying enabling conditions for knowledge creation and efficient instruments for knowledge sharing in order to make sure that "collaborations are good and should be encouraged". To do so, we will focus on the process underlying such relationships, in particular the University-Industry collaborative R&D projects.

## Research object

The Knowledge created in the academic spheres takes various paths before finally reaching a competitive recipient. This variety of channels leads to a real challenge for researchers interested in the field. Generally, we can distinguish between two broad perspectives to approach University-Industry (U-I) knowledge flows.

Table 1. U-I knowledge transfer epistemologies

	Untargeted KT	Targeted KT
Direction	U ⇒ I	U ⇔ I
Nature of knowledge	Public, explicit K	Private, explicit and tacit K
Instruments	Publication, conference, patent	Consulting, collaborative projects, exclusive licences

- An objectivist approach examines the transfer of codified knowledge originating from academic institutions to industry. It focuses on traditional instruments of open science (e.g. publication, conference) but also on patent through its mandatory publication. In this thesis, we refer to this approach as "untargeted knowledge transfer" as the codified pieces of knowledge are publicly available and are not targeted to any identified recipient.

- The second approach has regards with "targeted knowledge transfer" between a university and one (or more) specific private partner(s), like in licensing, consulting, or collaborative research, when the knowledge interaction gives the private partner the opportunity to access some level of knowledge appropriation. Note that the partial exclusion of other agents is not only due to contractual agreements; it is also caused by the particular nature of knowledge which is transferred through direct interactions. Indeed, the tacit dimension of the knowledge that will be exchanged also makes it difficult to replicate for external organizations or individuals.

*Untargeted and targeted knowledge transfers have different but complementary epistemologies. In this thesis, we chose to study U-I knowledge transfer as a product of interactions. Targeted knowledge transfer will be explored as a process through a qualitative study influenced by the constructivist tradition.*

## Research program

We consider the collaborative research project as a context for the creation and transfer of knowledge under its explicit form – reports, presentations, Intellectual Property instruments – as well as under its tacit form through know-how and experience sharing between individuals from both sides of the collaboration. This assumption about knowledge and how it comes about will have an important impact on the methodological approaches chosen to conduct the three empirical parts of the thesis.

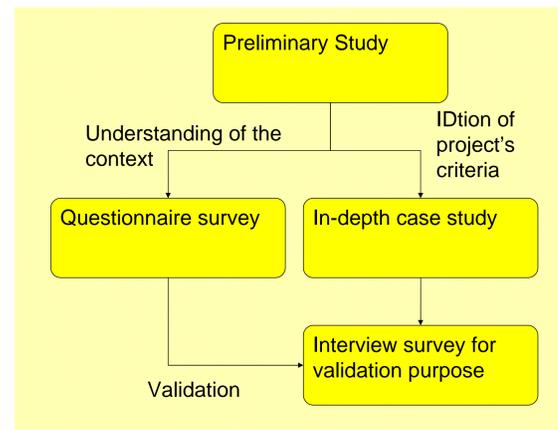


Figure 1. Research program

**The preliminary project** is an interview survey conducted toward actors involved in U-I collaborations (Researchers, TTO members, R&D managers, etc.). Purposes :

- Gain a deeper understanding of U-I collaborative research projects and underlying knowledge flows
- Reduce the scope of our research interest
- Confront the conceptual framework of the organizational knowledge creation theory with the context of U-I relationships

## A framework for processing knowledge

Nonaka and colleagues proposed an integrated model of the organizational knowledge creation process that should in their own words "be interpreted as an ideal example of the process". In order to disclose the knowledge process in U-I collaborative projects, we compared the organizational knowledge creation theory to the qualitative dataset gathered through the preliminary study.

Methods:

- Data collected through 20 semi-structured interviews
- Data analysed by pattern matching and explanation building techniques (Lee, 1999)

Through this preliminary study we found evidence supporting the knowledge spiral as a dynamic for the whole projects and identified some knowledge-based limits to the reconciliation process between university's interests and company's needs.

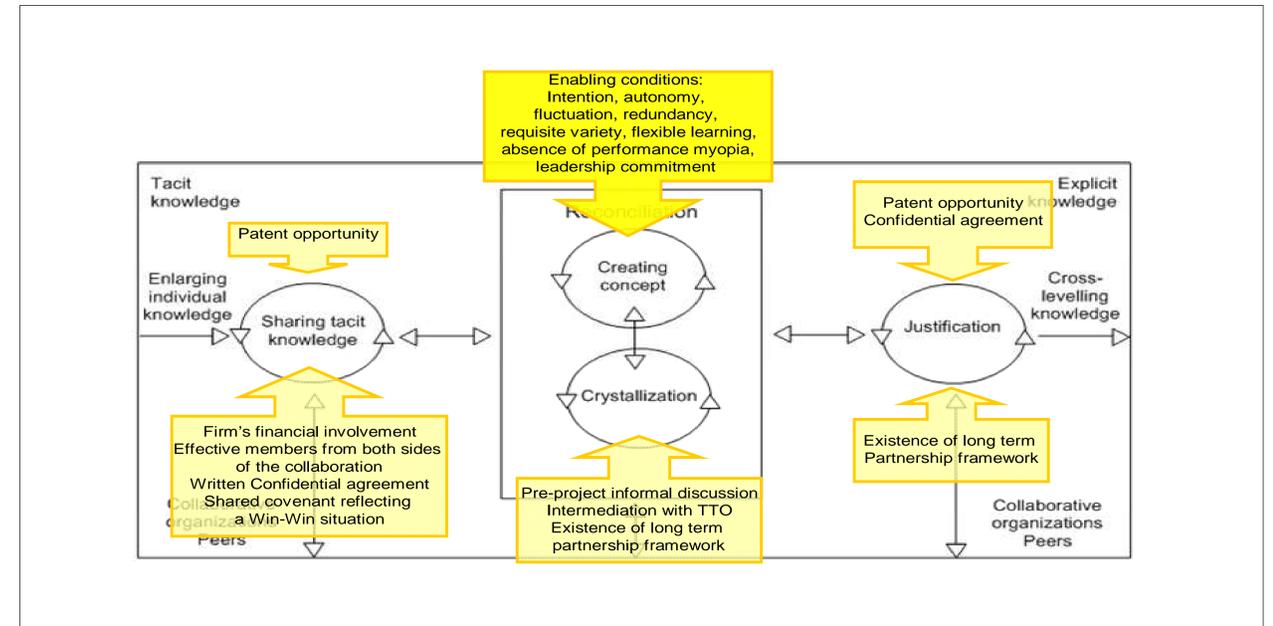


Figure 2. Knowledge process in U-I collaborative projects

As one respondent said:

*"We try to target scientific excellence while collaborating with the industry and sometimes we will not be necessary the best at the scientific level, precisely because we have this second objective"*

Nevertheless, this manager and other respondents also recognized that even if reconciliation was not an easy process, the balance between difficulties and benefits gained from the U-I collaborations was definitely positive, arguing for the preservation of such activities.

The preliminary study identified some key criteria to categorize collaborative projects (financial involvement of the firms, patent opportunities, LT relationship, ...) but we did not observe daily progress and exchanges. It leads the core of the thesis:

**The Case study project** is the main theory building part of the thesis. Purposes:

- Observe directly the knowledge process underlying a particular collaborative research project.
- Determine how to create and share knowledge more efficiently
- Answer the research questions: **"How enabling conditions affect the knowledge process underlying collaborative research projects"** and **"How does the nature of the relationship matter?"**.

We intend to engage in an in-depth case study of a collaborative research project in order to capture all relevant knowledge flows as well as their supports and potential impact on the overall process. A more deeply analysis of the process should be performed, looking at enabling conditions.

Meanwhile, a questionnaire survey will be launched, focusing on U-I collaboration modes and their impact on research modalities, knowledge appropriation behaviours, etc.

**The questionnaire survey** is based on an original study of Dominique Foray and Maurice Cassier (CNRS/IMRI). Purposes:

- Collect data about knowledge appropriation in University-Industry relationships and other labs' behaviours
- Complement previous projects with quantitative insights.

## Conclusion

The preliminary study was a first attempt to understand the knowledge flows underlying the research work performed through collaborative research. It highlights knowledge-based limits to the reconciliation process, leading to limited research diffusion and organizational learning, but it also confirms the importance of the third role of university, namely participation to economic development. A deeper insight about this process would help companies as well as academic researchers to manage the reconciliation's impact more efficiently and perform more proficient partnerships.

By achieving this research, we aim to contribute to the understanding of knowledge creation and sharing practices through U-I knowledge interactions. Besides, we hope it will bring some insights about the role of university as a knowledge supplier in the overall innovation process and as an active participant to regional and global economic development.

**References available on request:**  
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