HIDS

Hub Internacional para o Desenvolvimento Sustentável

Benchmarking Report

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Index

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1. Introduction

The HIDS team was asked to complete the Strategigram as an exercise to gain a much deeper understanding of what Innovation Spaces (IS) of different kinds are really about and what the main issues and problems are that the IS management has to deal with, increasing their knowledge about such projects in general, as well as HIDS' particular case.

Although the Strategigram was initially conceived as an instrument for operational organisations, it has proven to be useful for IS modelling, since it offers a methodology that systematically covers the main strategic ingredients that cannot be omitted when planning a new Innovation Space.

The Strategigram that we present in this report belongs to a project, it is therefore a simulation carried out by the HIDS representatives considering how they think HIDS will be in their first stage, within the first 5 years of life.

Since HIDS is currently in a projection phase it is not possible to carry out a benchmarking exercise as such. However, we have carried out a comparison to analyse whether the hub that is being designed is in line with the main global trends worldwide and also to offer some good practices from which HIDS can learn.
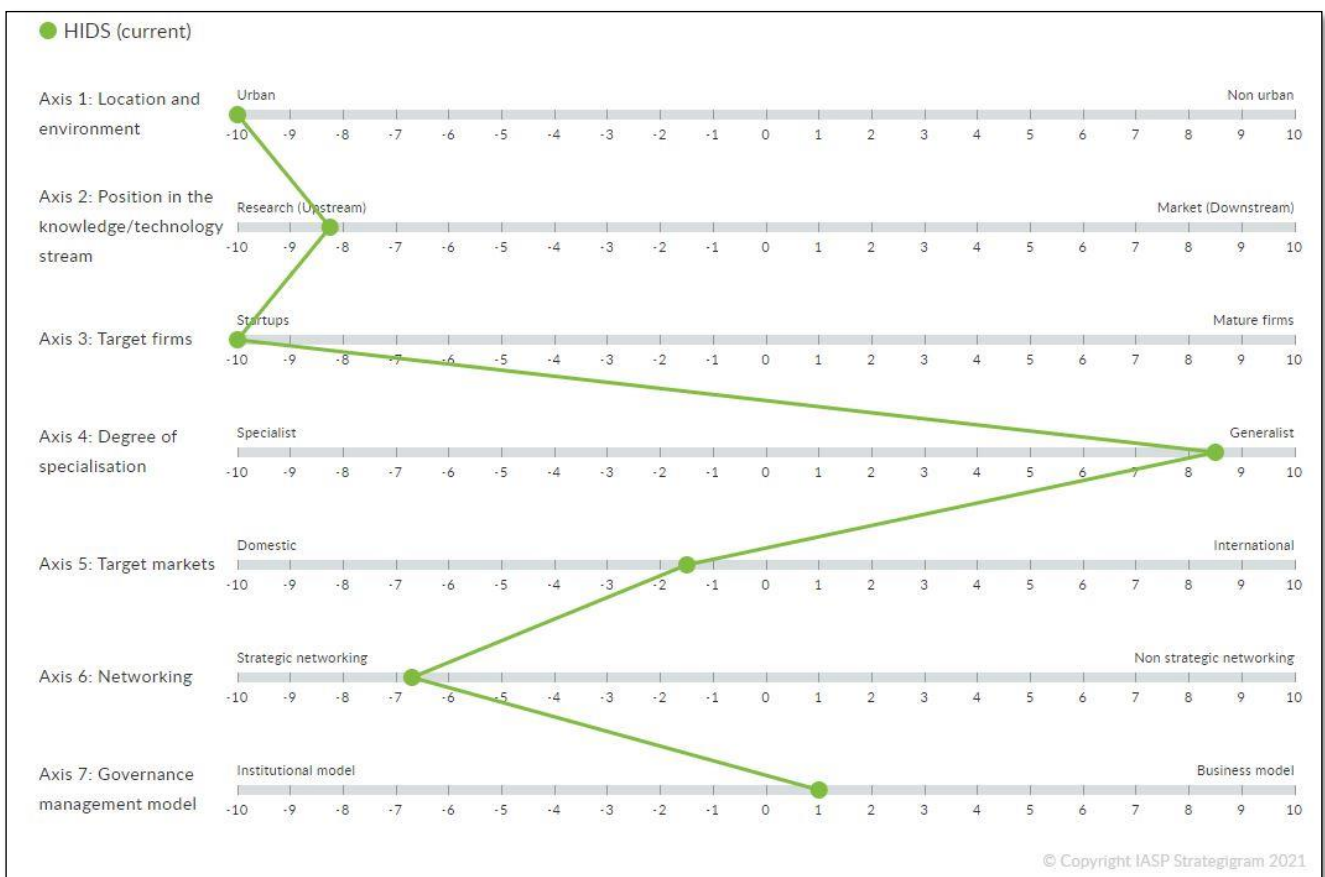
2. International Benchmarking: Global Trends

Being the largest networks of Science and Technology Parks and Areas of Innovation in the world and the only one with a real global reach, IASP is in a unique position to observe the different models and strategies and the evolution that these have undergone since the history of IS begun some seventy years ago.

IASP has always carried out an intensive knowledge management activity, understanding that knowledge about the IS industry is one of the most valuable assets that can offer its members.

One of the results that such continuous knowledge management activity has yielded is a software-based tool developed by IASP and called Strategigram. That enables our members to rigorously analyse the strategic model, establish educated comparisons among them and also see the evolution of the main strategic components of IS.

Please see annex for a comprehensive explanation of the Strategigram tool.

Using this tool, we present now the strategic trends that can be observed in our industry worldwide, which can be graphically represented as follows:

Chart 1- Strategigram global trends (2000-2020). Source: IASP – Strategigram

In the above graphic the red balls indicate the average position globally of IS on each given axis, 20-25 years ago. The green ball indicates the average position of IS today.

It is important to realise that the path of these evolutions has varied from region to region. In some cases, it has been quite swift while in others the change of strategic priorities has been rather slow. Also, even within the same region the changes observed in some of the seven axes here reflected occurred faster than in others. The graphic represents the average position of parks 15-

20 years ago and the current average position. By average we naturally mean that the biggest number of parks are accumulated in the positions indicated by the balls, but of course you can find examples spread all throughout the axes. The above Graphic illustrates this (Chart 1).

2.1 Axis 1: Location and environment

Global Trend
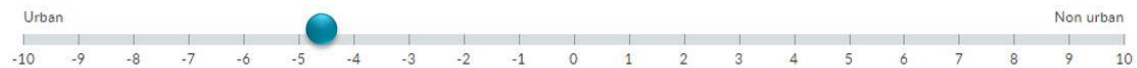
The original position in red was on the right side of the axes, as indeed the majority of parks were located outside cities, not far but definitely not downtown. There are a number of reasons for that phenomenon and we can mention two of them:

- A quite a few STPs then were intensively created by universities and very often located in the university land or campuses which also used to be outside the cities.
- The prices of land were more affordable in non-urban areas.

The graphic also shows a clear trend for parks to become more urban. This urbanisation of STPs is happening in two ways:

- New parks are being created, more than before, inside the cities.

- For parks already outside the city, or new parks built outside the city, on one hand they used to be not in but quite near the city, and on the other hand, they are now introducing city elements within the park itself, in an effort to increase what we can call the "urban density" of the park. Elements such as residential areas or buildings, sports clubs, the organisation of leisure and cultural activities, kindergartens, etc. are now the norm, and the idea is to inject "life" in the parks beyond the mere work-professional activities.

The rationale is that parks must be attractive not only for companies and organisations but also for people, for the entrepreneurs and the new creative class and highly qualified technicians.

HIDS
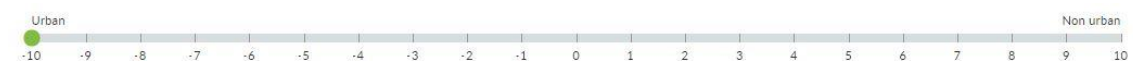
The position of HIDS that the Strategigram reveals is fully aligned with the current trends that can be observed in our industry. Innovation Spaces are continuously marching towards a greater integration with the city, and in this sense, we can say that HIDS is in the right direction, where the main public and private elements and mechanisms necessary for the creation and development of innovative companies will all cohabit, as well as being an attractive area to live in, which can facilitate the attraction of talent to the hub.

In principle it is foreseen that HIDS is to be located on an area belonging to the University, adjacent to the University itself. It is also being planned that there will be housing or residential zones specifically aimed at companies and their employees, as well as social and recreational areas and services such as restaurants, pubs, cafeterias, shops, social services, etc.

Organisations with similar positions in the axis

| Organisation	Country	Website	Axis position
Jeju Free International City Development Center	South Korea	http://www.jeju-sp.com/	-10
La Salle Technova Barcelona	Spain	http://technovabarcelona.org/en/	-10
Teknopark Istanbul	Turkey	www.teknoparkistanbul.com.tr/en	-10
Wista-Management GmbH Berlin Adlershof	Berlin	www.adlershof.de/en/	-10

2.2 Axis 2: Position in the knowledge/technology stream

Global trend

The changes of strategic approach in this axis are quite small yet perceptible. Parks have slightly moved towards up the upstream of the flow of technology of innovation, meaning that they want to make sure that their activities and services are also closer to universities and research institutions (whilst still remaining pretty close to companies and the market place) and by doing so they want to reinforce their role of privileged interlocutor with both academia and the businesses.

HIDS
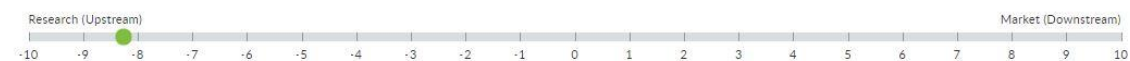
The fact that one of the main promoters of HIDS is the university, UNICAMP, is evident in the intention to position HIDS to work intensively in the research stream. As HIDS may be located on university-owned land this makes the link even stronger, as well as the planned location of a University-Industry liaison office, the establishment of a large number of technology centres (20) and that most of the people foreseen to work in HIDS will be employed by those technology centres gives rise to this rather extreme position on the axis.

The role of universities and research centers is crucial to generate knowledge, as well as for the attraction of talent and therefore key to the success of an area of innovation focus on supporting the creation of new companies, start-ups/spinoffs. But the involvement of public administrations and the private sector is also important. The HIDS representatives foresee up to a 50% percentage of ownership of HIDS for companies/private investors.

Although the global trend is to be orientated towards research, the position of HIDS is much more extreme than that of most hubs in the world. While maintaining its "research vocation", this will probably change gradually over time to find a better balance that brings its objective closer to the market, working more intensively with companies.

Organisations with similar positions in the axis

Organisation	Country	Website	Axis position
BILKENT CYBERPARK	Turkey	https://cyberpark.com.tr	-7.75
Corporación Parque Tecnológico Sartenejas - PTS	Venezuela	http://www.pts.org.ve/	-8.25
Feevale Techpark	Brazil	http://www.feevaletechpark.com.br/	-7.5
Parque Tecnológico del Litoral Centro SAPEM	Argentina	http://www.ptlc.org.ar/	-8.25
Parque Tecnológico do Rio/UFRJ	Brazil	www.parque.ufrj.br/	-8.25
PUCPR Tecnoparque - Pontífica Universidade Católica do Paraná	Brazil	http://hotmilk.pucpr.br/	-7.75
Universidad Carlos III de Madrid	Spain	http://www.uc3m.es/	-7.75

2.3 Axis 3: Target firms

Global trend

A couple of decades ago parks were mainly concerned with attracting already existing firms whereas it has been increasingly clear that a greater attention is now paid to the development of start-ups. This means that STPs have increased their activities in business incubation, acceleration and mechanisms to stimulate entrepreneurial growth.

It is important to mention that this graphic reflects trends globally A breakdown of different regions of the world may offer a greater variety of positions, and for example, STPs in western Europe or North America will show a much greater attention to start-ups, with the green ball probably somewhere around the -5 or -6 position.

HIDS

As mentioned above, the global trend in our industry is to favour the creation and establishment of start-ups. HIDS in this sense follows the global trend, although the extreme position in this axis implies a very strong focus on the development of start-ups. While a clear emphasis on supporting the creation of start-ups is a feasible and understandable strategy, we suggest that you consider making sure that other potential users and beneficiaries of your project receive your attention, such us existing SMEs. If HIDS remains solely concentrated on fostering the creation of start-ups, you risk to "reduce" your project to a simple business incubator, which is an important element, but only one element of modern innovation spaces. Working with existing and more mature

companies can often serve as anchor for the arrival of other companies and for the creation of new companies under its orbit. As HIDS gets established, this position will change over time and may move towards more central positions, although it will remain in the start-up area on the axis.

Organisations with similar positions in the axis

Organisation	Country	Website	Axis position
Administrative Committee of Zhongguancun Science City	China	http://www.zhsp.gov.cn/	-9.25
Kaunas Science and Technology Park	Lithuania	http://kaunomtp.lt/en	-9
Parque Científico Tecnológico de Gijón	Spain	https://innovacion.gijon.es/	-9.25

2.4 Axis 4: Degree of specialisation

Global trend
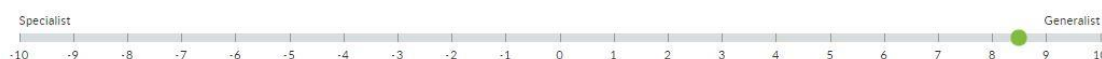
A very clear trend is also visible in this axis and an ever-increasing number of STPs are using the strategy of specialisation. Whilst we still see many STPs that will accept companies from any which technology sectors in their premises, as long as they show high innovation levels, more and more parks are choosing to specialise in a limited number of technology sectors.

This may be a good moment to say that this trend by no means claims to show the right way to go. It is a fact that in certain parts of the world having a generalist park, instead of a specialist one is in fact the right thing to do. What this graphic shows is what is currently happening in an increasing number of parks, and the graphic also seems to show an ongoing conversion of STP strategies, but also indicating clearly that different strategies are still in order.

HIDS

HIDS is positioned as a generalist area of innovation that welcomes companies from any technology sector, although it plans to have some of its facilities and/or infrastructures dedicated to specific sectors.

It doesn't follow the global trend, but as we have explained what the tool shows are facts and not value judgments on whether it is more convenient or not to take one path or another. However, HIDS is born with a vocation to be a sustainable development hub, which implies that it will adopt certain measures/policies to be created with parameters that make it a sustainable entity taking into account the United Nations Sustainable Development Goals (SDGs) and this could be seen

as an opportunity to promote the development of companies working in sectors related to this topic. HIDS could be a living lab where they could develop and test their products/services. We believe that this axis should lead to reflection on whether it would be of importance to try to attract and/or create this type of specialised companies and how to attract them. This could be an important element to distinguish HIDS from other such entities, to eventually be positioned as a reference point. From a branding point of view, this would also be key, and would play a significant factor in attracting residents.

Organisations with similar positions in the axis

Organisation	Country	Website	Axis position
CIUDAD DEL SABER	Panama	http://www.ciudaddelsaber.org	8
Kermanshah Science & Technology Park	Iran	http://www.kti.ir/	8.5
Khon Kaen University Science Park	Thailand	https://sciencepark.kku.ac.th	8.25
Knowledge Oasis Muscat	Oman	http://www.kom.om/	8.25
La Salle Technova Barcelona	Spain	http://technovabarcelona.org	8.5
Yasnobod Innovation Technopark	Uzbekistan	http://yait.uz/	9
ComoNExT SpA	Italy	http://www.comonext.it/	8.5

2.5 Axis 5: Target markets

Global trend

In axis 5 we detect an increasing concern of STPs of becoming more international, which not only is intended for doing a better job of attracting FDI, but also in knowing how to support the internationalisation efforts of their companies.

HIDS

HIDS occupies a relatively central and somewhat eclectic position in this axis. It is quite normal that IS projects start with a bigger emphasis on the domestic market and begging to emphasise their international dimension as time goes by and the project reaches a high development.

In any case it is important to understand since day one that IS of whatever type can't do nowadays without a significant international component. Such component, by the way, should not be understood only as all those programmes and activities that aim to attract foreign companies and investments to HIDS. This is unfortunately a mistake that to many IS make. In such a globalise

economy as ours, implementing programmes and activities to help our own domestic start-ups and SMEs to "go abroad", to expand and became international, to find partners, suppliers and clients in other countries is just as important to be truly and successfully international.

In this sense we seem to notice that on the one hand you state that one of your main goals will be to attract foreign companies, while at the same time you declare that start-ups are your main focus. We recommend that you make sure that both goals are coherent and fully compatible.

Organisations with similar positions in the axis

Organisation	Country	Website	Axis position
Knowledge Oasis Muscat	Oman	http://www.kom.om/	-1.25
Parque Científico Tecnológico de Pando	Uruguay	http://www.pctp.org.uy/	-1.5
Parque Tecnológico São Leopoldo - TECNOSINOS	Brazil	http://www.tecnosinos.com.br/	-1.5
Parque de Innovación Tecnológica del Centro de Investigaciones Biológicas del Noroeste,	Mexico	https://www.cibnor.gob.mx/	-1.75
Stiftelsen Dalarna Science Park	Sweden	http://www.dalarnasciencepark.se/	-1.5
TEHNOPOL Tallinn Science Park	Estonia	https://www.tehnopol.ee/en/	-2
Wista-Management GmbH Berlin Adlershof	Germany	https://www.adlershof.de/en/	-1.5

2.6 Axis 6: Networking

Global trend

Understanding that networking activities is an essential part of the STP business, most parks have reinforced their efforts to be able to conduct a more professional networking activity which is becoming a major strategic element in their plans. Networking is being increasingly incorporated to their annual business plan, is receiving its own budget and parks try to secure that they have their right profiles in their staff to do smart and professional networking.

HIDS

The position on the axis clearly reflects the importance that HIDS attaches to networking, as they plan to participate in different events and to organize events themselves to strengthen networking and cooperation among the institutions located in their area. Participation in formal networks that

can serve as a platform to expand their contacts and to provide them with higher visibility is also in their plans.

In order to develop strategic networking, a key decision is to foresee a budget specifically dedicated to networking and to which a part of the overall budget will be allocated. HIDS plans to have such a budget and also to allocate more than 20% of the general budget to it, both facts reflecting the significant role networking will play. However, it should be noted that having a budget without having drafted an annual plan to reach a series of specific objectives can be a waste of resources that unfortunately does not produce the desired results and does not serve to carry out correct networking work. Therefore, it is recommended to take this aspect into account. Also, participation in formal networks can shorten the learning curve and serve as a very important guide/accompaniment in the early stages of development.

Organisations with similar positions in the axis

| Organisation	Country	Website	Axis position
Ideon Science Park	Sweden	http://www.ideon.se/	-6.75
Linköping Science Park	Sweden	http://www.linkopingsciencepark.se/	-7
Luleå Science Park	Sweden	www.luleasciencepark.se/	-7
Mazandaran Science & Technology Park	Iran	http://www.mstp.ir/	-6.75
Mersin Technology Development Zone	Turkey	www.technoscope.com.tr/	-6.75
NETPark	UK	http://www.northeasttechnologypark.com/	-7.5
PUCPR Tecnoparque - Pontífica Universidade Católica do Paraná	Brazil	http://hotmilk.pucpr.br/	-6.5
Shanghai Hi-Tech Park United Development Co., Ltd.		http://www.caohejing.com/	-6.85
TEHNOPOL Tallinn Science Park	Estonia	https://www.tehnopol.ee/	-6.75
Turku Science Park Ltd	Finland	urkubusinessregion.com/en	-7.5
Wroclawski Park Technologiczny	Poland	www.technologpark.pl/	-6.75

2.7 Axis 7: Governance and management model

Global trend
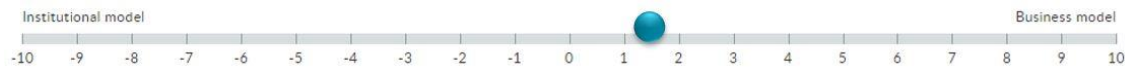
On this axis we see the biggest strategic change. While STPs remain projects that are mostly created and founded by public money and public administrations, the presence of "the private" has largely increased, and it has been done in two ways. Firstly, and obviously, the private sector is investing money in creating and developing STPs and similar projects. In some cases, they do it from scratch and in many others, they invest in already existing STPs. In this last case the most typical way is via PPP schemes. But, as mentioned before, it is the private money that is now getting involved in our industry, also in the governance of the parks: the composition of the board of directors of STPs, or equivalent bodies, the profile of the CEOs of parks, the type of staffing, and the legal forms that the company that manages the parks are adopting clearly indicates an approximation to the private market management styles.

The idea behind these tactics is to have public owned parks (whether owned by governance agencies or by public universities) being able to operate without the burden of the public procurement restrictions and more according to the agility that international markets require, yet remaining public in nature and main goals.

HIDS
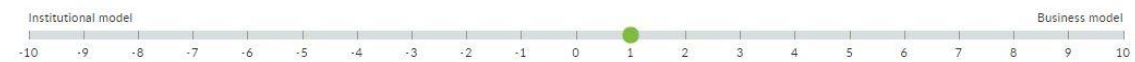
In line with the worldwide trend, HIDS shows a well-balanced position between the institutional and the business model that which could perhaps lead to the HIDS being set up with a public private partnership model. This model is often used to build projects from scratch where no previous infrastructures or operations exist. In the majority of cases, it would be the public party that holds a majority share of the project. The parties agree on the governance model, the management, the main strategy, mission and other important aspects that need to be decided upon before starting. Regardless of the "ownership distribution", of whether one of the parties is dominant or not, the most significant feature of this model is that the partnership is formed before launching the project (or in its very early stages), and all the parties in the partnership will jointly define the mission, goals and strategy of the project. Typically, the parties involved would create an intermediary organisation in charge of owning, building and managing the project. This model has been adopted by some of the innovation areas that will be presented in the following section, such as Ann Arbor SPARK and Here East.

Organisations with similar positions in the axis

Organisation	Country	Website	Axis position
Luoyang National University Science Park	China	http://www.lyusp.com/	1.5
Minsk City Technopark	Belarus	http://mgtp.by/	0.75
PIIT Parque de Investigación e Innovación Tecnológica	Mexico	https://piit.com.mx/en/index.php	0.75
Parque Científico Tecnológico de Pando	Uruguay	http://www.pctp.org.uy/	1.5
Parque Científico y Tecnológico de Bizkaia	Spain	https://parke.eus/	1
Parque de Innovación De La Salle A.C.	Mexico	http://www.parquedeinnovacion.org.mx/	1
Technoparc Montréal	Canada	https://www.technoparc.com/en/	1.25
Turku Science Park Ltd	Finland	https://turkubusinessregion.com/en	1
Wista-Management GmbH Berlin Adlershof	Germany	https://www.adlershof.de/en/	1.25

The following chart shows the distribution of STPs worldwide today. This chart has been created based on the data of 105 STPs using the Strategigram. The position of the parks on the different axes corroborates the trends displayed in the previous chart.
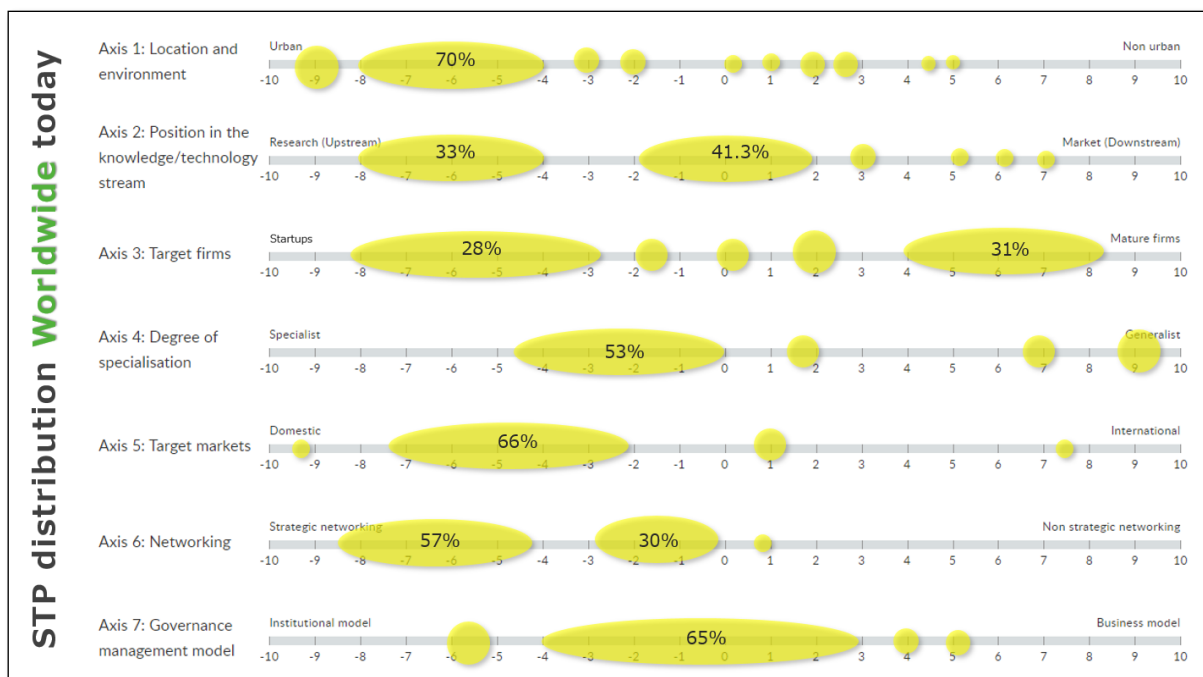

Chart 2- Strategigram STP distribution worldwide today (2020). Source: IASP – Strategigram

3. International Benchmarking: Best Practices – Areas of Innovation

In the middle of the 20 century the "science park" concept appeared and it quickly came a popular concept and became to be used and developed in an ever-increasing number of countries and regions. From the USA soon jump to Europe and then continue its expansion to Asia, Australia, Latin America and then Africa.

As it could be expected the use of this concept in an ever greater number of different socioeconomic contexts triggered a very reach evolution of the concept, and expressions such as technology park, research park, innovation hub, science city, knowledge city or area of innovation were soon coined to reflect projects that begin to present different features, even if they all maintained the same main common denominators, namely the goal of developing the knowledge economy, of supporting innovative and technology-based businesses, and strengthening the collaboration between universities and companies.

Based on the information that we have got so far HIDS will have features that are similar to those typically present in innovation spaces that are often known as areas of innovation or innovation hubs. Nevertheless, we recommend not to become obsessed with taxonomy and names, and rather focus on mission and elements necessary to fulfil that mission.

IASP official definition:

"Areas of innovation" are places designed and curated to attract entrepreneurial-minded people, skilled talent, knowledge-intensive businesses and investments, by developing and combining a set of infrastructural, institutional, scientific, technological, educational and social assets, together with value added services, thus enhancing sustainable economic development and prosperity with and for the community.

There are many different models of areas of innovation (also known by the acronym AOIs)– spanning from the broader city or region model with innovation activities in different locations within the area, to more place-specific projects like innovation districts, knowledge quarters, innovation hubs and the like. As a common feature they all have a management team tasked to execute a strategy conducive to growing innovation activity in the area.

This section presents six areas of innovation that we believe can serve as inspiration for HIDS, located in different parts of the world: Ann Arbor SPARK (USA), Here East (UK), Skolkovo (Russia), 22@Barcelona (Spain), RutaN (Colombia) and Porto Digital (Brazil).

In addition to the information presented below Josep Piqué, who was CEO of 22@Barcelona and was involved in the project since its inception, gave a presentation in which there was also time for discussion in order to give a more in-depth understanding of the concept of areas of innovation through the 22@Barcelona case study. 22@Barcelona, is recognized as a best practice worldwide and an example for many other areas of innovation that emerged later or even at the

same time on different latitudes, as was the case of Porto Digital, confirmed by former manager Francisco Saboya in some of his publications.

The information presented in this section has been extracted from the following sources:

- Information provided directly by Ann Arbor SPARK, Here East, Skolkovo and 22@Barcelona management team
- IASP website – members area – the information included has been directly provided by the four areas of innovation presented in the report.
- Promotional material.
- Interviews to Paul Krutko, Ann Arbor SPARK manager, Gavin Poole, CEO, and Mike Magan, COO of Here East-Plexal Innovation District within the study carried out in collaboration with the Joint Research Institute, EU for the publication *"Public-Private Partnerships for Science and Technology Parks"*
- *Application of the triple helix model in the revitalisation of cities: the case of Brazil.* Josep Miquel Pique and Francesc Miralles. Int. J. Knowledge-Based Development, Vol. 10, No. 1, 2019
- *Porto Digital: a model of implementing a technology park as a driver for economic development.* Emanoel Querette. IASP World Conference. The Research Triangle Park, NC, USA. 2009.
- *Areas of innovation in cities: the evolution of 22@Barcelona*. Miquel Pique and Francesc Miralles. Int. J. Knowledge-Based Development, Vol. 10, No. 1, 2019
- *Towards a more inclusive and sustainable 22@ within Poblenau.* Ajuntament da Barcelona. Fundació Barcelona Institute of Tecnology for the Habitat. 2019
- *22@Barcelona. 200-2015.* Report done by: Team INNOVA coordinated by Montserrat Pareja-EastawayResearch Group CRIT 'Creativity, Innovation and Urban transformation 'Faculty of Economics and BusinessUniversity of Barcelona Council of Business and Tourism of the Municipality of Barcelona.

3.1 PORTO DIGITAL

Country	Brazil
City	Recife
City's population	4,054,866 inhabitants
Website	www.portodigital.org
Year of creation	2000
Area	149 hectares
Main technology sectors	Creative industry ICT & Communications Computer Science and hardware Software Engineering Urban technologies
General manager	Business professional and academic
Number of companies	Over 300
Number of employees	8,500

Introduction

Known for its singular territory among other technological parks, the Porto Digital is one of the first urban parks and innovation environments in Brazil.

Porto Digital occupies a total area of 149 hectares in the state capital of Pernambuco, encompassing the whole of the island Recife neighbourhood and a block of the Santo Amaro district. The limits of the park, however, expanded to the interior of the state in 2014, and Porto Digital also operates the 'Armazém da Criatividade' (Creativity Warehouse), situated within the city of Caruaru's fashion centre.

The park project undertook the urban regeneration of the Recife district, which has an eclectic architectural heritage of diverse colonial, industrial and modern styles and has benefited from investment of R$ 90 million towards urban renovation over the last decade. Municipal, state and federal legislation, and the active participation of the public sector, have facilitated and stimulated private investment, with the goal of developing a world-class business environment.

Porto Digital complements existing regeneration initiatives in the city, demonstrating that it is possible to combine technology development with preserving a city's history and culture. The park has restored several outstanding buildings, adjusting the infrastructure of the area to welcome modern companies, while preserving its architectural characteristics.

Several corporate buildings in the surrounding area of the island and of the Santo Amaro district house the Porto Digital technology companies, a bank district, public and government agencies, a shopping mall, notaries, law firms, accounting firms, publicity agencies, marketing and communication agencies, training centres, reception halls, dozens of restaurants, cinemas, theatres and art institutions. In Caruaru, Porto Digital operations give support to a fashion chain as well as to design and games initiatives, besides the information technology sector.

The origin and objective

The origin of Porto Digital was distinct from traditional science and technology parks. The traditional technology-led development model focused on providing physical space for companies near universities and providing supportive business services.

Porto Digital does not directly provide supportive services, office spaces nor is located within/near a university campus. Porto Digital is an urban, open Technology Park, located in an ancient historical district, which has been renewed for sheltering technology firms. There are no walls delimitating the park. Such characteristic is determinant to building an innovative and creative environment for the firms and the workers. As well as office buildings, other urban artifacts have been refurbished, such as parks, museums, theatres, and others.

The birth of Porto Digital resulted from the impacts of market transformations and global economic trends. Whether formally created in 2000, it was originated from diverse factors which indicated, through the 1980's and 1990's, the possibility to develop a pool of knowledge production in information technology in Recife. By that time, Recife had all the ingredients to develop a successful strategy for technology-led economic development: political disposition in developing a local technology pool, a highly qualified work force pool, information technology enterprises, market demand, world class university and research center and available spaces in the ancient port district area. The underutilized spaces in the old Recife Port's area represented an opportunity in locating the Information Technology firms, which would, at the same time, contribute to revitalize the area.

Investments of more than US$15 million in telecommunication facilities, such as optic fibers, and building refurbishing transformed the ancient historic buildings in high-tech office spaces for IT companies and R&D Institutes.

A relevant characteristic of Porto Digital, when compared to other science and technology parks in the world, is that it was not born from within the University, in order to develop business up from its research products. Porto Digital, based in Gibbon's[1] innovation 'mode 2', was developed to be an Information Technology cluster, closely integrated to university and research institutes but focusing on the market and the demands for technology products and services. Gibbons' mode 2

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[1] Gibbons, M; Limoges, C; Nowotny, H; Schwartzman, S; Scott, P; and Trow, M (1994). The new production of knowledge; the dynamics of science and research in contemporary societies.

is closely related to the concept of the "triple helix". The Triple Helix20 conceptual model of innovation ecosystems is in the core approach to the creation of Porto Digital. Since its conception, it was possible to identify each one of the 'helixes': the local government, the university and private sectors related to the IT industry. Gibbons' "mode 2" of innovation refers to a new form of knowledge production, which is context-driven, problem-focused and interdisciplinary and emerged in the mid-20th century. The innovation process involves multidisciplinary teams for short periods of time, working on specific real market problems. What distinguishes the mode 2 of knowledge production from the "mode 1" is that, this is the traditional Academy knowledge production way, which is an, often abstract, investigate oriented and discipline-based knowledge production.

Conceptual model

Porto Digital conceptual model is based on the Local Innovation System (LIS) approach. It is structured in three axes: (i) innovation territory; (ii) innovation support policies and institutions; (iii) a new productive arrangement for the firms of the industry.

Success factors of this model are: local infrastructure improvements, attraction of business incubator for the continuous and sustained generation of new enterprises, attraction of innovation and research institutes for the knowledge and innovation production, attraction of instruments for economic and financial support to the innovation process, and a mix of high-performance companies.

Such model takes in consideration three orthogonal elements of the innovation process: institution, territory and organization.

At a lower level, firms and organizations settled in a territory form a business cluster, characterized for the lack of a specific and coherent institutional framework. The combination of an institutional system with organizations results in a National Innovation System, which means, "a group of economic agents, institutions and practices that constitute, develop and relevantly participate in the innovation process". Local development policies are perceived in the definition of an institutional framework over a territory. However, the lack of organizations and/or firms makes this agreement just impracticable.

Triple helix model

Founded in 2000, the Porto Digital project is a joint initiative of the state of Pernambuco Government and the private sector. It is considered a reference in the use of the Triple Helix model, alongside the 22@Barcelona innovation district, which creates an innovative environment through synergic action between government, academy and industry.

As such, the Porto Digital has an import role in the revitalisation and economic development of the City of Recife since it develops revitalisation projects to repurpose a socially and physically

degraded area of the city that lost importance due to the relocation of economic activities. As the buildings became degraded and vacant, the local infrastructure became underutilised, amounting very little to the local economy (Toledo, 2012). The project has two important counterparts for the city, such as the occupation of the island with almost 9,000 workers and 274 companies and the success of the city in meeting with its history. However, there is a dimension of 22@Barcelona that the Porto Digital has not yet been able to face, which is the creation of housing units in Porto Digital (Saboya, 2017).

The innovation district is comprised mostly by small and medium information technology and communication (ITC) businesses, and by anchor institutions like the Federal University of Pernambuco's computing centre, the Porto Digital's management centre, and the Recife's advanced studies and systems centre [Centro de Estudos e Sistemas Avançados do Recife (CESAR)].

The Park has given international visibility to the region and greatly increased its competitiveness, creating an innovative cultural environment that boosted the neighbourhood revitalisation (Marques and Leite, 2008). Its strategic plan is based on a 20 years' span, and is divided into eight axes (Toledo, 2012):

1. fostering businesses and human capital development
2. incubation and acceleration of new businesses
3. mobilisation of venture capital
4. fostering cooperation between government, industry and academy
5. promoting the institutional image of the Porto Digital
6. stimulating social accountability practices
7. stimulating the improvement of real estate and technological availability, as well as urban and business services continuous improvement of the technical staff, work environment, and the Porto Digital's management centre.
8. It operates in two knowledgeable and innovation intensive activities: software and ITC services, creative economy activities, mainly in games, multimedia, films and animations, music, design and photography (Porto Digital, 2016).

The Porto Digital is known as one of the main innovation and technology environments in Brazil (Toledo, 2012) for carrying out a fast urban revitalisation process through the recovering of buildings, urban areas as well as the historic patrimony. It demonstrated that it is possible to combine technological development and the preservation of history and culture, retrofitting buildings to receive modern companies while maintaining its architectonic characteristics (Porto Digital, 2016). According to Saboya (2017), Porto Digital is a way to present an open urban laboratory, with characteristics of a city in a limited area, as well as the 22@, which is an indirect inspiration and a support for the development of the project.

3.2 RUTA N

Country	Colombia
City	Medellin
City's population	2,569,000 inhabitants
Website	www.rutanmedellin.org/es/
Year of creation	2009
Area	172 hectares
Main technology sectors	ICT Health Energy
General manager	Business professional and academic
Number of companies	154
Number of employees	2,900

City of Knowledge

For the past decade, the city of Medellín has undergone a process of social, urban, cultural and economic transformation, which has allowed it to show itself to the world as a success story worth publicising and promoting. This is how the city continues to create strategies and programmes that allow it to continue to be a source of admiration for the world and pride for its citizens, such as having been awarded the prize for city of the year in innovation worldwide, ahead of New York, Tel Aviv and a group of more than 200 cities initially nominated, within the framework of a competition led by the Citi Group, the Wall Street Journal and the Urban Land Institute. In this context, the Mayor's Office of Medellín seeks to influence the improvement of the city's competitiveness conditions, implementing a new public policy that conceptualises and implements a strategy that will allow Medellín to become a city of knowledge.

Mission

Ruta N leads the city's economic evolution towards science, technology and innovation-intensive activities, in an inclusive and sustainable way.

The main mission is to articulate the STI ecosystem to transform Medellín into a knowledge economy, in which, by 2021, innovation will be its main driving force. To achieve this, three strategic priorities have been outlined: to attract talent, capital and global companies to the city;

to develop and strengthen the innovative and entrepreneurial business fabric; and to generate STI solutions for the city's challenges.

The programme offer is built on these priorities and is constantly evolving to respond to the changing needs of the ecosystem, always bearing in mind that its main indicator is, ultimately, the power of innovation to positively transform the quality of life of the people who live in Medellín.

Vision

By 2021, innovation will be the main driver of the city's economy and the city's well-being, based on a world-class ecosystem.

From industrial pole to global innovation hub

All the processes that cities undergo are reflected in the social and physical fabric of their territories. Medellín is no exception. Known as the "industrial capital of Colombia" in the 20th century, it decided to stop supporting its economic development exclusively on traditional industries, to generate a break and promote a knowledge economy: one that places more value on ideas than on labour.

To begin with, this industrial city had to realise that, without innovation and differentiation, it would not be competitive in the globalised world. The rest is a sum of political decisions and pre-existing conditions in the territory: the Municipal Administration created an entity such as Ruta N to promote business based on science, technology and innovation but, at the same time, Medellín had the necessary conditions for this to happen (some of the best universities, the main economic groups in the country and a private sector strongly committed to the region development.

Like cities with more developed indices, the first thing that was done was to promote a public policy to give a clear route to the efforts in CT+i. In a joint effort with researchers, public sector entrepreneurs and other actors in the innovation ecosystem, the Medellín Science, Technology and Innovation Plan was born. This plan is the city's guide in its commitment to innovation and prioritises three strategic markets in which opportunities were identified: health, energy and ICT.

The establishment of the public policy on science, technology and innovation, and its constant updating through the CT+i Observatory, allowed the city to establish impact indicators that will lead it to meet its main objective: to improve the quality of life of the citizens of Medellín through the generation of skilled jobs and an increase in per capita income.

To achieve this goal, Ruta N generated a promotion and attraction strategy based on four ingredients of the global innovation ecosystem: the training of the necessary talent, access to capital, business development and the generation of spaces conducive to innovation.

At the same time, it was understood that, in addition to focusing on the development of these four key ingredients, it was important to detonate parallel processes that would enhance each of the actions carried out. These efforts should not come exclusively from the public sector. That is why,

in order to encourage investment in innovation in the private sector, the Great Pact for Innovation was created, a strategy to mobilise the city's ecosystem actors to invest in science, technology and innovation activities, which, as of 2016, has more than 2,300 signatory organisations. This initiative has been key in encouraging companies to invest in innovation: in recent years, for every peso invested by Ruta N in the development of the CT+i plan, private companies have been able to contribute.

Urban component

This project has a fundamental urban component. As Medellín worked to make innovation a hallmark of the city, a differentiating factor and a common characteristic of public and private initiatives, it sought references of how other cities had been positively transformed. Experiences such as those of Boston and Barcelona were reviewed, identifying the need for a physical space to materialise this strategy. Thus was born the Medellín Innovation District, a project of more than 172 hectares and made up of three neighbourhoods (Jesús Nazareno, Sevilla and Chagualo).

Having an Innovation District in Medellín has enabled the generation of more than 2,900 jobs and the arrival of 154 new companies in the city from 23 countries. But it has also positioned the city as a global benchmark in the field. Juan Luis Mejía Arango, rector of Eafit University, once said that in the 1990s the only international journalists who came to Medellín were war journalists. Today the city is known worldwide for its advances in innovation.

Although the aim of making innovation the main driver of Medellín's economic development is medium to long term, the achievements are beginning to be seen. The Regional Innovation Survey showed that 57% of the city's companies generated at least one innovation in the last year and increased their sales by 26% as a result. It also found that 30% of the city's new jobs were created as a result of these innovations.

Strategy

The aim of this whole city strategy is not to create the "next Silicon Valley", but to impact every actor in society and transform its productive fabric. That innovation permeates the processes of large, small and medium-sized companies, and the way in which we educate ourselves and relate to each other. That every citizen feels the positive effect of innovation in their daily lives.

In 2017 the Global Innovation Cities Index of the Australian agency 2ThinkNow ranked the city as a global innovation hub. This achievement puts Medellín on a par with Latin American powers and makes it the first Colombian city to achieve this category. It continues to ratify the city as an attractive territory for the arrival of startups and global innovative businesses, and sends a clear message: grow, from Medellín, for Latin America and the world.

Medellín's experience is relevant for other cities because it shows that, through planning and the definition of a productive vocation, together with collective work, the sustainability and

development of a territory can be boosted. This innovative and resilient Medellín is, without a doubt, a clear example of an urban, political, economic and social transformation.

Created by the Mayor's Office of Medellín, EPM and UNE, the Ruta N Medellín Corporation is an entity from which different programmes are developed and the municipality's resources for science, technology and innovation - STI - are channelled. It seeks to promote the development of innovative technology-based businesses that increase the city's competitiveness, boost the economy, strengthen strategic clusters and provide better jobs for the citizens of Medellín. The Ruta N Corporation is making progress in the consolidation of Medellín as a city of knowledge. For this reason, in order to increase the city's competitiveness, it has undertaken the formulation of a technological district in the north of the city. This district will lay the foundations for the economic development of this area, attracting companies linked to science, technology and innovation, especially in the health, energy and ICT sectors.

This transformation has five dimensions:

- the urban, which consists of the physical transformation of the territory through real estate development and infrastructure;

- the business dimension, which promotes the attraction of national and international companies, as well as promoting and strengthening local entrepreneurship in order to give it a boost on the international stage;

- social, which seeks to include all citizens in this territory of knowledge, through the implementation of a culture of innovation; human talent, which maps out what professional skills the city needs in order to implement strategies that enable the creation, development and retention of talent in the territory;

- innovation, which seeks to integrate science and the market to help elucidate how to make science, technology and innovation relevant to the city's progress,

- and finally, governance, which is transversal to all these dimensions and ensures that they are articulated in a way that gives strength and relevance to this district.

Thanks to a regional innovation system made up of Ruta N, Tecnnova, universities, government, interface entities, among others, the city has ensured that STI is thought of transversally in all processes, working in an articulated way to be able, together, to think of a knowledge economy. All are integrated to promote the city of knowledge. All this with the aim of generating greater added value to the products and services offered by the strategic sectors identified in the city and thus fostering economic development in conditions of globalisation.

3.3   TECHNOPARK SKOLKOVO LLC

Country	Russia
City	Skolkovo - at 30km from Moscow
City's population	Moscow: 12,538,000
Website	www.technopark.sk.ru
Location	In a city
	Located on a university campus or adjacent to it
Year of creation	2010
Built area	23,500m2
Main technology sectors	Energy Saving and Conservation
	Nuclear Science and Technology
	Informatics and Telematics
	Space Technology
	Biomedical Science and Technology
Companies located in the park	431
Number of employees	4,637
Technology Centres employees	100
Skolkovo ecosystem companies	2,700
Skolkovo ecosystem employees	40,000

Introduction:

Founded in 2010, Technopark Skolkovo is based on the outskirts of Moscow and forms part of the Skolkovo Foundation, whose overarching goal is to create a sustainable ecosystem of entrepreneurship and innovation, engendering a start-up culture and encouraging venture capitalism.

Technopark Skolkovo forms part of the Skolkovo Innovation Center, composed of companies and start-ups developing innovative technologies, and the Skolkovo Institute of Technology (Skoltech), a new graduate research University established in collaboration with the Massachusetts Institute of Technology.

In 2020 there were more than 2,700 companies inside the Skolkovo ecosystem, and employing more than 40,000 people.

The status of a Skolkovo Member gives start-ups the right to apply for R&D grants, providing that the start-up manages to attract equal co-financing. Resident companies also enjoy various tax breaks, including on customs duty on importing scientific equipment from abroad, as well as mentoring and consulting services.

Skolkovo Technopark offers facilities and services that include offices and laboratories with industrial ventilation, seamless antistatic flooring, modern climate systems, and a supply of dry compressed air and water, all designed in consultation with residents to meet their business needs. In addition, the Technopark offers common use centres for prototyping, including industrial design, 3D-prototyping, functional coatings, computer engineering, embedded control and monitoring systems, numerical modelling and computational technologies, electronics development and instrument making, and precision machining process. Its common use centres also offer facilities for medical research, metrological research, and testing and certification.

Innovation ecosystem context

Skolkovo is an innovative city under construction located 3 km from Moscow. 22,000 people will live and work in the city. Skolkovo City is based on the Principle of 4E: environmental friendliness, energy efficiency, ergonomics, economy. There are also schools on the territory of Skolkovo. Moscow government supports Skolkovo with grants and subsidies.

The Russian government has set up a number of investment and measures to support innovation ecosystem in the country, putting in place state programs aimed to help knowledge-based industries, to build clusters in selected municipal zones and regions, and to support a country-wide network of technoparks.

The State supports the creation of technoparks in the field of high technologies in the form of subsidies to the budgets of subjects of the Russian Federation for reimbursement of the costs of creating the infrastructure of technoparks in the sphere of high technologies. The state started practicing this form of support in 2015. These subsidies are formed at the expense of federal taxes and customs duties paid by the residents of technoparks. The emphasis is shifted towards stimulating the development of existing structures in the subjects of the Russian Federation and the creation of new ones.

Moscow is the largest Russian metropolis and the most developed region of the country with more than 500 Research institutes, including 50 Technical universities that provide a solid R&D, educational and industrial base.

Moscow is the major national R&D hub with the highest concentration of venture capital. According to the Russian Regional innovation index, in 2019 Moscow received the 1st rank in 'Socio-Economic Conditions for Innovation Activities' and the 2nd rank in 'Innovations Policy Quality'.

Moscow is one of the key players in Russian innovation landscape for the next decade that was declared on a federal level to be a period of digital economics. This means that technoparks are becoming fundamental ones for the national development.

Moscow and the Moscow region, where around 40% of the total number of Russian technoparks is located. This high concentration of technology parks in Moscow and the high level of efficiency of their functioning is due to the high interest of Moscow Government in the creation of specialized sites for the development of high-tech companies, a high concentration of scientific and educational institutions which have substantial groundwork for the development of high-tech economic activities and scientific research, as well significant number of industrial facilities optimal for launching of technology parks. The interest of the Government of Moscow is also focused on providing substantial quantities of preferences for residents and management companies of technoparks, which cannot be found in other regions.

The Moscow Administration provides technoparks with benefits for income, land and property taxes. technoparks residents have the possibility to rent offices on very favourable terms.

According to Federal State Statistic service (Rosstat), in 2018 in Moscow, the share of staff employed in R&D sector amounted to around 205 000 persons or more than 30% of the total number of employees in R&D area of Russia. In particular, this policy includes the creation of a regional legislative framework, the use of state support measures for managing companies and residents, attracting funds from private investors and the Federal budget.

Objective:

When constituted:

Skolkovo was established to solve the following problems:

1. Russia needs an "innovative lift" for modernization and technological development of the economy
2. Integration of Russian science and technology into the world economy is necessary
3. The emergence and support of competitive knowledge-based companies is required
4. Scientific research needs to be encouraged
5. A full-fledged ecosystem is needed for the development of innovations and scientific developments

Currently:

The goal of the Foundation is to support technological entrepreneurship in Russia and the commercialization of the results of research activities.

Ownership:

Skolkovo Foundation is a non-profit organization founded in 2010 and functions as the administrator of the Skolkovo Innovation Center.

The purpose of the Foundation is to support technological entrepreneurship in Russia and commercialize the results of research activities.

The activities of the Skolkovo Foundation are regulated by federal laws and other statutory acts, as well as documents formulated by the Foundation itself. In particular, regulations on the investment committee and investment policy are formulated by the Foundation, as are the procedures for submission and consideration of applications from participants.

Governance and Management:

The Skolkovo Foundation governing bodies overseeing the Technopark Skolkovo:

1. Skolkovo Foundation Board of trustees: with 13 members including government and academy representatives.

2. Skolkovo Foundation Council: with 19 members, including government, academy, and business representatives.

3. Chairman of the Skolkovo Foundation

4. Board of Foundation: with 10 members

Strategy:

On Sept. 28, 2010, then-President Dmitry Medvedev signed a law "On the Skolkovo Innovation Center," giving rise to the project's managing entity, the not-for-profit Skolkovo Foundation.

Charged with providing the catalyst for the diversification of the Russian economy, the Skolkovo Foundation's overarching goal is to create a sustainable ecosystem of entrepreneurship and innovation, engendering a start-up culture and encouraging venture capitalism.

The Skolkovo Foundation identified five key areas of potential growth: energy efficiency, strategic computer technologies, biomedicine, nuclear technologies and space technologies.

To achieve this the Foundation is overseeing the creation of the Skolkovo Innovation Center, composed of companies and start-ups, developing innovative technologies (currently numbering over 1,000), a Technopark, the Skolkovo Institute of Technology (Skoltech), a new graduate research University established in collaboration with the Massachusetts Institute of Technology, and Skolkovo city, located near Moscow. Together these entities will establish a vibrant ecosystem of technology innovation and entrepreneurship. Thirty of the world's most successful corporations, including Boeing, Cisco Systems, EADS, GE, Johnson & Johnson,

IBM, Intel, Microsoft, Siemens, Nokia, Samsung etc. have already recognized the opportunity Skolkovo presents, having signed R&D partnership agreements with the Foundation.

Dozens of innovative projects developed by Skolkovo Startups have found success in international markets, in particular, equipment for the dynamic modelling of oil and gas fields, next-generation screen displays and laser systems for soft-tissue surgery.

Surveys have showed that Skolkovo start-ups are three times more likely to attract investment than non-members.

In August 2013, the Skolkovo project was chosen for inclusion in the government's "economic development and innovation economy" program, resulting in the allocation of 3.5 billion Rubles for the development of Skolkovo through 2020.

Milestones in the Skolkovo ecosystem development:

- 2010-2012 – Reaching the chain-reacting amount of ecosystem elements.

- 2013-2015 – Improving the quality of ecosystem elements and ensuring their integration.

- 2016 and later - Moving transition to self-development stage, revealing the commercialization

- capabilities.

- 2017 – The start of creation Regional Operators – Skolkovo brunches in Russian regions. From this moment Skolkovo starts to transfer its experience to other Russian cities and innovation area.

- 2018 - The representative office of the Skolkovo Foundation was opened in China. It offers a wide range of services for the residents of the Innovation Center: from advisory support to arranging business missions and finding investors.

- 2019 - Since 2019, legislation has allowed any organization conducting research activities in Russia to access the services and benefits of the Skolkovo Innovation Centre.

Networking:

In Skolkovo there are a number of crucial institutions that creates a necessary network for start-ups creation and growth:

- SkVentures – Venture Fund of Skolkovo (Skolkovo – Venture Investments LLC) was launched in 2017 and currently has more than $20 bln assets under management. The fund invests in IT start-ups of venture and growth stages with focus on financial technologies, Internet of Things, artificial intelligence, virtual and augmented reality, big data, cyber security and other areas.

Fund mandate: a) companies engaged in commercialization of the developments performed by the Skolkovo Fund residents; b) companies complying with the purposes, directions, KPI's and(or) significant control results of NTI (National Technology Initiative) roadmaps

- Sk Legal - Skolkovo Intellectual Property Centre (IPC) was established in 2011. The team of the center includes more than 40 lawyers and patent attorneys providing the full range of professional services to the participants of the Skolkovo project and to third parties with legal advice and patenting in Russia and abroad.

- Customs and Financial Company (CFC) is established to support export-import activities of Skolkovo start-ups. CFC successfully handles export of goods to support the activities of Skolkovo residents, including participation in international exhibitions. CFC is also engaged in various products from equipment and machinery to biological substance and chemical reagents.

Skolkovo innovation center coordinates a network of 16 regional operators which are the major points of focus for innovation companies in the regions.

Regional operators are science and technology parks that have been accredited by Skolkovo as providers of Skolkovo services in the regions of Russia. They are competent in developing the start-ups teams and in managing innovative projects within their geographical outreach. The regional network helps to improve coverage of start-up communities and increase the number of applications to the Skolkovo ecosystem. Skolkovo regularly hosts trainings for technoparks in order to improve the skills required for supporting regional start-ups.

Skolkovo is well-known international and has a wide network of international partners including industrial companies, development institutions, accelerators support international activities of start-ups in North America, Europe, and Asia.

Technopark Skolkovo is member of IASP from 2012. In September 2016 it hosted and organised along with the Teknopark Strogino and MSU Science Park, the 33rd IASP World Conference gathered nearly 1600 delegates from 64 countries in Moscow.

Held in three different venues Skolkovo Technopark, the World Trade Center and MSU Science Park - it showcased the flourishing science park and area of innovation community in Moscow, fast becoming a major tech hub in Europe. It was the first time an IASP World Conference took place in Russia, recognising its growing role in the international innovation community.

Working with the university:

Skolkovo has close connections with more than 30 Russian universities and several international including MIT.

Technopark Skolkovo works closely with Skoltech as part of the Skolkovo ecosystem. The university act as a 'catalyst' for the development of advanced research, enhancing the entrepreneurial activity.

Skoltech has 200 full time professors, lecturers, guest and associate professors; 1,000 master and post-docs; 20% of international students from 38 countries; and more than two thirds of students are involved in the development of innovation projects and start-ups.

Skoltech is composed of nine centres for research, education and innovation: biomedicine and biotechnology; infectious diseases and functional genomics; electrochemical energy storage; designing, manufacturing technologies and materials; hydrocarbon recovery; photonics and quantum materials; big data; space; and advanced studies.

Skoltech is diversifying its academic network by expanding cooperation with the best international universities. It opened laboratories in cooperation with Munich Technical University and the University of Calgary. We share academic knowledge and human resources with 30 universities, mostly from Europe and USA. Representatives of 800 foreign universities and research centers are co-authors of Skoltech science papers.

3.4 22@BARCELONA

Country	Spain
City	Barcelona
City's population	1,664,182 inhabitants
Website	www.bcn.cat
Year of creation	2000
Area	200 hectares
Number of companies	Over 300
Number of employees	8,500

Background and objectives

The 22@, also known as 22@Barcelona or the innovation district was constituted in Poblenou in 2000 It is a suburb in Barcelona located in the Sant Martí district.

The project aimed at creating a new perspective to the area, transforming it into an innovative productive environment with modern spaces strategically arranged to boost the implementation and clustering of technology and science-based businesses (Pareja-Eastaway and Piqué, 2011).

The neighbourhood originated during the 18th and 19th centuries as a result of the expansion of the city of Barcelona. Until the first half of the 20th century period, the area consolidated as an

industrial zone-based primarily on textile goods. However, because of obsolescence and the loss of competitiveness of the traditional industry, the district was abandoned and degraded zones emerged as negative results of the capital crisis (Marques and Leite, 2007).

22@Barcelona project pursued a threefold objective: the urban, economic and social revitalisation of the old industrial neighbourhood of Poblenou. The idea was to create a compact intelligent city, under a balanced, hybrid model where productive spaces, homes, green zones and public equipment could coexist, allowing the area to become an interesting place to live and work (Ajuntament de Barcelona, 2012; Fajardo, 2014).

The first focus of the 22@Barcelona Society during the transformation of the district of innovation was the urban development of the zone's 200 hectares, creating a special urban law for 22@ and a special infrastructure plan (Pareja-Eastaway and Piqué, 2011).

The project has invested 191.3 M€ in local infrastructure and has mobilised 1581 M€ in construction and land investments (Mur and Clusa, 2011).

In order to convert Poblenou into an attractive zone for the urban, economic and social activities, the industrial areas were reassigned from old industrial zones (22a) to knowledge-based industrial zones (22@), including knowledge-based facilities (7@), green zones and subsidised housing. In addition, some buildings were selected to be restored as part of the local historic patrimony (Pareja-Eastaway and Piqué, 2011; Ajuntament de Barcelona, 2012; Fajardo, 2014).

The 22@ project attracted anchor companies as a magnet to other businesses, and also built new office spaces destined to small and medium enterprises in order to facilitate the landing process. Both public and private universities, as well as centres of professional education and life-long learning were installed to foster the education of local talent and the attraction of international talent aiming at the creation of new knowledge. A clear cluster strategy was developed on IT, media, energy, health and design; incubators were created to spur start-ups; new residences for students and professionals were built; venues for exhibitions as well as support services (venture capital, consulting, and others) were created to support the development of the district (Battaglia and Tremblay, 2011; Ajuntament de Barcelona, 2012). According to the 22@ business census 2015, more than 8,223 companies are located in 22@, and more than 93,000 jobs are now in the district.

In the social sphere, 22@ was involving professionals, residents and regular citizens in the knowledge-based economy. The goal was to use technology to involve residents in the professional, research and education networks. The CreaTalent, for example, was promoting the scientific and technological vocations of the children of the district.

Additionally, the digital district program supported the development of innovative projects based on new ICTs and was developed by multidisciplinary and multi-age groups. Cultural factories and museums were included in the social strategy.

22@Barcelona is as a central piece of the grand design of the city of Barcelona: to become 'Barcelona, the knowledge city' (Trullén, 2001). Its main goal was to transform from an industrial

society into a knowledge-based society, based on new generation activities related to education, creativity and innovation (Pareja-Eastaway and Piqué, 2011).

Facts and figures

Data referring the first 15 years of life of 22@Barcelona

Basic characteristics

- · 22@Barcelona covers 198.26 ha, 1,159,626 m2 of land, and 115 blocks.
- · 4614 pre-existing houses are recognized in the area, and 4000 new subsidized housing units are planned (25% rented housing).
- · Increase of green areas covering 145,000 m2 of land.
- · New facilities: 145,000 m2 of land.
- · Heritage elements to be conserved: 114.
- · Investment through the Special Infrastructure Plan (PEI): 180 million euros.

Urban transformation in the neighbourhood

- · The 22@ sector has more than 1600 subsidized housing units completed.
- · 40,737 m2 have been developed for green areas (public and private).
- · Approximately 14,000 m2 have been constructed above ground level
- · for facilities for the productive fabric (for example, the MediaTIC building
- · or the business incubator Almogàvers Business Factory) and the
- · neighbourhood fabric (CEIP Llacuna primary education centre or the
- · Camí Antic de València Community Centre and Senior Citizens' Centre).
- · 15 km of streets have been redeveloped.
- · In total, 50.60% of 22@ land awaits completion of its transformation.

Economic transformation in the neighbourhood

- · While in 2000 3473 companies were calculated in the neighbourhood, according to the Business Census (2015), the number of companies installed in 22@ is currently 8823.
- · Since 2000, 4500 businesses have installed themselves in the district, which means an average of 545 new businesses installed each year.
- · Of these 4500, 47.3% are newly formed and the rest are relocations.
- · Approximately 30% are involved in knowledge- and technology-intensive activities.
- · In 2015, 22@ has a total of 2914 freelance workers.

- The number of workers (Business Census, 2015) is estimated to be around 93,000. Of this number, workers with university qualifications represent, on average, 32.2% of overall workers in 22@.
- Exporting companies invoice on average 38% of their sales volume abroad.
- While in 2010 the percentage of businesses located in 22@ with a positive view of the evolution of the economic context for the following year was 53%, this percentage increased to 72% in 2015.

Social transformation in the neighbourhood

- The population of the Sant Martí district increased by 3.69% for the period 2007-2014.
- The foreign population from the EU-28 is over-represented in the neighbourhoods of Vila Olímpica (10.63%), La Llacuna (8.06%), and Diagonal Mar (8.22%).
- Household disposable income is higher than in Barcelona overall and has increased substantially since 2009 in the neighbourhoods of Diagonal Mar and Vila Olímpica. The rest of the neighbourhoods present a household income that is below Barcelona's and that has been decreasing since 2009.

Infrastructures and urban development

The objectives of the 22@Barcelona Plan were stated to renew the urban and economic Poblenou (Pareja-Eastaway and Pique, 2011) suggesting a compact and diverse city with a balanced and sustainable focus, instead of a model specialised on industrial land.

Therefore, the new economic activities coexist with research, training and technology transfer, housing, equipment and trade, in one high quality environment, whose density makes it compatible with a balanced allocation open space and equipment.

On the one hand, through a system of incentives for the real state, urban renewal processes contribute to the redevelopment of all streets with the renewal of infrastructure, improved quality and capacity of the urban services and of the new organisation of the urban mobility. In addition, free land was generated for the community from initial 100% private land, with the transformation, 30% of the land will become public land-to create new green zones, facilities and social housing. On the other hand, the so-called '@' activities are favoured. These activities are those that use talent as a main productive resource.

Thus, the progressive transformation of the industrial land solves historical deficits and restores the social and business dynamism that has historically characterised Poblenou. Since the project's inception in 2000 until now, the urban renewal project has involved the creation of a diverse and balanced environment where most innovative companies coexisted with research centres, training and technology transfer and with shops, housing and green zones, that promote social and entrepreneurial dynamism.

Companies and economic development

A cluster strategy was developed in the District in order to promote the knowledge-based economy. In 2004, adding value at the physical transformation (urban and infrastructures), 22@Barcelona developed policies centred on emerging sectors with local assets and international opportunities to grow: media, ICT, medical technologies and energy. In 2008 the design cluster began as a new strategic sector of Barcelona (Pareja-Eastaway and Pique, 2014).

Promoting urban clusters in the territory of 22@Barcelona, the district improved the innovative capacity of the ecosystem of innovation. Each of the five clusters of 22@Barcelona was located in the district in different levels of maturity. The methodology followed in all cases was aimed at establishing a cluster program.

22@Barcelona promoted the creation of sectorial centres of technology transfer as tools for better connection between research (universities) and companies. 22@Barcelona was working on consolidating these, as Barcelona Media Foundation in the sector audio-visual and Barcelona digital foundation in the sector ICT. In 2009, support was given to Barcelona Centre of Design (BCD) and the consolidation of Institute for Energy Research Catalonia (IREC) which together with b_TEC were leading the energy cluster.

In 2008, with the strategic objective of strengthening the support to companies that wanted to be located in the 22@Barcelona, the initiative 22@PLUS was promoted. The 22@PLUS was conceived as a compact value proposition to companies looking at possible relocation in the district and consisted of a catalogue of services that included comprehensively all the elements of value added at 22@Barcelona. This initiative is now the business one-stop service (OAE) for companies wishing to settle down in the district.

Talent and social development

To develop a talent management strategy that supplied the raw material for the knowledge economy (Florida, 2005), 22@Barcelona managed the implementation of university centres in the district with the objective of locating talent in the district and installed critical mass of talent and new generations of talent.

It was promoted in primary and secondary schools with the aim of influencing scientific and technological vocations, entrepreneurship and understanding of global citizenship. These actions connected schools with clusters developed in the district (creatalent program). As such, 22@Barcelona led to an approach of schools with businesses, promoting career guidance (Porta 22), workplace internships (Staying in Company) and employability (Talent Marketplace 22@). Likewise, with the aim of developing a community of professionals in the District, 22@Barcelona promoted events such as the 22@Update breakfast which served to interrelate across profiles and create a sense of belonging.

Universities and companies acted as true international magnet of talent. In this sense, landing performances were promoted for the international community, ensuring a comprehensive welcome. Publications such as 'Welcome to Barcelona' which describes international schools or practical processes of life in Barcelona facilitate the implementation and integration of newcomers. In parallel, 22@Barcelona developed social programs in order to involve the neighbourhood. programs such as digital district have included grandparents and parents in the process of the district by the implementation of digital training programs.

Key learnings

Key learnings from 22@Barcelona are:

1. the holistic approach for the urban, economic and social transformation
2. a district for working and living
3. a triple helix orientation and governance in the transformation process (government,
4. universities and industry)
5. clear rules for the transformation (urban planning, infrastructure plan and 22@
6. company)
7. the district as an urban lab, as the base of the smart city
8. the smart specialisation (clusters and technology) of the district
9. the attraction of anchor companies and institutions
10. the promotion of technology-based entrepreneurship, incubators and investors
11. the attraction, retention, development and creation of talent

The future- road map

The Poblenou is without doubt the territory in Barcelona that has undergone the most profound transformation over the past 35 years. The construction of the Olympic Village (Vila Olímpica) and the seafront together with the opening of the Diagonal, the remodelling of Plaça de les Glòries and the transformation of the industrial fabric, largely through the 22@ Project, have changed and continue to change both the physiognomy of Poblenou and its socio-economic characteristics.

Plan 22@ (The 22@ Plan), which was approved in 2000, set out the guidelines to transform 200 hectares of industrial land. This emblematic project has had positive impacts, such as Barcelona's top ranking in terms of innovation and attracting businesses, gaining new land for facilities and green areas, developing new public housing, and reurbanising spaces and streets. On the other hand, the plan has not adequately addressed the deficiencies suffered in Poblenou related to the urban model and the daily life of residents, such as the closing down of small retail businesses and workshops, abandoned warehouses and the proliferation of large plots of land unused for long periods of time, generating isolation and exclusion. In parallel, hotel use has been excessive, which has created an imbalance compared with other uses.

Aside from Poblenou's physical and socio-economic transformation, it has also been one of the spaces in the city most intensely affected by the more general phenomena that have taken place and continue to take place in Barcelona, such as the tourism effect and the problems related to accessing housing, with consequences such as gentrification and a tendency towards a monoculture n certain (monoculture in certain) places.

The tensions between the different stakeholders in this territory and the developing diversity of Plan 22@ (the 22@ Plan) prompted Barcelona City Council to initiate the participatory reflection including all the stakeholders involved. Various work spaces and participatory processes have taken place with the goal of drawing up a shared roadmap to guide the future transformation of Poblenou, seeking a rebalance that accommodates the interests of the different social, local resident and economic stakeholders.

Further information about the future of 22@Barcelona can be found in the publication: *"Towards a more inclusive and sustainable 22@ within Poblenau"*. Document that presents the set of actions identified by the various stakeholders in order to define a roadmap that enables 22@ areas to cohese the neighbourhoods of Poblenou and el Maresme based on an inclusive, sustainable transformation.

3.5   HERE EAST

Country	United Kingdom
City	London
City's population	9,425,622
Website	www.hereeast.com
Year of creation	2012
Area	The Campus has 1.200.000 sqft in total of premises
Main technology sectors	Creative industry Robotics Mobility e-sports
General manager	A business professional
Number of companies	Approx. 170 companies
People	About 4,000 people working and studying

Introduction

Here East (www.hereeast.com) is a brand new Innovation District in East London, at Stratford, in the wider area of London 2008 Olympic Games venue.

New hub for creativity and innovation in East London, easily accessible on public transport and surrounded by parkland. It is expected to attract creative businesses and technology companies, and it is already catalysing further regeneration in the area.

Designed to be flexible with future use in mind, Here East has the connectivity, infrastructure and state-of-the-art utilities for a range of different potential uses in the future.

The Campus has 1,200,000 sqft in total of premises out of which 80,000 sqft correspond to the building of the start-up focused Innovation Centre Plexal (mainly in form open space hot desks and small offices, further 130,000 sqft are occupied by University and College departments and the rest is mix of offices, studios and high ceiling spaces for special purposes. Companies of all sizes occupy from 10 – 10,000 sqft space. The three main building are the Press Centre, the Broadcast Centre, and the Theatre (conference venue), encompassing the beautifully landscaped open area named The Yard. The buildings offer flexible working space, with large open floors, retail units, large-scale studios, including active television studios supported by a state-of-the-art data centre and lots of space where start-ups can develop and grow.

Today there are 150 start-ups in Plexal, 20 larger businesses in the premises of the bigger buildings described above, which also host several departments of London Colleges and Universities. Here East is hosting in total 4000 people, out of whom 1000 students (60-70 PHDs) and close to 700 are those employed in the start-up building.

Objective

The project aimed not only to capitalize on expensive infrastructure, that had become idle after the Olympics, but also to have an impact on the wider Hackney Community, related to employment and education and to serve as a regional regeneration vehicle, based on vibrant, technology sectors.

Ownership, Governance, Management

Here East was established after a public private partnership (PPP) tender in 2012, for transforming the Olympic Games Press and Broadcast Center Area and Buildings, into an Innovation District, with special purpose buildings serving innovation, start-up entrepreneurship in creative and emerging technologies, R&D and tertiary education.

The tender provided that the Public Body (Landlord is the London Legacy Development Corporation/ reporting to Mayor of London office) will lease the space and buildings for 200 years, while the private partner will in turn invest 150 million GBP to refurbish the existing buildings (70%

of current infrastructure) and to add premises according to a plan, that would lead to the creation of London's and one of Europe's biggest Innovation Districts. The successful bidder (based on both quantitative and strategic/qualitative criteria), Delancey, a Real Estate Funds advisory group, backed by funds like DV4, started immediately works in the existing buildings. While some tenants were already in place as from 2013, the iconic, start-up innovation building, branded as PLEXAL, commenced operation in October 2016.

The Here East Innovation District was formed with a rather classical PPP procedure, where the public partner contributed the land, mandated the scope of the project and the private partner following an agreement on a common vision, invested 150 million GBP for refurbishment, adaptations and initial operation costs till break-even of the Management Company. The company was set for operating the infrastructure, and in addition also to set up the Here East Innovation Ecosystem, with several intangible important services to innovative tenants, start-ups, SMEs, big companies and university departments moving there.

The shares of the Management Company belong 100% to the investor. The private partner is 100% responsible for covering any deficit from the operation (as happened in the initial operating years) as well as with commercial risks of the project.

Additional projects that were created in the district, outside of the initial PPP contract, and which were funded by the public sector include the 13 million GBP Cybersecurity Innovation Center. These projects were attracted through competitive procedures.

In addition to the socioeconomic impacts the public sector benefits also indirectly from the increased assets value around the Here East Innovation District.

The policies and strategies of Here East and the specialized substructures such as Plexal (www.plexal.com) are developed by the management team, the landlord (public partner) having no institutional involvement in that. However, the management team is constantly in close cooperation and consultancy with all relevant London City Departments (Foreign Direct Investments Dept.) as well as relevant government departments at central level (Dept. of Transport, Health, Work and Pension, even the strategy team of Downing Street No10/the Prime Minister's office), adjusting strategy and projects, according to the local/municipal and national innovation-related opportunities and priorities.

Any surplus generated by Here East following investment repayment, will be used for expanding current infrastructure, alongside to the distribution of dividends to investors.

Although Here East is operationally a fully private venture, its management team is very selective when it comes to tenants. They interview candidate tenants and evaluate their business, or future businesses of startups, in terms of sector dynamics and relevance to sectors focused by Here East, and the potential of businesses to grow globally and became serious scale-ups.

Thus, the content of business is much more important, than the need to fill the space with rent paying tenants. The long-term lease gives the management team (which has quite a clear vision)

the freedom to deliver results, according to the business plan of Here East, without making compromises on initial strategy.

The managers of Here East were invited to comment on their experiences and potential advice they could give to other STP/Innovation District developers (although it is clearly quite early for an ex-post evaluation).

Their opinion on the applicability of the PPP model for/in STPs and Innovation District is, that it is difficult to develop a triple "P" strictly based on financial and technical parameters, without a shared vision. Significant communication is needed, among the partners and stakeholders, who should collaboratively develop this vision.

In their case a big percentage of the partnership proposal scoring, during the evaluation, was based on the vision and strategy for the buildings, alongside the technical and financial capability. Thus, the vision was proposed, agreed and approved by each side during that bidding process.

Classical PPP approaches placing emphasis on financial and technical criteria, availability payments, structure etc., are not suitable for Innovation Projects where vision is equally (or even more-) important. Thus, such PPPs could exploit the Here East example where vision was on par with financial and technical aspects of the tender.

Partners

There is just one partner in the Management Company of Here East Innovation District - the Private Investor Delancey, which has been the same throughout all stages of development. The Landlord, which provided the 200 years leasing contract, had no other financial contribution to the project than the real estate but has been continuously consulted during the planning and construction phase.

Strategy- vision

Although Here East Innovation District is a rather new venture, significant successes have already been recorded. The management team implements a business plan with KPIs for letting and jobs creation.

As with other Innovation and Technology Parks, the qualitative criteria are also important, alongside numerical achievements. SMEs are attracted to Here East with a scope of improving and growing their business, by osmosis with innovation and knowledge developers present in the Innovation District.

Start-ups are attracted also, by the very well-designed conducive environment for innovation and entrepreneurship. In addition, individuals and companies, outside of Here East are attracted to the knowledge and entrepreneurship events taking place there.

Here East has 4 major 'E' strands to its vision, these are:

Education: Education and skills are at the heart of Here East. Hackney Community College will provide the UK's first digital apprentices, with the necessary skills to take advantage of the new jobs in the digital economy. Loughborough University will provide a new research centre for postgraduate studies linking culture, business, sport, exercise and health.

Employment: To create more than 7,500 jobs on site and in the local community, providing routes into employment for local people and a local legacy of jobs, skills and economic growth.

Enterprise: To provide low-cost space with unrivalled infrastructure. Incubator and accelerator space will be provided by TechHub and Space Studios, helping start-up businesses to develop, grow and succeed.

Environment: To promote collaboration and innovation. It will bring together start-ups, established businesses, venture capitalists and academia in one place to share knowledge and expertise.

Relationship with academia:

Loughborough University London

The London 2012 Olympic and Paralympic Games and its legacy was a real opportunity to build a fairer, more inclusive, East London. With Loughborough University London we wanted to ensure that, as much as possible, we created the opportunity for local and global talent to come here to learn and grow. Loughborough University London is an inspiring postgraduate campus located on Queen Elizabeth Olympic Park.

Established exclusively for postgraduate study and research, Loughborough University London combines influential thought leaders, pioneering researchers and creative innovators. Each master's and PhD degree is led by real-world issues and industry challenges, enabling students to contribute to local and global innovations.

Loughborough University London is part of an exciting community of organisations, creatives and educational providers located inside Here East. Our unique location provides a stimulating environment for students and staff to ask questions, challenge ideas and collaborate with a wide range of inspiring industry partners.

Staffordshire University London – **Digital Institute**

In 2019, Staffordshire University branched out its award-winning higher education to the European capital of technology with the launch of Staffordshire University London. The specialist Digital Institute is located in Queen Elizabeth Olympic Park, London and extends the reach of the University to the heart of the European capital of technology.

The institution offers a specialist selection of undergraduate and postgraduate courses designed to corner the industries of tomorrow, including games, cyber security and esports.

This state-of-the-art space within Here East acts as a hub of collaboration, education, and houses the latest digital facilities, including a fully operational esports arena, a control room, studio suites, and multiple dynamic learning spaces.

Staffordshire University London is a perfect example of a commitment to making the most employable graduates for the most significant and growing industries. The Digital Institute offers a selection of finest technological and digital courses, centred on the gaming and computing sectors. The undergraduate and postgraduate portfolio has been designed to cover the lifecycle of modern industry.

Staffordshire University London, have their own expert academic team, facilities, and are part of a bustling community within the Here East campus. They share their location with leading companies in communication, broadcasting and technology, giving students the chance to network while they study and open doors and opportunities for future careers. What's more, central London is just a short tube ride away.

They are working to create a network of employers to expand work experience opportunities in new and upcoming industries – just one advantage of being in one of the best-connected places in London. Plus, the ease of travel via public transport between Here East, the UK and the rest of the globe gives students the chance to juggle work, social and professional development activities easily.

3.6   ANN ARBOR SPARK

Country	United States of America
City	Ann Arbor (Michigan)
City's population	121,885
Website	www.annarborusa.org
Year of creation	2005
Area	City has an area of 28.70 square miles (74.33 square kilometres); Rented/dedicated building: 18,000 square ft.
Main technology sectors	Advanced Services in Technology Transfer ICT & Communications Manufacturing and Automation Technologies Military and Defence Software Engineering and Bioscience
General manager	A business professional

Number of companies	Washtenaw County (Ann Arbor MSA): 8,212 establishments. Downtown district: approx. 180 companies
Number of employees	• About 61,000 in the city of Ann Arbor; • About 152,000 for county (Ann Arbor MSA); • Approx. 3000 in the downtown district

Introduction:

Ann Arbor SPARK is a non-profit organization dedicated to the development of economic and employment opportunities in Washtenaw and Livingston counties located in South East Michigan, USA. Ann Arbor SPARK aims to advance the economy of the Ann Arbor region by establishing it as a desired place for innovation, business location and growth, and for highly skilled workers to live and work.

One of SPARK's primary objectives is to bring together private and public partners, like the Michigan Economic Development Corporation (MEDC), Michigan Works! Association, city and municipal partners, University of Michigan, and others to support the growth of companies and the creation of jobs in Washtenaw and Livingston counties. SPARK has a contractual partnership with the Economic Development Council of Livingston County (EDCLC) to provide economic development services to businesses in the area. The EDCLC Board oversees the work that Ann Arbor SPARK does to advance the economy of Livingston County. This partnership leverages project-based and strategic economic development services in the region through proactive outreach to local businesses in Livingston County that result in value-added services and connections.

Ann Arbor SPARK is an area of innovation serving companies scattered throughout the downtown innovation district and the surrounding region. In the downtown district alone, there are approximately 180 companies with over 3000 employees in existing private real estate. SPARK provides services and support where they are domiciled and also rents an 18K square foot building that houses offices, events space, start-up tenants, etc.

Ann Arbor region draws on a wealth of advantages in talent, location and innovation to craft a dynamic $23.5 billion economy. With innovation-driven cornerstone industries, including automotive and mobility, life sciences and health care, technology, and data and information, the two-county region benefits from a deep pool of educated talent, world-class research and education assets and a lower cost structure than coastal locations. The University of Michigan and Eastern Michigan University help drive entrepreneurial innovation in the region.

There is a wealth of opportunity for businesses to start and grow in the region. With many established industries, the Ann Arbor region also has become a magnet for emerging and rapidly growing sectors and world-class companies have come to Ann Arbor, including Google,

Barracuda Networks, FordLabs, Toyota, Thomson Reuters, TD Ameritrade, Expedia and Nokia.

Additionally, companies are able to capitalize on its proximity to world-class academic institutions, like the University of Michigan and Eastern Michigan University, that are funnelling talent into the workforce. The region of 562,000 residents offers a highly educated workforce, nearly 55% of adults have at least a bachelor's degree, well above state and U.S. averages.

As a renowned high-tech community to live and work, the Ann Arbor region has been awarded as:

- 1st Most educated cities in the USA – wallethub.com 2019
- 2nd Autonomous vehicle Jobs – axios/ziprecruiter 2018
- 2nd Best cities to live in America – niche.com 2019
- 3rd Best college towns & cities in America - wallethub.com 2019
- 4th Best cities to retire – usatoday.com 2018
- 9nd Most innovative metro areas – Verizon 2019

Objective:

SPARK's primary mission was and is to bring together private and public partners, like the Michigan Economic Development Corporation[2] (MEDC), Michigan Works! Association[3], city and municipal partners, University of Michigan, and by 2019 eighty private sector companies to support the growth of existing companies and the creation of new technology-based companies and jobs in the counties surrounding Ann Arbor.

Ownership, governance and management:

The ownership of Ann Arbor SPARK evolved over 15 years. Originally, the structure was a tacit partnership between local government and the University of Michigan. A non-profit entity was formed under Federal and State laws in which the Board consisted of private sector representatives, the local municipality, and academia. Every year the budget of SPARK is determined by a board consisting of members from local government, academia and private sector who devise a program of activities based on funding contributions from each of those sectors.

Presently there are 80 private companies who annually fund SPARK, including large corporations such as Google and Toyota and smaller local firms. These private companies have a mix of motivations ranging from being good corporate citizens as well as seeking to benefit from the showcase of technology that is presented. Some of the private sector funders use money from their own foundations to support SPARK, not money from their operations. In the report for 2018

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[2] https://www.michiganbusiness.org/
[3] https://www.michiganworks.org/

which is publicly available on the organisation's website the total budget is 6.47 million USD, the major part of which dedicated to acceleration, incubation and grants to early-stage companies while the operating budget was 1.875 million USD. The funding sources for this operating part were roughly split into 1:1:3 respectively for public (which includes government & municipal funding), academia (university) and private contributions and sponsorships. Some companies provide non-budgetary contributions, an example of which are credits given to SPARK by Google for social media marketing.

The City of Ann Arbor's motivation is that SPARK has enabled a professional staff that it otherwise would not have been able to afford without the benefit of additional resources from the private and academic sectors. City of Ann Arbor contributes 75k USD to the yearly 7.0 million USD effort (rounded total budget).

During the 2008 – 2012 timeframe, Michigan was still viewed as a flyover State for venture capital investing. Recognizing Ann Arbor SPARK's success in nurturing start-ups and accelerating their growth, the State of Michigan through the Economic Development initiative of the Governor, created a state funded VC fund of 24 million USD paid to be housed at SPARK. SPARK made pre-seed investments in over 100 companies across the State of Michigan with half of the portfolio being located in the Ann Arbor region as a locus of technology start-ups. The State required that 50% of the its funding must be matched by other sources. To date, 560 million USD of additional capital came into the portfolio companies. 70% of the companies originally invested in are still in existence.

On the non-startup side, there is a variety of city and local government support with the university providing approx. 15% of the funding, the private sector about 30%, and the remainder coming from a variety of city and local government sources. After a national search, the group hired Paul Krutko in 2011, an experienced Silicon Valley economic development executive as its second CEO. His tenure has been marked by the ability to attract technology companies from Silicon Valley to locate facilities in the Ann Arbor area of innovation.

Since 2011, SPARK has attracted approximately $1.5 billion USD in investment in company investment and 15k new jobs. In 2018, 150 million USD was the investment by the private sector, signalling that the private sector role is a mature one.

It is estimated that 50% of all start-ups in the State of Michigan happen in and around the Ann Arbor area of innovation. Ann Arbor attracts successful entrepreneurs from across the state and the nation.

The local chamber of commerce primarily works with the private sector companies serving the local market. SPARK's focus is on companies from the start-up phase through mature players like the Toyota North America Research Facility that are growing the regional GDP by selling goods and services outside the region to national and global markets and not local ones.

SPARK CEO sees himself as helping to lead strategic projects on behalf of the stakeholder members of Ann Arbor's triple helix by developing the concept, bringing new and current players

to the table, and providing an environment and community to facilitate partnerships and investment.

SPARK can be seen as a premier example of an emerging area of innovation/innovation district model in the US. This model is coming more and more to the fore and to some extent replacing "science parks" as the leading model.

Strategy:

Ann Arbor SPARK Five-Year Strategic Plan (2018-2021).

<u>Mission Statement</u>

SPARK will advance the economy of the Ann Arbor Region by establishing the area as a desired place for business expansion and location by identifying and meeting the needs of business at every stage, from those that are established to those working to successfully commercialize innovations.

<u>Values</u>

To provide high value and innovative services to our stakeholders and customers helping meet their challenges in an increasingly dynamic and volatile global economy.

To pursue the principles of open-source economic development by engaging in regional and state-wide collaboration with public, private and non-profit partners to advance the Ann Arbor region, Southeast Michigan, the State of Michigan and the nation.

Strategic Direction 1 Acceleration- Create long term regional prosperity by accelerating the growth of startups and early-stage companies through investment and by support through offering direct and consultant services and through collaboration with other partners.

Objectives:

- Look for new funding and service opportunities to expand support to early stage and second stage companies to accelerate their growth to global scale whenever possible.

- Cultivate SPARK's capacity to connect emerging companies with early financing, talent and other resources to strengthen the bridge from start-up to maturity. No venture or business should have to leave our region due to a lack of talent, capital or real estate.

Strategic Direction 2 - Talent - Maximize the retention, development and attraction of knowledge workers and experienced entrepreneurial management though convening and collaborating with partner organizations and direct program delivery to meet the needs of early stage and mature companies we serve.

Objectives:

- Engage in developing new strategic and tactical approaches with partner organizations to respond to the "talent" deficit.

- Scale initiatives like Tech Trek and the TrueJob Portal to build on initial success from Strategic Plan 1.0.

Strategic Direction 3 - Growth - Maximize job creation and capital investment growing the regions GDP through the retention and expansion of established driving industry companies that sell goods and services outside the Ann Arbor region and through the targeted attraction domestically and internationally of similar companies that fit the regions identified clusters.

Objectives:

- Achieve levels of investment and job creation at levels that exceed comparable US communities of our size with major research universities. (i.e. Chapel Hill, NC, Evanston, IL, Madison, WI, Boulder, CO)

- Attract new companies that "fit" our region and grow those already here, advancing our existing and emerging clusters and the opportunities for existing talent within the community and attracting new talent here.

Strategic Support 1 - Leadership - Further strengthen the Ann Arbor SPARK organization to maintain SPARKs position as one of the nations and world's leading economic development organizations. Increase Ann Arbor SPARKs role in activities that advance regional collaboration toward economic prosperity.

Objectives:

- Maintain the best staff with top-notch skills.

- Develop targeted quantitative and qualitative success metrics that demonstrate ROI to ensure continued funding support from our stakeholders.

- Continue to proactively convene community leaders and organizations, where appropriate, to develop collaborative approaches to continued prosperity and enhanced inclusion in the region.

Strategic Support 2 - Planning - Lead the creation of a long-term strategic framework for maximizing the Ann Arbor regions economic competitiveness globally in the year 2025 that reflects best practices, new opportunities with appropriate partners and that is informed by stakeholder input.

Objectives:

- Ensure that appropriate office and research/development space, especially Class A for driving industry companies, particularly headquarters and ICT companies is being developed in Ann Arbor and surrounding communities within our regional partnership.

- Collaborate with partners to identify, create and enhance other regional physical assets, and infrastructure including hotel and meeting space necessary to support effective and sustainable economic development.

- Collaborate with the University of Michigan to identify opportunities to develop a university affiliated technology park(s).

Strategic Support 3 - Communication and Engagement – Building on SPARK's successful event and social media program, expand local, regional, state-wide, national and global awareness of the Ann Arbor region's attractiveness for business location and career and life opportunities.

Objectives:

- Utilize social media channels and resources available to SPARK to communicate a positive message to external audiences concerning the attributes of our region for companies, individuals and families.

- Collaborate with partners in communicating that message in any and all appropriate venues.

Entrepreneur Partners

Ann Arbor Angels: The Ann Arbor Angels is a membership organization of angel investors that invest in early-stage technology companies in the greater Ann Arbor area. www.annarborangels.org

BBC Entrepreneurial Training & Consulting (BBCetc): BBCetc concentrates its efforts in the areas of business development, SBIR/STTR training, and proposal preparation and support. www.bbcetc.com/

Michigan Angel Fund (MAF): The MAF is a for-profit, pooled, professionally managed angel fund. MAF was established by Ann Arbor SPARK and supported by the Michigan Economic Development Corporation to help finance early-stage companies in the state of Michigan and to attract additional angel investors to the Michigan entrepreneurial ecosystem. www.miangelfund.com

Michigan Emerging Technologies Fund (ETF): The Michigan Emerging Technologies Fund (Michigan ETF) is designed to expand funding opportunities for Michigan technology-based companies in the federal innovation research and development arena. The fund will match both Phase I and Phase II SBIR/STTR awards until funds are exhausted. www.mietf.org

Small Business Administration: The SBA helps Americans start, build, and grow businesses. Approximately 35-40% of all SBA loans are made to startups. www.sba.gov

Venture Capital and Angel Investors: The mission of both venture capital firms and angel investors is to invest in start-up, early-stage, and emerging growth companies in exchange for an equity position. The vision of the Michigan Venture Capital Association (MVCA) is to increase the amount of capital and talent available to venture and angel investors so they can fund Michigan's most innovative entrepreneurs and work closely with them to transform breakthrough ideas into

new companies and industries that drive Michigan job creation and economic growth. MichiganVCA.org

Networking/relationship with academia:

Ann Arbor SPARK is a public private partnership of the University of Michigan, over three dozen leading private corporations and the municipal and county governments located in the Ann Arbor region that was formed through the collaboration of the Office of the President of the University of Michigan and its Office of Technology Transfer and those other entities listed including the resident venture capital community.

The University of Michigan currently has the largest research budget of a public university in the US at approximately $1.5B. The President of the University of Michigan as well as the Presidents of the Eastern Michigan University and Washtenaw are members of the board of directors along with CEOs of several leading technology companies' residents in the area along with key elected officials.

The depth of the relationships across the academic, private and public sectors is illustrated by the fact that the first chair of A2 SPARK who was a regional venture capitalist who now is the Governor of the State of Michigan who after completion of a three-year term was succeeded by the Vice President for Research of the University of Michigan who was succeeded by the President of the Bank of Ann Arbor. All of the academic institutions provide significant funding to A2 SPARK for operations, as do on-going annual contributions by the private corporations and funding from the local governments. The Executive Director of the University of Michigan's Office of Technology Transfer chairs the A2 SPARK Entrepreneurial Services Committee and the President/CEO of Ann Arbor SPARK is member of the OTT National Advisory Board.

A key partnership is with the City of Ann Arbor Local Development Finance Authority that provides nearly $2M in on-going operating capital for direct acceleration services to start-ups and \nearly stage companies that are being created through the on-going research and development across the myriad of scientific and practical research being conducted at the University of Michigan. This is funded through a special taxing district called a SMART Zone centred around the downtown of Ann Arbor where a significant number of high technology companies are located. These funds are used to support incubator and acceleration facilities as while as direct service provision and consultancy to early-stage firms.

Additionally, A2 SPARK has a significant relationship with the State of Michigan in the initial development and spinoff of a bioscience industry acceleration facility within the area of innovation. This relationship also includes the management of a $25M pre-seed investment fund on behalf of the state that provides funding to early-stage companies before initial venture capital investment. Although A2 SPARK makes investments throughout the State of Michigan approximately 35% have been made in the proposed area of innovation. Over 90 investments have been made to date. A2 SPARK has also developed a pilot Angel Fund to test the concept

of pooling Angel Investment into vetted companies spreading the angel investment risk across a portfolio of companies.

Ann Arbor's tech community benefits from regional colleges and universities, foremost of which is the University of Michigan. In 2016, U-M awarded 842 degrees in computer information systems, computer sciences, and electrical engineering. Eastern Michigan University awarded 57 degrees in computer operating systems, Web programming, and CAD/CAE.

The University of Michigan ranks among the world's top universities and its graduate and professional programs are consistently listed among the nation's top ten. University of Michigan's College of Electrical Engineering and Computer Science Engineering offers degree programs in: Computer Engineering, Computer Science, Data Science, Electrical Engineering and Eastern Michigan University.

The College of Technology at Eastern Michigan University, located in downtown Ypsilanti, offers four-year degrees in computer engineering technology and information security.

In addition to University of Michigan and Eastern Michigan University, Ann Arbor area employers can recruit from universities within an hour's drive of Ann Arbor—Wayne State University, Lawrence Tech, Kettering, and Michigan State University. All four have degree programs in computer science.

The University of Michigan (UofM) is behind the creation of Ann Arbor SPARK, and is one of their main promoters.

In 2005, the new President of the University of Michigan (UofM), Mary Sue Coleman was concerned about how effective the University was in impacting the regional economy through the commercialization of its research. This was an important concern because the University of Michigan is one of the largest research universities in the United States, with a current budget of $1.5B USD annually. The President's question focused around why University of Michigan was not generating the start-ups and spinouts like MIT (Massachusetts Institute of Technology) and Stanford given that the University of Michigan's research budget was larger than both and why there was not significant technology company growth through investment and job creation in the Ann Arbor region.

The President convened a national advisory panel of alumni that developed a triple helix organization called Ann Arbor SPARK which was an initiative which assembled private sector, academia - the University of Michigan, Eastern Michigan University, and Washtenaw Community College as well as local government.

The initiative had three initial objectives for UofM:

1. Help start-ups grow out of the University Michigan.
2. Improve the capabilities of The University of Michigan's Technology Transfer Office.
3. Direct some of the school's fundraising proceeds (target 10%) into early-stage companies without any geographic restriction.

One mandate was to tie into the University's alumni network and talent pool to help market Ann Arbor as an attractive place to start a company or relocate an existing one. The University of Michigan's 500,000 living alumni community is one of the largest in the country. Its graduates include such Silicon Valley luminaries such as Larry Page, a co-founder of Google.