CREATING A COOPETITIVE CONTEXT FOR KNOWLEDGE SHARING BY AN OUTLIER ORGANIZATION: THE CASE OF ATLAB AT CERN

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Abstract: The concept of coopetition is used in the literature to characterize firms' strategies in industrial and trade contexts. Little research is dedicated to the study of coopetition in scientific contexts. The contribution of this paper explores the following question: How can a scientific organization implement a coopetitive environment as a proactive strategy to create innovation? The ATLab case study explores an innovative initiative which aims to generate new technologies and ideas by creating a coopetitive environment for knowledge sharing. The implementation of such an innovative practice is based on a number of determinants, among them: a clear ambition, scientific and technical capabilities, and an open way in organizing the coopetitive context.

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1. Open science to facilitate exploration and discovery

In their reflection on the future of HEP (High Energy Physics), Boisot and Nordberg (2011) note that the organizations and institutions of countries in which new technologies are invented often lack the absorptive capacity (taken as an institutionalized know-how) to properly exploit them. Thus, while certain organizations and institutions bear the risks and costs of inventing new technologies for reasons of domestic infrastructure, others are often better placed to pick them up and profitably apply them. The argument applies to scientific no less than to technological discoveries. Countries in which new scientific knowledge is created may lack the absorptive capacity domestically to apply such knowledge productively.

Could we find fundamental new knowledge emerging in Europe but being entrepreneurially exploited in either North America or in developing Asia? HEP sees itself operate upstream, promoting the values of open science in order to facilitate exploration and discovery. The more players that take part, openly sharing their findings, the larger the areas at the adjacent possible (Kauffman, 1993) that can productively be explored. In the exploration phase it is win-win, and whatever is discovered in this phase is then available to all to further exploit. Yet exploitation, which often involves scaling up, is generally far more costly than exploration and, given the resulting need to secure higher levels of return, it is likely to be far more competitive and resembles more a zero-sum game between the players than exploration. In the exploitation phase, therefore, a concern with openness is likely to give way to a concern with closure, appropriation, and intellectual property rights (Foray, 2004).

The HEP community is now facing new challenges, in particular in terms of major new upgrades and consolidation pressures, which will start in 2013 since the LHC has entered a new phase of its history after the discovery of new particles (with data to be taken beyond 2022, in addition to the decision on the next generation accelerators that will be built in the next ten years). Moreover, they must consider the high level of industrial investments and R&D structure modes which are radically different compared to the initial construction period (before 1996). It is then necessary to reflect on new ideas to prepare for the future. In that respect, the HEP community is conscious that its strength is the capability of integrating new and complex technologies to solve difficult problems with a network that is very knowledgeable and proactive in benchmarking the technology market.

Looking ahead, it is necessary to think about how to create innovation and facilitate the emergence of new technologies for securing the upgrading of the detectors. For this, new ways to interact with industry have to be developed in order to get access to new ideas, flexibility has to be maintained in order to adapt to HEP's specific and often extreme needs, affordable solutions have to be found, both in terms of cost and time, and a new image to the public has to be created that conveys the usefulness of basic science in solving problems humanity faces, in order to foster and also justify the important public investments needed.

The meeting of both 'spheres' – science and industry- involves bringing together actors with different interests and having them converge in a common collective space where the synergies express a win-win game. The simultaneous presence of competition (industry) and cooperation (science) to form coopetition (as defined below) are to be considered at various levels.

2. Coopetition as a lever for innovation in knowledge based contexts

In an industry context, confronted with rapid technological change and global competition, inter-organizational collaboration has become increasingly important to improve firms' competitiveness (Powell, Koput and Smith- Doerr, 1996). As stated by Bengtsson et al. (2010), since the mid-1990, an increasing body of research highlights the fact that competition and cooperation behaviors coexist and simultaneously influence the strategic operations of firms and other organizations (see for example Gnyawali, He and Madhavan, 2008; Walley, 2007). We retain here two conceptualizations of coopetition that lead to two complementary definitions revealing two levels of analysis.

In their seminal book on coopetition published in 1996, Nalebuff and Brandenburger define coopetition at a network level as relationships in a value net of customers, suppliers, complementors, and competitors that together add value to the firm. They argued that coopetition in a value net arises, for example, when two computer manufacturers compete with each other but simultaneously complement each other in the value net by cooperating with software producers. Also, two competitors can cooperate to create the value needed to compete with a third firm. Nalebuff and Brandenburger and their followers consequently view coopetition as the sum of many different relationships where the cooperative and competitive part of the relationship is divided between different actors. Such a conceptualization is often used in the literature on coopetition in networks and industrial districts (see for example Dei Ottati, 1994; Lado, Boyd and Hanlon, 1997; Levy, Loebbecke and Powell, 2003; Bonel and Rocco, 2007).

At the interorganizational level, focusing on mutual relationships, Bengtsson and Kock (1999) suggest that coopetition should be defined more narrowly to allow for a better grasp of the tension and complexity that follows when two or more firms simultaneously cooperate and compete. Hence, the authors view cooperation and competition as two interrelated parts of mutual relationships. Bengtsson and Kock also argue that the different parts of the coopetitive relationship are divided between activities; for example, two or more competitors can cooperate in product development or technology upgrades and at the same time compete in taking orders, attracting customers, or attaining market share. A consequence of this view is that coopetition comprises cooperative interaction related to one activity and competitive interaction with the same firm related to another activity (see for example Gnyawali and Madhavan, 2001; Tsai, 2002; M'Chirgui, 2005; Gnyawali, He and Madhavan, 2008; Mariani, 2007; Padula and Dagnino, 2007).

The concept of coopetition is used in the literature to characterize firms' strategies in industrial and trade contexts. Little research is dedicated to the study of coopetition in scientific contexts. The contribution of this paper explores the following question: How can a scientific organization implement a coopetitive environment as a proactive strategy to create innovation?

3. Method

In order to shed some light on the questions mentioned above, we will look at one of the few initiatives that propose a new way to combine the efforts of scientific institutions and commercial firms in the development of new technological solutions: the ATLAB platform developed by the ATLAS Collaboration at CERN.

Started two years ago, ATLab (ATLAS Technology Lab) is a centralized platform or interface which aims to facilitate technology exchange with external industrial partners outside the ATLAS Collaboration at CERN, across different ATLAS Upgrades and R&D projects, by obtaining complementary funding (e.g. from the EU). In this regard, it offers external partners an integrated test environment for new technology products and ideas. With methods to scan the market potential for new concepts and ideas, ATLab represents a technology-market meeting point. In the spirit of openness and sharing, there is no membership fee to join ATLab.

Our approach to this research will be based on an in-depth case study. Case-based exploratory methods are appropriate to tackle a phenomenon that is poorly understood (Eisenhardt, 1989), has multiple and complex elements (Dodgson et al. 2008) which evolve over time (Langley, 1999). An in-depth study exploring details of a multi-faceted and paradoxical phenomenon is the best way to understand difficulties associated with the management of a coopetitive strategy (Gnyawali and Park, 2011). ATLab is currently in its development phase. In terms of data collection, primary sources are based on interviews of the initiators and stakeholders of the project, complemented by secondary sources like documents and presentations at CERN conferences. Data analysis follows qualitative criteria (Eisenhardt and Graebner, 2007; Miles and Huberman, 1994; Yin, 2003) based on a thematic content approach.

4. Results

The ATLab case study explores an innovative initiative which aims to generate new technologies and ideas by creating a coopetitive environment for knowledge sharing. The implementation of such an innovative practice is based on a number of determinants, among them: a clear ambition, scientific and technical capabilities, and an open way in organizing the coopetitive context.

An ambition to lead and build a clear strategic vision

The initiators defend clearly their ambition for the ATLab idea and are very specific about what ATLab is and is not in terms of pursued objectives. ATLab’s ambition is: not about R&D contract research but mutual benefits; not about making money but sharing knowledge; not about hording IP but creating new value; not about technology transfer but about knowledge transfer. This ambition is coherent with the ATLab mission which consists in offering a platform to channel complementary resources for HL-LHC (High Luminosity–Large Hadron Collider) related ATLAS R&D and technology development; and providing an appropriate entry point for external partners to access, contribute to and adapt ATLAS technologies for future use (see Figure 1).

ATLab seeks to develop the following services:

- Technology Development: prototyping of (future) ATLAS technologies with external partners exploring possible new areas of use and addressing technological needs

- Impact analysis: assisting partners in the development and evaluation of possible usage plans
- Promotion: common showroom and events for technology developments carried out in ATLAS institutions

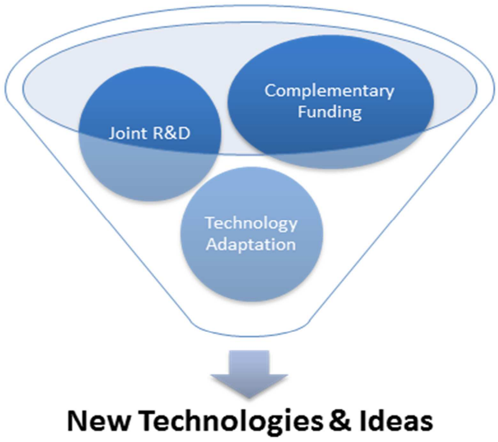

Figure 1. Process of generating new technologies and ideas
(Source: Nessi M. and Nordberg M. 2012)

Scientific and technical capabilities

Based on the technology of the ATLAS detector, the HEP community and the CERN brand image, ATLab benefits from scientific and technical capabilities that constitute its core competence, which in turn enables it to build such an innovation initiative. More precisely, ATLAS develops several strengths as shown in Table 1.

A huge academic network, scattered across the planet (~200 University and national laboratories) capable of carrying out R&D efforts in an effective way
A test environment unique and very demanding, where new products and ideas can be proven and challenged (the ATLAS detector)
A long tradition in the scientific community in establishing effective collaborative efforts on long and complex projects, with a very high rate of success
The established brand name associated with the community and with CERN
Cost efficiency in shared R&D to lower threshold for external partners (in particular SMEs)
Access to established world-wide network of experts (4000 people in ~200 universities in 38 countries)
Gaining from ATLAS as experienced partner in management and controlling of complex development projects
Gaining access to related high-tech markets
Exchange of knowledge and training of partners’ staff with world-leading technology experts
Technology advantages: • Access to CERN/ATLAS infrastructure and technologies • Interface to international top level academic research • Fast access to expert network

Table 1. ATLab strengths through ATLAS

Organizing the coopetitive environment: ATLab as a structural node

The way the coopetitive environment is organized through the ATLab initiative shows mainly that it is necessary to structure the platform so that technology expertise can be provided as well as support activities in terms of planning and administration. At each stage ATLab is present and plays the role of coordinating and facilitating the partnering process. Table 2 shows the ATLab organization.

Technology development	• Provides technology advise and adaptation to partner • Develops application prototypes together with partner • Composed of ATLAS (and possibly CERN) technology experts
Adaptation planning	• Assistance in developing plans for external applications (product, scientific instrument) adaptation outside HEP, in collaboration with selected Business Schools or Economics Departments
Administration	• Coordination of partner linkages (eg. EU-funded initiatives) • Controlling and financial management of selected projects • ATLAB Infrastructure management (showroom and laboratory supervision) • Provides access to site and administrative support to partners • Interfacing with CERN (Legal issues, agreements, finance services)

Table 2. ATLab organization

As for the ATLAS Collaboration, the main juridical tool called "ATLab Partnership Agreement" consists in signing a Memorandum of Understanding (MoU) with all its external partners (individually). The MoU allows defining precisely the following elements:

- Identify areas of common interest (ATLab Technology Programs, potential EU-programs etc.)
- Agree on the nature of collaboration and level of expectations
- Agree on the sharing of technology and related information
- Agree on the basic principles of complementary funded projects
- Ensure complementarity and non-competitive positioning with the other external ATLab partners in a Technology Program

Besides, the ATLab Operating Guidelines are based on the operation principles of both the ATLAS Collaboration and CERN. The open dimension constitutes here the norm and appears through the guiding principles of the ATLab MoU as follows:

- The nature of the scientific and technological exchange is open
- ATLab will not protect any possible new ideas or products resulting from the contributions made from the ATLAS side
- ATLab will only use the (integrated) results of the exchange for the R&D/upgrade purposes of ATLAS
- ATLab will not sign any non-disclosure agreements

- External partners are free to make best use of the results (possible concerns of confidentiality need to be identified and addressed)
- ATLab facilities are access-free, open.

5. Discussion and conclusion

The objective of this contribution is to highlight the characteristics of an innovative partnership initiative which connects a scientific organization to industrial organizations to help create emerging technologies and ideas.
The ATLab initiative is an exemplary case, all the more interesting because of its scale and because it is driven by the scientific side, where it is more common to see this type of project emerge from the industrial side (cf Bell Labs or Microsoft Innovation Lab for example).
This innovative practice is based on the creation and the organization of a coopetitive environment which is characterized by openness and the voluntary nature of actors' engagement, where ATLab plays the role of structural node and facilitator of the learning process. Beyond the exemplary nature of the case and the description of the organizational modalities of the partnership, it also points to the importance of making scientific outcomes and the knowledge it generates available to a broader audience of interested actors (be they for-profit or not-for--profit), since this is the source of innovation and societal benefit.

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