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Centech, a world-class business incubator based in the Montréal innovation district, inspired by Barcelona 22@

Abstract

The objective of the paper is to highlight the process behind the design and development of Centech, a world-class incubator located in Montreal and recognized as one of the most successful university incubators in the world. Centech is housed in a cultural heritage building, the old Dow Planetarium, situated in the heart of the innovative district of Montréal, the "Quartier de l'innovation" (QI). Based on a methodology using different sets of data (interviews, series of reports made for the Montréal-Barcelona Summer School on Management of Creativity and Innovation, etc.), the paper shows how the development of Centech was in large part inspired by 22@Barcelona. The conclusion highlights the importance of an iconic collaborative place in the building of a local ecosystem of innovation.

Keywords: Innovation district, space of collaboration, incubator, creative city

Centech, una incubadora de negocis d'escala mundial amb seu al districte de la innovació de Montreal, inspirat pel 22@ Barcelona

Resum

L'objectiu de l'article és destacar el procés que es troba al darrere del disseny i desenvolupament de Centech, una incubadora d'escala mundial situada a Montreal i reconeguda com una de les incubadores universitàries més exitoses del món. Centech es troba en un edifici que és patrimoni cultural, l'antic Dow Planetarium, situat en el cor de l'innovador districte de Montreal, el "Quartier de l'innovation" (QI). L'article mostra com el desenvolupament de Centech va ser en gran part inspirat pel 22@BarBarcelona, a través d'una sèrie d'informes fets per a l'Escola d'Estiu Montreal-Barcelona sobre Gestió de la Creativitat i la Innovació.

Paraules clau: districte d'innovació, espai de col·laboració, incubador, ciutat creativa

Centech, una incubadora de negocios de escala mundial con sede en el distrito de innovación de Montreal, inspirado por el 22@Barcelona

Resumen

El objetivo del artículo es arrojar luz sobre el proceso existente tras el diseño y desarrollo de Centech, una incubadora de alcance mundial situada en Montreal, y reconocida como una de las incubadoras universitarias más exitosas del mundo. Centech se encuentra en un edificio que es patrimonio cultural, el antiguo Dow Planetarium situado en el corazón del distrito innovador de Montreal, el "Quartier de l'innovation" (QI). El artículo muestra cómo el desarrollo de Centech fue en gran parte inspirado por el ejemplo del 22@Barcelona, a través de una serie de informes realizados para la Escuela de Verano Montreal-Barcelona sobre Gestión de la Creatividad y la Innovación. La conclusión subraya la importancia de un lugar colaborativo icónico en la construcción de un sistema local de innovación.

Palabras clave: distrito de innovación, espacio de colaboración, incubadora; ciudad creativa

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1. Introduction

The project of developing an innovation district in the heart of Montréal (“le Quartier de l’Innovation”, hereinafter “QI”) started in 2009 under the leadership of an engineering school, l’École de Technologie Supérieure (ÉTS). The QI was incorporated as a non-profit organization in May 2013 by ÉTS and McGill University, and later joined by Concordia University and the Université du Québec à Montréal (UQAM). This alliance aimed to combine each institutions strengths and complementarities in research, training, innovation and entrepreneurship, as well as their regional and international networks. In addition to its member universities, the QI is financially supported by the City of Montreal, the Government of Québec and the Government of Canada, and 25 corporate and academic partners.

The “Quartier de l’innovation” of Montréal is located in Griffintown, an historic neighborhood of Montréal that played an important role in the industrial revolution which started in the 19th century, both as an industrial neighborhood with small businesses, artisans, and factories, and as a residential neighborhood for workers.

To a large extent, the idea of developing the QI in Montréal was inspired by similar innovation districts in the world such as the Boston Innovation District, but by far the main source of inspiration was undoubtedly the 22@Barcelona district. The director of ÉTS at this time was convinced that 22@Barcelona was a model to follow, and he commissioned a series of studies to be carried out by the participants of successive “Summer Schools of Creativity and Innovation” (from 2010 to 2014) organized by HEC Montréal and the University of Barcelona, to explore the 22@Barcelona district and capture the main factors of success for developing the Montréal QI.

One of the main lessons drawn from 22@Barcelona was the importance of developing an emblematic location, as a node to foster, incubate and accelerate entrepreneurial projects, like Barcelona Activa, to raise the profile of the innovation district. The location of the old Montréal planetarium quickly becomes the best option. Its central location in the neighborhood and its proximity to ÉTS, makes it an ideal space for developing quality interactions between the business, academic, scientific, and artistic communities, and for connecting academic competences with industrial practices.

The former Dow Planetarium was thus selected to house Centech, ÉTS' technological entrepreneurship center. This business incubator, dedicated to deep-tech companies with high growth potential, is a non-profit organization open to everyone and offers two support programs for startups: the *Acceleration* program (12 weeks), where the biggest potentials are selected to then move on to the *Propulsion* program (24 months) which oversees the actual launch of the company and focuses on the execution of the plan, and a *Collision* program, to foster collaborations between large firms and start-ups on emerging technologies. In 2019, Centech was recognized by the *Ubi Global World Rankings Report of Business Incubators and Accelerators* as one of the most successful university incubators in the world (Meyer and Sowa 2019).

The aim of the paper is first to highlight, through the different reports made for the Montréal-Barcelona Summer School on Management of Creativity and Innovation (see Box 1), how Barcelona Activa and Barcelona 22@ provided major sources of inspiration for the Montréal QI.

After briefly reviewing the significance of incubators in urban innovation systems, we introduce the conceptual framework of the “middleground” (Simon 2009, Cohendet, Grandadam and

Simon 2010, Grandadam, Cohendet and Simon 2013) as a lens to analyze the functioning and positioning of Centech in the innovation district.

Then we focus on the story of the design and development of the Centech, which acts as a magnet to attract startups and as a cultural heritage for Montrealers, as well as a place to couple academic competences with industrial practices.

We argue that Centech plays a unique role of “middleground” for the innovation district by being an innovative platform that connects the companies and organizations of the “upperground” (firms like Thales, Dassault Systèmes, Deloitte, National Bank or Amazon Web Services..., and institutional funding programs like Prompt, a provincial public fund for innovation, etc.) with the talents, creative collectives and entrepreneurial communities of the “underground”. We then discuss the present limitations of the project and point to potential paths for future developments, to enhance its role in the QI and the community, over and beyond pure business outputs.

2. Conceptual framework

Innovation models and practices are evolving along with the socio-economic context. As the “Open Innovation” paradigm emerged at the end of XXth Century, it rapidly became the dominant design of innovation (Chesbrough 2003). In the context of cities and regions, innovation systems increasingly appear as rich ecosystems, shifting from a double, to triple, to quadruple “helix” (Carayannis and Campbell, 2009 and 2012), inaugurating new models of open collaboration for innovation involving a wide array of diverse stakeholders: academic research, public organizations, private organizations (large firms, SMEs and startups) and citizens — as users and contributors —, through associations and “the plural society”. In this context, Mérindol and Versailles argue than many different versions of “open labs” are

emerging and flourishing as an organizational solution to the integration of multiple heterogeneous stakeholders, at different steps of the innovation value-chain (Mérindol and Versailles 2017; Mérindol et al. 2016). Among these “open labs” and initiatives of connection and co-location of stakeholders, incubators appear to generate the most significant economic results in the context of regional systems of innovation, in terms of new firms creation, innovation projects for established firms, and overall economic results (Madaleno et al. 2018, Harper-Anderson and Lewis 2018). Analyzing the roles and activities of incubators, Van Rijnssoever also concludes they play a key connecting role as intermediaries in innovation systems, and that their “systemic benefits (...) also greatly enhance their societal value proposition” (2020).

In a series of papers questioning the flow of knowledge and ideas that feed entrepreneurial endeavours and innovation in the context of the “creative city” (Landry 2000, Florida 2002), Cohendet, Grandadam and Simon introduced the concept of “middleground” (Simon 2009, Cohendet, Grandadam and Simon 2010, Grandadam, Cohendet and Simon 2013). The authors suggest that the dynamic of an innovative district relies on the interactions between three layers of stakeholders, activities, and knowledge bases: the *upperground*, the *middleground* and the *underground*. New innovative ideas emerge, circulate, expand and find their way to the market through the constant interactions between these three layers and transit from an informal micro-level to a formal macro-level, and vice versa. The *upperground* is the level of formal institutions such as large corporations, creative or cultural firms or institutions, whose specific role is to bring creative ideas to the market (Howkins 2001). Conversely, the *underground* is constituted by creative individuals such as individual entrepreneurs, passionate scholars, techno-geeks, artists or other knowledge workers, who are individuals not immediately linked to the commercial and industrial world: underground culture lies outside the corporate logic of

standardization (Arvidsson 2007). In between the *upperground* and the *underground*, a key role is played in an innovative district by the *middleground*, which is the level of common platforms necessary for the exchange, transmission and learning of knowledge that enables innovative ideas to reach the market. According to Grandadam, Cohendet and Simon (2013), the dynamic of the *middleground* as a platform of interactions relies on the following mechanisms: “place”, “space”, “events” and “projects”. Each one of these layers intervenes with specific characteristics in the creative process and enables innovative ideas.

- *Places*: As physical locations — a building, a lab, an artistic venue, a public square... — open and accessible to different stakeholders, places can be defined as “the realm of near, intimate, and bounded relations” (Amin and Cohendet 2004). They activate the linkages between different people, enabling them to co-opt shared understanding or to interpret particular performances on the basis of their own tacit and codified knowledge. In addition, they favor not only the diversity of creative communities, but also provide continuous and ever-renewed opportunities to intertwine communities, transfer knowledge across and within communities, and accelerate the translation of ideas and practices. Places also bear a symbolic dimension, through the significance of their location, the history of the building or its architectural features. They offer a reference point to go to for external stakeholders interested to connect with experts and/or contribute to the key challenges addressed by the middleground community.
- *Spaces*: Spaces are “the realm of far, impersonal, and fluid relations” (Amin and Cohendet 2004). In other words, while places should be considered as physically established, *spaces*, on the contrary, appear as cognitive constructions. They are constituted by the epistemic questions around which the stakeholders of the middle

ground gravitate and their associated knowledge bases and exploratory practices. Spaces provide the local milieu with cognitive platforms of knowledge, where different communities can get together, exchange views, and generate new ideas both locally and more globally. An active middleground translates, transforms and confronts local ideas with knowledge and practices issued from different local experiences and potentially different parts of the world. It is a node of multiple connections of varying intensity and geographical distance. Spaces are necessary to give a consistency to the middleground and nurture the debates between stakeholders, to activate the cognitive role of local places, to widen the local buzz to other communities, to strengthen the global pipelines, and to help bring the local underground to the surface.

- *Projects*: Projects usually target local communities, for them to produce and promote work from its members, foster diverse reactions and comments, and stimulate renewed inspiration. This drives the communities' members to engage in conversations and work together. In these communities, members communicate regularly with each other about their practices through informal cognitive spaces with more or less open boundaries, where people meet and trade knowledge in a not-so-organized way.
- *Events*: Events are essential to revive and refresh the creative process by opening these small worlds to new global influences. In turn, this phenomenon stimulates a process of institutionalization aimed at bringing the project or event to potential producers or consumers (Bathelt, Malmberg and Maskell 2004). The buzz may also expand and reach out to other more distant communities. Local communities often interact on the outside world with specialists of the same focus of knowledge, sometimes even with members of competing firms who share the same interest for a given practice.

From this conceptual framework, we analyze the case of Centech as a “middleground” for the innovation district of Montreal, along the following parts: In part 3, we expose the methodology relying on a series of several research reports from the Summer School on Creativity between Montreal and Barcelona; in part 4, we highlight how the innovation district of Montréal was inspired by Barcelona 22@; in part 5, we expose the history of the Dow Planetarium which is the location of Centech; in part 6, we detail the current development of Centech; followed by a discussion in part 7.

3. Methodology

This paper draws from a diverse set of data. In 2010, the director of ÉTS mandated Mosaic to organize a first co-design session on the emerging idea of an innovation district in Montréal, inspired by 22@, leveraging the second edition of the Creativity Summer School between Montréal and Barcelona (See Box 1). This first event led to the production of several research reports from 2010 to 2014 (Langlois and Pawlak 2010, Capdevila et al. 2011, Buisson et al. 2013, Oliveira et al. 2013, Rhimbassen et al. 2014). The authors also developed direct relationships with 22@ promoters and introduced 22@ as the topic of roundtables, field visits, and action-research projects in the following editions of the Summer School, giving it the status of a longitudinal case-study. Data sets were complemented with regular consultation of the website and institutional documentation. The authors also stayed regularly informed about the developments of Montréal QI, through direct connections and institutional documentation. For the specific data collection on Centech, the authors performed a series of interviews with the executive team and with different stakeholders of Centech.

Box 1: The Montréal-Barcelona Summer School on Management of Creativity and Innovation

The Summer School on Management of Creativity in an Innovation Society was initiated by HEC Montréal, in collaboration with the University of Barcelona. Launched in 2009, the Summer School offers a unique program for the creation and transfer of knowledge that is innovative and appropriate to the changing socio-economic reality. Since its launch, it has witnessed the creation of an international community (over 900 alumni from 40 different countries). The Summer School fosters interdisciplinary knowledge sharing of best practices on creativity and innovation, engages with actual challenges with firms and institutions, and co-creates well beyond the end of the Summer School itself.

This 2-week intensive program was designed to compare creative approaches and practices from a diversity of disciplines, cultures and backgrounds. The participants represent a mix of professionals and managers from diverse industry sectors, graduate students from different fields of study, academics from leading research institutions, and decision-makers. The interdisciplinary, international, and intergenerational nature of the course encourages comparative reflection on organizational, economic, institutional, and political best practices.

The Summer School adopts an interactive approach with emphasis on professional visits — both in Montreal and in Barcelona — to creative industries and organisations, to innovative places and spaces, as well as creativity workshops and lectures. It is very much a learn by doing program: a living lab for generating and experimenting with new ideas, new concepts, and new innovative processes.

In addition to the faculty from HEC Montréal and the Faculty of Economics and Business at the University of Barcelona, participants learn from academics from leading research centres in creativity and innovation management from the Catholic University of Lille, Cass Business School, City University of London, Osaka University, Toyo University, Université de Strasbourg, among others. Leaders from creative companies and prestigious speakers from a wide array of sector supplement the faculty. The program also draws and builds on the experience of its participants to illustrate learnings and facilitate the link between theory and practice.

The iterative nature of the program enables the progressive collective production of a codebook for the best practices of management of creativity for business, social, and institutional innovation. The dynamics of learning at the Summer School is enriched by the collective experience of field visits in two countries and direct exchanges with innovation managers and creative professionals. One of the strengths of the Summer School experience is that it takes participants to the very places of innovation and creativity. These journeys foster emotion, leverage diversity to elicit sharing, and confront discourse with actual field experiences. During the different editions of the Summer School, a consistent specialization has emerged in accommodating business, social, cultural or environmental challenges that require new forms of approach and analysis. Such was the case for the Quartier de l'innovation de Montréal during the 2010-2013 editions of the Summer School, and other Challenges submitted to subsequent editions of the program. The value of working on a Challenge — an actual project with deliverables, sponsored by one or several partners — within the Summer School context is the exposure to new perspectives and new ideas that one would not otherwise have been exposed to in the regular course of one's job. Such challenges could be considered as forms of "action research" (Reason and Bradbury 2001, Rowell et al. 2015), a methodology of research and of critical reflection seeking transformative change through the simultaneous and iterative process of doing research and engaging with action. Thus, the Summer School acts as an accelerator of creativity and innovation.

4. The Montréal innovation district inspired by 22@Barcelona

In 2010 the director of ÉTS suggested to the Summer School organized by Mosaic-HEC Montréal and the University of Barcelona to explore and investigate the 22@Barcelona district. His vision was that a similar district could be designed in the Griffintown district, which shared strong similarities with the 22@Barcelona district. A team of participants of the 2010 edition of the Summer School (which included faculty members from ÉTS) inspired by their visit at the 22@ Barcelona district came back and wrote a report on the possibility to develop an innovation district in Montréal. The impact of the report was such that the director of ÉTS commissioned three more consecutive studies to the 2011, 2012 and 2013 editions of the Summer School (Langlois and Pawlak 2010, Capdevila et al. 2011, Buisson et al. 2013, Oliveira et al. 2013, Rhimbassen et al. 2014). In particular, the 2012 report suggested that the former Dow Planetarium could become the emblem of the innovation district. The vision was that instead of being dedicated to the popularization of astronomy and space exploration, the Dow Planetarium could be dedicated to the generation and diffusion of creative and innovative ideas. The following results are issued from these reports.

City similarities

When comparing Montréal and Barcelona, it becomes clear that there are important similarities between the two cities and their neighborhoods. Both are the economic capitals of their respective provinces and operate within an autonomous government from the central government. The question of Catalan identity is similar to that of Quebec: both have a different official language and both demand recognition of their distinct status. In terms of geography and territory, there are also several commonalities between the two cities. Although Montréal is three times larger than Barcelona in area (365 km² vs. 101 km²), the population of the two

metropolises is almost identical with 1.6 million inhabitants. Even when considering the large agglomerations, the populations are similar in proportions (4.4 million for Barcelona and 3.6 million for Montreal). Moreover, both cities are near a border with a major country and thus serve as a hub for imports and exports (from the US and France).

With regards to the two concerned areas, respectively 22@ Barcelona and Griffintown Montréal, these neighborhoods are similar in size (2 km²) and are located on the waterfront, near the port and very close to downtown. Both areas are former industrial areas that have marked the development of their city:

- Poblenu in Barcelona where the current 22@ district is concentrated, experienced the great years of industrialization from 1860 to 1960. One of the reasons for this was the establishment of the first Spanish railroad, which passed directly through the neighborhood. The metal, textile, food and wine industries as well as construction were the main activities of the neighborhood. However, agriculture is not to be neglected, as it has always coexisted with heavy industry. The deindustrialization of the 1960s was caused by the appearance of the free zone, which replaced Poblenu as the new industrial center. The desertion of the neighborhood by heavy industry left many factories and buildings in disrepair. Between 1963 and 1990, 1300 companies left the area (Capdevila et al. 2011). Manufacturing activity was mainly replaced by transportation-related activities, which further contributed to the desertion of the district by its inhabitants.
- Griffintown, Montreal's Sud-Ouest district has followed a similar path. “Originally a rural community, the neighborhood became an emblem of the history of industrialization and a precursor to the transportation revolution in Canada with the

first opening of the Lachine Canal in the late 19th century. This factor led to the establishment of several industries, notably metallurgy and manufacturing, on the banks of the canal, and the neighborhood grew rapidly. However, the increase in the size of ships forced the maritime traffic to reorient itself: the size of ships forced the maritime traffic to be redirected towards the Saint Lawrence River in 1970, and it is from this moment on that the district experienced the exodus, industrial and demographic exodus that still characterizes the district today.” (Capdevila et al. 2011).

Another point of convergence between the two districts is the strong involvement of some major university establishments (Pompeu Fabra University and University of Barcelona in the case of 22@Barcelona, ÉTS and McGill in the case of the Montréal QI). In both neighborhoods, it is clear that the university presence plays an important role and that a great deal of effort must be put into inter-university and university/business synergies. However, this role will be much more central in Montréal since the initiative for the project comes from ÉTS and McGill, with the goal of becoming a dynamic player in the Montreal economy.

Some differences between the two districts:

If the industrial boom followed by the decline of the neighborhoods is similar, the recovery enjoyed by Poblenou is very different from the early recovery in southwest Montréal. Poblenou became connected to the Barcelona metropolitan area, the port and the airport through the construction of the infrastructure necessary for the 1992 Olympic Games, including the construction of ring roads. The creation of the Olympic Village on the Mediterranean coastline of this district gave Barcelona its first coastal residential area and rekindled public interest in this former industrial area. Finally, the opening of the extension of Avinguda Diagonal in 1999

accelerated the debate about the future of the neighborhood and led to the plan known as 22@ in July 2000. Thus, the neighborhood has been completely transformed in the span of a decade.

This is not the case in Montreal's Griffintown neighborhood. No concrete plan or large-scale events have been carried out to promote the revitalization of the neighborhood. ÉTS moved into the area in 1997 and despite efforts to build an integrated campus, the neighborhood as a whole has not been able to take advantage of the new infrastructure. Though the Bonaventure Expressway refurbishment project has been discussed for many years, nothing has yet been done.

Yet, the revitalization of the district must inevitably go through this operation, in order to connect the area to the rest of downtown, from which it is currently isolated. Thus, rather than being propelled by an international event, the Quartier de l'innovation de Montréal project will have to draw its resources from a collective strategy of re-urbanization and development.

To sum-up, when comparing Barcelona 22@ and Montréal QI, some important similarities could be highlighted. First, in terms of geographical scope the two districts have a comparable size and location on a waterfront, near the port and very close to downtown. Second, in terms of socio-economic contexts, both districts are former industrial areas that have marked the development of their city. Third, in terms of support from universities, both districts host prestigious universities. However, with regards to the urban regeneration plan, the two districts differ: while a coherent public program accompanied the development of the district in Barcelona (including the building of some major infrastructures), the development of the Griffintown area surrounding the innovation district of Montréal was essentially led by private real-estate promoters, without a publicly organized strategy of re-urbanization.

5. The Dow Planetarium as the core of the Montréal QI

One of the main lessons from Barcelona 22@, that was already noted by the 2010 Summer School participants, was the importance of having an emblematic structure in the heart of an innovation district, as an inspiring platform to encourage collaboration, social diversity and sharing knowledge. The participants were inspired by the role of Barcelona Activa in the core of the 22@ district as a local vibrant development agency fostering quality employment, boosting entrepreneurship, and supporting sustainable business fabrics. Sharing this view, the director of ÉTS was convinced that the old Planetarium of Montréal, close to downtown in the Innovation District and surrounded by buildings from ÉTS, was potentially a perfect strategic location. The planetarium was inaugurated in 1966, just before the International and Universal Exposition Expo 67. It welcomed 6 million visitors and thousands of exhibits between 1966 and 2011. The structure closed in October 2011 and was left abandoned, waiting for a new purpose.

Thus, the director of ÉTS commissioned teams of participants of the 2012 and 2013 editions of the Summer School to work on a project of transforming the old planetarium into a hub of creativity and innovation as an emblematic building, inspired by Barcelona Activa. The vision was that a central architectural structure was needed: 1) to build the identity and the visibility of the innovation neighborhood; 2) to shape its image, and 3) to allow the communities living and working in the neighborhood to develop a sense of pride and belonging.

The Summer School teams worked firstly on the history of the old Planetarium. The Dow Planetarium was the first public planetarium in Canada. Its creation in 1966 was made possible by the financial support of the Dow Brewery to contribute to the education and promotion of science, especially space and astronomy. As an example, the exterior structure which is inspired

by the planet Saturn takes the form of a parallelepiped topped by a cylinder. The upper part reveals the existence of the dome, characteristic of the projection spaces of modern planetariums, with a circular geometry for the presentation of original productions dedicated to the popularization of astronomy and space exploration. Classified as an historical site of Montréal, the City of Montréal did not allow the Planetarium building to be modified from the outside.

Secondly, the teams of the Summer Schools, while insisting on the priority to preserve the memory of this emblematic Montréal location, suggested that its rehabilitation should accommodate the main values and principles that guide the development of Barcelona Activa: A platform to encourage innovation, creativity, collaboration and social diversity; a hub where diverse participants could experiment advanced tools and technologies; a laboratory of ideas and uses that brings together people from different backgrounds (companies, engineers, social science researchers, scientists, artists, etc.).

Besides designing a space to promote cross-fertilization between the academic and industrial milieux', the reports of the Summer School underlined the importance for such a platform to be open to the general public, including the Griffintown residents, so that they find a space they are motivated to visit, either to meet with neighbors or with other visitors. Although there is a considerable daily influx of students around the planetarium, Griffintown in general and Chaboyer Square specifically (where the planetarium is located) are not places where Montreal residents and visitors are used to wander and stroll. The attraction of visitors is important to give life, recognition, and dynamism, not only to the emblematic building or to the innovation district, but to Montréal which aims at being a creative city recognized worldwide. In the creative economy, Montréal seems to have indeed all the right ingredients to become a global

leader: creative industries, smart and talented people, renowned universities and amazing events. In such a perspective, the reports emphasized that the city needs to identify, valorize and support a physical space — a creative hub — in which this potential can be put to use, and the old planetarium can be such a venue.

To a large extent, the architects that carried out the rehabilitation of the old planetarium have taken into account the values and principles that have been detailed above. The former Dow Planetarium is now home to Centech, a non-profit incubator to support technology and entrepreneurship of the *École de Technologie Supérieure* (ÉTS).

As underlined by the architects of the firm MSDL in charge of the transformation of the old Dow Planetarium, the center of the building is accessible on all sides, with a circulation path leading to glass-walled meeting rooms, as well as a café, other meeting spaces, and an ideation room. Thus, the center of the building is clearly designed to be the heart of the incubator, destined for unexpected encounters, for the serendipity that is often the source of great discoveries. The use of glass partitions creates transparency and openness in the spaces, allowing users to benefit from natural light throughout the building and to see the activities taking place there, creating a synergy that favors exchanges. Most of the interiors of these spaces are light and bright, with white walls and concrete floors, while black ceilings create a dramatic contrast. Structural concrete pillars and posts reveal the original construction and are left uncovered for an industrial feel

The formal architectural language used to renovate the building makes the principle of openness and evolution perceptible: from the walls composed of a juxtaposition of vertical slats to the concentric circles that are superimposed on the plane, everything is a rotation mechanism. The exploration of the site revealed how interesting the concrete framework of the circular space

overhanging the projection dome was, and how the height and truncated spherical shape of the roof structure made the space unique. These observations led to the decision to work with a mezzanine not attached to the existing structure in order to leave the space in its original form and integrity. Inspired by the perpetual motion of the Universe and the curious complexity of ancient instruments, such as the astrolabe or the Orrery machine, the architectural intervention transforms the former Dow Planetarium into a dynamic space that utilizes cosmic motion, rather than explaining it.

6. Centech: the current development

Founded in 1996, Centech is one of the oldest incubators / accelerators in Canada. It's a non-profit organization and its mission is to accelerate and power high technology businesses called deep-tech startups. Deep-tech startups are companies that require lengthy research and development and large capital investment before successful commercialization (De la Tour et al. 2019). Traditional incubator at the start, Centech made a major shift in 2016 to increase the number of companies created and accelerate the launch of these. Saving time for innovators started to be an important key performance indicator for Centech. As Centech's CEO underlines, Centech aims at transforming "technopreneurs" having high potential innovative ideas into a true company having commercial successes with a product well connected from the onset to market needs.

In 2021, along with Velocity in Waterloo, ON, Centech was considered as the strongest incubator for the Internet of Things (IoT) and deep tech in Canada. Centech is recognized as a pragmatic incubator that works with entrepreneurs who address specific industry needs and thus contributes to the success of these entrepreneurs. Centech performs particularly well in subsectors such as medical devices, industry 4.0, telecoms, electronic, energy, aerospace and

other sectors using deep technologies. These domains were a natural selection because Centech is surrounded by many engineers and scientists in these fields. Its mandate is to support talented innovators who apply new technologies to develop tangible products that can solve real challenges. Therefore, Centech adopts more of a problem-solving approach rather than a “techno-push” approach, too often seen in the start-up world, especially in deep-tech. Entrepreneurs in Centech mainly focus on deep technologies in domains where the time to market is often longer and more expensive to launch than in pure software activities.

Centech offers two main programs: First, the Acceleration program, which lasts 12 weeks and serves to substantiate several elements of the business project including: the strength of the team, the traction of the product on the market and the scalability. During the last week, the best candidates are able to present their product and their business project in front of investors and angels in a private demo day. A week later, they give their final presentation with the goal of being selected for the Propulsion program. Second, the Propulsion program oversees the actual launch of the company and focuses on the execution of the plan. The selected entrepreneurs are supported for two years, with everything they need to launch the business and accelerate the product development. Everything is on the line: shareholder agreement, accounting structure, incorporation, trademark registration, financing, strategies for sales, design, regulation, production and distribution, etc. The main goal of these two programs is to create real SMEs with a product on the market, a starting sales pipeline and ready for growth.

Since 2018, Centech has its own open innovation lab, Collision Lab, where large corporations are supported to integrate technology projects thanks to the agility of startups and the entrepreneurial ecosystem. The large corporations are interested to connect to the Centech ecosystem, for two main reasons: the first is attracting talent. The second is how to do tech

scouting more easily. So far, the Port of Montréal, Ericsson, Siemens, Servier, Thales, Loto-Québec and CAE have begun to collaborate with Centech startups through the Collision Lab program. Results came fast with strategic innovation projects between these large corporations and some startups in portfolio. After one year, one of these won a major global prize for the best innovative project in the subsector.

More recently, Centech launched Boreal Ventures, the first early-stage venture capital fund dedicated to deep-tech companies in Quebec. This fund will support the development of pre-seed and seed-stage companies based on science and engineering. With an investment capacity of \$26 million, Boreal Ventures will support companies that have emerged from Centech and the Québec innovation ecosystem. Boreal Ventures will be able to count on the expanded multidisciplinary team of Centech to help with due diligence, operations and the outreach of the fund and the companies it supports. The companies targeted by this new fund operate in applied science sectors such as artificial intelligence, medical technologies, industry 4.0 and connected objects.

Since 2016, 1175 projects have been supported by Centech with a net creation of more than 45 new SMEs still growing, more than \$ 400 millions of capital has been raised by these new SMEs with more than 1000 jobs created, mainly in science, technology, engineering and mathematics (STEM). The survival rate after five years exceeds 65%. This unique value proposition, combined with the fact that Centech's services are free, and they take no equity or IP, means that entrepreneurs from all over Canada, and from different regions of the world are interested to gain acceptance into these programs.

7. Discussion

The above developments have highlighted the dynamic of formation of Centech, inspired by the experience of the development of 22@Barcelona. As a world class incubator in the heart of an innovation district, Centech exhibits the following major characteristics:

First, Centech is located in a cultural heritage building for all Montrealers and visitors. The recent expansion in 2018 into Montréal's old Dow Planetarium has helped Centech make its mark on both the Canadian and the global innovation stage. This unique position helps to explain the power of attraction of Centech for multiple stakeholders, and its capacity to permanently create collisions and synergies with startups, corporations, researchers and professors, and to bridge academic competences with industrial practices. This power of attraction of a cultural heritage building has been enhanced by the architects of the firm MSDL in charge of the rehabilitation of the old Dow Planetarium. The architects have developed the project around the concepts of revolution (about an axis) and the circle, transforming it into a dynamic place that becomes a generator, accelerator and source of inventions with a variety of new facilities: spaces to encourage encounters, collaboration and reflection linked to tools and advanced technologies; and spaces of social diversity and exchange platforms for sharing knowledge. With reference to the perpetual movements of the universe and the curious complexity of ancient instruments such as the astrolabe or the Orrery machine, the Montréal-based architects transformed the former planetarium not only into a place that visualizes the cosmic movement, but into a dynamic place which uses it. As we have underlined above, an open circular space accessible on all sides is located at the center of the building and is intended for unplanned encounters and opportunities that are often at the origin of the greatest discoveries. The proximity of Centech with the laboratories and equipment of ÉTS adds to the

power of attraction of the incubator. The startups have indeed access to equipment that is sometimes worth up to more than one million dollars, which they can utilize to develop their projects. This unique location as a cultural heritage, confirms the key role played by an emblematic location in the development of an innovative district. In Barcelona, Jean Nouvel's Agbar tower and the "green building" have thus become part of the city's identity and the dynamic of 22@Barcelona. In Toronto, Frank Gehry's new Art Gallery of Ontario and Libeskind's Royal Ontario Museum contribute to the image of a dynamic and creative downtown.

Second, the dynamic of the incubator strongly relies on a community of passionate scholars and entrepreneurs who support the CEO of Centech and his staff. There is no vibrant hub of innovation without a community of active members who takes care of the common platform of interactions between participants, who establishes interdisciplinary boundary crossing collaboration, who gathers the ideas, the skills, and the diverse types of knowledge required for the incubator, and who facilitates the work of younger entrepreneurs by connecting them with potentially helpful contacts from their personal networks.

Third, beyond the emblematic location in the heart of the innovation district of Montréal, Centech can also be considered as a "middleground" according to the definition given by Cohendet, Grandadam and Simon (2010). We analyze the role of Centech as a platform of interactions supporting the following mechanisms: "place", "space", "projects", and "events":

- Centech as a *place*: the above developments have highlighted the power of attraction of Centech as an emblematic location that can be considered as the realm of near, intimate, and bounded relations, physically established. The rehabilitated old Dow Brewery Planetarium facilitates not only meetings between professionals who are used to

working together, but unexpected encounters providing the serendipity that is often the source of diverse processes of innovation.

- Centech as a *space*: Centech, as a cognitive space, translates, transforms, and confronts local ideas with knowledge and practices issued from different parts of the world. The incubator is becoming a reference, which is an important source of inspiration for other incubators and intermediaries of innovation. The values, the vision and the activities of Centech are regularly diffused through publications, interventions in different types of broadcast, and in social medias. As a key element of the middleground, space activates the cognitive role of the local place, contributes to nurture the reputation of the incubator, widens the local buzz to other communities in the global world (Bathelt, Malmberg and Maskell 2004), and helps to bring the local underground to the surface.
- Centech as a platform of *projects*: through its two main programs, (the Acceleration program and the Propulsion program), Centech activates numerous projects that involve diverse participants. These projects usually target entrepreneurs and researchers for them to produce and promote work from their members, foster diverse reactions and comments, and stimulate renewed inspiration. Such collaborative forms of experience and collective learning drive the different communities' members to engage in conversations and work together. These learning experiences help to build trust and the desire to cooperate between participants which in turn could give rise to new projects and unexpected forms of collaboration.
- Centech as a platform of *events*: As is the case in Barcelona, where the existence of events such as the HiT Barcelona conference, the 22@breakfast, the 22@network or the different events organized by Infonomia are essential to the development of innovation

in the neighborhood, Centech organizes numerous events , such as the “networking events”, “start a tech-business events”, the “Age of AI”, etc. These events favor interactions between all the communities participating to the activities of the incubator, tighten the connections between the local and the global, and contribute to open the small local worlds to new global influences.

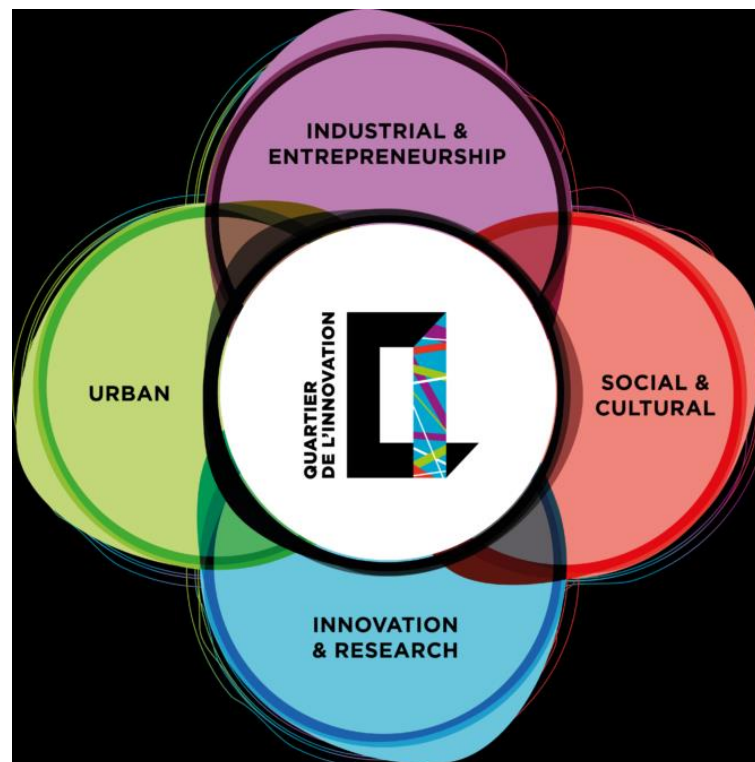
This key role of middleground played by Centech at the core of the innovation district of Montréal thus promotes a clear collaborative dynamic which enhances the reputation of the QI. As Grandadam, Cohendet and Simon (2013, 1703) emphasize, “within the middleground, agents do not compete against each other. Instead, they are expected to cooperate with one another voluntarily in closely knitted clusters and share their knowledge, thus boosting their creative power and that of others (Rosenberg 1982)”.

8. Conclusion and Futures Lines

As much as Centech can be considered a success as a deep tech incubator, acknowledged by international rankings (Ubi Global) and positive comments from entrepreneurs and industrial partners, the scope of its activities and their impact is still a matter of debates, especially with regards to the original Quartier de l’Innovation vision, inspired by 22@ (expressed in figure 1).

Even if Centech would be recognized as a core component of the Innovation district, the district can’t be limited to the incubator, however, the activities of the incubator could be leveraged further to increase its contribution and impact on the district.

FIGURE 1. The conceptual frame of the Quartier de l'innovation (source website, Quartier de l'innovation)



Source: Website Quartier de l'innovation: <https://quartierinnovationmontreal.com/en/about/who-we-are/>.

Beyond the economic, industrial, innovation, and technological dimensions benefiting to firms and entrepreneurs, three perspectives deserve to be considered here: the connections with the academic stakeholders, the openness to and outcomes for citizens, in the urban milieu, and the social and cultural impacts.

Through interviews, academic stakeholders communicated a very positive appreciation of the work of Centech: On the one hand, they emphasize the role of Centech in the absorption and mobilization of scientific and technical knowledge. On the other hand, they also expressed expectations that the incubator would include more students for training purpose, as part of regular courses either on the applications of deep tech and on entrepreneurial and innovation processes, and for research purpose, on the best practices of incubation and innovation management. One thing that was mentioned was that the incubator could become a powerful

platform to relaunch ÉTS “24h for Innovation”, an ideas competition for students, organized from the mid-2000s to now, and losing a bit of traction because of the Covid situation. As mentioned, in the middleground framework, events are playing a significant role to support the actualization of projects, to showcase and promote the activities of the incubator, and to allow the regeneration of knowledge bases through openness and attraction of new stakeholders. One scholar also mentioned that with respectively, 10,000 students at ÉTS, over 40,000 at McGill University, and over 45,000 at Concordia University, the Innovation district could be used as a testbed for emerging so-called “EdTech”, technologies applied to learning and education improvement, which they recognize presents a huge emerging market¹.

In terms of social impacts and social inclusion, Centech has the highest ratio of startups in the cleantech field, not counting those that improve the quality of life for people in the medical technology field. The incubator is currently working with Youth Fusion, which supports young entrepreneurs from disadvantaged backgrounds at the elementary and high school levels and has lent its premises to groups such as QueerIntech, Women in tech and others. Also, over the past few years, the companies supported by Centech have facilitated the integration and creation of jobs for foreign students as well as qualified immigrants without work experience related to their qualifications in Canada.

In terms of issues of connection with the urban milieu, the redevelopment of the Griffintown district was essentially led by private real-estate promoters, independently from the project of QI. As the City received major criticisms for having let promoters take charge, it supported the settlement of “La maison de l’innovation sociale” just behind ÉTS. “La maison de l’innovation sociale” is an independent organization acting as an incubator for projects with significant

¹ <https://www.grandviewresearch.com/industry-analysis/education-technology-market>

social impacts and promoting best practices in social entrepreneurship, and project management for social endeavors. It also helps social entrepreneurs in applying to public or private funding programs. Actions of “La maison” aimed at mitigating some side-effects of the urban revitalization of the Griffintown area, with projects supporting accessible housing, or social and cultural inclusion. The proximity between Centech and “La maison” could have been a good opportunity to include citizens further in hi-tech project and educate social entrepreneurs about the possibilities of deep-tech, in order, for instance, to monitor pollution in the district for public health, to develop stronger arguments about mobility issues by using measures and big data, or to inspire kids with STEM education. Unfortunately, “La maison” moved two years ago to another district of Montréal. For these reasons, Centech envisages to develop projects in connection with the urban milieu with two institutions that recently established themselves next door to Centech, in the former Rodier building 50m away: “La Piscine” (an accelerator for creative and cultural businesses) and l’”Esplanade” (an accelerator for social and environmental impact entrepreneurs).

A last perspective, reflecting some of the original objectives of the 22@ project, touches upon the recognition of the place and role of artists and cultural activities in the district, emphasizing the importance of art and culture in the daily life of citizens. Though a staple of the discourse of public authorities on urban regeneration since the turn of the Century, the place of artists and culture doesn’t appear as a priority in actual projects. In the Griffintown district, arts and culture obtained a significant recognition over the years through the work of some grassroots associations, the participation of citizens to local events, and the opening of several art galleries. One of these art galleries, L’Arsenal, of international fame, is dedicated to contemporary art, with a focus on digital practices in the arts. When discussing the potential role of Centech, one manager of L’Arsenal envisions potential collaboration on “Entertainment tech” and rapidly

growing technological solutions for the digital diffusion of arts, like NFTs. Another significant stream of work could explore collaborations with local cultural and creative industries on the potential of deep-tech for the metaverse, as it appears as the “new frontier” for the development of new value-propositions and new business models².

These elements point to some specific challenges Centech could engage with to reinforce its legitimacy and impacts in the district and in the wider context of Montréal.

Through the examination of the emergence and development of Centech, as a key middleground in the innovation district of Montréal, we have highlighted how Barcelona 22@ has inspired the vision of the promoters of the incubator, which is recognized today as one of the most successful university incubators in the world. The study confirms how such a collaborative platform for innovation plays a central role in an innovation district, adding to the creative image of Montréal, attracting to its emblematic location visitors from all over the world, developing projects that involve entrepreneurs, researchers as well as students, and creating events that contribute to bring together different types of communities.

² <https://www.ces.tech/Articles/2019/8-Entertainment-Tech-Trends.aspx>;
<https://www.pwc.com/gx/en/industries/tmt/media/outlook.html>

References

- Amin, Ash, and Patrick Cohendet. 2004. *Architectures of knowledge: Firms, capabilities, and communities*. Oxford: Oxford University Press.
- Arvidsson, Adam. 2007. "Creative class or administrative class? On advertising and the 'underground'." *Ephemera, Theory and Politics in Organizations* 7(1): 8–23.
- Bathelt Harald, Anders Malmberg and Peter Maskell. 2004. "Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation." *Progress in Human Geography* 28: 31–35.
- Buisson, Frédéric, Ignasi Capdevila, Mario Dubois, Marie-France Faucher, Luisa-Maria Jiménez-Narvaez, Irene Kitimbo, Charles-Antoine Majeau and Renaud Sylvain. 2012. "Créativité collective en action au sein du Quartier de l'innovation: conceptualisation d'un Hub de Créativité au Planétarium Dow à partir de l'expérience de l'École d'été en management de la création." *Mosaic Summer School Report – HEC Montréal*. Montréal: ÉTS-McGill-HEC Montréal.
- Capdevila, Ignasi, Louis-Félix Binette, Simon Bacon, Michael Bloch, Solène Melyon, Chloé Peccate and Fanny Sun-Drapeau. 2011. "22@barcelona: Leçons pour le Quartier d'innovation de Montréal." *Mosaic Summer School Report – HEC Montréal*. Montréal: ÉTS-McGill-HEC Montréal.
- Carayannis, Elias. G., and David. F. Campbell. 2009. "Mode 3 and Quadruple Helix': toward a 21st century fractal innovation ecosystem." *International Journal of Technology Management*, 46(3-4): 201-234.
- Carayannis, Elias. G., and David. F. Campbell. 2012. *Mode 3 knowledge production in quadruple helix innovation systems*. In *Mode 3 knowledge production in quadruple helix innovation systems*. New York: Springer.
- Chesbrough, Henry. W. 2003. *Open innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press.
- Cohendet, Patrick., David Grandadam and Laurent Simon. 2010. "The Anatomy of the Creative City." *Industry and innovation* 17(1): 91-111.
- De la Tour, Arnaud, Massimo Portincaso, Kyle Blank and Nicolas Goeldel. 2019. "[The Dawn of the Deep Tech Ecosystem.](https://www.bcg.com/capabilities/digital-technology-data/emerging-technologies/deep-tech)" *The Boston Consulting Group*. Retrieved September 13. <https://www.bcg.com/capabilities/digital-technology-data/emerging-technologies/deep-tech>.
- Florida, Richard. 2002. *The Rise of the Creative Class*. New York: Basic Books.
- Grandadam, David., Patrick Cohendet and Laurent Simon. 2013. "Places, Spaces and the Dynamics of Creativity: The Video Game Industry in Montreal." *Regional Studies* 47(10): 1701-1714.

- Harper-Anderson, Elsie, and David Lewis. 2018. "What makes business incubation work? Measuring the influence of incubator quality and regional capacity on incubator outcomes." *Economic Development Quarterly* 32(1): 60-77.
- Howkins, John. 2001. *The Creative Economy*. London: Penguin.
- Landry, Charles. 2000. *The Creative City: A Toolkit for Urban Innovators*. London: Earthscan.
- Langlois, Gabrielle, and Émilie Pawlak. 2010. "22@barcelona: Une expérience à réinventer pour le Quartier de l'Innovation de Montréal." *Mosaic Summer School Report – HEC Montréal*. Montréal: ÉTS-McGill-HEC Montréal.
- Madaleno, Margarida, Max Nathan, Henry Overman, and Sevrin Waights. 2018. Incubators, accelerators and regional economic development. *IZA Discussion Papers* 11856. Institute of Labor Economics. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3261715.
- Mérindol, Valérie, Nadine Bouquin, David Versailles, Ignasi Capdevila, Nicolas Aubouin, Alexandra Le Chaffotec and Thierry Voisin. 2016. *Le Livre Blanc des Open Labs, Quelles pratiques, Quels changements en France?* ANRT, FutuRIS, PSB. <https://www.leslivresblancs.fr/livre/entreprise/innovation/le-livre-blanc-des-open-labs-quellespratiques-queles-changements-en>, vérifié le, 2(01), 2021.
- Mérindol, Valérie and David Versailles. 2017. "Développer des capacités hautement créatives dans les entreprises: le cas des laboratoires d'innovation ouverte." *Management international/International Management/Gestión Internacional* 22(1): 58-72.
- Meyer, Holger, and Joshua Sowah. 2019. "The Ubi Global World Rankings of Business Incubators and Accelerators. 19/20 Report". *Ubi Global*.
- Oliveira, Daniele, Ahmed Cherifi, Geneviève Dupuis, Julie Fabbri, Teymour Dantec, Mirla Pirlea 2013. "Réflexions sur le Hub de créativité Montréal." *Mosaic Summer School Report – HEC Montréal*. Montréal: ÉTS-McGill-HEC Montréal.
- Reason, Peter, and Hilary Bradbury, eds. 2001. *Handbook of Action Research: Participative Inquiry and Practice*. London: Sage.
- Rhimbassen, Maria., Lorena Escandon, Isabelle Bonneau, Samuel Rispal, Christophe Masurel, Myriam Tamisier and Joyce Lee. 2014. "Le QI de Montréal: La destination 3D au Canada." *Mosaic Summer School Report – HEC Montréal*. Montréal: ÉTS-McGill-HEC Montréal.
- Rosenberg Nathan. 1982. *Inside the Black Box: Technology and Economics*. Cambridge: Cambridge University Press.

- Rowell, Lonnie L., Elena Yu Polush, Margaret Riel and Aaron Bruewer. 2015. "Action researchers' perspectives about the distinguishing characteristics of action research: a Delphi and learning circles mixed-methods study." *Educational Action Research* 23(2): 243–270. doi:[10.1080/09650792.2014.990987](https://doi.org/10.1080/09650792.2014.990987).
- Simon, Laurent. 2009. "Underground, upperground et middleground: les collectifs créatifs et la capacité créative de la ville." *Management international/Gestión Internacional/International Management* 13: 37-51.
- Van Rijnsoever, Franck. J. 2020. "Meeting, mating, and intermediating: How incubators can overcome weak network problems in entrepreneurial ecosystems." *Research Policy* 49(1): 103884.

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