Urbanize or Perish? Assessing the Urbanization of Knowledge Locations in Europe

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ABSTRACT This paper explores the drivers behind a recent “urban turn” of planned knowledge locations in Europe. While acknowledging a general tendency towards more urbanity, we argue that a dense and diverse urban environment is not equally relevant for all types of knowledge-based activities because of nuanced workers’ preferences and innovation modes. Based on a theory “considering different types of knowledge bases”, we suggest that activities that more intensively rely on symbolic knowledge (e.g., media, design) tend to have a stronger preference for urban settings, while this is less the case for activities based on analytical and synthetic knowledge (e.g., biotechnology and advanced engineering). We illustrate our thesis by three case studies: Kista Science Park in Stockholm, The Digital Hub in Dublin, and Biocant in Coimbra.

KEYWORDS knowledge and innovation spaces; innovation districts; knowledge bases; science and technology parks; knowledge cities; science cities; creative districts

Introduction

In recent decades, many cities and regions developed “knowledge locations:” planned, area-based initiatives aimed at agglomerating knowledge-based activities in designated city districts. Knowledge locations come in a variety of forms, the longest established and studied being science and technology parks (inter alia Massey et al., 1992; Castells and Hall, 1994): spatial concentrations of scientific research institutes and companies, often at or near university premises. In the last 15 years, new forms and precincts (Yigitcanlar et al., 2008) have emerged including “creative factories,” “innovation districts,” “science quarters,” and “open-innovation campuses” (see van Winden et al., 2012). Many are developed around more specific and thematic fields beyond “high-tech,” such as digital media or other creative industries (Evans, 2009).

In recent years, we have seen a remarkable development in the conception and (re) design of knowledge locations, which may be dubbed as an “urban turn.” Many sub-urban and (semi) secluded knowledge hotspots (campuses, science parks, technology parks, etc.) are being “urbanized:” new functions are being added, such as housing, amenities, cultural facilities, and education (Carvalho, 2013). From mono-functional business and research-oriented places, many of those areas are being transformed into more diverse, open, and urban
environments. Moreover, and in parallel, new types of innovation hotspots are designed and embedded in the urban fabric from the early start. Those are planned to become diverse and lively urban areas, promising enhanced opportunities for workers and entrepreneurs to mingle. They come in different forms; some are developed as part of large urban regeneration projects (such as Barcelona’s 22@ district or Helsinki’s Arabiaranta), others evolve around anchor institutions such as large medical hospitals or universities (Benneworth et al., 2010).

The urban turn in knowledge locations has increasingly been recognized by scholars and policymakers. Urban innovation districts are believed to be dynamic, facilitators of unexpected encounters between people, new hotbeds for innovation, and attractors of talented people. Katz and Wagner (2014) review a range of literature that documents the rise of urban knowledge locations as core sites of a new geography of innovation, such as “inner-city industrial districts” (Hutton, 2004) and “new century city developments” (Jaroff et al., 2009: 6): innovative clusters of creative industries, life sciences, and other knowledge fields, “driven by inter-organizational and cross-industry collaboration, open systems for R&D and workers who have the aptitudes and skills required by the networked knowledge economy.” More recently, Florida (2014 ) empirically showed a shift in venture capital investment, start-up activity, and high-tech development to urban centers and to mixed-use, walkable, and transit-oriented areas.

Yet, and despite this seemingly strong “urbanization trend,” many science parks and locations remain suburban and are still being planned in Greenfield locations, with limited urban ambiance (IASP, 2013). Departing from these observations, this paper proposes an interpretation of the urban turn in knowledge locations. It reassesses the relevance of a number of fundamental socioeconomic trends behind it, but combines them with a more fine-grained understanding of the spatial requirements for (different types of) innovation, as well as knowledge workers’ nuanced location preferences. To do so, we explore two latent research questions. First, what are the drivers behind the alleged “urban turn” in knowledge locations? And second, to what extent do the attributes of urbanity (e.g., density, proximity, amenities, vibrancy) matter for different types of innovative activities?

In the next section, we provide a preliminary conceptual argument and theoretical expectations. We start by exploring three general drivers behind the rising urbanity of knowledge locations, namely (i) the consolidation of a knowledge-based economy with more interactive and distributed modes of knowledge production; (ii) overall shifting working, living, and consumption preferences of knowledge workers; and (iii) the rising expectations placed on knowledge hubs as urban regeneration engines. Moreover, beyond the general trends, we put the urbanization trend under closer inspection. We look at knowledge locations—and their activities—from a systematic perspective to understand differences in innovation modes and locational preferences, using the conceptual distinction of Asheim et al. (2007) between three general types of knowledge-creation modes: analytical (science-based), synthetic (engineering and problem-solving based), and symbolic (aesthetic and artistic based). We design a typology of knowledge locations, arguing that the relevance of urban attributes may be increasing overall, but depends on the dominant type of knowledge activity in a location. Our theoretical expectation is that “urban preferences” will be rather more pronounced for symbolic-driven innovation activities than for synthetic and analyti-
cal knowledge activities, which will call for different types of attributes in knowledge locations.

In the following section, we describe our research methods and illustrate our points with three representative cases: The Digital Hub in Dublin (Ireland), focused on digital media activities; Kista Science City in Stockholm (Sweden), focused on (changing types of) IT activities; and Biocant Park in Cantanhede/Coimbra (Portugal), specializing in biotechnology. The cases are interesting for the analysis because they represent different types of dominant knowledge bases. The Digital Hub is an urban location for creative and digital-oriented firms, and largely relies on symbolic knowledge; Kista Science City is a suburban technology park, dominated by IT firms and R&D institutes that rely on synthetic and analytic knowledge bases—it used to be mono-functional but is now being urbanized. And Biocant, a biotech hub, is a “science-based” development, relying on analytic knowledge and located in a rural area but relatively close to the university city of Coimbra. The different cases help us to understand and put in perspective the role of diversity and urbanity in European knowledge locations. For each case, we explore how its urban orientation profile is associated with the aforementioned trends, but also with the specific knowledge creation requirements of its tenants and values attached to the living and working environment. The final section summarizes the findings of the analysis, draws conclusions, and raises new perspectives for further research and for the management of knowledge locations.

An Urban Turn?

Key Drivers

What major drivers and societal developments explain the contemporary “urban turn” in knowledge locations? In this section, we put forward three general drivers, linking them with changing designs and features of contemporary knowledge locations.

Consolidation of a Knowledge-Based Economy with Interactive and Distributed Modes of Knowledge Creation. The last decade-and-a-half witnessed significant change in knowledge-creation practices, challenging the linear model of innovation “from R&D to commercialization” (Godin, 2006). The image of the isolated inventor in his lab or garage has been progressively replaced by the notion that knowledge creation and learning occur in interactive processes, in which actors combine different types of complementary competences (Nooteboom, 2000; Bathelt and Cohendet, 2014). One argument is that technological development has become so fast and complex that progress can only be realized when innovators work together with others in multidisciplinary, often project-based teams (Ekstedt et al., 1999). Chesbrough’s work on “open innovation” has been very influential in this respect: it shows how high-tech companies increasingly engage in networks to tap external sources of knowledge to create new products or services, instead of doing it exclusively in-house (Chesbrough 2003). Moreover, the most valuable innovations are increasingly happening at the juncture of technology and industry and rely on interplays between technology, design, finance, and behavioral sciences (Cooke, 2011; Hoffman, 2014), often requiring the involvement of final users throughout the process (von Hippel, 2005).
A consequence of the previous is that the boundaries of (small and large) firms have become more porous, heightening the relevance of environments that facilitate networking, face-to-face exchange, communication, and even serendipity (Storper and Venables, 2004). To cope with these challenges, many new-generation knowledge locations have been deliberately planned in urban settings and/or envisioned to recreate denser, innovation-friendly environments within their boundaries. For example, instead of conventional monolithic office blocks, many locations have architectural and ergonomic features conducive to interaction, such as dense and open building designs, short walking distances, and the provision of several shared working, innovation piloting, and leisure facilities (van Winden and van der Klundert, 2008). Finally, beyond hosting companies and R&D institutes, the involvement of users (residents, visitors) has been actively pursued in many knowledge locations as raw material for many innovations, namely in the fields of IT (Carvalho, 2012).

The Rise of Urban Lifestyles and Associated Location Preferences of Knowledge Workers. The “urban turn” in the development of knowledge hubs is also a manifestation of a more general appreciation of lively “city environments” among the highly educated (Glaeser et al., 2001) and the so-called “creative class” (Florida, 2002). The literature empirically demonstrates that, other things being equal, highly-qualified and “creative” workers increasingly prefer to work in lively and culture-rich environments offering amenities and facilities beyond just office and lab space, and where consumption and leisure opportunities are more widely available (see also Mellander et al., 2014). The presence of amenities has been largely pointed to as an explanation for the sorting of knowledge workers—who are also residents—within functional urban regions (Storper, 2013), making some areas more attractive than others.

A related point pushing for the urbanization of knowledge locations is the shifting of work-life balance (Florida, 2008). Work and life have increasingly become mingled, and social interaction with colleagues is considered important (DeFraine et al., 2014). This lifestyle is facilitated in a lively environment that offers adequate amenities and facilities. Other empirical studies support that growing appreciation of urban lifestyles. Larger and diverse metropolitan areas are growing faster, in terms of population, than smaller and medium sized towns both in Europe and the United States (EC, 2010, 2013; Frey, 2014). Moreover, the mixed “live-work” urban cores are growing faster than metropolitan regions (Levy and Gilchrist, 2014).

Moreover, there is also a growing image/status dimension associated with the workplace, which knowledge locations try to emulate (e.g., Carvalho, 2013). This is particularly the case for innovative start-ups, who draw from the status of the location to project their own image to the outside world. An area’s history and tradition (e.g., reconverted old iconic buildings) are often pointed to as relevant in that respect, but the same goes for new status buildings in new city areas. Van der Poel (2013) presents the example of the Amsterdam canals as status locations for new start-ups and incubators, due to their rich history and visibility.

The Rising Expectations Placed on Knowledge Hubs as Urban Regeneration Engines and Commercial Hubs. Throughout the world, policymakers and real estate developers learned that developing knowledge locations could help regenerate
deprived urban districts and raise land values (Peck 2005). In many cities, coalitions of developers and administrations have been redeveloping old industrial areas into innovation and creative quarters, cleaning polluted soils, and reconverting industrial buildings into loft houses for the creative class, or office space/lab rooms for creative industries (Miles and Paddison, 2005; van Winden, 2010; Carvalho, 2012). The same goes for coalitions between universities and local authorities aimed at the development of new locations around university campuses, with an eye to payoffs for local economic development (Benneworth et al., 2010).

In a recent global survey of “creative-related” innovation districts, Evans (2009) synthesized the dimensions and policy objectives involved in the planning of such locations. He found that the dominant objectives are economic development, agglomeration and investment attraction, entrepreneurship, and job creation. There were also other benefits and opportunities for cities, including the regeneration of worn-out areas, branding opportunities, tourism promotion, physical and environmental revitalization, and social inclusion. Examples abound of old factory premises within the urban fabric that have been reconverted into knowledge locations with an eye to fulfilling multiple goals. Also, a number of exurban science parks and campuses are investing heavily in becoming more urban by adding commercial and leisure facilities and creating better transport links.

**Urbanize or Perish? A Typology of Knowledge Locations**

Given the force of these drivers, will all innovation activity end up in lively, mixed, urbanized areas? And, related with the previous, are suburban-style science and technology parks doomed to urbanize or perish? In this section, we provide reasons to be more nuanced in this respect. Our entry point is the fact that knowledge workers and knowledge-intensive companies are not a homogeneous whole (e.g., Markusen, 2006; Fritsch and Stuetzer, 2014). Despite the overall forces pushing knowledge locations to move to the city and/or to urbanize, there are still different preferences regarding the “quality” of the living and (knowledge) working environment, and different sensitivities to distance and access.

Recent work of Asheim and colleagues (e.g., Asheim et al., 2007; Asheim and Hansen, 2009) confirms this perspective and provides a lens to understand differences in locational preferences for knowledge workers and the spatial configuration of innovation. Based on the distinction between three general types of knowledge—analytical (science-based), synthetic (engineering and problem-solving based), and symbolic (aesthetic and artistic based)—they review and analyze significant differences in the modes of knowledge creation and innovation across activities, and in the ways knowledge workers weigh their living and working preferences within urban regions.

As analyzed in the literature, the preference for lively urban atmospheres is more pronounced for workers and activities relying on symbolic knowledge (artistic and aesthetic). Symbolic knowledge is primarily linked with the creation of symbols, images, designs, and cultural artifacts. The meaning and utilization of different knowledge pieces is thus strongly context-specific and innovation largely relies on interpreting external-to-the-company stimuli. Symbolic-driven activities—such as concept design firms, architect agencies, and digital media
companies—do prefer environments with a distinct urban identity (Florida, 2008). In these segments, working and living are often mixed up in time and space. Workers think more in terms of projects rather than being employed by fixed employers (Grabher, 2002); freelancing and temporary working is frequent, and urban facilities are used as meeting places (e.g., restaurants, cafes). Such activities are often deeply linked to cultural production and consumption and thrive in a lively and diverse urban environment, often associated with inner and core city atmospheres and some degree of serendipity (Pratt, 2000; Hutton, 2004). Taste and images are often negotiated and constructed in place. “Buzzing” urban environments are important places for knowledge transmission and innovation in these industries to the extent that they favor easier access to strategic rumors, gossip, and “know-who” (Asheim et al., 2007; Asheim and Hansen, 2009).

The story is rather different for workers and activities relying on synthetic and analytical knowledge bases. Synthetic knowledge results from the application or re-engineering of exiting knowledge pieces, relying on “know-how,” customization, and problem-solving skills (e.g., in advanced IT activities and machinery-related industries). Frequent face-to-face contacts and user-client interaction is vital in problem-solving and innovation (e.g., Gertler, 2008), but that can often easily be achieved within the setting of the functional urban region, not only because of physical proximity but also backed by mutual understanding and social proximity. For these activities, being located in dense and central locations is often unnecessary and frequently incompatible with the physical needs of such industries (large premises, environment and safety regulations). Overall, previous research shows that workers in these fields put more value on the “business climate” (presence of knowledge partners; businesses ensuring cash flows) than on the “people climate” of dense urban places, with cultural and leisure amenities (Asheim and Hansen, 2009).

A similar story goes for science-based activities relying on analytical knowledge. This type of knowledge is dominant, for example, in medical and biotechnology activities, relying on the application of universal scientific laws and “know-why.” For such activities, one of the key location factors is the proximity to other scientists and state-of-the-art laboratories (e.g., physics, biology, health, etc.). Those are often found in large urban regions but do not necessarily require “urbanity” in their immediate surroundings. Knowledge creation and innovation hardly rely on “buzzy” environments but on formalized processes, and demand strict safety and confidentiality requirements, with limited if any room for serendipity and unexpected meetings (Moodysson, 2008).

The evidence reviewed above helps to better understand the persistence of a rich diversity of knowledge locations within functional urban regions, or, more specifically, why many knowledge locations (but not all) are moving back to cities centers and/or becoming more “urban.” The changing preferences of companies and workers affects the investment decisions of planners and developers of planned knowledge locations, with expected variations according to the types of dominant knowledge base involved. Figure 1 illustrates this with a simple typology that disentangles knowledge locations into “science and technology parks,” “tech hubs and science cities,” and “creative districts.”

The preferences and location needs of companies and workers primarily relying on analytical and synthetic knowledge bases (such as, e.g., biotechnology, IT, and advanced engineering, respectively) are generally well fulfilled in “science and technology parks,” typically located in quiet greenfield areas that offer limited
urban ambience, but have laboratory facilities, partner research institutes, and good accessibility within the functional urban region. This doesn’t mean that such places are not becoming more urban as well: as they grow in size, amenities like retail and catering may be added to meet consumption demands. The point is, however, that urbanity is not the prime location factor for these industries and activities.

The upper right quarter of Figure 1 represents the “tech hub” or “science city,” the urban variant of science and technology parks. Here, we also find activities primarily relying on analytical and synthetic knowledge base. Such locations are, however, generally well embedded in the urban fabric, often in (or in proximity to) city centers. Frequently designed to cover up old industrial plots, they also thrive on activities related to science and engineering, concentrating not only research units and labs, but also offices and incubation space for related activities. These locations are often linked to path dependencies associated with their proponent’s previous location (e.g., urban university premises).

The “creative district” type (at the bottom right of the figure) represents the knowledge locations for activities primarily relying on symbolic knowledge (e.g., design, audio-visual, multimedia), but also with relevant synthetic components (e.g., digital and software design). The urban atmosphere and associated amenities is in the “DNA” of such locations. Those districts focus on facilitating adequate working-living conditions for such types of industries (studios, shared workspaces) and often host educational organizations as well, but, contrary to the typical science park model, they have an aesthetic and visual drive encompassing cultural facilities, architectural quality, and heritage preservation.

The bottom left corner of our Figure 1 is empty: knowledge locations with a strong focus on symbolic knowledge in Greenfield locations are very rare types. To our knowledge, there is no evidence of such manifestation. In line with the theory underlying this typology, this has to do with the clear preferences of companies and residents/workers with regard to urban atmospheres and places with “identity” for their activities. This is not to say that activities primarily reliant on a symbolic knowledge base cannot take place outside of the urban fabric. The cases of goods such as gourmet food, tourism products, or luxury watches are some
examples (Jeannerat and Crevoisier, 2011). However, the actors involved in such types of activities do not seem to show enough preference for a public policy provision such as a knowledge location (as we define it), which probably makes limited sense to their activities.

Naturally, in the same way that most firms innovate using different types of knowledge, there are also many grey zones and hybrids between the suggested “pure” types. All in all, despite the pressures towards an urban turn in the design and planning of knowledge locations—whether newly built or already existing—there are good reasons to believe that not all suburban knowledge locations will disappear, namely the ones whose activities are relatively more reliant on analytical and synthetic modes of innovation (e.g., biotechnology, advanced engineering). However, the urban turn is likely to be more pronounced when the dominant (or planned) activities depend on symbolic knowledge (e.g., concept design, fashion, digital media, audio-visual).

Illustrating the Typology: The Digital Hub, Kista Science City, and Biocant

Methodology and Case Studies

In this section we illustrate the aforementioned arguments and typology with three case studies of European knowledge locations. Our first case, The Digital Hub (Dublin, Ireland), is an urban location for digital and media oriented firms, and largely relies on symbolic knowledge, and the case is illustrative of the “creative district” type. The second case, Kista Science City (Stockholm, Sweden), is a suburban technology park, dominated by IT firms and R&D institutes that rely on synthetic and analytic knowledge bases—it used to be mono-functional but is now being urbanized and fits well within the “tech hub/science city” type. The third case, Biocant, is a biotech hub near Coimbra, Portugal, a typical “science and technology park.” This is a fully science-based development, relying on analytic knowledge and located in a rural area but relatively close to the university city of Coimbra.

The cases were chosen on the basis of theoretical sampling, and they are interesting for the analysis because they represent different types of dominant knowledge bases. In order to understand how the “urban turn” plays out (or not) in the development and dynamics of these rather different knowledge locations, we describe the history and development of each location, the type of activities that take place there, and their urban orientation. For each case, we explore if, how, and to what extent the three alleged “urbanization drivers” (as identified in section 2) play out, and what actually drives the spatial-urban configuration of the location. To what extent do we observe spatial implications of:

(1) more interactive and distributed modes of innovation/knowledge production;
(2) shifting working, living, and consumption preferences of knowledge workers, and
(3) the societal pressures to turn knowledge hubs into urban regeneration engines?

To conduct this analysis, primary evidence was collected through 53 semi-structured face-to-face interviews (The Digital Hub, 23; Kista, 11; Biocant, 20) with company staff and CEOs, R&D directors, park managers, planners, and pol-
icymakers, in the course of three international research projects during 2009 to 2012. Interviews lasted between 45 minutes and three hours and focused on (i) the location’s activities and recent developments; (ii) its design, planning, and relation with the surrounding areas, and (iii) the different company and organization’s activities, their modes of innovation, and workers’ location preferences. Interviews were transcribed into detailed interview reports, and this information was triangulated with secondary sources such as company, park, and industrial reports, press releases, personal communications, etc.

We opted for a narrative approach to present our findings, as this offers more scope to do justice to the context specificity and helps to preserve most of the richness of each case. Yet, for the sake of comparability, Table 1 summarizes and compares across cases, linking each location’s spatial features with its dominant knowledge bases and its tenants’ location rationales.

The Digital Hub (Dublin, Ireland)

The Digital Hub was created in 2001 with the ambition of becoming one of the main hotspots for digital media in Ireland. It is located in the western end of Dublin (Liberties area), in the former premises of Guinness Brewery. When MIT Media Lab announced it would set up a European subsidiary in Dublin, the city saw an opportunity to regenerate the former brewery site (e.g., vacant lands, depots, and hop stores) and accommodate the activities of the MIT Media Lab Europe (MLE). A public-private partnership involving national and local government and the MLE itself, promoted the development of office space for MLE and for many other indigenous and foreign start-up companies. The MLE eventually left the area in 2005 due to financial and operational problems, but that did not stop the area from continuing its development. Up to now, The Digital Hub has already hosted about 200 companies and is now running at full capacity with about 100 tenants (companies and other institutions) (e.g., National Digital Research Centre) in the fields of gaming, animation, web-design, and mobile applications.

The Digital Hub is well integrated in Dublin’s urban core and very close to lively neighborhoods such as Temple Bar, with a large concentration of bars, restaurants, and cultural and art venues. In fact, many of the surveys and focus groups carried out by the hub’s proponents pointed to the fact that the “average” professional in digital media activities was an urban dweller. They tend to appreciate the proximity to higher-order amenities that the Digital Hub offers (Dublin’s city center). Moreover, the facilities required by smaller digital media firms are typically not very complex or space intensive and can be easily integrated in more conventional offices and shared open spaces in urban areas.

The Digital Hub managers made strong efforts to preserve the heritage and keep the industrial identity of the former brewery area, revamping the office premises under their original setting. Interviewees do mention the identity and image of the premises (the Guinness Brewery as an icon, old bricked walls, etc.) as a plus in their decision to locate in Digital Hub. Moreover, they describe the urban setting as inspirational (e.g., to watch changing trends and behaviors, new fashions, etc.), which is important given the creative nature and symbolic character of new media firms.

The Digital Hub’s buildings provide facilities such as flexible offices, workshop and studio spaces, formal and informal meeting rooms, and dedicated
| Table 1 Cases and features |
|----------------------------|
| Type of location | Dominant knowledge bases | Location | Drivers behind the observed spatial-urbanity features |
| The Digital Hub  | “Creative district” | Symbolic, synthetic (e.g., gaming, animation, web-design, mobile applications) | Urban (Close to the core city center) | Tenants value the edgy, urban-industrial atmosphere and on-site access to partners. Nearbyness of inner city as source of leisure, inspiration, and serendipity. Willingness to regenerate a vacant industrial site. |
| (Dublin, launched in 2001) | | | |
| Kista Science City | “Science and technology park” → “Science City” | Synthetic, analytic (Businesses and R&D institutes focused on ICTs) | Peri-urban (15 km from city center, next to distressed neighborhood) | New housing, retail, leisure, and cultural functions driven by new “open” modes of innovation and market demand. Tenants value the place’s image as innovation hotspot but consider it not very exciting. |
| (Stockholm, launched in 1976) | | | |
| Biocant | “Science and technology park” | Analytic (Medical and food biotechnology) | Rural (30 km from Coimbra) | Tenants value calm and safety, as well as the quality of labs and the being close to their peers. Urban-reverse relocation of researchers from Coimbra’s city center. |
space for product showcases, receptions, and exhibitions, as well as joint catering facilities. These types of premises closely fit with the tenants’ knowledge exchange and innovation requirements, namely their “eco-system”-like way of working and changing project-based activities. Many interviewees stress the possibilities to access complementary partners on-site, as well as policy and research contacts in the location. Recently, an unplanned meet-up between some tenants resulted in the joint development of new “apps” based on city data. A survey conducted in 2007 of the hub’s companies (DHDA, 2007), reported that even if 20 percent of the companies had no cooperation whatsoever with each other, the others report some kind of interaction and relations, ranging from ad-hoc cooperation for business strategy to joint ventures and strategic partnerships. There are different outsourcing and client-supplier relationships going on in the hub between companies and entrepreneurs that met in place.

All in all, the Digital Hub—representing the “creative district” type—illuminates the strong role played by urbanity and density in the working location preferences of workers in the more “creative” segments of the knowledge economy. Those are heightened by—and strongly correlated with—the more interactive and “inspirational” modes of innovation in those activities, in which living and working are becoming increasingly intertwined and serendipity plays an important role. In this case, the pressure to regenerate vacant urban land while keeping the area heritage and identity came together with the latter factors to definitely influence the urban orientation of the knowledge location.

**Kista Science City (Stockholm, Sweden)**

Kista Science City is a large knowledge location in the Stockholm region, and, unlike the Digital Hub, it is located about 15 km to the northwest of Stockholm’s city center. It is located next to a large residential area—with much social housing and many disadvantaged minorities—dating from the early 1970s. Kista’s tenant firms are mostly high-tech companies largely relying on analytical (scientific) and synthetic (engineering) modes of knowledge creation. It is the home base of the ICT giant Ericsson, and a number of other firms and R&D institutes, many of them focusing on ICT infrastructure and network development. The area is currently undergoing a significant urbanization process (hence the term “science city”). New retail and leisure functions have been added, a technical university has relocated to the area, and substantial new housing is planned.

The development of Kista took off in 1976 when the City Council decided to develop an abandoned military area into an industrial zone. Two large Ericsson subsidiaries (SRA and Rifa) moved to Kista, shortly afterwards followed by IBM Sweden, which at that time had plans for deep cooperation with Ericsson. Together they employed about 3,000, most of them engineers. The size and reputation of these three anchor tenants set off a chain reaction, quickly giving Kista an image of high-tech engineering and making it an attractive location for other electronics firms and their suppliers. Many of the tenants moving in were related to what would later be called ICT. From the late 1990s, Kista developed into an ICT hub of global reputation, fueled by anchor firm Ericsson’s rise as leader in wireless ICT infrastructure technology. Two universities opened their doors in Kista: The Royal Institute of Technology (KTH) and Stockholm University moved their electronics- and ICT-related departments to the area. Currently,
Kista Science City is home to about 7,000 university students, more than 1,000 ICT companies, and a large number of R&D institutes.

In the 1970s, Kista was designed and grew as a mono-functional area. The urban turn for Kista set in at the turn of the century. By 1999 Kista had developed into a well-known and prestigious business location. Its available land had mostly filled up, but demand continued to grow as the Dotcom Bubble was still picking up momentum. At the same time, the area was far from vibrant in urban terms. In 1999 Kista was described by a student as

... incredibly sad, cultural and entertainment offerings are zero and regimentation is total. (Translated from Swedish; original quote in Swedish in Bengtsson, 2011: 114.)

The Stockholm planning agency and the Kista’s key stakeholders (united in a foundation) came together to think about the future of Kista, re-conceptualizing it as an emerging “Science City:” it should become more diverse and dense, able to accommodate growth, mixing working, studying, and living. The planners believed that a vibrant urban atmosphere was needed for the long-term success of the area, namely as overall innovation modes in ICT were starting to change from linear to more “messy” and interactive ones, based on open innovation and uncertainty.

Hence, since the turn of the century, a number of urbanity-building initiatives have been launched. Building large office towers increased density; retail and leisure functions were added or expanded. Moreover, initiatives linking “hard” technology to society, culture, and the arts were promoted. The Kista Science Theatre started in 2009 (aiming to explore crossovers between technology, culture, and society); the Mobile Life Center was set up, connecting technologies to the needs of everyday life; the Digital Art Center opened its doors in 2010, as an interactive exhibition, meeting, and work space, in which artists, researchers, and firms, both from Kista and elsewhere, can showcase their work. An iconic building called NOD will be opened at Kista to bring many of the cultural initiatives together and raise their visibility. The area’s new master plan puts priority on lively public spaces. Iconic buildings (“gates”) are planned on three sides of the park, leading visitors into three squares, including commercial and cultural hubs with intense visitor traffic due to the nearby public transport access. The strict separation of working and living will be abandoned, mixing student housing and new apartments in the area. All in all, heavy investments have been committed to enhance the urbanity of the wider Kista Science City area.

Naturally, there are powerful real estate drivers behind the new urbanization offensive of Kista from a traditional science and technology park towards a science city; the overall demand for the area is still rather high. However, the observed urban turn is also closely linked to the changing knowledge creation and innovation practices in the area, and the recent urbanization plans had a strong input from companies in the location. New types of companies are emerging that move away from the “hard ICT” space (e.g., back office hardware and business services to keep an ICT system running) towards embedding different types of knowledge in their products and solutions (e.g., design). In this vein, for many companies, in-house “closed” innovation is still relevant but is complemented by more networked and ecosystem-like modes of innovation. Increasingly, engineers work in teams with other experts and Kista’s firms participate
in pre-competitive innovation networks with partners in the area. As a manager of a small-medium sized ICT company in Kista puts it:

The key reason to locate in Kista is the advantage of being in a cluster: meetings with other firms in Kista are quick and easy to arrange, there is interesting research going on at the Kista campus of KTH and being co-located gives you better access to it.

Moreover, all our interviewees in companies indicate that the quality of the workplace and its environment and image increasingly matters to attract staff. Namely Kista competes with other locations in the greater Stockholm area. But many stress that adding housing to the area will not help much in this respect. Kista is a great location for their company (the reputation of the area, vicinity of partners), but staff can commute from elsewhere in the Stockholm metro area. Furthermore, while Kista’s former “science and technology park” model was fine for the large corporate tenants (with all the facilities in their own corporate buildings), the new urbanity drive (restaurants, retail, meeting places) is particularly appreciated by smaller firms and the younger generations.

All in all, Kista’s recent urban development towards a “tech hub/science city” is illustrative of an ex-post urban turn in knowledge locations. How do the three identified general trends “calling” for more urbanity in knowledge locations play out? The changing modes of knowledge production permeating the area (changing innovation modes in ICT) influenced the recent urbanization trends in the location, and so did the general societal (and commercial) pressures to urbanize it further. The impact of the worker’s living and consumption preferences is more mixed, and seems to vary with age and type of company.

**Biocant (Coimbra-Cantanhede, Portugal)**

Biocant is a biotechnology-dedicated “science and technology park.” It is located in the rural municipality of Cantanhede, about 30 km from Coimbra, a medium sized university-city in Portugal. Biocant was developed from scratch in a greenfield location in 2005. It resulted from a partnership between the Centre of Neuroscience and Cell Biology of the University of Coimbra (CNC) and the Municipality of Cantanhede, and has the ambition to support the commercialization of the University’s life-science research. Unlike many other cases of science and technology parks that turned into generalist business parks (namely in lagging regions), Biocant has strictly maintained its biotechnology focus over the decade. It presently hosts eight specialized technology transfer centers, with around 70 full-time researchers and 20 dedicated biotechnology firms in early growth stages. Some entrepreneurs and lab directors are “star scientists” and graduates from Harvard University and MIT.

The park is highly dynamic. During its first year, Biocant’s companies created a total turnover of five million euro, including contracts and research funding. Some indigenous tenant firms were recently taken over by large North American multinationals; entrepreneurs from larger cities such as Porto and Lisbon are relocating to Biocant, as has the National Association for Bio-industries. Biocant has recently developed two new buildings to cope with the national and international tenant’s demand and to accommodate the headquarters of CNC, with 150 researchers (previously located in scattered locations in the city center of
Coimbra). During 2011, Biocant labs reported a 30 percent increase in the volume of contract research (Biocant, 2012) despite the economic and financial crisis in the country. From the start, Biocant invested heavily in shared laboratory facilities for their domains of specialization, such as cell and molecular biotechnology, genomics, microbiology, and DNA sequencing.

Despite the attractiveness of the park, the urban-spatial setting of Biocant is the extreme opposite of a lively urban location. It is located in a rural and quiet area, in the proximity of a few industrial plants, and it is fully car-based (with hardly any public transport access). The city of Coimbra is 30 km away and the neighboring village of Cantanhede is very small, rendering only basic services. The area and its surroundings are thus mono-functional, with a rather limited diversity of uses. Yet, these features didn’t seem to have hampered the agglomeration and innovation potential of the location for biotechnology activities. On the contrary, they seem to fit well the knowledge production modes involved. As explained by the founder of a biotech company in Biocant:

We all like cafés, restaurants and museums, and most of us live in cities [Coimbra, Porto], but for our business, dealing with precision experiments, we do need a quiet place, far from the buzz and confusion of city life …

Important pieces of valuable knowledge for biotechnology entrepreneurs and researchers come from codified scientific articles and patents, not from the “hustle and bustle” of city life. The labs are privileged places for knowledge exploration, acquisition and exchange. Yet, as referred to above, some lab facilities are not only space intensive but require extra safety measures (e.g., blood and cell banks), calling for calmer surroundings. As explained:

In activities with a strong scientific and R&D compound and combined with pilot production, locations in the core of city centers are unfavorable. It has to do with the calm and safety required to conduct experiments, and also with the biotechnology requirements [labs]. It is not sufficient to just adapt a number of conventional offices.

In biotechnology, experimentation, testing and production are run under strict safety and quality regulations; hence, the ability to access (and settle) in Biocant such types of rare facilities has been an attractor for many companies (e.g., blood and cell banks, food compounds, and fermentation pilots). Moreover, as the CEO of a start-up company explained:

Since I work for pharmaceutical companies dealing with big data about all the drug development process, they oblige me to have extra safety measures in many respects. Those requirements are fulfilled in Biocant but not if I want to work from home or from a general office. And the same goes for many companies here who came because of the labs and their quality.

Like in other activities, the ability to gather with like-minded individuals is also valued by the companies located in Biocant, but more as a problem-solving feature and does not happen in an unexpected/serendipitous fashion. Having similar companies and organizations as neighbors is perceived as helping to rapidly solve unexpected problems and challenges. The director of Biocant explains it vividly:
Bio-entrepreneurs—and the venture capital invested in them!—value a location within an “ecosystem” of related companies, people, and laboratories that can rapidly support them in case something goes wrong or an unexpected technical problem emerges during an experiment. Moreover, there is a growing tradition of mentoring between older and younger entrepreneurs in the park . . .

To sum up, the case of the “science and technology park” Biocant illustrates that for science-driven types of activities, urbanity and “buzz” is not a necessary condition for interaction and innovation. The living and consumption patterns of knowledge workers in biotechnology do not get entangled with their working environment preferences. On the contrary, those activities rely on knowledge access and interaction modes to which the “hustle and bustle” of core city centers can be harmful. The urban-reverse relocation of researchers from Coimbra’s city center to Biocant suggests the relevance of different types of facilities and social interactions for analytical modes of knowledge production.

Conclusions and Perspectives

This paper discussed the “urban” turn in the development of knowledge locations. This turn has two manifestations. On the one hand, in many cities, central city districts are developed as innovation districts, becoming hotbeds for knowledge activities. On the other, suburban mono-functional, secluded science parks are being urbanized, through densification, the adding of urban functions (residential, leisure) and facilities. Supported by recent literature, we framed three key drivers behind this “urban turn:” (i) the consolidation of new interactive modes of knowledge production; (ii) the increasingly “urban” preferences of knowledge workers; and (iii) rising expectations placed on knowledge locations as urban regeneration engines and commercial hubs. Hence, after decades of developing knowledge locations on the outskirts of metropolitan areas, a new urban innovation orthodoxy seems to be emerging.

Will all innovative activity end up in mixed and dense urban areas? In this paper we provided a nuanced perspective, based on a conceptualization of innovation processes across different types of firms and industries, with impacts on the type of environments they can thrive in. The added value of urbanity in a knowledge location depends on the dominant “knowledge base” of its tenants: analytical, synthetic, or symbolic (Asheim et al, 2007; Asheim and Hansen, 2009). Urban settings add value for knowledge hubs relying on symbolic knowledge (e.g., “creative districts,” like the Digital Hub), but more suburban and secluded types of locations (e.g., science and technology parks) continue to be attractive for activities that rely on analytical and synthetic knowledge. In these segments, innovation is more planned and formalized, does not rely on incidental or “serendipitous” contacts, and many networks are regional and (inter)national rather than hyper local. All this reduces the value added of a denser (and more expensive) urban location. Biocant illustrates this reality, and even shows a reverse turn of scientists moving from city centers to settle in rural areas. Secluded areas have advantages over more open and urbanized areas in terms of security and secrecy control; it is easier to keep out unwanted suspects. Despite the surge of open innovation, this still matters for some tech firms or risk-prone facilities (i.e., in working with nuclear energy, dangerous viruses, etc.).
In cases where we can clearly observe an urbanization process, it is not always straightforward to disentangle its drivers. In the case of Kista (currently in transition from “science and technology park” to “science city”), the urbanization plans are framed as a response to shifting working and innovation modes of its tenants (e.g., from analytical-synthetic to more symbolic activities; open innovation; image ascribed to work); the planners stress the need to create a twenty-first century environment for the knowledge economy, which to them implies a mix of functions. But a more mundane driver is the recognition of the overall commercial potential of the area (e.g., for retail or housing) by developers and investors.

Economic motives might be important in other contexts as well. In campus locations, universities and campus owners have strong financial incentives to develop commercial real estate (housing, offices, retail) around their premises. For commercial developers, university campuses are interesting sites because they tend to be well connected and concentrate and attract thousands of potential clients per day. More research is required in order to better disentangle these effects; however, from a policy perspective, it is already clear that there might be trade-offs between urbanity and seclusion, namely in terms of policing and safety.

The urban turn of knowledge locations has strong political motives as well: Councils are ready to (co)invest in knowledge locations as drivers for regeneration or even social inclusion; witness the cases of Kista and Digital Hub, where efforts are made to connect the knowledge location with the adjacent problematic neighborhoods. More research is needed to understand if, how, and under what conditions knowledge locations can have positive socioeconomic effects on their surroundings.

In this paper, for the sake of simplification, knowledge locations are treated as agents who “act,” “offer,” “provide,” etc. Clearly, the reality is more complex than that, and there are many actors behind the design and urbanity profile of knowledge locations, such as local planners and policymakers, real estate developers, university deans, etc. The ways through which they interact, exert power, and decide also call for further research.

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Notes

1. One example is biosciences, where digital sciences and biology open many promising new opportunities; other examples can be found in green technology platforms, relying on IT, life sciences, advanced engineering, among others.

2. Naturally, a planned knowledge location is a “negotiated” provision, not a fully “owned” government provision: the location and design of a knowledge location is often negotiated between different actors (firms, entrepreneurs, developers, land owners, universities) within an urban region—and those have different location preferences (including profit maximization, raising land values, expanding university campuses, or political reasons). Yet, out of the relation between different types of knowledge bases and actors’ preferences for urban settings, different types of knowledge
locations emerge. The final outcome naturally relies on the power exerted by different actors, but the analysis of those processes is out of the scope of this paper.

3. The terminology was chosen in order to allow for comparisons with the most common types of locations often depicted in the literature.

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