Impacts of ICT's research intermediaries on Quebec's innovation ecosystem: final results

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Introduction

Over the last twenty years, Quebec has been trying to promote research collaborations between the academic and industrial sectors in order to improve research performance. Various programs have emerged to ensure that the different actors involved in research can meet and work together. Over the years, a program such as Valorisation recherche Québec or the Stratégies québécoises de la recherche et de l'innovation has enabled the creation of several active research intermediaries (RI) in various sectors of the economy. RI being defined as *an organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties.* The province of Quebec has thus built a network of over thirty RIs in different fields. Although they pursue the same goal—to support the R&D efforts of organizations—these RIs have different impacts on the Quebec innovation ecosystem. We have noticed that the context in which Quebec's ICT intermediaries operate, the various roles that they take and the impact of their activities are poorly addressed in the literature.

1. Key Research Question and Major Findings

Our research sought to answer the question: What are the impacts of information and communications technology (ICT) research intermediaries (RIs) on the innovation ecosystem in Quebec? By answering the question, this research will lay the foundations for improving our understanding of the impacts of innovation intermediaries. In order to answer our research question, we conducted an exploratory study of semi-structured interviews that took place in 2015 with seven ICT leaders and triangulated the information obtained through data from the Web. This exercise allowed us to write four case studies RI1, RI2, RI3, RI4 around these intermediaries[1]. The questions in the interview guide covered 8 themes: background and context, links between the RI and governments, network establishment, modes of operations, intellectual property (IP) management, extra-sectoral and international relationships, relationships with partners and role of the RI within the innovation ecosystem. All these intermediaries have in common the fact of being active in Quebec, of connecting companies (large, medium or small) with scientists and engineers from the public research community (university, research center, colleges) and to offer financial support for research projects. All are present in the greater Montreal area with RI1 being based outside of Montreal. RI1 is also a research center that provides state-of-the-art ICT hardware equipment and promotes the commercialization of innovation in the field. RI2 is a research consortium that funds ICT collaborative research projects between universities and businesses. RI3 is working with their members to help them adopt new ICT practices. Unlike other cases that favor the development of technological innovations, RI2 is much more active in creating social innovation and in spreading ICT knowledge to the public. RI4

[1] The ethics certificate obtained in order to be allowed to perform this study does not allow us to release the names of the intermediaries, nor of the individuals that were interviewed, or the number of individuals interviewed in each intermediary.

is also a consortium that funds university-business collaborative research projects but is active in an application domain that heavily uses ICT. For instance, one of the subdomains is heavily anchored in ICT and as a consequence heavily pushes the RI to becoming active in this area as well.

We have found that these institutions play three main roles: 1) they reinforce the innovation ecosystem; 2) they facilitate communication between the actors; and 3) they promote a culture of collaboration between industry and public research organisations. Each of these research intermediaries have different impacts and roles on the innovation system, despite the fact that they all provide some form of funding to the actors in the system. RI1 provides state-of-the-art research equipment, marketing tools and contacts leading to commercialization. It helps organizations achieve advanced prototyping through the expertise they provide. For questions that remain unanswered, it uses its network of collaborators. This network therefore allows the RI to offer, in the same location, a response to the needs of ICT actors. However, it is particularly interested in industrial players, and its activities are much closer to commercialisation that to early research.

RI2 focuses more on R&D and does not address commercialisation issues and does not perform activities in this regard. It provides funding for research partnerships and an environment where ICT researchers can meet. When companies need ICT expertise, RI2 can help and guide them. The intermediary also plays a connection role, but unlike RI1, whose connection role is production-focused, RI2 makes it possible for researchers to meet people and organisations with research needs. RI3 is responsible for the ownership of practices and the generation of knowledge in the field of ICT. It helps to develop ICT use and knowledge that will have an impact on the actors of the network and it focuses more specifically on social projects and government activities. RI2 and RI4 share roughly the same roles in the ecosystem, although RI4 focusses its contribution in a specific industrial sector that heavily relies on ICT. This focus a particular application field enabled RI4 to bring ICT researchers to take an interest in that particular industrial sector. In fact, the digital transformation of this particular sector has forced a much closer collaboration between the two industrial sectors than was previously in existence. In short, RI1, RI2 and RI4 have a great impact on industry representatives and researchers, RI3 adds an impact on both the public and the government, and RI2 as well as RI4 are closer in terms of impact and modes of operations.

To summarize, RIs have specific and more global roles. RI1 and RI3 have more specific roles in the innovation system. Their global roles are unique to almost all RIs and include linking governments and the rest of the network to keep governments informed of the needs and field realities, or linking the local part of innovation ecosystem with its international constituents. Specific roles are related to the very nature of the RI. This suggests that the ICT industry is covered by different RIs that provide different services depending on the needs and the category of actors.

We also noticed that opportunities for multisectorial projects were able to emerge if a more conscious and targeted effort was made on this particular objective and if the RIs shared good practices on the subject.

2. Meaning for the Canadian Digital Opportunity

Because of their situation, RIs in Quebec have become actors within different sectors (ICT, Health, Aerospace, Education, etc.) and as such have interactions with different players (SMEs, large companies, the research community, for example). These close relationships with and between various innovation ecosystems allows them to develop a good understanding of the needs of the

ICT industry as well as a vision for its evolution and implementation across a wide range of industrial sectors. They have developed expertise in partnership development and partnership management and are often seen as an useful and necessary third party. They therefore seem ideal candidates for developing projects that require extensive structuring coordination for the industry or the integration of actors and knowledge from several sectors. On an ad hoc basis, structuring projects and coordinating the efforts of companies, governments or economic agents towards new practices or a new technology that will have an impact for the entire industry have been the bread and butter of most IRs studied. For example, RI3 has been mandated to set up a program to help SMEs adopt digital technologies. More recently RI3 has been involved with RI2, in a project that aims to develop 5G technologies. Provincial governments can, and are using, the expertise and position of Quebec RIs to help them set up structuring projects in the ICT industry.

These intermediaries offer different opportunities for cross-sectoral exchanges, whether according to the wishes of the IRs, at the request of their clientele or through collaborative research projects. During the study these intersectoral exchange opportunities were punctual and poorly documented. If the IR spent efforts to better supervise and document this type of project, we could better understand the impact of this type of project on companies as well as develop expertise for this type of project and put in place best practices.

At the overall provincial level, however, we noted a general lack of coordination and the wide spread difficulty of SMEs to navigate through the numerous innovation intermediaries, from incubators, accelerators, consultants, research consortia, commercialisation centers, etc. Quebec Innove, initially mandated to become an innovation platform, has launched a wide consultation to identify the way to provide such guidance to SMEs who are seeking to knock at the right door to gain help in their research and innovation problems. As most sectors of the economy will start a drastic digital transformation, exacerbated by the multitude of technologies and solutions available, greater coordination between all RI in the province will be required. Apart from sporadic interactions, our research has not shown that the innovation intermediaries are ready for this change of tac. In addition, RIs do not seem to be able to facilitate or coordinate the necessary cross-sector inter-disciplinary sandboxes that will foster radical innovation.

3. Key Policy Implications from Findings

The availability of capital:

1) The interviews made us realize that government rules are not favorable to the creation of collaborative research projects involving different intermediaries. Complex procedures combined with unattractive financial incentives make it unattractive to build such projects. Recognizing the potential benefits of multi-sectoral research projects for innovation by becoming the source of new products, governments should consider facilitating procedures for collaborative research projects involving different intermediaries or increasing funding for such interdisciplinary and intersectoral projects.

Access to knowledge:

1) To participate in these collaborative projects and to benefit from the fruits of the research, companies must have bases in innovation (IP management, research capacity,

both human and financial). The benefits of such projects could unfortunately be limited to certain types of companies, i.e. those interested in innovation and having the capacity to do so. Intermediaries should therefore offer assistance, directly or indirectly, to SMEs to improve their innovation base by participating in such innovative projects and to ensure that their service offer also matches these needs. To do so, RIs should plan more regular activities to ensure that SMEs can be better trained in this area and thus be more able to seize opportunities for collaboration. Governments must ensure that the realization of R&D training is also part of RI's mandate. Close collaboration with universities to design programs that encourage such cross-disciplinary and intersectoral research will be necessary to foster a smooth and efficient digital transformation of these sectors. Establishing liaison agents within each RI to develop and nurture an extensive network of coaches, innovation specialists, commercialisation experts, etc., should have a positive impact. In our interviews, RI representatives have mentioned that they already work together to some extent, but that the close relationships that will be required in the future call for a dramatic change in the support they will need for such purposes.

2) Finally, many of the intermediaries financed solely by the Quebec government also have a lower level of international involvement. Our meetings made us realize the lack of resources in this regard. Since in the agreement between the government and these intermediaries, the question of internationalization is generally not addressed, efforts to promote international trade are very uneven. Recognizing the contribution that ideas from outside the innovation (eco)system can make to innovation, governments should add a criterion of internalization in their assessment of the RIs and in their mandate. This way RIs can explore avenues internationally and thus foster research links between local and international institutions.

On a final note, it is imperative that the performance indicators for these RIs be adapted to foster collaboration. At the moment, our impression is that RIs ferociously protect their member base because the number of interactions they have with them, the number of events to which SME leaders participate in, and so on are key performance indicators. This is not conducive to collaboration across RI. The recent years have seen the proliferation of innovation intermediaries, the increased complexity of the basket of services and programs offered, and the resulting lack of coordination will eventually slow down opportunities for radical innovation. As a consequence, putting in place a simple coordination mechanism, without rethinking the way in which the performance of these RIs is measured will not achieve the necessary change. Both go hand in hand.