

## **Challenges to semi-open research initiatives in university-business collaboration**

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### **INTRODUCTION**

The basic tasks of universities are research, education and societal impact. Since the 1980's there has been increasing pressure on academics to collaborate with business partners and to commercialize the results of their research. A paradigm change in the university system from research universities into entrepreneurial universities has been observed (Rothaermel et al., 2007). Some authors (Siegel et al., 2004) have seen this as a natural evolution of a university system that emphasizes economic development in addition to the more traditional mandates of education and research.

The semi-open research initiative in university-business collaboration context illustrates situation where universities and business together develop novel joint research project. Usually the next step in further development of the idea is trying to get at least partial public funding to boost the research initiative and thus increase resources allocated in to mission execution. In many cases the public research funding from different sources (e.g. EU or national funding instruments) increases not only the scientific ambition level of the initiative but also the possibilities to achieve results with high practical relevance. In this kind of initiative creation there typically are several universities and companies working together. This is a challenge to orchestration of the coalition: which doer or who's expertise fits best to the required roles?

The main purpose of this paper is to discuss about benefits and disadvantages when semi-open research initiative is used in the university-business collaboration. The

semi-open research initiative requires more effort and resources to achieve consensus in consortium level compared to open or closed joint project cases. On the other hand the semi-open form can offer very ambitious scientific research results with high practical impact. Two core objectives of this paper are following. The first is to describe how semi-open research initiative and semi-open project differ from open or closed forms. The second is to discuss about the required resources typical for successful university-business collaboration executed in semi-open research initiative context.

## LITERATURE

Engaging increasingly in interactions with business, the core of the university system has expanded to include activities outside basic research with the goal of transforming inventions into innovations. This is an area where we have seen an increasing amount of academic entrepreneurship activities, such as contract research, patenting, licensing, and spin-off firm creation (Klofsten and Jones-Evans, 2000; Perkmann et al., 2013). When university-business collaboration is discussed it is important to remember that even the presence of economical aspect is important, the cooperation usually offers interesting opportunity to receive unique data from business to be used in research. This is an important driver to deepen collaboration in many fields of research.

### *Triple-Helix model*

The Triple Helix model, theorized by Leydesdorff and Etzkowitz (1996), suggests that in a knowledge-based society the boundaries between the public and private sector, science and technology, university and industry are fading increasingly, giving rise to a system of overlapping interactions which did not previously exist. In practice the model is seen for example when universities perform tasks that were formerly assigned to firms and vice versa. The principle of Triple-Helix model is shown in Figure 1.

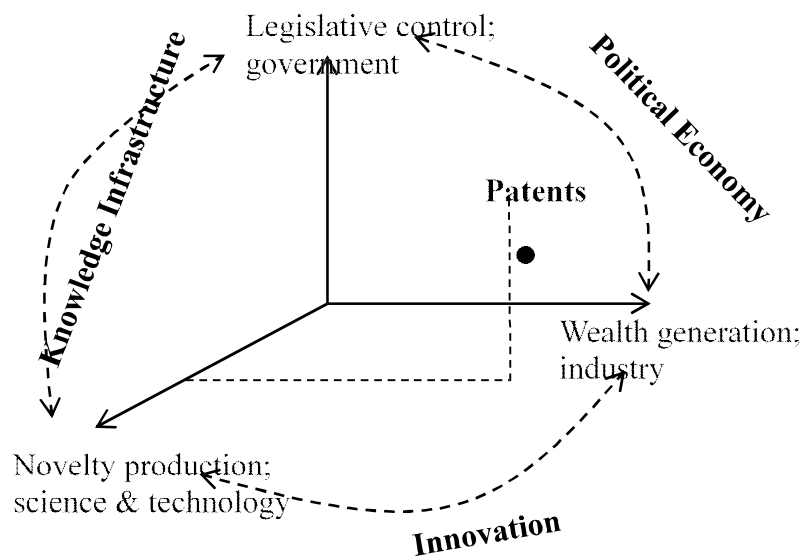


Figure 1. Patents as events in the three-dimensional space of Triple Helix interactions (Leydesdorff, 2012)

### ***University-business collaboration***

The public research organizations (PRO) and their relations with industry has interested many researchers. The research covers many angles from ethical dilemmas of university-company collaboration (Kenney, 1987) to university research collaboration (Starbuck, 2001) in general.

The importance of technology development in research organization plays a remarkable role (Mina, et al., 2009) in this area. A profile of public laboratories (Joly and Mangematin, 1996) offers good background, as well as a paper concentrating on a public research organization and knowledge infrastructure (Dalpé and Ippersiel, 1999). Many institutes operate like private companies (Etzkowitz, 2003; Marion et al., 2012; Rothaermel et al., 2007; Shane, 2004; Van Looy et al., 2004) or business units, but there are some differences.

The effective university-industry interaction has been studied (Barnes et al., 2002; Perkman and Walsh, 2007), as well as the market approach (Mindruta, 2008), and research collaboration of university research centers (Boardman and Corley, 2008; Orlikowski and Barley, 2001). The development of university-industry collaboration has been an area of interest for research (Santoro and Betts, 2002), as well as the processes and performance in this relation (Johnson and Johnston, 2004).

### **METHODOLOGICAL CHOICES AND RESEARCH APPROACH**

Action research (Lewin, 1946) is the main methodology in this study. Action research aims at understanding real world actions in a chosen research frame. According to Denscombe (2010), the purpose of the action research strategy is to solve a particular problem and to produce guidelines for best practice. The concepts and methods of action research has been studied by Argyris et al. (1985), the system level approach aiming at whole system change by Burns (2007), and the role of participative inquiry and practice by Reason and Bradbury (2007). The Triple Helix (TH) is the major research frame of the study. TH is localized to the national innovation system (NIS).

According to Saunders et al. (2009), one of the criteria for action research is that it is about the resolution of issues together with those that experience them directly. Action research may involve practitioners so that they collaborate with the researcher, and the researcher is a practitioner him/herself. A third characteristic is the process of action research, which is iterative. The nature of action research is a continuous process. After the diagnosis comes the planning of performance improvement. Planned improvements must be implemented and evaluated before the next research phase starts.

The case study design, and methods and the implementation of the results has been studied by Yin (2009) and Stake (1995).

The case study target in this context was Centre of Separation Technology (CST) hosted by Lappeenranta University of Technology (LUT). Several case study research results concerning LUT CST has been published (Karvonen et al., 2012; Karvonen et al., 2015 and Karvonen, 2015). Those papers include detailed information about data collection used in these case studies.

## FINDINGS

After the semi-open initiative has organized everything ready (e.g. coalition, roles of the participants and resources including optional public funding) the semi-open research initiative acts like normal research project or program. Figure 2 shows different project types.

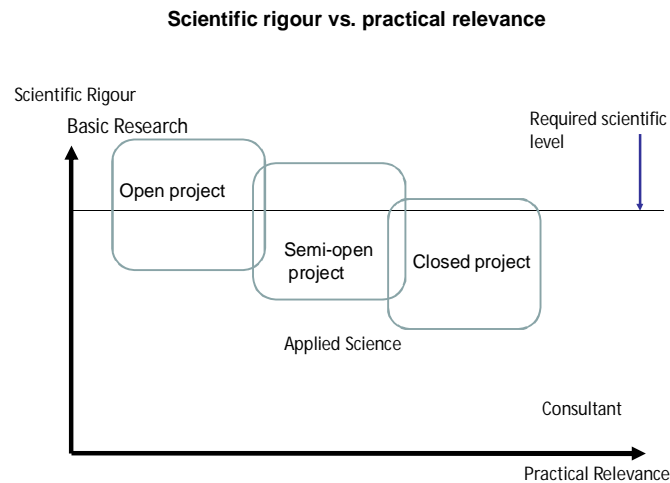


Figure 2. Different project types in scientific/practical scale (Karvonen et al., 2015).

Figure 2 shows that all university project formats must exceed required scientific standard which is the minimum demand to the university level research and actions. It is not recommendable to participate in the business driven project if the required scientific level is not attainable.

The open project model is close to the classic “free science” but also in this format there are lots of projects going on partially financed by external funding because of the lack of basic funding to the universities. The closed project model is typically business driven where university offers scientific expertise. The semi-open project model illustrates the combination of open and closed projects. In the semi-open project the joint research plan has been created in close collaboration between university and business and in the coalition there might be several partners from both sides. In the optimal situation this model can offer a win-win situation.

For a PRO it is essential to identify the current situation on the project level. All the project types characterized in Table 1 are relevant and possible to manage if the PRO understands the different cases. The danger, especially with closed projects of a research organization in a university of technology, lies in focusing on more or less industrial R&D instead of scientific ambitious research. The more detailed differences in all above mentioned project types are introduced in Table 1. Table 1 shows also the relation between the level of the expected hit rate, the required trust and possibilities for research result dissemination. Competition means in this context competition between universities and research institutes.

Table 1. The characteristics of different project types on the practical level (Karvonen et al., 2015).

	Open project	Semi-open project	Closed project
<b>In accordance with PRO's own strategy</b>	Usually not possible to influence the titles of open calls. Sometimes difficult to follow PRO's own strategy.	Possible to influence the research agenda	Usually the task is given by the customer, but normally these arrangements are based on long term partnership and trust
<b>Expected hit rate to get funds to university</b>	Small	Normal	Good
<b>Competition</b>	Hard	Normal	Small
<b>Freedom in scientific choices</b>	Huge	Limited	Small
<b>Ownership of the IPRs</b>	University	According to the consortium agreement	Customer
<b>Possibility to publish the research results</b>	Full	Delayed (usually a permit from consortium required)	Needs permission
<b>Required funding from business</b>	Max. 10 %	Typically 40-50 % on the consortium level	100%
<b>Required trust between partners</b>	Normal	High	Total
<b>Number of required partners in general</b>	Open structure, collaboration required, also on the international level	Mostly from the consortium in addition to relevant international contacts	Case by case, but seldom more than a few

## DISCUSSION

The most important issue distinguishing semi-open research initiative from normal joint research projects and programs is the consortium structure. The development starts from observed need which leads to the research idea. The idea might link to scientific or business based observation. Consortium needs both academic and industrial partners. It is important to select partners who have special expertise required to mission execution. Some overlap in competences is important because this enables to define roles to each partner.

In the optimum situation the participants of the coalition are representing different parts of the value chain. This offers possibilities to find joint research agenda linking leading companies and SMEs together with same objective. The varied knowledge base of participants is a benefit to the consortium. The trust inside the coalition increases if there are not hard competition between participating companies.

Partners should have similar strategic objectives to create compact joint research agenda with high impact ambition. The consortium agreement defines the roles of the partners, IPR and financial issues, dissemination of results, etc. The term semi-open means that before consortium agreement the development is open for all partners interested in research idea but after the agreement is signed new partners can't join to the coalition.

If the consortium is applying public research funding the situation is very close to Triple Helix model (Leydesdorf and Etzkowitz, 1996; Leydesdorff, 2012) because then all three major elements (government, science and industry) are present. The public research funding themes and regulations are based on current policy but private foundations operate according to their own strategies. To get public funding the semi-open research initiative should fit to public funding policy. Public funding enables bigger project resources and sometimes even multiplies them. Some public research financiers emphasize consortium structure like Horizon2020 on the European Union level and Tekes (National Agency for Technology and Innovations) in Finland. The rules and regulations concerning this kind of public funding boost scientific dissemination and fast implementation of the research results at the same time. The Strategic Centres for Science, Technology and Innovation (abbreviation SHOK in Finnish) used semi-open research initiative model in developing new research programs.

The expected output from the coalition contribute to academic interest in form of scientific articles and business needs in form of R&D, novel products, better production efficiency and increased profit. When the project/program has finished it is important to arrange internal or external evaluation concerning activities and results. Keeping the existing coalition based network alive and active for next missions is one of the core tasks.

## CONCLUSIONS

This paper has discussed about challenges to semi-open research initiatives in university-business collaboration. The semi-open research initiatives execution is typically in consortiums including several partners from academic and business sides. In optimum case this structure is very effective compared to the traditional collaboration forms between public research organization and business, open and closed projects.

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