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Developmental Paper

Mind the gap

*New types of innovation habitats to help startups grow and scale faster:
The Digital Catapult Centres in UK*

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This developmental paper makes an analogy with the much known British expression “Mind the Gap”, considering innovation habitats as instruments that can mitigate the gaps in the system and catalyse the innovation process, especially the relationships among startups and other actors in the system. These habitats represent a new form of innovation support, distinct from established instruments like technology parks and incubators, operating at a lower level of investment with activities that are typically co-produced with their participants. In the literature, and in empirical studies, we may find a range of innovation habitats, with their own remits and definitions. This paper begins with an exploration of such issues, focusing on an innovative policy initiative supported by Innovate UK (formerly UK Technology Strategy Board): the Digital Catapult Centres. The overall research objective is to understand the critical factors behind the implementation and operation of these Centres. The research also aims to obtain a better understanding of public policies to support them and the results generated by such Centres.

Key words: innovation habitats; Digital Catapults; startups; innovation public policy

1. Introduction

This paper contributes to the innovation policy literature in two ways, it proposes two levels of aggregation of innovation habitats, and also characterises these new forms of innovation support and delivery with a broader and systemic view, and their sub-level of activities operating under the radar, by comparison to traditional instruments such as technology parks and incubators. These habitats are co-produced and delivered by participants at lower levels of infrastructural investment than established forms. We analyse their potential for stimulating innovation with reference to the activities of the Digital Catapult Centres in the UK.

Technological innovation is one of the most important factors for economic development in a knowledge-based economy. According to Kim and Nelson (2005), since the dawn of modern discipline, the economists that have been written about economic development identified technological breakthrough as its main driving force. In this context, the creation of new technology-based companies is placed at the centre of policy discussions aimed at economic development through innovation, since they extrapolate its dynamism to industrial sectors that are still under development (Santos, 2005).

The OECD (2005) points out the change of the prevailing technological paradigm, in which innovations tended to happen in large companies, usually via processes based on integrative technologies, to an alternative paradigm in which innovations occur mainly in products that incorporate science-based modular technologies, and are carried out by new and / or small businesses. This new paradigm is accompanied by the following changes:

- emphasis is on the relationship between science and industry;
- strengthening the engagement of the public sector with industry, especially with regard to mobility of researchers;
- promoting collaboration between companies;
- incentives to small and medium - sized enterprises and new companies based on technology, since there is a difficulty for large companies already established to change their business and innovation model; and,
- globalisation of R & D, where the promotion of the creation and development of small enterprises based on technology becomes relevant, due to the absorption of R & D activities of foreign companies, balancing the amounts invested in R & D by domestic companies abroad; and innovation in services.

Several institutions – such as government, educational, research and development – and incumbent companies are involved in carrying out actions to promote the creation of innovative businesses. Among the various initiatives, we can find the establishment of environments that enable greater interaction of these agents at the local level, known as innovation habitats (Hauser, 1997; Zouain, 2003; Correia and Gomes, 2012; Plonski, 2016)¹.

A common feature of innovation habitats, regardless the nomenclature they adopt, is the promotion of interaction among actors of an innovation system whose connections can be established and strengthened. That is why the title of this developmental paper makes an analogy with the much known British expression “Mind the Gap”, considering innovation habitats as instruments that can mitigate the gaps in the system and catalyse the innovation process, especially the relationships among startups and other actors in the system.

¹ The term “habitats” in the literature and empirically are used, very often, interchangeably with innovation “environments”, “spaces” and “areas”.

In the literature are found, quite systematically, research about issues regarding innovation habitats such as: technopolis (Castells and Hall, 1994; Zen, Hauser and Vieira, 2004; Lunardi, 1997; Spolidoro, 1997), technology centres (Zen, Hauser and Vieira, 2004; Lahorgue et al, 2004), science parks (Scandizzo, 2005; Lahorgue et al, 2004), technology parks (Link, 2009; Phan et al, 2005; Figlioli, 2013; ABDI, ANPROTEC, 2008; Zouain and Plonski, 2006; Lahorgue et al, 2004), and business incubators (Zen, Hauser and Vieira, 2004; Scandizzo, 2005; Vedovello, 2001). More recently, some studies address accelerators (Bruneel et al, 2012; Pauwels et al, 2016), living labs (Shuurman and Tönurist, 2017; Mulas, 2016) and makerspaces (Han et al, 2017; Mulas, 2016).

In particular, business incubators and technology parks have national associations that represent them - such as United Kingdom Science Parks Association (UKSPA)², Association of University Research Parks (AURP)³, in United States, and Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores (ANPROTEC)⁴, in Brazil. Globally, the most representative is the International Association of Science Parks and Areas of Innovation (IASP)⁵. All these associations have their own remits and definitions, although most are similar regarding the environments they represent. Recently, efforts have been made to include other types of innovation habitats, such as those mentioned above, in the list of possible associates.

In terms of public policy and its execution, technology parks and business incubators have undergone a trivialization of their concepts in the last decade in Brazil. One of the factors that contributes to the misuse of the concept, especially in the case of technology parks, is the adoption of the definition by initiatives that, although have a physical environment that resembles a proper technology park, fail in offering the services companies should expect to receive from an innovation environment, or because the habitat is more based in a political vision than in real critical mass and entrepreneurial potential that could be fostered. It also must be considered that not all regions have the necessary conditions and resources to develop complex and sophisticated environments as technology parks.

Consequently, it is important to have a comprehensive understanding of other initiatives aimed at creating innovative companies and provide services to minimize the gaps in the local innovation system. These initiatives, in order to be easier implemented in developed and developing economies, should be based in cities (Mulas, 2016), be less complex (in terms of area and resources of all types) and more flexible in terms of infrastructures, allowing also locations out of mainstream cities and neighbourhoods to promote regional development by fostering innovation. This requires an understanding of the critical factors for the implementation and operation of this type of initiative. Therefore, this research adopts a institutional perspective, considering innovation habitat “an institution providing assistance to its tenants in specific policy-based or mechanism-based ways” (Koh et al, 2005).

This research will explore the subjects above, and will move deeply into the categories of innovation habitats and its key features, including theory and empirical evidences, focusing an innovative policy initiative supported by Innovate UK (formerly UK Technology Strategy Board): the Digital Catapult Centres⁶.

² www.ukspa.org.uk/

³ www.aurp.net/

⁴ <http://anprotec.org.br/site/>

⁵ www.iasp.ws

⁶ www.digitalcatapultcentre.org.uk/

The centres, installed in four locations in UK (London, Brighton, Yorkshire and Sunderland) aim to promote collaboration between business, universities and other non-profit organizations, jointly investing in projects that build platforms and capabilities for many small enterprises to innovate quickly and with less risk. Such centres assumes the open innovation model (Chesbrough, 2003) as basis for the support of startups.

The research also aims to:

- a) Understand the activities they offer, how their management is structured, and describe the good practices adopted by them;
- b) Understand the resources, including human resources, necessary for the development of its activities;
- c) Analyse how the centres are funded and how they become sustainable;
- d) Identify the type of connections and relationships promoted by the centres, particularly regarding to one of its programs, the IoTUK;
- e) Understand which public policies support such centres; and
- f) Present the results generated by the centres, including customers' perceptions of them.

1.2 Rationale and expected contributions

The first author has a background in research related to innovation management and innovation environments. The master dissertation and doctoral thesis, both from the University of São Paulo, were about Technology Parks, with focus, respectively, on financing prospects and on business models of management organisations of such initiatives. This developmental paper is related to the ongoing post-doc research that have been carrying out at the Centre for Research in Innovation Management (CENTRIM), at the University of Brighton, a partner of Brighton Digital Catapult.

Besides researching in the area, the first author was a member of the team that developed the planning, and that coordinated, under the Advanced Pole Institute of Health of Ribeirão Preto, the implementation of the Technology Park of Ribeirão Preto, in the local campus of University of Sao Paulo. The researcher worked from 2012 to 2016 for the State of Goiás in Brazil, as Head of Technological Development, Innovation and Promotion of Information Technology. The author also participates in the movement of incubators and technology parks in Brazil since 2005.

The experience as a researcher, as a practitioner in the implementation of a technology park, and as a public policy proponent and executor, provided the first author a grounded view of the huge barriers of deploying successful technology parks in locations that do not have critical mass in research and also business. Even more critical is the feasibility analysis of this type of initiative, mainly when public resources are scarce and, in most cases, such enterprises do not have a clear business model that allows the structure of revenue to match its expenses with low, or no dependence, on government support (Figlioli, 2013).

In this context, at the macro level, it is essential to understand the different innovation habitats (and activities and services they offer) available to promote the faster development of new innovative business and, therefore, the economic development of less central regions. Several contributions can be extracted from this research. There is still a gap in terms of clear

definitions, both in academia and in practice, regarding the types of innovation habitats and the characteristics that differentiate them, what lead to comparisons between “oranges and apples”.

In a broad view, this research attempts to contribute to literature providing a more comprehensive and systemic framework of the categories of innovation habitats. For policy makers, a comprehensive understanding of innovation habitats alternatives can lead to the preparation and implementation of more systemic innovation policy through the establishment and fostering of instrument mixes (in this case, innovation habitats) that addresses specific gaps in the innovation system according to a certain context (Borras and Edquist, 2013). A more clear definition should also contribute to entrepreneurs, startups and incumbent companies to avoid a mismatch between what they expect from innovation habitats and what they can actually receive as support from them.

In a more narrow perspective, although it will not be able to present in this developmental paper, the research also aims to contribute to literature in applying the business model theory lenses to analyse the Digital Catapults in UK. Its business model components can bring enlightenments about the main characteristics and practices of this kind of habitat to organisations, including municipalities, educational and research institutions, and incumbent companies who wish to promote the fast development of innovative business from local digital expertise.

2. Research design

This research is mainly qualitative, but uses both qualitative and quantitative data. The research will promote at first a literature review on innovation habitats and search for empirically evidences of projects of different kinds, in order to present a framework of characteristics and services offer by them. Therefore, it uses the content analysis technique in order to find the common key patterns of characteristics in the definitions and in other information (such as services and infrastructure) found in the literature, in websites of renowned associations and in reports of institutions that research about innovation and entrepreneurship policy and policy instruments. The sources used to build the framework is presented in table 1.

Table 1 – Sources used for the construction of the innovation habitat framework

Innovation Habitat	Source
Literature	
Technopolis	Castells and Hall (1994); Zen, Hauser and Vieira (2004); Lunardi (1997); Spolidoro, (1997)
Technology Pole	Lahorgue et al. (2004); Spolidoro, (1997)
Innovation Hub	X
Technology Park	Link (2009); Phan et al. (2005); Figlioli (2013); Zouain and Plonski (2006); Lahorgue et al. (2004)
Science Park	Scandizzo (2005); Lahorgue et al. (2004)
Accelerator	Bruneel et al. (2012); Pauwels et al. (2016)
Incubator	Zen, Hauser and Vieira (2004); Scandizzo (2005); Vedovello (2001)
Coworking	Spinuzzi (2012), Moriset (2013)
Makerspace	Han et al. (2017), Van Holm (2014)
Living Lab	Shuurman and Tönurist (2017)
Innovation Centres	Zen, Hauser and Vieira (2004); Lahorgue et al. (2004)
Associations websites	
Technopolis	IASP, UKPSA, AURP, ANPROTEC
Technology Pole	IASP, UKPSA, AURP, ANPROTEC
Innovation Hub	European Creative Hubs (http://creativehubs.eu/)

Innovation Habitat	Source
Technology Park	International Association of Science Park (IASP) (www.iasp.ws) United Kingdom Science Parks Association (UKSPA) (www.ukspa.org.uk) Association of University Research Parks (AURP) (www.aurp.net) Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores (ANPROTEC) (www.anprotec.org.br)
Science Park	IASP, UKPSA, AURP, ANPROTEC
Accelerator	International Business Innovation Association (InBIA) (inbia.org), ANPROTEC
Incubator	IASP, UKPSA, AURP, ANPROTEC
Coworking	European Creative Hubs (http://creativehubs.eu/), European Coworking Assembly (https://coworkingassembly.eu/)
Makerspace	Fab Central (http://fab.cba.mit.edu/)
Living Lab	European Network of Living Labs (ENoLL) (http://www.openlivinglabs.eu/)
Innovation Centres	EBN Innovation Network (http://ebn.eu/), UKPSA
Reports	
Technopolis	X
Technology Pole	X
Innovation Hub	Mulas (2016)
Technology Park	ABDI, ANPROTEC (2008)
Science Park	ABDI, ANPROTEC (2008)
Accelerator	Mulas (2016); Dee et al. (2015); Clarysse et al. (2015)
Incubator	Dee et al. (2015)
Coworking	Mulas (2016); Dee et al. (2015)
Makerspace	Mulas (2016); Sleight et al. (2015)
Living Lab	Mulas (2016)
Innovation Centres	Mulas (2016)

Secondly, with a descriptive approach, it will use secondary data to allow a better understanding of the Digital Catapult Program and its centres, as well about the public policy to support them.

Although not present here in this developmental paper, following the researcher will pilot the methodology and data collection instruments. Visits will be conducted in the four Digital Catapult Centres, in order to interview their local managers, and the general coordinator of the projects, to collect primary data on the following variables related to the implementation and operation of the centres:

- a) Environment management and practices adopted: legal model, governance model, management model, strategic planning and performance indicators;
- b) Physical resources and human capital: infrastructure, support services, skills of the people involved in the project, composition of teams, qualification of them, programs of staff training;
- c) Financing and sustainability: revenue sources and cost structure, fundraising, private partnerships;
- d) Connections and relationships: integration with universities and research centres, institutional coordination, environment promotion, forms of communication and technology diffusion;
- f) Results generated by the centres in terms of business and employment creation, projects developed in partnership, transferred technologies, among others, considering they are ongoing projects.

In order to have a systemic view of the Digital Catapult centres operation, the business model canvas technique (Osterwalder and Pigneur 2010) will be employed in order to highlight the key components, and its interconnections, of these innovation habitats to support digital

startups. Sources of secondary data, such as monitoring reports of the project and institutional materials, will be used to supplement the primary data collected.

3. Literature review

3.1 Innovation habitats

According to the English Oxford Living Dictionaries⁷, habitat is “the natural home or environment of an animal, plant, or other organism”. They are the “specific addresses” of certain species in a broader ecosystem that includes “all living organisms (biotic factors) in an area as well as its physical environments (abiotic factors) functioning together as a unit” (Jackson, 2011). As every natural ecosystem is different, the habitats that hosts certain species in different ecosystems varies in its characteristics and dynamics.

Making an analogy with the fashion and still in-consolidation term innovation ecosystems (Oh et al, 2016), innovation habitats can be consider spaces that offers certain conditions to nurture innovation by offering various kinds of services demanded by the living organisms, in this case, new born and incumbent companies. These services are established in order to address innovation market failures, depending on the needs of the portfolio of companies served by the innovation habitat, and on the objectives of its shareholders and stakeholders.

Several terms are used in literature and technical reports to address innovation habitats. According to Mian (2016), one of “the major challenges for research on Technology Business Incubators (TBIs) is the lack of an agreed upon definition and unified theory”. The same author also stresses that “TBIs are operationalised as science parks, technology incubators, innovation centres and accelerators”. In this case, Mian (2016) reduces the spectrum of analysis of innovation habitats to business incubation, what is not consistent to the activities promote by a series of innovation habitats, mainly in case of science and technology parks, technology poles and technopolis.

Even recent publications shows that is a lack of consistency in theory regarding to innovation habitats, what is more critical when the term are used to propose mechanisms to respond to technology driven economic trends (Mulas, 2016). Three of the four areas to be prioritised by policies suggested by Mulas (2016), points what the author denominates as “collaboration and community promotion spaces”:

- Promoting the development of local innovation ecosystems (focus on cities, city innovation model, easily available to developed and developing countries, collaboration spaces);
- Fostering entrepreneurship that creates new sectors and businesses (challenges, virtual and physical spaces);
- Creating innovation networks and collaborative environments (for example, innovation labs) for existing core and traditional industries to remain competitive (innovation hubs, environments for rapid testing, prototyping and adaptation).

In addressing these spaces, Mulas (2016) present concepts that overlaps each other (as the case of Maker Spaces, Fab Labs and Techshops, and Living Labs and Urban Labs). The author

⁷ <https://en.oxforddictionaries.com/definition/habitat>

didn't include business incubators or science and technology parks on the roll, although he refers to innovation hubs.

Other recent publication from Brunel et al (2012) presents the classification of generations of incubators regarding the evolution of their value proposition, also building a relation with a specific theoretical lens (table 2).

Table 2 - Evolution of Business Incubation value proposition

	First generation	Second generation	Third generation
Offering	Office space and shared resources	Coaching and training support	Access to technological, professional, and financial networks
Theoretical rationale	Economies of scale	Accelerating the learning curve	Access to external resources, knowledge, and legitimacy

Source: Brunel et al (2012, p. 113)

The authors verified that the business incubators studied could be classified in generations depending on what they offer, and that nowadays they standardize their value proposition and state a similar mission, independent of "their generation". Albeit, first and second generation business incubators extended their value proposition while not adjusting their selection criteria and exit policy. Then, in order to have a clear view of what they really offer, the authors suggest that it is better to check the prospective tenants than checking the business incubator profile (Brunel et al, 2012). Although the authors considered all the innovation habitats studied as incubators, we can observe that the third generation incubators offers services related to accelerators. Pauwells et al (2016) applied the business model design to study the incubation model evolution and also consider accelerators as a new generation of incubation model. Other publications and associations propose a clear difference between incubators and accelerators.

As there is a range of innovation habitats which denomination varies in different publications, technical reports and association's prospectus, the authors of this developmental paper propose to develop a broad framework considering their main characteristics and the intensity of services they offer.

3.2 Premises considered to address innovation habitats

Two main premises are considered in order to establish the innovation habitat framework:

- the institutions should operate in a context of open innovation;
- they are considered innovation intermediators.

3.2.1. Open innovation paradigm

Since the innovative new companies (startups) specialise in a certain part of the product value chain, these companies rely on an interorganisational network, in an open system, whose performance is related to the capacity of other companies in the network. Thus, the dynamic of regional growth combines development and diffusion of innovation, since regional innovation not only refers to the process that triggers the growth dynamics of the region, but also redefine it through the industrial specialization process (Best, 2001). In this sense, the open innovation concept appears as basis for rapid development of innovative companies.

Catalysing the innovation process through collaboration with organisations outside the company is a widely treated object in the literature. From the coining of the term Open

Innovation by Chesbrough (2003), it sparked up new interest in the subject, which refers not only to the internalisation of knowledge, ideas and technology, as well as putting out of company borders technologies that would not be taken forward.

In this new approach, research and development are treated as open systems, where internal and external flows of knowledge are used to accelerate internal innovation and, at the same time, to expand the markets via the external placement of innovation that is not developed internally. This allows the company to receive earnings from projects that could be abandoned in the innovation funnel for not fitting the criteria established by the company (Chesbrough; Vanhaverbeke and West, 2006). Figure 1 shows the potential influence of the innovation habitats in the dynamic of open innovation, promoting the catalysis of the process.

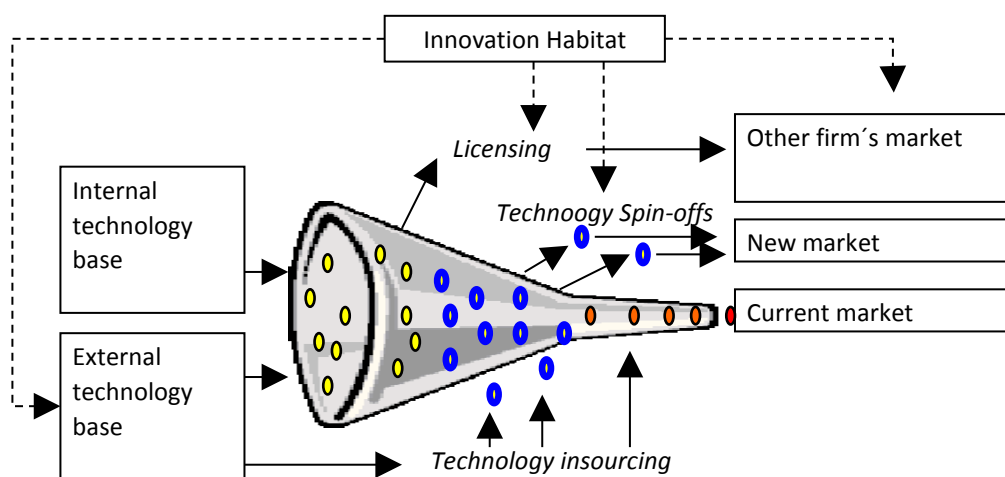


Figure 1 - The potential influence of innovation habitats in the dynamics of open innovation
Source: Adapted from Chesbrough, Vanhaverbeke and West (2006).

3.2.2 Innovation intermediary organizations

Clarke e Ramirez (2011, p. 4), define innovation intermediary as “an organisation that promotes and facilitates knowledge flows between two or more parties, contributing to a process of learning and capability building amongst the firms and/or clusters with whom they work”. They aim to mitigate the structural weaknesses in the innovation system in which they are inserted (Sapsed et al 2007; Howells, 2006).

Innovation intermediaries “denote a range of organizations including brokers, third parties and agencies that are involved in supporting the innovation process” (Howells, 2006, p. 715). The author points 10 functions for the innovation intermediaries: foresight and diagnostics, scanning and information processing, knowledge processing and combination/recombination, gatekeeping and brokering, testing and validation, accreditation, validation and regulation, protecting the results, commercialisation, and evaluation of outcomes. As we can see from the figure 1, innovation habitats promote innovation intermediation, and the functions presented, and others added, are considered in the offerings of innovation habitats framework in section 3.3.

3.3 Framework of Innovation Habitats categories

“If you’ve seen one park, you’ve seen one park.”
Prof. Albert Link (Wessner, 2009, p.42)

The quote that headline this section could seem a paradox if we argue to propose a framework of innovation habitats. But what we propose is that, although there is variation inside a category of innovation habitat – take the case of technology parks, for instance – there are characteristics that differs among categories and, although without perfect and clear frontiers, as academic classifications regularly are, allows a systemic view of them.

In order to elaborate a framework of innovation habitats, we propose a classification in two levels of aggregation:

- a) The first level includes habitats that aggregates other innovation habitats, or offer the services/activities that those organizations are supposed to offer, and that have a more broad mission in coordinating the innovation local system;
- b) The second comprises innovation habitats that are configured as organizations that offer services in order to mitigate certain innovation system gaps, with a more focused mission (figure 2).

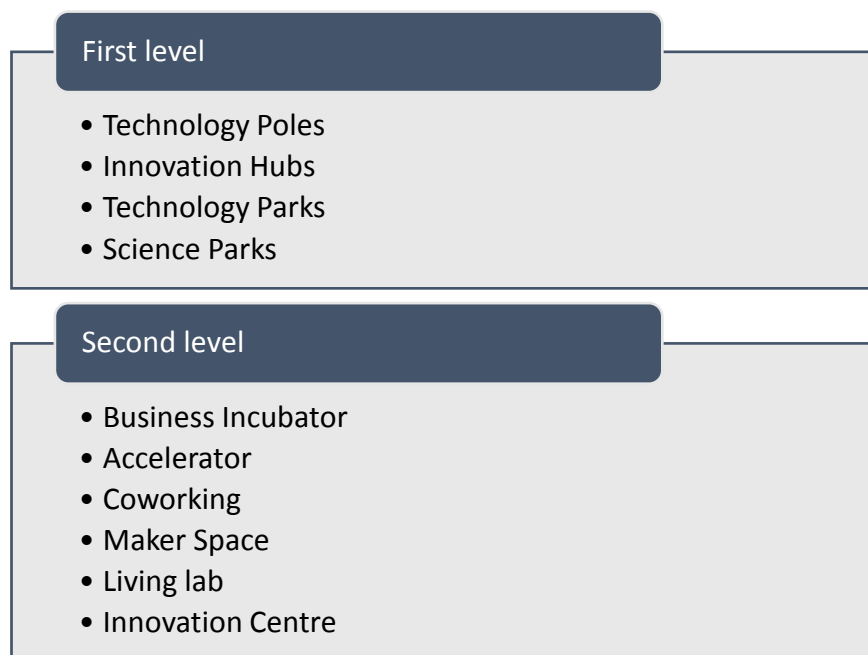


Figure 2 – Levels of aggregation of Innovation Habitats

Tables 3 and 4 presents the framework of innovation habitats for the first and second level of aggregation, respectively. In table 3, the services offered by the innovation habitats are aggregated using Bruneel et al (2012) broad categories for each generation of business incubators, but other services than the original presented in the paper were added, considering the function of innovation intermediary organizations and others services found in the literature presented in section 2.

Table 3 - Framework considering innovation habitats of the first level of aggregation

	Types of Innovation Habitats				
	Technopolis	Technology Pole	Innovation Hub	Technology Park	Science Park
Location	Open area Spread through a city	Open area Agglomerated in spaces that resemble modern Industrial Districts	Near, or into, other IH or a near a dense entrepreneurial area	Open or closed area, but clearly identified by agglomeration of organizations Suburbs, urban centres (mainly to recover previous depressed districts), research institutions/university campus	Closed area Research institutions or University campus
Management	Central managed Led by the government in partnership with other public and private organizations.	No central managed Associations and clusters governance leads the shared activities	Central coordinated by members of the government or members of the hub.	Central managed Led by the government, universities or Research Institutions, private companies, or a partnership between them.	Central managed Led by Universities or Research Institutions
Infrastructure	Modern city type	Modern industrial district type	No need for special infrastructure, or if it host other IH, a small scale facility. Access to infrastructure of its members Network and virtual type	Modern real estate development type	Modern research campus type (exclude high level production/services volume premises)
Organization/ Programmes offered	Potential to host all the other innovation habitats	Potential to host all the other IH of the second level of aggregation and Innovation Hubs	Potential to coordinate joint actions of IH of the second level of aggregation Potential to host Coworking, marker space and living lab.	Potential to host all the other IH of the second level of aggregation and Innovation Hubs	Potential to host all the other IH of the second level of aggregation and Innovation Hubs
Examples	Sophia Antipolis https://www.sophia-antipolis.org/ Tsukuba Science City https://www.jnto.go.jp/eng/regional/ibaraki/tsukuba_science_city.html	Polo I e II de Alta Tecnologia de Campinas/Brazil http://www.ciatec.org.br/site/conteudo/pagina/1,31+Polo-I.html	iHub (Nairobi) www.impacthub.net Forum Virium (Helsinki) (https://forumvirium.fi/en)	Andalucia Technology Park (http://www.pta.es/en/index.cfm) Cambridge Science Park (http://www.cambridgesciencepark.co.uk/)	Barcelona Science Park (http://www.pcb.ub.edu/portal/en/) Tecnopuc (http://www3.pucrs.br/portal/page/portal/inovapucrs/Capa/Tecnopuc/Eng)

Table 4 - Framework considering innovation habitats of the first level of aggregation

		Types of Innovation Habitats					
		Accelerator	Business Incubator	Coworking	Maker Space	Living Lab	Innovation Centres
Main value proposition							
Organizational policies:							
Main target public							
Average ternure of resident company/project		3 to 6 months	Up to 3 years (or more depending on the sector)	Not defined a priori	-	-	
Selection and exit policy		Strict on both			Open and ad hoc	Open and ad hoc	
Services offered:^(a)							
Infrastructure	Shared working space	***	**	***	*	*	** (lab)
	Individual units	*	***	*			*
	Equipment for fabrication and prototyping		**		***	**	**
	Social space (cafeteria/coffee shop)	***	**	***	*	*	**
	Shared resources (reception, meeting rooms)	**	***	***			**
Business Support	Coaching	***	**		*		
	Mentoring	***	**		**		
	Consultancy on accounting, finance, law, marketing and business	**	***				
	Seminars/Worksho ps	**	***	*	*	*	**

		Types of Innovation Habitats					Innovation Centres
		Accelerator	Business Incubator	Coworking	Maker Space	Living Lab	
	Short term training programs	**	***	*	*	*	*
	Medium term training programs	*	***				*
	IP protecting services	*	**				**
	Product development trough user centric desig methodology	*	**	*	**	***	**
Access to networks	Seed capital	***	*				
	Venture capital	***	**				
	Finance institutions	***	**				
	Customers	***	**	*	*	***	**
	Suppliers	**	**	*		**	
	Partners	***	**	*	*	**	
	Groups of experts	***	**	**	*	**	**
	Talented people	***	***	**	**	**	***
Examples	Y Combinator (www.ycombinator.com) Techstars (www.techstars.com)	Cietec – Incubadora de Empresas de Base Tecnologica de Sao Paulo (www.cietec.org.br/)	WeWork (www.wework.com)	Fab Lab (fab.cba.mit.edu/) Techshop (www.techshop.ws)	Josephs (http://www.josephs-service-manufaktur.de/en/)	X	

Note: (a) Degree of Activity:

* Some activity

** Active

***Major Activity

XXX...

4. The UK Digital Catapults

The Digital Catapult Programme is supported by Innovate UK⁸, formerly Technology Strategy Board, which is an independent public body, funded by the Department for Business Innovation and Skills of UK.

The idea of the programme is to build platforms for many small businesses to innovate fast and with less risk, so that new digital products and services can be accelerated to market. The Digital Catapult Centres represent the physical part of the programme.

To achieve this goal, the initiative promotes the interaction of a wide range of partners, such as large companies, startups and small companies, and the academic community. Installed at four locations in the United Kingdom, their remit stresses that they do not constitute a development agency, but promote collaboration platforms.

The programme focus on two large and significant sectors: Digital Manufacturing and Creative Industries, and has been also researching on the growth potential of Digital Health and Care. The activities developed to these sectors are related to four transversal technology layers (figure 2).

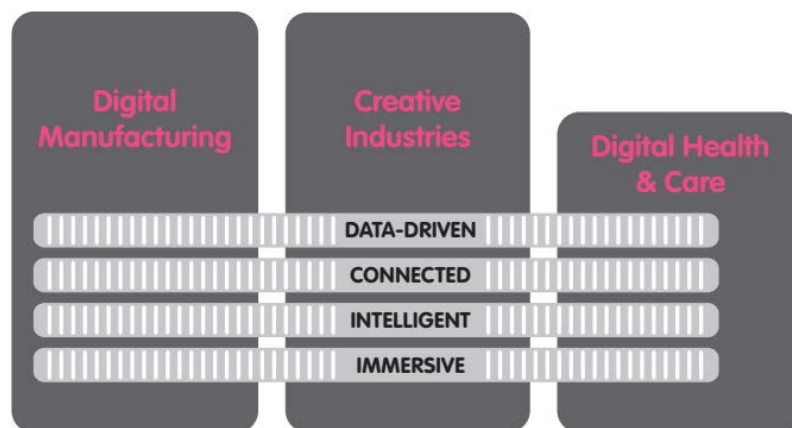


Figure 2 – Digital catapult sectors and technology layers

Source: Digital Catapult (2017, p. 13)

A study developed by Parris et al (2015) about the potential of Digital Catapults in increasing productivity through sharing closed data give us an better idea of the kind of market and innovation inefficiencies they address and how they do it (figure 3).

⁸ www.gov.uk/government/organisations/innovate-uk

Mechanism	How does the Catapult do it?	Which market inefficiencies does this mechanism address?	What productivity implications does it have in the:	
			short term	& long term?
1 Enabling critical infrastructure for the sharing and flow of closed or proprietary data	Supports the development of secure platforms to combine and manage access to closed data to unlock value. Supports the development of trusted frameworks to promote open competition and enterprise.	<ul style="list-style-type: none"> • Data liquidity • Lack of interoperable and support structures for sharing data • Lack of good quality, reliable and trusted data to share 	<ul style="list-style-type: none"> • Lower costs to understand and assimilate to data-driven models of production, delivery and decisionmaking • Faster adoption of data-driven business processes • New data-driven products and services • More optimised production and delivery processes • Improved decision-making capabilities 	<ul style="list-style-type: none"> • Better evidence for business performance assessment • Automated production and delivery business processes • Better flow of raw data and subsequently information in the markets • Enhanced R&D processes
2 Increasing absorptive capacity of organisations to unlock the value from data	Helps firms across sectors to realise value from data and so enhance market capacity to understand, assimilate and act upon data opportunities for commercial ends.	<ul style="list-style-type: none"> • Inadequate access to and transfer of knowledge • Lacking business and managerial capacity to understand the opportunity and derive the value from data • Inadequate data analytical capabilities • Slow uptake of data technologies in the legacy markets 		
3 Convening, leading and fostering trust	Creates more effective and targeted links between large enterprise, SMEs, universities and public sector for specific data-related challenges. It reduces search and investment costs for organisations to locate key expertise and knowledge in challenge areas. It acts independently and neutrally to build trust in sharing data in the market, reducing market frictions and the need for regulation.	<ul style="list-style-type: none"> • Regulatory framework conditions for data privacy, ownership, copyright and security and integration with consumer policy • Consumer privacy and security concern 		

Figure 3 – Digital Catapult mechanisms to overcome market and innovation inefficiencies through sharing closed data

Source: Parris et al (2015, p. 11)

The first Digital Catapult was founded in London in 2013, endorsed by the triple helix actors, including more than 250 companies and community of stakeholders. It is operated by a private limited company by guarantee, without share capital use, under the current denomination of Digital Catapult (it was previous denominated The Connected Digital Economy Catapult Limited), that has an agreement with Innovative UK to run the programme for five years, from 2013 to 2017, followed by an assessment of achievements.

The Digital Catapult have three main sources of income Innovative UK grants, other competitive grants and services (revenue generate by own activities). From 2015 to 2016 there was an expressive positive variation of the sources of income of other grants (+246%) and services (+669%), although it was not possible to reach yet the planned composition of incomes of 1/3 of each the sources mentioned (figure 4).

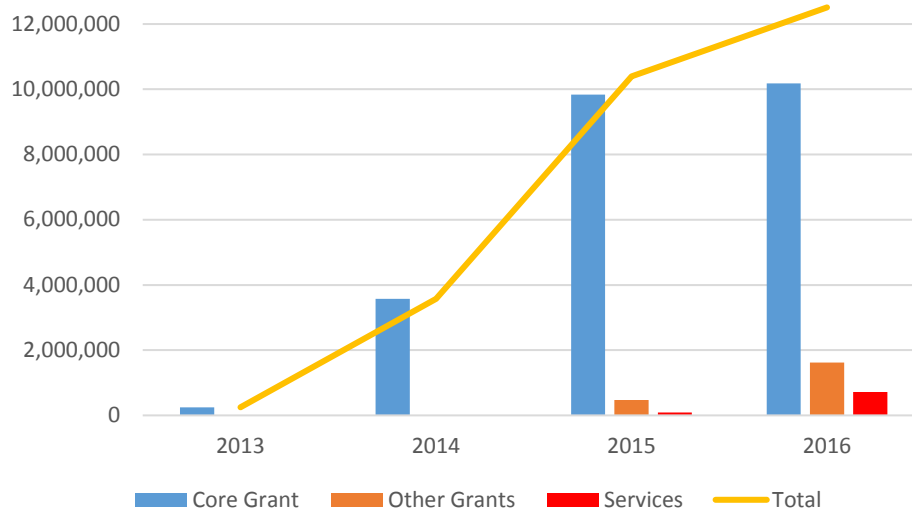


Figure 4 – Evolution of Income Sources

Source: Elaborated by the authors using data from the UK Companies House reports⁹

The Digital Catapults commercial revenues comes mainly from relations established through projects with companies – as Visa, PwC and Rolls Roice – sector focused activities, and “Pit Stops” (Digital Catapult, 2017). These lasts activities are, in general, runned by a Digital Catapult professional in order to, in two immersive days, find solutions for challenges present by incumbent companies through new ideas of startups, experts and innovators. One question that is important to be verified is about their potential, and timing, of reaching the expected 1/3 of incomes coming from their own commercial revenues.

5. Final considerations

XXXXX

5.1 What next?

Visits and interviews will be performed at the Digital Catapults Centres to raise primary data to built the cases. Also, the technique of business model canvas will be employed to better understand the operationalisation of the centres.

Other empirically evidence of innovation habits that supports the digital sector will be aggregated to the research as the JOSEPH’S project (Greve *et al.*, 2016), a partnership between Nuremberg University and Fraunhofer Institute; and We Work, a coworking company that has 76 spaces spread across the USA, UK, Israel, Netherlands, Canada, Germany, Mexico, and India (Waters-Lynch *et al.*, 2016).

This research is scheduled to be developed during a one-year post-doctorate program on innovation habitats. By the presentation at BAM’s Conference, it is expected that the key features for innovation habitats to support the digital sector will be accomplished.

⁹ <https://beta.companieshouse.gov.uk/> - Companie number 07964699

The post-doctoral results, beyond deepening the qualification of the researcher, will be:

- a) Theoretical advance regarding to the understanding of this type of innovation environment, to be published as an article in a journal from this knowledge area;
- b) Assessment report of the innovation environment model with contributions to the elaboration of public policies to support this type of initiative in Brazil; as well as
- c) Report of good practices, which can be used by managers of innovation environments to update or implement new actions.

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