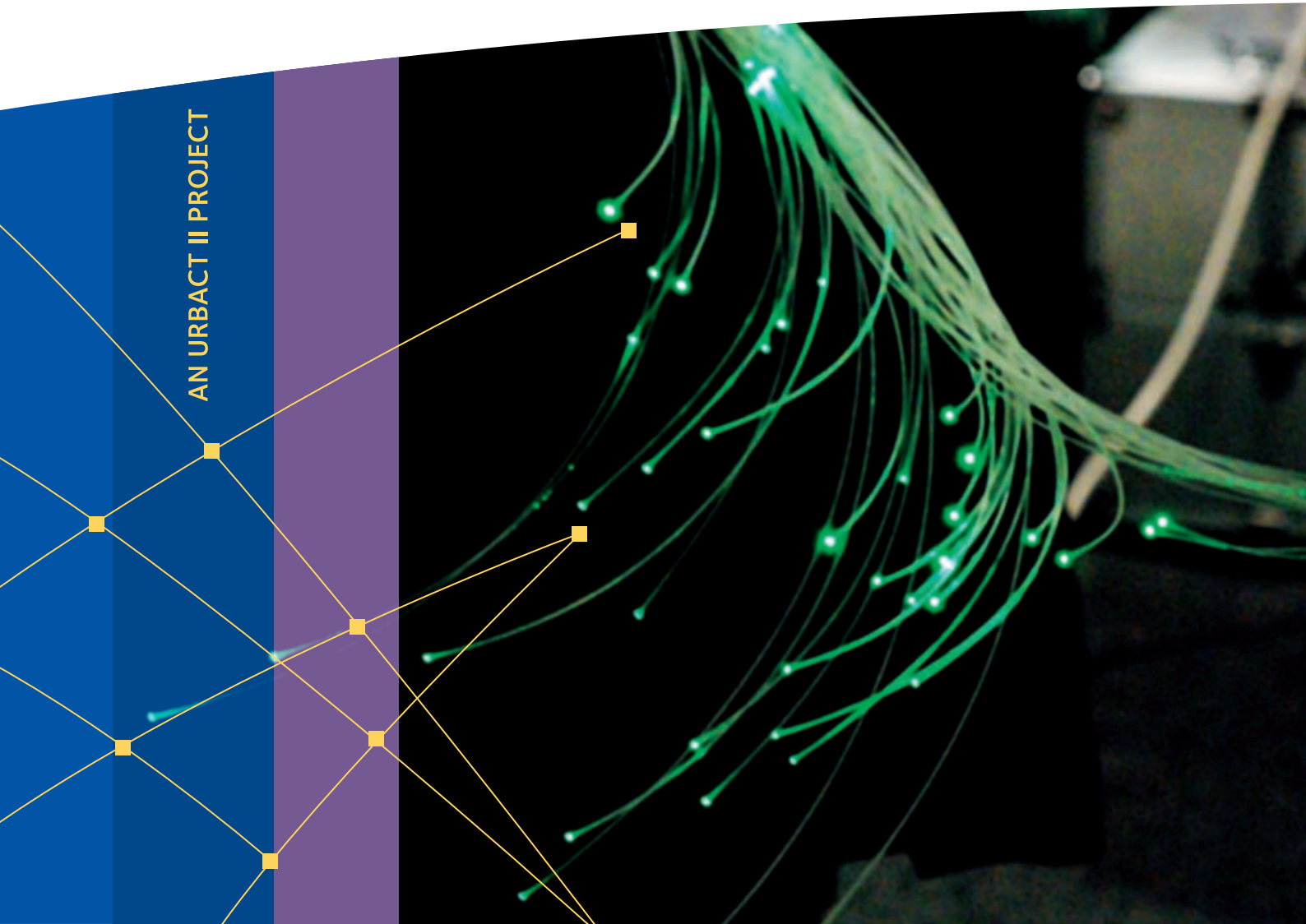# Creating knowledge hotspots in the city: A handbook

Practical guidelines for developing campuses, science quarters, creative districts and other knowledge hotspots

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CONTENTS

PREFACE

This 'handbook' has been developed as an output of the REDIS[1] project. In a journey that lasted 2,5 years, we intensely discussed the development of knowledge hotspots in eight European cities: Aarhus, Bialystok, Halle, Magdeburg, Manresa, Newcastle, Piraeus and Vienna. Moreover, we made inspiring study trips to Aachen and Tampere. In the same period, I led a comparative study about knowledge locations[2], of which the lessons have also been incorporated into this book.

Along the way, the REDIS network became something like a family, albeit a very professional one. The structured, in-depth exchange generated many new ideas and insights for each partner city, and for me personally, it was a great learning experience as well. During each visit, I was amazed how much a motivated, committed and professional group of people can achieve in a short period of time.

This book intends to convey some of the lessons we learned to a wider audience. It is intended for professionals involved in the development or management of knowledge hotspots (campuses, science quarters, creative districts). Hopefully, it fulfils this promise. It must be noted that some of the project partners were in a rather early, conceptual stage of developing their knowledge area (Bialystok, Halle, Manresa, Piraeus and Vienna), whereas others were more advanced. This book naturally focuses mainly on the advanced cases, where obviously the most lessons can be derived for a wider audience.

This book, although written by a single author, relies on the collective intelligence of a number of people. Special credits are for Klaus Puchta (City of Magdeburg), the lead partner of the RE-DIS project. His humour inspired us all, and we owe much to his massive administrative work for REDIS behind the scenes. Furthermore, Volkmar Pamer (City of Vienna) deserves a special word of thanks: it was his idea to apply the implementation lab method, which proved to be so fruitful during our sessions. Also, he did a great job as moderator and speaker, and perfectly complemented my own poor knowledge about urban planning, architecture (and tramlines). Moreover, I want to thank all the participants, speakers and organisers of the sessions in the eight partner cities, includingthe local support groups. It was a lot of work, but it was well worth it.

Amsterdam, March 2011
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[1] **RE**structuring **D**istricts **I**nto **S**cience quarters
[2] W. van Winden et al. (2011), Creating knowledge locations in cities: innovation and integration challenges, Erasmus University, Rotterdam

CHAPTER 1. INTRODUCTION AND ORGANISATION OF THIS BOOK

Many cities and regions have the ambition to promote their 'knowledge economy': it is generally recognized that knowledge has become the prime source of wealth in advanced economies. This book focuses on one particular way to promote the urban knowledge economy: the creation of knowledge 'hotspots'.

The term 'urban knowledge hotspot', as we use it, includes concepts like science parks, technology parks, all sorts of campuses, creative districts, science quarters, etc[3]. Some knowledge locations focus on one specific branch or technology (i.e. bio science parks, media hubs), others are more diversified. Some are integrated into the city, some are developed at greenfield locations (figure 1). Generally speaking, a knowledge hotspot is a designated area where the focus lies on knowledge-based economic development.

Knowledge hotspots are believed to have a number of advantages. They provide opportunities for facility sharing (i.e. the joint use of expensive facilities such as cleanrooms or laboratorial facilities); they may enhance networking and face-to-face interaction, which may result in more innovation. Knowledge hotspots could help to strengthen links between companies and universities, and provide a favourable incubating environment for start-ups. Moreover, knowledge hotspots can help to 'market' the city as progressive knowledge-based city: they give the local
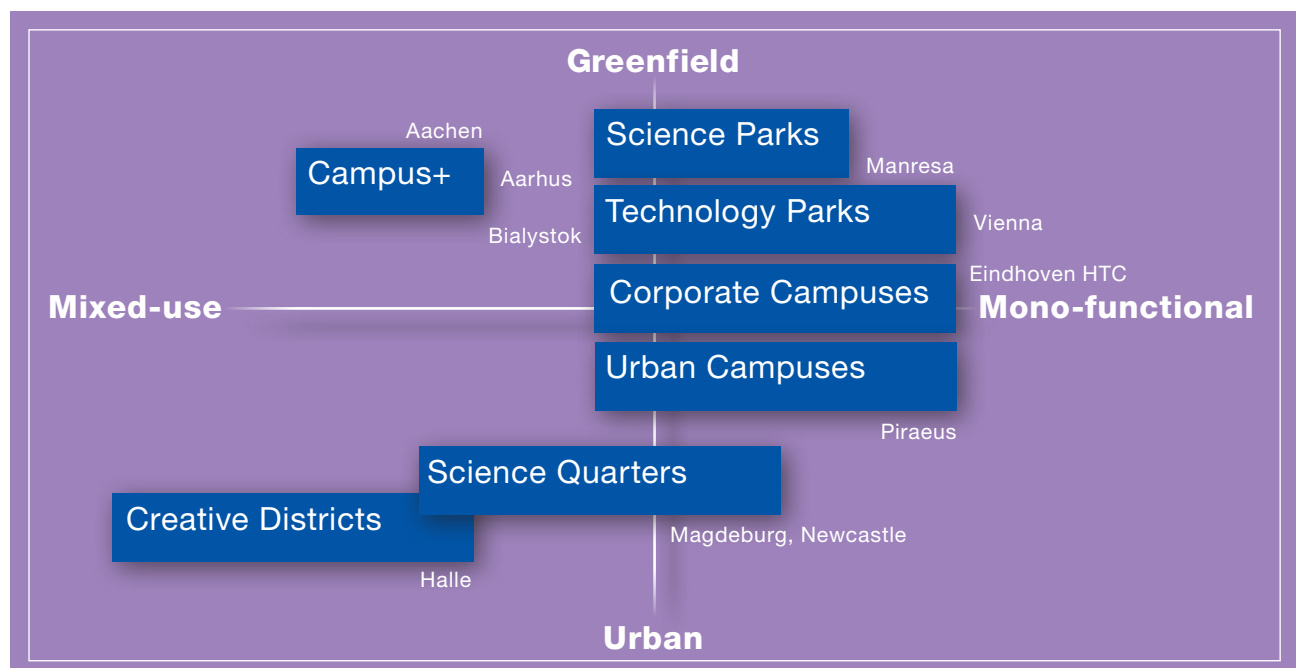

Figure 1 Types of knowledge hotspots.

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[3] It excludes wider territorial concepts like regional clusters, in which activities are spread over a larger territorial area, although we recognise and explicitly address the role of the wider regional economic context in analysing knowledge locations.

knowledge economy a face and an address. Finally, knowledge hotspots are increasingly seen as a powerful tool for urban regeneration. Many cities seek to transform derelict urban areas into 'creative districts'.

What makes a good knowledge hotspot?

A good knowledge hotspot has at least four features:
1) it has a joint identity;
2) its target groups and concept are clearly defined;
3) it is well connected to the city and
4) it is well managed.

Joint identity: In a good knowledge hotspot, actors and activities have things in common, share ambitions and develop some degree of joint identity and belonging. There can be a common image/identity around a particular theme (i.e. life sciences, environmental technology, or design). Other types of 'togetherness' may emerge if companies closely co-operate, or use each other's services, or if they share common facilities. Also, the location can become a hotspot for information exchange ('gossip and buzz'), making it the 'place to be' to pick up new information and trends. There are several ways to promote 'togetherness' and identity: by organising events, offering joint facilities, promoting co-operation. A good knowledge hotspot is designed (in terms of urban design and landscaping) in such a way that its ambitions, identity and commonalities are expressed in the physical layout.

Target groups: A good knowledge hotspot has clear primary target groups. These may be specific types of companies, research institutes, other organisations, or people. It is important to prevent a massive inflow of unrelated activities. It's not only about permanent tenants. A hotspot can also become a place of networking and temporary activity, such as events (seminars, conferences, demonstrations). In the knowledge economy, temporary activities are growing in importance, with new, mobile ways of working and an increased domination of project work with changing partners. A good knowledge hotspot is not a boring mono functional place (work-only): it also should include leisure, retail functions, or even housing.

Knowledge hotspots must be attractive places

The key to any successful knowledge hotspot development is that knowledge workers should feel happy to work, live, and -at times- relax there. Talented people are the key drivers for innovation, especially higher educated, entrepreneurial and creative people. Places that that manage to attract/retain these people are successful in the knowledge economy. The challenge for cities is to create dynamic environments where these people feel happy and at ease: attractive areas, with good amenities, good jobs, good food, a great ambiance, and good connections.

Connections: A good knowledge hotspot is not a stand-alone development: it is well-connected to the urban fabric. This is reflected in fruitful

economic, social and physical links between the hotspot and the city. A well-connected hotspot contributes to the urban liveliness and dynamics, and adds to innovation power of the city. Tenants/inhabitants of the hotspot can tap from the diversity and amenities of the urban economy, and realise synergies. Moreover, ideally, a hotspot is not a 'ghetto for boffins' but rather an open and welcoming space. Chapter 6 elaborates further on this issue.

Good management. A good knowledge hotspot is well-managed. This is a complex task given the often diverging interests and ambitions of stakeholders (land owners, developers, tenants, inhabitants, knowledge institutes, city departments). Chapters 4 and 5 deal more in-depth with this issue.

Six reasons for developing a 'knowledge hotspot'

· Attracting/retaining knowledge workers and businesses
· Attracting events and other temporary activity
· Signalling that the city plays a pro-active role in the knowledge economy
· Upgrading a degraded area or neighbourhood
· Promoting innovation
· Bringing research and business closer together

Organisation of the book

This book elaborates a number of the issues described above, illustrated by practical case studies. For each topic, some lessons and pitfalls are derived, that may help policymakers and developers to make soundly-based decisions.

Chapter 2 is about the idea behind the hotspot: how to develop and elaborate an appropriate concept (biotech? ICT? Creative industries?), and make sure that it is realised?
Chapter 3 focuses on the question how to promote innovation and interaction in a knowledge hotspot: what tools are available? What can we realistically expect?
Chapter 4 turns to the management question: how to run a knowledge hotspot, in its various development stages? The chapter does not provide a single answer, but presents a range of governance models that may be applied in different situations.
Chapter 5 deals with a special relationship: the one between city and university. This sometimes-difficult marriage is nevertheless an important factor for the success of knowledge hotspots.
Chapter 6, finally, raises the question of integration. What is (or should be) the relation between a knowledge hotspot and the rest of the city? How can the two be integrated in a fruitful way, in different situations?

The annex, finally, contains a number of examples of knowledge hotspots in European cities. Most examples are from member cities of the REDIS network, but some other cases are added as well.

CHAPTER 2.
BIOTECH, CLEAN ENERGY, CREATIVE INDUSTRIES? DESIGNING A CONCEPT FOR THE HOTSPOT

In urban planning, the 'conceptual' approach is gaining ground, and this approach is very well applicable to the development of knowledge hotspots. A conceptual development assumes a central unifying idea, an overarching theme that unites the different functions and users of a locality, and creates or fosters a particular identity of place. Many cities and developers try to create hotspots around a particular theme. This thematic focus may be a particular sector (IT, or biotech for example), or based on broader notions like 'design', 'creativity', or 'cleantech'.

One of the most prominent examples in Europe –elaborated on in this chapter- is Helsinki's Arabianranta district, in which 'art & design' was chosen as central theme, and elaborated in many directions.

A conceptual approach to a knowledge hotspot has a number of advantages. It helps to set guidelines for making choices, i.e. about admission criteria for tenants, architectural qualities, the design of public spaces etc. Also, a well-defined and elaborated conceptual approach helps to create a common identity in the area –the sense of being part of something special-, and to build a particular image for the outside world. This distinguishing quality is important in a world in which many business locations vie with each other to attract companies, people and events.

A conceptual approach may also help to foster 'new combinations' and promote innovation at a site, for example when specialised university groups are clustered with firms that conduct R&D in the same field.

This chapter starts with two examples of the conceptual approach: Arabianranta in Helsinki, and Aachen's new research campus. Next, it draws some lessons for hotspot developers.

Helsinki's Arabianrannta[4]: Design as unifying theme

The Arabianranta area in Helsinki (Finland) has drawn the attention of many urban planners worldwide as a success story of creative urban regeneration, based on a strong concept. In a nutshell, Arabianranta is a regenerated former wasteland area in the north- eastern part of Helsinki. It has been turned into a mixed urban district, with living, working, studying and leisure functions, centred around the theme of 'design, art and creativity'. It is currently in a rather advanced stage. As planned, the area hosts already many national and international design, media and ICT firms, as well as renowned higher education institutions (HEI, e.g. the university of applied sciences and the University of Art and Design Helsinki). Moreover, the area has high-quality residential areas for diverse social groups, as well as leisure and cultural facilities like shops, restaurants and museums. Arabianranta's vision is to become the leading centre of Art and Design in the Baltic area.

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[4] Based on W. van Winden et al. (2011), Creating knowledge locations in cities: innovation and integration challenges, Erasmus University, Rotterdam, chapter 8

For a long time, the location was a centre of porcelain production, with the dominant 'Arabia' factory as central player. In the 1980s, the area became physically and socially degraded, with plant closures and high unemployment. By that time, the surrounding area consisted of wastelands and abandoned premises of sewage plants, rather polluted, hosting socially deprived groups. The city had no specific plan for the area. A crucial event took place in 1986, when the University of Art and Design Helsinki (TaiK) settled in the old premises of Arabia factory. The university had been located in the city centre and was looking for space to accommodate its growth. The former factory fitted TaiK's requirements: it provided suitable spaces for classrooms and larger studios and workshops, it had the tradition and character of an old 'design intensive' factory, and it was linked with the history of the university itself. In addition, it was relatively close to the city centre due to improved transport connections.. During the period 1986-88, TaiK started talks with the City to assess whether their new premises would be temporary, or a more stable option to grow. By that time, the City of Helsinki and its Planning Department were considering converting the area into an urban green park. Before the turn of the decade, the decision was made to transform the area and create a functional mix, making use of the advantages of the area: the presence of TaiK, a waterfront location and a strong identity. In 1992, the City started to detail the area's new master plan; soil remediation and earth cleaning took place until late 1990s, when housing construction began.

The key stakeholders felt that, in order to guarantee success in the long run, a core idea for the area was needed. Design was chosen as the central theme, and it was elaborated in several directions. It was the first time that the City of Helsinki planned a fully integrated urban area development around a holistic theme, going beyond traditional developments based on general physical infrastructure, industrial premises or isolated housing. The area was planned to host a coherent and diverse mix of functions centred around the topic of 'art', associated with a distinctive quality of life.

Ever since the area has attracted many design and creative firms, students and residents, and there is still substantial demand both for residential space and office space. According to a recent survey, the key location factors for the companies are: the image of the area, the presence of TaiK, the creative atmosphere and the accessibility. It is important to note that many of the design firms mainly have showrooms in the area rather than production or design activities. They have settled there to 'see what is going on'. As one director of a firm said: 'This is the spot to see what is around'.

Aachen's new campus: clusters as guiding principle

A second, rather different examples of a 'conceptual approach' to hotspot development is the new university campus in Aachen.

Aachen is a medium sized town in the West of Germany, situated near the border of Belgium

and The Netherlands. The city has a large technical university, one of the largest in Germany: The RWTH Aachen University (Rheinisch-Westfalische Technische Hochschule). The university has the full range of technology and science disciplines, and is oriented towards applied research. Some years ago, it received the 'excellenz' status, placing it in the top league of German academia. Currently, it is the largest German university in terms of contracts with businesses, with an annual €227m income from projects with the industry.

Typically, when universities build a new campus, their primary concern is to create space for their existing research and education activities. In the German city of Aachen, the university takes a broader and more integral perspective. It developed two new campus sites for joint research of companies and university groups, centred around specific themes. The university's vision is to develop the campus into a **catalyst for research and a trigger for innovation.**

The idea is to achieve synergies by physically situating firms and institutes together in thematic 'sub-clusters' and let them work together. The basis for one sub-cluster is research. Internally, the university has identified a number of strong research themes (multidisciplinary, with sufficient critical mass). In the first phase, six clusters were approved by the board: Photonics, bio medical engineering, logistics, integrative production technology, sustainable energy, and heavy duty-& off highway power trains. These clusters are to become hotpots of knowledge creation, diffusion, and application.

The Campus GmbH –a special vehicle set up to develop the campus- invites industrial companies to locate near these institutes on the campus' premises. Not every firm is welcome, however: there are strict admission criteria. To be allowed on the campus, firms have to sign a long-term R&D framework contract in which they commit themselves to engage in contract research activi-

Figure 2 The Melaten-campus

Figure 3 Campus West

ties with the university, in a particular cluster-field, and also to deliver lectures at RWTH. A firm has to sign a 10-year lease contract, and must actually base part of their (research) staff on the campus premises.

The aim of the concept is to improve the quality, scale and relevance of research in the various fields by mixing the resources and knowledge of business and academia. Also, the university hopes to improve the quality of teaching by having lectures from industrial partners. This way, the latest insights from the business world are transmitted to the students. Also, employees of the 'embedded' firms can take (part-time) Master courses at reduced rates.

The new campus should develop as a patchwork of 'mini-campuses' focusing on a particular technology field, with university institutes, firms, and service companies or public research institutes like Fraunhofer. The strong point is that research is always central stage; the university stays in charge but captures the knowledge embedded in industrial firms, and simultaneously expands its financial possibilities. In applied research (like wind energy, combustion engines or new materials) it makes sense to co-operate with industrial partners and have real and long-term commitments.

The 'Aachen model' is a strategic approach, much more than is common in Europe. Importantly, co-operation is never exclusive and may never block new developments. Any institute keeps the right to sign deals with other industrial partners who are not on the campus; new clusters may emerge, and spinning out is encouraged.
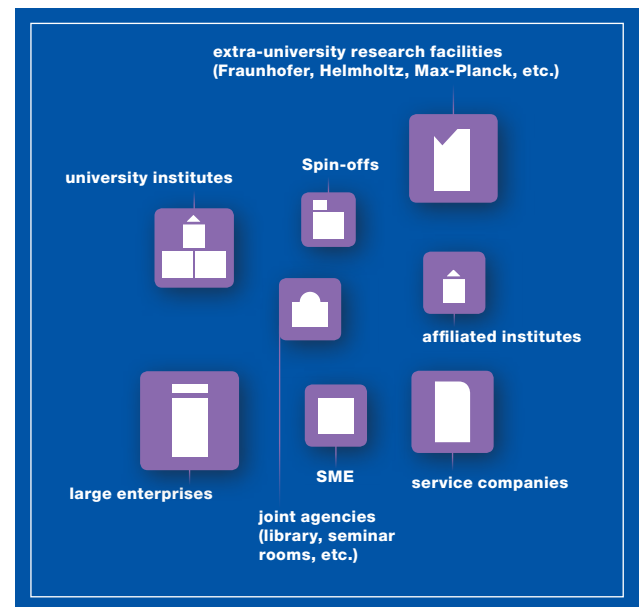
Figure 4. Partners in a 'mini-campus'

Matriculation is the term the university uses to indicate this way of integrating firms into the university. By 'matriculating', companies gain a special position: They receive influence on the research focus for the coming years, they obtain discounted access to R&D-services of the university and 'matriculated' staff members receive teaching and further education offered byRWTH Aachen. And, very importantly, they have direct access to the best new talents of the university. The concept seems to work. Whilst writing this report, 82 firms already had signed a letter of intent for a long-term co-operation contract, and will locate to the campus. Most of them were not located in Aachen before.

Lessons on concept development & management

Based on these examples (and a number of other cases throughout Europe, see annex 1), a number of **lessons** can be learned:

· **Chose the right theme, not too broad, not too narrow.** The choice of the theme or concept is crucial: it sets directions for development in the long run. Therefore, it is advisable to carefully manage the process of 'concept design'. It is essential to involve the key stakeholders in the area from the very beginning (property owners, key existing tenants that will stay, but also inhabitants): If they don't experience the idea or concept as being 'theirs', implementation will be problematic. Moreover, it may help to involve external experts and artists in the soul-searching of the area. They often see characteristic things about the site that insiders don't see anymore and which can be helpful to link the old to the new.

· **Choose a concept or theme in which the city or region has proven strengths.** The design quarter in Helsinki could only become a success because the city had a pre-existing strength in this field.

· **Concept development should start at the very first stage in the (re)development of a knowledge hub.** It should result in a set of guidelines and principles that are the input for later stages, like master planning, urban design and area programming.

· **Stay close to the unique –historical- identity of the place (as was done very appropriately in Helsinki's Art & Design city).** This makes the concept more credible and increases the chances of success.

· **Think deeply on the meaning of the concept in a number of domains.** It should provide guidelines to select the type of tenants to be attracted to the area, but also for the type and style of architecture, urban planning, the design of public spaces, housing, and amenities in the area.

· **Communicate the concept from the very beginning of the development.** One option is to organise specific events or festivals on the site, before the (re)development has actually started. This gives the area a certain reputation and image which may in a later stage help to attract the 'right' companies, people and amenities. The city of Eindhoven has done this in the 'strijp S' quarter (see box).

Six questions to be asked when designing a concept

• Does the concept fit with the economic or knowledge strengths of the city
• Does the concept have a link with the history of the place
• Are there enough relevant 'proponents' of the idea?
• Is there a concept champion?
• Can the concept be sustained, also in difficult times
• Can the concept be 'translated' into various directions, i.e. housing, public spaces, infrastructure, branding, education etc.

A cultural fund for Strijp-S

Strijp-S is a large redevelopment area in Eindhoven, The Netherlands. It used to be one of the main production and R&D locations of Philips, and now it is being redeveloped into a creative city, that should add to Eindhoven's metropolitan ambiance. The project is being developed by a number of partners, including a commercial developer, housing corporations, and the municipality. One of the core objectives is to make the area lively and to give it a cultural atmosphere. In 2008, a number of stakeholders erected a cultural fund , to enable the organisation of events and festivals that should contribute to the new image of the area, and draw people to the once "forbidden city". The fund has an annual budget of €600,000. Since its start, a number of cultural initiatives have been taken in the area, and have contributed to the new image and identity of the place.

· **Give the area a particular 'style', reflected in the design of public spaces.** Helsinki has done this in Arabianranta (art & design city) by investing heavily in public art and by demanding a distinctive quality of architecture. 'Area dressing' is another way to do this (using flags and banners in the area which convey the message). Moreover, incorporating new technologies in pavements or lighting systems are powerful tools to communicate and convey the area's identity.

· **Not all the area must be filled with companies that exactly 'fit' the concept; it is enough if there are a number of highly visible 'concept carriers' or 'flagships', that carry the identity of the area.** These can be important companies, or a university (like the University of Art & Design in the case of Helsinki's Arabianranta district).

· **Consider differentiating rent levels between different tenant types (i.e. lower rents for artists or start-up firms) to increase diversity in the area.**

· **The time dimension is crucial.** The success of a conceptual approach strongly depends on the consistency of the implementation over a longer period of time. Keeping a concept intact over time can be a challenge. In difficult economic times, it can be tempting to lift admission criteria (for example allowing nonrelated companies to locate at a specialised biotech location), to fill vacant spaces and create jobs. But this may destroy the concept in the long run. Hence, mechanisms must be put into place to safeguard a certain concept –once chosen – to prevent this.

· **Create a delivery organisation.** In the development of any knowledge hotspot, many actors are involved. The development, elaboration and communication of the concept is a joint challenge and cannot be carried by one stakeholder only, or by the city. For this purpose, it can be helpful to set up an area based 'delivery' organisation that unites the stakeholders, and functions as a platform and implementation force. Dublin did this in setting up the 'digital development agency'. For the development of Strijp-S creative district, Eindhoven set up a special management company, Park Strijp Beheer ('Park Strijp Management'), with the municipality of Eindhoven and the real estate company Volkers Wessels as the two shareholders. These organisations can also help to maintain political support for the development.

CHAPTER 3.
PROMOTING INNOVATION
'ON THE SPOT'?

'More innovation' is one of the promising features of a knowledge hotspot. The added value of a knowledge hotspot becomes evident when it is not a mere collection of similar tenants, but really a catalyst for innovation.

For tenant companies, being located in such a place helps to boost their business and make them more innovative and competitive. This will attract new tenants and drive up the value of the place. For the property owner or developer, it means that the value of their assets will rise as a result.

An illuminating example of an innovation-promoting hotspot is the Eindhoven Hightech Campus. According to the research director, the innovative and collaborative atmosphere of this 'open innovation campus' helped to boost the number of patents at Philips, representing a business value that far exceeds the investments in the campus area.

The key question is of course how a knowledge hotspot can really become an innovation accelerator. This chapter first discusses the case of Eindhoven's High Tech Campus, and how it was designed to promote innovation and collaboration between tenants. Next, we list a number of instruments and tools to be used to promote innovation at the knowledge hotspot.

Connecting the bits at Eindhoven's High Tech Campus[5]

The High Tech Campus is situated at the edge of Eindhoven, south of the city centre. It covers approximately 103 hectares and is adjacent to the highway A2 with a direct turnoff into the area. It is well accessible by car, public transport and by bike. The investments in the area-based development cover approximately 506 million euro.

The High Tech Campus is a private development, initiated by Royal Philips Electronics, by then the owner of the property. The Philips Research division is one of the major tenants (1.800 employees and 125.000 m2 floor space) and the 'launching customer' , but there are several other tenants on the campus as well.

An explicit goal of the High Tech Campus is to create an environment for open innovation. Several instruments are used to ensure that companies cooperate in innovation projects. First, the High Tech Campus has a selective acquisition/admission strategy. All potential tenants have to be R&D intensive organizations, which are related to one of the five main technological domains on the campus: microsystems, life-tech, high-tech systems, infotainment and embedded systems. Admission of end-users is an integral decision made by the campus management, which strongly relates to the concept-value of the park and the mix of users as a whole[6] .

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[5] Based on Van de Klundert, M. J. C. A. and W. Van Winden (2008), Creating Environments for Working in a Knowledge Economy: Promoting Knowledge Diffusion through Area Based Development, paper presented at Corporations and Cities: Envisioning Corporate Real Estate in the Urban Future, Brussels, 26 May
[6] Westerveld, G. (2006). Integration of the Development proces: business areas (in Dutch), Lecture MasterCityDeveloper, May 2007.

Second, to promote interaction on the campus, a 'Technology Liaisons Office'' was set up. This organisation maintains close contact with tenants and pinpoints potentially valuable connections between them. It organises workshops, business meetings and network happenings to enhance knowledge diffusion. It has also initiated the 'Campus Technology Liaisons Club', which is a network organisation of decision-makers and 'influentials' on the campus. The office essentially tries to build and maintain a community of practice. As a manager put it "In the end, the purpose of this community is to have the feeling you work on the campus instead of with an individual company".

Third, to promote interaction and knowledge diffusion, the campus has a specific zoning plan and special rules. The designers have opted for a central position of collectively used facilities, with a concentric zoning of different functions around it. In the heart of the campus, collective functions (like a restaurant, shops and meeting rooms) are situated in one building called 'The Strip'. Next-door, there are shared facilities like 'MiPlaza', 'The Holst Centre' and the 'Centre for Molecular Medicine': buildings that contain clean rooms, laboratories and specialized spaces. More towards the edges of the campus, there are several collective parking buildings in between buildings with mixed functions and users. In the periphery, there are sports facilities and a kindergarten. The maximum walking distance between the centralized shared facilities and other functions on the campus is approximately eight minutes.

The interior zone is inaccessible by car and the quality of the green spaces is high (landscaped). Employees and visitors are encouraged to walk to their destinations on the campus, enlarging the chance of casual encounters in a nice environment. Within the individual buildings there are no meeting rooms allowed for more than 8 people. Instead, these facilities are collectively offered within 'The Strip'. It's also not allowed to have lunchrooms or café's within the individual buildings. Again, these are offered collectively. Even the collective sporting facilities focus on team sports, in favour of individual workouts.

Some precautions

Developers of knowledge hotspots and local governments typically have very high expectations of the innovation potential of the new area. However, based on a number of earlier studies, there is no reason to believe that knowledge hotspots are innovation machines driven by local interaction.

First of all, research shows that **most companies have links with innovation partners outside rather than inside the location**[7] , often with established partners. This is not to say that important relations do not unfold within the location and in bars or informal settings; Rather, they often do not relate directly to "knowledge and innovation" partnerships, but more to access to business information (e.g. market trends) and policy-related information (e.g. access to subsidies).

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[7] Malmberg, A., & Maskell, P. (2006). Localized Learning Revisited. Growth and Change, 37(1), 1-18.

Second, it is important to realise that **innovation works very different in different industries**[8]. In the creative industries, innovation heavily relies on informal interactions with customers, and 'knowing the right people'. These firms prefer an inspiring ambiance that enhances creativity. Free-lancing and job rotation is very common, and reputation is a central asset. But in science-based sectors (like biotechnology), innovation processes are highly planned and based on formal knowledge and scientific methods; 'know-what' and 'know-why' are more relevant, and firms search for partners in a very selective way. Technical cooperation often takes place through international networks of carefully selected partners. But even within certain sectors, modes of innovation differ – industrial design is very different from shooting a film; discovering a new molecule requires other procedures and "proximity" than developing new human tissues.

Finally, **don't expect that a common bar will promote innovation.** As Huber finds out, in the case of Cambridge ICT workers, "in bars people are often too drunk to say something technically meaningful."[9]

A small toolbox for promoting innovation at a knowledge hotspot

Given the restrictions listed above, what tools are available for knowledge hotspot developers?

Apply tenant selection: Make sure that tenants at the hotspot are complementary to some extent. The 'cognitive distance' between tenants should not be too high (i.e. they do completely unrelated things) but not too low either (if tenants are exactly similar, they won't have an interest in co-operating). Tenant selection can be achieved by setting admission criteria for new tenants.

Offer shared professional facilities (i.e. cleanrooms, labspace, prototyping services, funding agencies, business support services, etc.). This enables tenants to concentrate on their core activity: innovation, and gives them access to state-of-the-art facilities. Many professional knowledge firms are happy with turn key solutions and an all-in price including many excellent facilities. Moreover, it may lead to unexpected encounters between tenant firms.

Smart programming of activities. Organising keynote speeches by industry leaders, new technology demonstrations, etc. can bring different people together around a shared interest, and may bring interesting leads. On the soft side, organising events (like sports tournaments or cultural events) may promote the formation of social bonds and bring people into contact with each other, which may result in business co-operation.

[8] Asheim, B. (2009). Guest Editorial: Introduction to the creative class in European city regions. Economic Geography, 85(4), 355-362.
[9] Huber, 2009.

Promote interaction through urban and landscape design. The area of the knowledge hotspot could be designed as to optimize the chance of 'spontaneous' encounters between people in public space. Conducive elements are a park-like setting, car-free, with crossing walking paths offering rewarding walks, and/or bicycle tracks.

Create common facilities or amenities at a central location. Having a central place for bars, restaurants or meeting rooms enhances the chance of encounters there, and also helps to give the place a centre and an identity. In a very strict regime, tenants may be forbidden to have their own facilities (as is the case in Eindhoven High Tech Campus).

Offer special facilities for start-up firms. Young firms are a source of innovation and new ideas. Make sure they feel at home at the knowledge hotspot, by offering cheaper premises and business support services. Moreover, put them into contact with larger firms on the site, that could become potential clients or help to open up networks for them.

Set up a 'technology transfer point', where tenants can link up with sources of (technological) knowledge they might need. Local universities might be willing to open up an information desk.

Hire a programme manager for the knowledge hotspot: this person should set up and implement a programme for joint activities in the area that help to bring the concept forward (see box).

Task list of an 'area programme manager'

What could be the role of an area programme manager? Evidently, much depends on the type of location, but here are some general ideas:

· Relationship management with tenants, to find out their common interests and needs
· Organise keynote lectures, demonstration projects and other events that are relevant to the tenants, might attract outsiders, or contribute to the image of the location
· Set up staff exchange programmes/circulate vacancies among the tenant community
· Organise linkages with university departments or other local research institutes
· Create a 'hotspot newsletter', a website, and other communication tools
· Organise cultural and sports events for employers and employees
· Play a role in new tenant's selection, to guard cohesion and concept value
· Communicate with external stakeholders like municipal administration, services providers

Evaluate frequently how the tenants value the contributions of the programme manager.

CHAPTER 4.
HOW TO RUN A KNOWLEDGE HOTSPOT?
SOME GOVERNANCE MODELS

A 'knowledge hotspot' (a science quarter, creative district, a campus) can be seen as a real estate project like any other, with investments and (expected) returns in the form of rents and increased real estate value. Often, however, such developments are not considered as an 'ordinary' real estate development. City councils see local economic benefits (jobs!, image!, innovation!) and are often prepared to make a contribution, and often, not-for-profit organisations are involved as well. This makes the development of a hotspot rather complex: there is a plethora of interests and organisations including the municipality (various departments), the university, private firms, landowners, property developers, investors, housing corporations, development agencies etc.

How to manage this complexity? How to deal with conflicting interests, different ambitions, expectations and objectives of the various stakeholders?

Developing a hotspot requires innovative partnerships between different types of organisations. It is difficult to give blueprints here: new 'smart partnerships' are contingent upon national planning frameworks and always strongly depend on the local situation[10]. And, it makes a big difference if the knowledge hotspot is deliberately planned and/or built from scratch (greenfield, or brownfield location that gets a full new destination), or if it is a more organically grown cluster that is part of the urban fabric.

The following paragraph describes two rather different case studies. The first is the development of the IT city Katrinebjerg in Aarhus (Denmark). This knowledge hub evolved gradually without strong top-down planning. It thrives on the ambition and power of a few leading like-minded people in a handful of key institutes. Here, an extreme light type of informal partnership was sufficient to set things in motion. The second case is more complex: it concerns the development of a 'science city' at a large plot of vacant land in the centre of Newcastle (UK). A partnership was created by the three core stakeholders: the university, the city council, and the regional development agency.

Informal leaders group: Aarhus IT City
The city of Aarhus (Denmark's second city, with 300,000 inhabitants) is home to the 'IT City of Katrinebjerg'. This quarter (150k m2) is located north-west of the historic city centre, between

[10] Roughly, there is the Anglo-Saxon model (applied in the UK and Ireland) and the continental approach, and they differ in fundamental respects. The Anglo-Saxon model has a strict division between public and private tasks: public actors cannot engage in activities that can be done by the market as well. That implies that local governments cannot act as developers. Also, national government is more powerful and influential in the UK and Ireland: ministers can transfer planning competences to other agencies ('special delivery vehicles'). Examples are the Urban Development Corporations in the UK, that were given substantial competences and funds by the national government to redevelop urban areas. Also, continental countries tend to have legally binding 'zoning plans' that set the margins for development beforehand, whereas in the UK, the system is more discretionary. There, it is common for market actors make proposals to (re) develop an area, and negotiate with the local planning authority about a 'planning permission' and conditions under which development can take place (Louw, E. and M. Spaans (2009), andere publiek-private verhoudingen, in Real Estate Research Quarterly, vol. 8 No. 4, pp. 53-58).

the university campus area and the city centre. It hosts a significant number of research institutes and IT firms, and in the next few years, it is to be further transformed into a leading IT centre. It should attract research institutes and entrepreneurs, and function as an incubation site for new ideas and firms. The idea is to excel in particular fields in pervasive computing, and user involvement in innovation. The university is expanding, and has concentrated all its IT research and education (both from the Sciences and the Humanities faculties) in the Katrinebjerg area, so now, the area is home to 1,800 full time IT students. In the near future, the area will be further redeveloped: the university (through a foundation) has bought substantial plots of land, and the IT department of the School of Engineering will soon be located there. Importantly, Bang and Olufsen has located a R&D department in Katrinebjerg: 'Having a department in Katrinebjerg enables us to recruit competent employees within the environment and establish non-bureaucratic research partnerships. It is pragmatic, fast and efficient' (Peter Petersen, Chief Technology Officer, B&O).

Katrinebjerg's development is a bottom-up story. It was never planned as a grand project, but evolved slowly, and it does not have a heavy management structure or formal partnership. The first ideas (back in the late 1990s) were developed by a handful of enthusiastic influential people from the University of Aarhus and the corporate sector. They involved politicians from the municipality and the county to join the efforts. It was an informal group, without a common institutional base, that, through its energy and influ-

ence, managed to push forward the Katrinebjerg project. And still, almost a decade later, there is no formal organization that steers the development of the area. It is the individual leadership in the key organizations that drives its development.

The municipality's role is also limited. The city owns none of the property in the area. It mainly facilitates discussions amongst key stakeholders, it works on branding (through its Internet sites and otherwise), it sets the legal margins for the area, and is responsible for masterplanning and district plans. However, strategic relations are quite good, and this model has worked relatively well. In late 2006, the main stakeholders created a Masterplan 2011, with an outline of the ambitions for the area until 2011.

So far, the 'informal' and light organization of Katrinebjerg has worked fine. Informal leadership has been effective and successful. But it is questionable whether it will work in the future as well, as a number of key challenges lie ahead. One problem is the limited terms of reference of the current informal working group. There are no hard targets, and there is little 'implementation power' if the informal leaders in the area decide that things need to be done. Moreover, the current leaders are not professionals in the fields of area management, development and branding. With the growth of the area and the ambition to become world-class, a more professional approach would be helpful. At the same time it is essential to nurture the effectiveness of the current informal networks and not create a bureaucratic management system.

Formal partnership:
Newcastle 'Science Central'

To boost its knowledge economy, Newcastle has developed plans to create a new science quarter in the heart of the city. It is being developed at the former location of the famous Scottish and Newcastle brewery, that moved its operations from the city centre and sold the land. Together with two main partners, the University of New-castle and the Regional Development Agency (OneNorthEast), the City Council is now in the process of transforming this large site into a sci-ence quarter, termed 'Science Central' because of the site's central location and proposed future status as a central hub for regional scientific activity. The ambitions are very high: Science Central is to become 'one of the world's premier locations for the integration of science, business and economic development' (Masterplan, 2007). Science Central will mainly focus on the creation and exploitation of cutting edge new technology, and given the regional economic structure it will rely strongly on spinoffs and spin-outs from aca-demic institutes.

ONE
Regional Economic Development
Jobs
Business Creation

Goverment
Knowledge Economy

University
Funding
Talent (research, professors, students)
Infrastructure (labs etc.)
Repultaion
Companies

City Council
Planning
Regeneration
Economic Development

Science Central?

1NG
Talking parteners and stakeholders objectives into a deliverable scheme
Successful quality of design

Newcastle Science Company
Platform for private enterprise through science
Jobs / businesses

New Deal / Centre West
Jobs, business opportunities (not just entry level)
Improve quality of environment (local people)
Accessibility & permeability
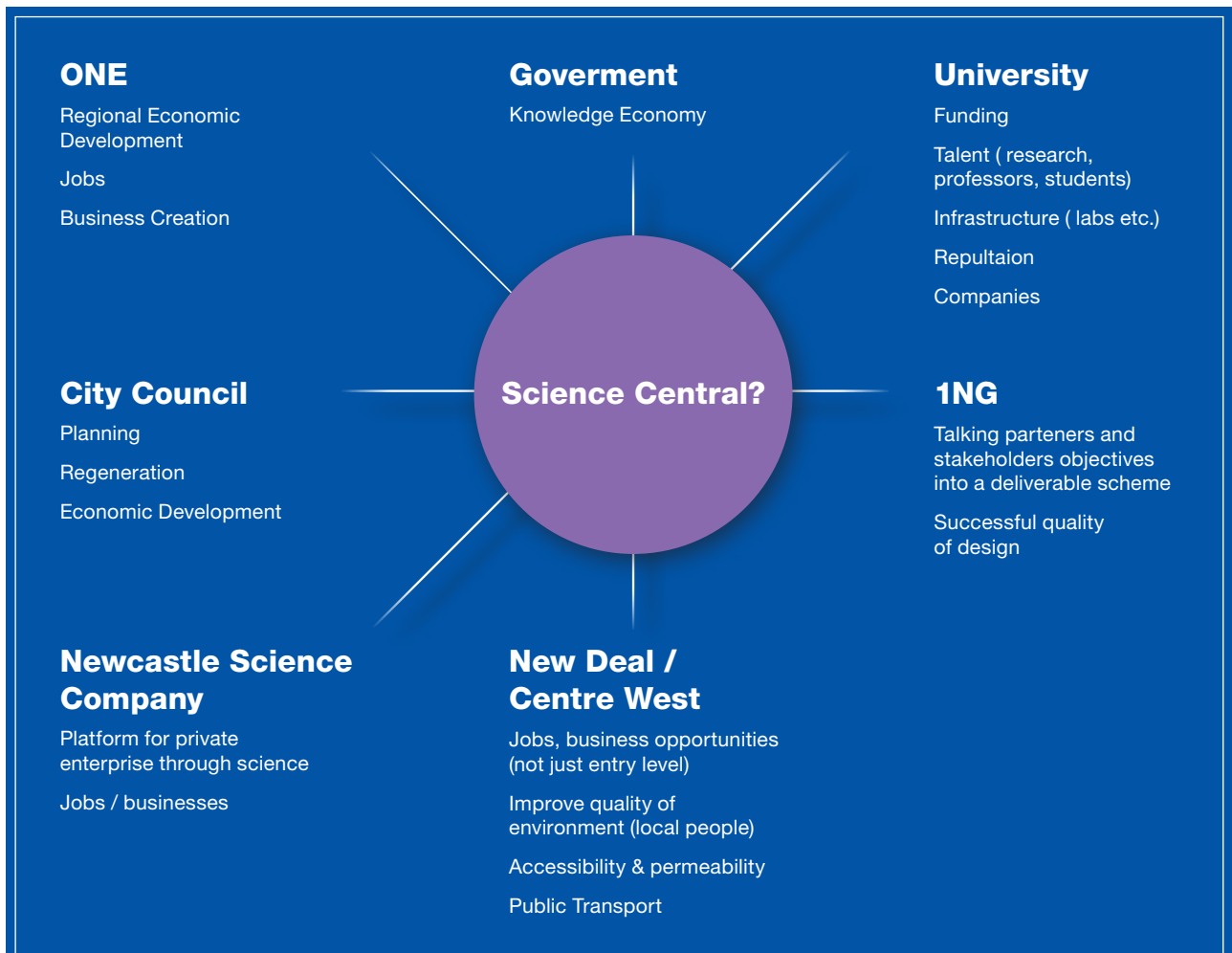Public Transport

Figure 5 Partners and stakeholders

Science Central was developed by a partnership of three organisations: the City Council, Newcastle University, and OneNorthEast (the regional development agency). Two 'hybrid' organisations are also involved: the delivery organisation 1NG (a joint city development company with Newcastle Council Gateshead Council and OneNorthEast), and the Science City company, a special organisation that was created to promote the development and dissemination of science in the city.

Each individual organisation has its own dynamics and interests (see figure). Newcastle University is strongly committed to the development. The vice-chancellor plays a very active role in the process, and considers Science Central as a key opportunity to expand the university, to boost commercialization of research, and to connect its various 'science sites'. The City of Newcastle considers the transformation of the brewery site as a main driving force for future growth and prosperity of the city. And OneNorthEast, finally, has a regional agenda: it considers the site as one of the flagship sites for the regeneration of the entire North East region.

The land ownership of the site is fragmented. About 30% of the land is owned by a private developer; 25% is to be developed into a residential quarter by the City of Newcastle in the framework of the Pathfinder programme (a national public housing scheme). The remaining 45% -the central part of the area- is to be developed jointly by the Partnership. This is the heart of the project as it includes the main 'scientific' components.

In January 2007, a Master planning consortium was commissioned by the three partners to develop a strategy and a Masterplan for the area. A public consultation was held with stakeholders and residents, to raise awareness of the concept, to update the people on emerging proposals for the brewery site, and to test some of the options (Brewery Site Consultation Report, December 2007).

This partnership model in Newcastle is rather complex and comes with its own challenges. First, the partners have varying legal statuses. The university is a charity, and in principle cannot engage in large-scale commercial activity (such as the development and exploitation of substantial real estate project). The university is rich in capital but 'poor' in revenues: its revenue streams depend on student numbers (and for a smaller part on contract research). The development agency, One North East, strongly depends on funding (and policy directives) from the national government. Newcastle City Council is the most flexible partner, with substantial legal powers and planning instruments. It proved a challenge to set up a common corporate vehicle for the area, that both unites these three institutions and is able to manage and develop the area appropriately over a long period of time. The three main partners (City Council, Newcastle University, and OneNorthEast) are sometimes internally divided, and in fact, the development of Science Central is the combined result of a large number of decisions. It is difficult to streamline visions and views, or to

have a clear and unified branding of the development. There is no clear 'project champion' in each of the three partner organisations, nor heavyweight person that is able to mobilise the organisation, promote the project internally and externally, and get things done.

Types of partnerships: An overview

There are no clues as to which type of partnership works best. Specific national regulatory and legal frameworks set the margins for partnership models, and, of course, the choice is contingent on the specific local situation, the type of development, and the stage of the development. Table 1 shows a number of governance structures.

Governance structure	What	When appropriate	Remarks	Case
Stakeholder Working group	Informal group of stakeholders	Early stage of development: can help to define a concept, negotiate interests, set objectives and mobilise organisations	· no formal power · important to involve all key stakeholders · risks of lack of ownership	Magdeburg Science Port Halle REDIS district
Informal leaders group	Informal group of leading actors in the area	Can be highly effective if personal relations are good and leaders share similar ambitions for the area	· strong dependence on individuals · lack of 'implementation power' for common activities	Aarhus, IT City Katrinebjerg
'Club model'	Tenants pay a fee to contribute to common facilities	May work well in organically grown hotspots, or in absence of a dominant player	Risks of free riding	
Formal partnership	Formalised PPP in which partners bring in assets and divide roles	Appropriate in large-scale and capital-intensive projects	High level of complexity; strong process management needed	Strijp S, Eindhoven
Dominant player setting the rules	Key player (typically land owner) sets the rules of the game and the terms of co-operation	In case of one dominant player with substantial power		Aachen's new campus High Tech Campus Eindhoven

Some lessons

Despite the contingencies, a number of **lessons** can be drawn from the experience of cities researched:

A formal partnership –culminating in a professional project or delivery organisation- is an appropriate approach in highly complex, large-scale and capital-intensive projects which require a professional approach. The success of a partnership depends on many factors. One is the perceived legitimacy of the new organisation by its constituent partners. Leadership changes may pose a problem (or an opportunity). There is always risk of 'alienation' between the new project organisation and its parents, and, as the case of Newcastle proves, the different legal status of partners may cause problems. At an early stage of the partnership, it is important to have absolute clarity about each partner's ambitions, expectations and commitments. Also, it is helpful to make scenario analyses with estimates of risk and returns, as we well as clear rules how to share them.

Partnerships tend to work better when partners 'grow up together' and learn to speak each other's language. In the end, they need to agree on a particular concept (see chapter 2) and really feel ownership towards it.

In organically grown knowledge hotspots (without one dominant player and with dispersed land ownership), it makes sense to create a semi-formal level working group consisting of individuals from the various stakeholders. These people must be influential 'change agents', and respected not only in their own organisation but also beyond.

Less formal partnerships can work very well. If personal networks are strong and levels of trust are high, they are able to generate surprisingly good results, as the case of Arhus shows. On the other hand, in a growing cluster, more professionalism and implementation power may be needed; moreover, newcomers may feel excluded by the 'old boys network'. Without a formal organisation, it may sometimes be more difficult to secure all sorts of funding, or to get things done for the collective benefit.

A 'club model' can reduce some of the drawbacks of informality. A 'Club' can be set up as a collective body that takes care of the development of the knowledge hub. Members of the club –which can consist of a variety of stakeholders- pay a membership fee, and this fund is used for collective action in the area. For this model to work, it is essential to agree what the group should achieve collectively, and how much 'implementing power' is required to do what is needed. It could make sense to set up a small implementing company or secretariat with professional competence.

CHAPTER 5.
LIVING APART TOGETHER?
CO-OPERATION BETWEEN
CITY AND UNIVERSITY

In recent years, there is an intense debate about the relations between university and city. From a local economic development perspective (OECD, 2007), it is repeatedly argued that universities should align their research and education policies to the needs of the regional economy, and engage more actively in strategic relations with local companies. Many city leaders tend to agree with this analysis, and try to urge universities to do more for and in the city.

Meanwhile, universities have a natural tendency to behave according to their own logic: scoring high in international academic rankings, winning prestigious research funding, attracting students (preferably the brightest ones). This is a logical response to some extent, because the status of a university mainly depends on its performance in research and education. Their funding largely depends on student numbers, and the career of academic staff varies with his or her publications in peer-reviewed journal (not the number of projects with local firms). Local engagement is normally not number one on their priority lists.

Also in spatial development, there can be frictions between city and university. The city may want the university to be a partner in city development, most notably in the development of knowledge hotspots. Meanwhile, universities are often not that interested in integrated urban planning: they prefer expanding on their 'own' campus, or building new premises and facilities on their own land rather than somewhere else in the city.

Campus & City:
a difficult marriage at times

In many cities, universities are property owners, and tend to optimize their own subsystem. There are many cases where universities prefer to 'fill' their own university campus with academic activity, (student) housing and amenities, rather than collaborate with the city (or developer) to create a more comprehensive knowledge hotspot together.

Nevertheless, there are a least five good reasons why universities 'should' be interested in the co-development of a knowledge hotspot in the city:

- Great urban knowledge hotspots help to attract knowledge-intensive companies. These may be interesting partners (or funders) for university research groups, and generate job opportunities for graduates, internships etc.
- Knowledge hotspots could offer facilities that can be interesting for the university as well (seminar rooms, lab space, equipment). Joint investment can bring benefits for both sides.
- Knowledge hotspots can improve the image of the city as innovative 'knowledge city', helping to attract students and knowledge workers
- Knowledge hotspots can be good incubating places for start-up firms from the university
- Specialized knowledge hotspots can be excellent physical environments for specialized university education or research groups (i.e. put the design academy in a design hotspot, or an IT department in an IT business cluster). Many synergies can be achieved in this way.

Magdeburg's Science Port: Bridging two worlds?

In Magdeburg, the relation between university and city is an intricate one. It proves to be not that easy to develop a joint strategy for developing a new 'science quarter' in the city.

In 1893, a new inland trade port was opened in Magdeburg, along the Elbe River, by then a major European transport corridor. Magdeburg hoped to gain prominence as main transport hub along the Elbe, in Central Germany. In subsequent years, the area developed as a lively and busy area full of logistic and industrial activity. But more than 100 years later, the port no longer lived up to technical demands in inland water transport and transhipment, the infrastructure was no longer adequate to facilitate the new generation of ships, and the port steadily lost importance. When it was decided to stop the regulation of the water level in the port basin, the port could no longer function as transhipment hub.

This raised the question what to do with the area. Interestingly, to the south of the port, some sort of science cluster already had developed over the last decades. The Otto von Guericke University had developed its campus there, and some science institutes (Fraunhofer and Max Planck) had moved into the area as well. The idea was born to transform the old port area –with very characteristic industrial heritage- into what came to be called a 'science harbour'. That would give the area a new destination, and contribute to Magdeburg's much needed economic revitalization. The science harbour could become home to innovative companies, scientific institutes (some already set up shops in the area), but also to housing and leisure facilities. Since 2001, new buildings have been constructed, and research institutes and several small companies have moved in. The Max Planck institute is now located there, as well as the Fraunhofer Institute VDTC (Virtual Development and Training Centre). Furthermore, over the last few years, some public spaces in the Science Harbour area have been improved or constructed, including a new square. The Science Harbour area is managed by a private company named KGE Kommunalgrund (KGE). This firm (operating on behalf of the City of Magdeburg) is responsible for the integrated development of the area (i.e. housing, business locations and conditions, creation of new jobs).

The university campus is located just to the south west of the Science Harbour planning area, on the other side of the main road. The university is the 'neighbour' of the area, and many of the research institutes in the Science Harbour have close contacts with the university. That does not imply that relations are smooth. There are frequent and strategic encounters between university and the local authorities, but there are also tensions and perceived conflicts of interest. The university's real estate department wants to 'fill' its own campus premises, so if a research institute or knowledge based firm considers moving to Magdeburg, there may be competition between the university campus and the Science Harbour area. The university does not consider the Science Harbour as a strategic, complemen-

tary asset from which it can largely benefit, nor are there plans to jointly develop labs, research facilities or incubators.

How to improve the co-operation?

The City of Magdeburg is far from alone in this respect: in many other cities, city government and university struggle to frame relations and engage in joint developments. Often, interests diverge, and common interests are not always fully recognized or acknowledged; personal relationships matter, too. How to improve the relation? Based on a number of cases studies, some **lessons** can be drawn:

· involve the university leaders from the very beginning of the development of the knowledge hotspot, and continue to involve them throughout the process. They must develop a sense of ownership, rather than feeling urged to enter a running train.

· Invite teachers and student teams to contribute to the design stage of the new knowledge hotspot
· Seduction. The city administration (or developer) can make it interesting for the university to locate at a knowledge hotspot, by offering cheap/attractive office space, interesting facilities (seminar rooms, labs), student-housing.

City-university co-operation stretches far beyond the developing of urban hotpots; there is a range of other aspects related to knowledge based economic development in cities, many of which

popped up during the discussions held in the REDIS project. Although a bit beyond the scope of this book, here are a few **lessons** and ideas on framing the relation:

· An annual or bi-annual high-level meeting between the University's Rector and the Mayor is not sufficient to ensure effective strategic co-operation. A more deep and fine-grained relation management is needed.
· Building relationships. It makes sense to identify individual professors with a positive attitude or with a reputation in industry relations, and involve them to co-operate.
· Create a fund to promote research that is of interest to the local economy. This will help to align the research priorities with the needs of the urban economy.
· Engage with the university participating in European research or exchange programmes (URBACT, Interreg, framework programmes)
· Involve the university research teams in the design of local economy policy, city marketing, and many other policy domains.
· Create a common think-and-do-tank about attracting the best and brightest human resources (students, researchers, knowledge workers). City and university need each other for that.
· Organise 'science events' (for the general public) together, to show what science means for society, and to stimulate young people to engage.
· If everything fails: Wait for the next, perhaps more pro-active rector or mayor…

CHAPTER 6.
MAKING THE CONNECTION: LINKING KNOWLEDGE HOTSPOTS TO THE CITY

In chapter 1, it was stated that a good knowledge hotspot is a connected one. This point is elaborated in this chapter.

In the 1970s and 1980s, knowledge hotspots (science parks, technology parks, campuses) were developed out of town, at greenfield locations, with little communication links with the city cores. This trend has reversed. Many – not all! – new hotspots are now developed in city quarters and/or regenerated industrial areas, in an urban and lively ambience. This is particularly true for 'creative' hotspots. The tenants – high tech firms, design firms, architect agencies, media companies, etc. – prefer environments with a distinct and urban identity. Their work culture is far beyond the 9-17 mentality, and work and life are mixed up in time and space. People in these industries think and work in the logic of projects rather than fixed contracts with employers; there are many freelancers working temporarily together, and they use bars, restaurants, gyms and libraries as meeting places. They are often deeply involved in cultural production and consumption, and thrive in a lively and diverse urban environment.

All over Europe and the US, worn-out urban industrial sites have been transformed into lively creative factories – often with substantial public sector support –, and they have certainly contributed to the regeneration of many cities and districts. It's not only about physical regeneration: often, urban knowledge hubs are developed with explicit social regeneration objectives in mind.

Thus, 'new generation' knowledge hubs are increasingly being developed as part of the urban fabric rather than outside town, and they tend be more mixed in term of functions. Interestingly, this is not only true for hotspots for creative industries. There are several recent examples of technology-oriented urban knowledge quarters. The city of Newcastle (UK) is developing a large science quarter in the heart of the city, and in Dortmund (Germany), a second generation technology hub 'Phoenix' is being developed as full part of a new urban neighbourhood, including housing and leisure functions (see http://www.phoenixdortmund.de/de/home/)

The shift from the isolated campus model to integrated approaches has brought knowledge-based development to the heart of Europe's cities. This 'urban turn' is a manifestation of a more general re-appreciation of cities. Knowledge workers increasingly prefer to work in a nice and lively working environment that offers amenities and facilities beyond just office and lab space, and where consumption opportunities are more widely available (Florida, 2002; Glaeser, consumer city). There is pressure on firms and research institutes to meet these demands: skilled knowledge workers have become a scarce commodity, and there is severe competition to lure them. One of the ways to do so, is to offer a very attractive working environment that includes facilities for leisure and shopping.

The challenge of integration

New urban knowledge hubs are places where the new economy merges with the old, where incoming 'elitist' knowledge workers mix with the indigenous inhabitants, and where new architec-

ture and structures blend with the existing urban fabric. A major challenge for cities is to handle conflicts of interest and to integrate knowledge hubs into the city in a sustainable way. Based on experience gained in the REDIS-project and other case studies, one may distinguish three dimensions of integration: physical, social, and economic. All three have to be taken into account when developing an urban knowledge hotspot.

Economic connections refer to the links between the knowledge hotspot and the local economy. Does the new development generate jobs for locals or people in adjacent neighbourhood, or only for the 'creative class' coming from elsewhere? To what extent does the new knowledge hub offer interesting new business perspectives for firms in the area, i.e. services firms, café's,

restaurants? Can local firms use new facilities to be developed there? Are local firms involved in the project development process?

Social connections refer to the social benefits of a new hub for inhabitants of the area and the city at large. Will it generate relevant job openings for locals, or educational opportunities for adults and children? Are there links with local schools? How is the development affec-ting the social fabric of the neighbourhood? Will the development drive up prices of real estate and replace poor inhabitants with more wealthy ones? To what extent can the new facilities be used for local community activities? In what ways are citizens involved in the development stages of the project? Do ordinary citizens benefit from the development of the knowledge hub?
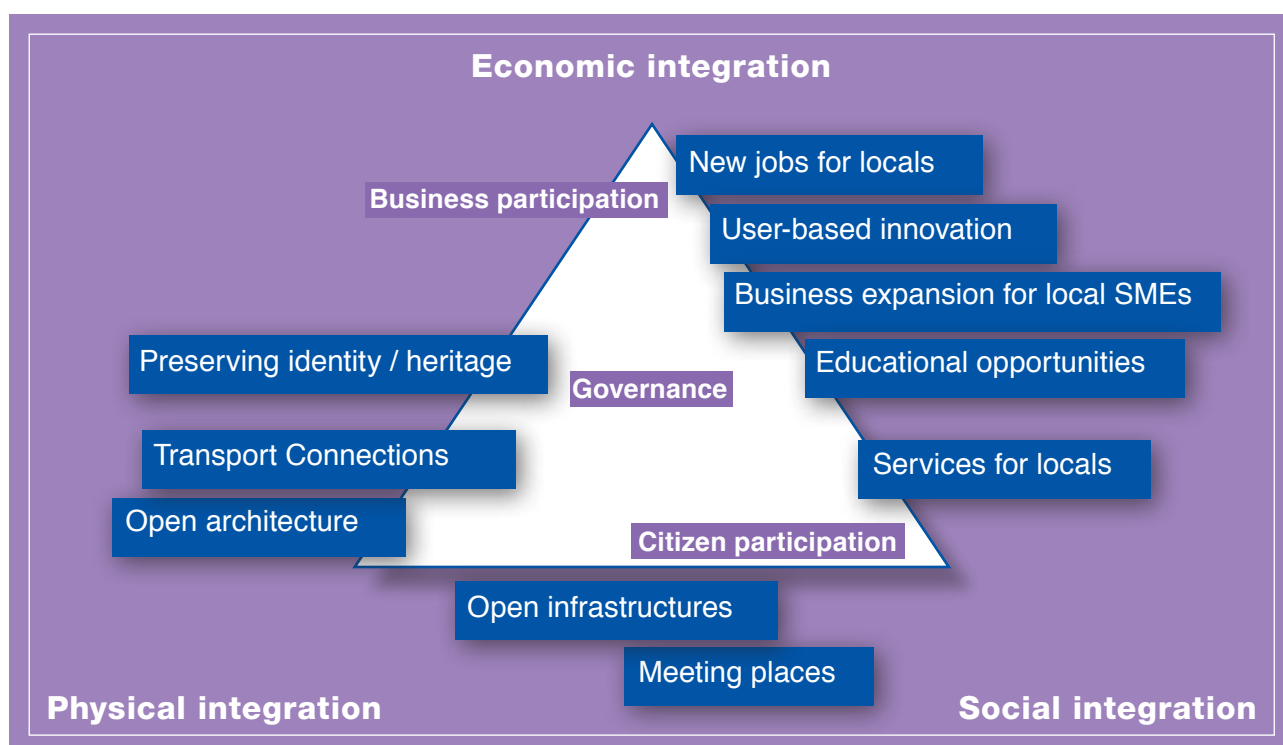

Figure 6 Integration of knowledge hotspots in the urban fabric: three dimensions.

Figure 6 show the three dimensions. A key aspect in the figure is governance and participation of stakeholders in the development process. The figure can be seen as a checklist for policymakers to find out how closely new knowledge hubs are integrated into the city.

Examples from European cities

Cities all over Europe are struggling to integrate knowledge hubs in the urban fabric, each with its own parti-cular approaches and issues.

The German city of **Magdeburg** explicitly seeks to integrate its ''science port'' development into the city, not only physically but also in social respects. Citizens should know what's happening in the area, they should recognize it as a new economic pillar of their city. With this in mind, each year the city organises the 'long night of science', during which labs and knowledge institutes open to the public; there are all kinds of workshops, exhibitions and shows related to innovation and science. The event is very popular, drawing thousands of visitors. It clearly signals that knowledge and science need not be something abstract and obscure, but can lead to interesting new products that make sense in daily life; also it reflects hopes for a new economic future of the city.

Dublin is another example where integration is a central issue. Since 2000, the 'Digital Hub' is being developed. It is a dedicated cluster of ICT and new media firms, located in a distressed neighbourhood, at the premises of the well-known Guinness-brewery. The old offices and

buildings have been upgraded and refurbished, and made ready to house ICT and media companies, thanks to contributions of the city and the national government. The ambition is to develop the area as a world-class knowledge cluster for ICT and new media firms. The Hub should become a symbol for Dublin's economic transition. Meanwhile, 84 companies have located in the Hub, among which big names like Google and France Telecom. The Digital Hub is located on the edge of Dublin's city centre, in a distressed neighbourhood named The Liberties. This is a typical blue-collar working class area for the workers of the Guinness brewery. Over the last decades, the Liberties area has been in decay. It suffers from a high unemployment rate, educational levels are low, and crime rates are relatively high.

To manage the different conflicting interests in the area, the state created a special development organization – de Digital Hub Development Agency (DHDA), This organization acquired the land, and was assigned to develop a concept for the area and to make deals with private developers for the development of commercial functions (retail, housing). From the outset, the government did not want the Digital Hub to become an 'elitist island' in the middle of a deprived area, and therefore took several measures to link the Hub with its surroundings. One of the key ambitions has been to make the residents benefit from the hub as well. The idea to explicitly link the Hub with the Liberties area emerged in a consultation process with the main stakeholders. A 'Community-Public-Private-Partnership' (CPPP) was set up before the start of the development. Residents

could express their wishes and ideas, which resulted in a set of conditions and guidelines for the development process. Private developers committed themselves to comply with these guidelines. In particular, all stakeholders signaled the importance of training and education as a link between the Digital Hub and the Liberties area. The Digital Hub Development Agency (DHDA) has signed agreements with 16 schools in the area. It provides training sessions on ICT and new media, typically in co-operation with tenants of the Digital Hub. Moreover, it organizes excursions for schoolchildren to the Hub, and during holiday breaks, it offers all kinds of workshops, for example on making rap songs using digital technologies.

How to improve 'stand alone' monofunctional campuses?

Many cities still have (and develop) mono-functional campus areas at their outskirts, typically technology parks or university campuses developed in the past decades. There is an increasing awareness, however, that campuses should become more lively and vibrant places. University managers and city planners increasingly believe that a certain level of liveliness and diversity has a positive influence on the 'success' of science parks or any other type of knowledge location (influenced by the ideas of Jane Jacobs and Richard Florida). Throughout Europe we see efforts to make existing campuses and technology parks more 'urban' and attractive[12].

Creative quarters in the city

In a recent study about the planning of a cultural quarter in Birmingham's East Side, Porter and Barber (2007)[11] review "stylized facts" and lessons about the development of creative quarters in Western cities;

· With the development of creative quarters, property prices are likely to rise, displacing activities and inhabitants planned to attract in the first place. Thus, these gentrification processes might reduce the desired diversity of the area and attention should be given tothe nature of local property and real estate markets in advance;

· Policies exclusively focused on the production side of creative quarters often overlook the quality of public space and thus may not generate the desired urban liveliness in the area; hence, creative quarters should combine creative production, consumption and fruition of the public space in an holistic way;

· Flagship projects like arts centres, museums and landmark buildings tend to benefit mainly the "aesthetic desires" and world visions of political and cultural elites. Moreover, its eventual positive impacts are hard to measure. In order to "root" the quarter, there is a strong need to recognize and empower local talent; creative quarters must work with the existing urban fabric and be committed to lever local talent, designers, architects and capital;

· Public debate and local participative democracy help aligning the quarter with the desires of local populations, building on the distinctiveness of the place and making local communities benefit from it.

[11] Porter, L., & Barber, A. (2007). Planning the cultural quarter in Birmingham's Eastside. European Planning Studies, 15(10), 1327 – 1348.
[12] A number of examples can be found in Hoeger and Christiaanse (eds), (2007), Campus and the City. Urban Design for the Knowledge Society

New functions are added, like student housing, restaurants, sports facilities and shopping functions, to make the area more interesting and lively. Another common practice is to provide office space for start-up companies and incubators. Typically, developments are driven by the real estate department of the university, that sees opportunities to optimize the economic use of the campus.

One way to increase diversity is by **adding residential functions** to an existing science location. Indirectly, this can increase the liveliness of a knowledge location as well. Residents generate traffic and activity after office hours; they constitute a market for other facilities (shops, bars, restaurants) in the area, from which tenants in the area can benefit and which may attract people from outside. A certain critical mass is needed to make this happen. Housing projects may target at specific groups (dormitories for students, expats, or other

The city of Dortmund may serve as an example. Back in the 1980s and 1990s, the city developed a monofunctional technology park, physically remote from the city. Currently, the city is developing a second, 'new generation' knowledge hotspot on the Phoenix site, a former industrial site near the city centre. In contrast to the first technology park, this one is being redeveloped as a mixed-use area, including residential functions, leisure, and all sorts of amenities. Moreover, to give it identity, the development is explicitly linked to the industrial past of the area. Parts of the industrial heritage is being preserved and reconverted. This attempt to preserve or create 'identity' is typical for post-modern knowledge locations.

types of temporary knowledge workers), or, alternatively, at any type of tenants/buyers. At newly planned knowledge sites, residential functions can easily be added to knowledge locations: unlike heavy industries, science and innovation activities are not polluting or dangerous to the population (although there are exceptions).

The situation is different at 'legacy' monofunctional campuses or science parks. To add residential functions there, high investments are needed (parks, basic amenities and services), and companies in the area may be worried about security, especially if the area used to be closed at night time. Depending on the situation, other functions could be added to a knowledge location as well. Obvious candidates are **leisure, tourism, and sports facilities**. These functions are adequate 'network facilitators' and could enhance planned or spontaneous interaction. Moreover, they could be used by people outside the area as well. Again, adding functions is easier at a new site than at an existing legacy site. In the city of Magdeburg, tourism is considered a catalyst to enhance the liveliness of the science area. The cities' 'Science Harbor' is located at an attractive location along the Elbe River, that is suitable for activities like boating, or cycling.

Through **events**, knowledge hotspots can temporarily be turned into very lively and vibrant places. Each year, the city of Magdeburg organizes a 'long night of science' in its Science Harbor area. For one night, the research institutes open their doors to the general public, and organize all kinds of activities. These types of events have several positive effects: it may encourage young people

to study science; it raises awareness of the local population, and it puts the area on the mental map as a place where interesting things happen. Events can help to change the identity of an area. In the city of Eindhoven, a new 'art & design' district is being developed, at old factory premises of Philips (Strijp S). To make the area more known as a hip knowledge location, events are organized on-site that relate to the theme of the new quarter.

Some lessons

Clearly, there are no blueprints for an 'optimal' integration of knowledge hubs, as their development is highly context-specific.

Especially for new developments, stakeholder management is essential, and needs to go beyond the 'traditional' approach of informing and consulting citizens in the masterplanning process. The transformational aspects of large knowledge-driven urban development plans require a deeper involvement approach, that does not only address the spatial and physical aspects of the development, but also the functional and conceptual linkages between the new knowledge hub and the city. Participation should not be organized as an occasional confrontation of professional planners with ordinary citizens or business owners in the design stage only, but as a continuing dialogue.

This may benefit the knowledge quarter in several ways, and contributes to its physical and functional integration in the city as a whole. Also, a smart participation approach increases the acceptance of knowledge hubs that would other-

wise be considered by many residents as elitist urban enclaves to which they have no relation. It is advisable to set up structures in which stakeholders are represented from the outset. They serve as arena's where conflicting interests are addressed at an early stage, and where creative solutions can be developed. As in the case of Dublin, the process may lead to a set of 'development guidelines' that reflects (or reconciles) the different interests and ambitions.

In practice, some topics or conceptual areas could be identified in which participation is likely to add value: examples are the temporary use of the development site, or the potential links between science/technology and citizen's daily lives. To generate and elaborate ideas, working groups could be created, involving community representatives, relevant university researchers, civil officers and members of the delivery organization, and funding should be made available to put the ideas into practice.

In many places in Europe, 1970s-style suburban campuses were transformed into more diverse places, by adding all sorts of functions to the campus (student housing, restaurants, amenities etc.). This may make sense from the university's perspective. However, there is a tradeoff: this development is at the expense of the liveliness of the (inner) city, and reduces the demand there. Students or researchers who otherwise would have lived and consumed in the city, now spend their time and money in the campus area. Policymakers must realise that the indirect costs of a less lively (inner) city are substantial, with impacts on tourism, image, and attractiveness for the creative class.

ANNEX 1.
KNOWLEDGE HOTSPOTS - COLLECTION

Aachen: New university campus
Type of location: Greenfield university campus

Location

Aachen is a medium sized town in the West of Germany situated near the border of Belgium and The Netherlands. The city is home to a large technical university, one of the largest in Germany: The RWTH Aachen University (Rheinisch-Westfalische Technische Hochschule). Some years ago, it received the 'excellenz' status, putting it in the top league of German academia. Currently, it is the largest German university in terms of contracts with business, with an annual €227m income from projects with the industry. The university is developing a new campus area, which is expected to generate 10,000 new jobs in the city of Aachen. The new campus is developed at two different locations: The Campus Melaten (Phase 1), and the Campus West (Phase 2).

In the Melaten Area (473,000m^2), construction has already taken off. This area is situated at the northwestern edge of the city. Phase 1 shows an artificial aerial impression of the development, based on a Masterplan designed by an architect agency. It will be developed as an open area, home of 11 clusters (25,000 m^2 each), as well as a number of facilities such as restaurants, shops, a hotel, a training centre/seminar building, and cultural amenities. The visitor functions and services are to be concentrated along a green boulevard. The area should become not only a place for working but also for leisure and entertainment. The development plan for Melaten was adopted in 2009, and in 2010, preparations for the construction have begun.

The Melaten-campus

Campus West

The next stage (the Campus West) will be developed along the railtrack (at walking distance from the city centre), in an area that is now derelict and messy. This area is to become the home of eight additional clusters, and also, the university intends to build a convention centre and a new library there. It has a size of 325,000 m². Unlike in the Melaten area, housing will be developed here as well. Developments are planned to start in 2011.

Development & concept
It is the vision of the university to make the campus a **catalyst for research and a trigger for innovation**. The concept is based on clustering academic institutes and companies around multi-disciplinary themes or shared challenges. The idea is to achieve synergies by literally putting them together in a 'sub-cluster' and let them work together. The basis for a mini cluster is research. Internally, the RWTH has identified a number of strong research themes (multidisciplinary, with sufficient critical mass). The Campus GmbH invites industrial companies to locate near the institutes at the campus. Not every firm

is welcome, however: there are strict admission criteria. To be allowed at the campus, firms have to sign a long-term R&D framework contract in which they commit themselves to conducting contract research with the university, in a particular cluster-field, and also to deliver lectures at RWTH. A firm has to sign a 10-year lease contract, and must actually base part of their (research) staff at the campus premises.

The aim of the concept is to improve the quality, scale and relevance of research in the various fields by mixing the resources and knowledge of business and academia. Also, the university hopes to improve the quality of teaching by having lectures from industrial partners -university professors always carry end-responsibility. The latest insights from the business world are transmitted to the students. Moreover, employees of the 'embedded' firms can take Master courses at RWTH at reduced rates, and in part-time.

Importantly, co-operation is never exclusive and may never block new developments. Any institute keeps the right to sign deals with other industrial

partners who are not on the campus; new clusters may emerge, and spinning out is encouraged.

The concept seems to work. By the time of writing, 92 firms had signed a letter of intent for a long-term co-operation contract, and will locate at the campus. Most of them were not located in Aachen before. City and university expect to attract some 5,000 researchers in the next years, thanks to the campus, and new housing projects are planned accordingly. One key reason why firms are interested in the concept is the early access to skilled graduates. In an ageing society, this factor becomes ever more important.

Management & stakeholder involvement
The leading person behind the development of this vision is Prof. Günter Schuh, Vice-Rector for Industry and Business Relations at RWTH; in his view, in the current stage of industrialisation, academia and business need each other to prosper and innovate, and physical proximity is a key condition for success. The university created a special vehicle, the RWTH Aachen Campus GmbH, in order to realise the project, and to realise a 'cluster-based' development model in which the university co-operates strategically with technology companies to the benefit of both sides.

A key player in the development is the state-owned company BLB-NRW (Bau- und Liegenschaftsbetrieb NRW). This organisation owns and develops public real estate in the State of NorthRhine-Westphalia, and it is the planner of most public works. It is the owner, builder and developer of the new campus areas.

The clusters at the campus will not all be the same: dependent on their specialisation, they need specific facilities, or buildings have to meet specific demands. To cater for this, the tenants of each cluster (firms or institutes) can specify which type of facilities they need, and the design of their buildings is adapted accordingly. In return, they have to sign 10 years lease deals. Private investors are invited by the Campus GmbH to finance these buildings (and pay a leasehold to BLB), but they do not have a say over the selection of tenants. The Campus GmbH (95 owned by the university, 5% by the City) is the landlord of the campus premises and buildings. It specifies the building requirements, and decides who can rent premises and who cannot, based on its sub-cluster strategy.

Each cluster is led by a professor, and this person also has a seat in the Campus GmbH. The Campus GmbH is the legal body that signs the contracts with industrial partners, subcontracts other institutes in joint projects etc. A percentage of the revenues (2 – 3%) are kept by the Campus GmbH to cover the overhead costs.

Private investors are invited to invest in the new campus buildings (they lease the land from BLB) and get the rent revenues, but they are not the ones to select the tenants. This approach also implies that they don't have to marketing and acquisition. So far, there is ample interest from investors to involve in the development of the sub-clusters. Importantly, rent levels are market-based, there are no subsidies involved, to make sure that firms don't come for the low rent.

Aarhus: IT City Katrinebjerg
Type of location: Gradually developed IT hotspot, part of the city

Location

Aarhus is Denmark's second city. It has about 300,000 inhabitants, and a large student population of app. 40,000. The information technology sector is a key economic priority for the city, and the city has considerable strengths in this respect, both in business and research. To further build on this, the city is developing the 'IT City of Katrinebjerg'. The Katrinebjerg area (150k m²) is located to the Northwest of the historic city centre, between the Campus area and the city centre. Thus, it is not an isolated 'science city' campus style, but rather forms an integrated part of the urban fabric. It is part of a run-down neighbourhood in full transformation towards a 'world class environment' for IT firms.

Development & concept

The area is in a full redevelopment process. It started off in 1999, when the idea and vision of the IT city Katrinebjerg was born in a working group under the regional IT council. The area was (and still is) a mixed business area with a variety of functions. There is a large shopping mall, and a wide variety of business is located there. Many companies are in the lower segments, such as car repair shops, manufacturing establishments etc, and these sit next to very modern knowledge based companies (many active in IT). Of relatively recent date are the buildings of the Alexandra Institute (2004) and The Department of Computer Science (2004) and INCUBA Science Park Katrinebjerg (2006/stage one 10.000 m² and 2009/ stage two 3.400 m²), where around 80 mixed sized firms are located, among others a Google R&D department. These glass and steel buildings form a sharp contrast with run-down buildings and firms, and because of this, the area yet lacks a clear identification as 'IT city'.

IT City Katrinebjerg

However, the 'IT component' of the area is strong and getting stronger. The university is expanding in the area (from the adjacent university campus), and has concentrated all its IT research and education (both from the Sciences and the Humanities faculties) in the Katrinebjerg area, so now, the area has over 1,800 full time IT students. In the near future, the area will be further redeveloped: the university (through a foundation) has bought substantial plots of land, and the IT department of the School of Engineering will soon be located in the area. Importantly, Bang and Olufsen has located a R&D department from Struer in the Katrinebjerg area: 'having a department in Katrinebjerg enables us to recruit competent employees within the environment and establish unbureaucratic research partnerships. It is pragmatic, fast and efficient' (Peter Petersen, Chief Technology Officer, B&O).

The area has received considerable local and national media attention, and despite its early development stage it has managed to develop a high profile. However, the scale of the IT city is still limited and the transition of the area is far from complete.

Management & stakeholder involvement
The first ideas for the IT City were developed in the late 1990s by a handful of enthusiast influential people from the University of Aarhus and the corporate sector. They involved politicians from the municipality and the county to join the efforts. It was an informal group, without common institutional base, that, through its energy and influence, managed to push forward the Katrinebjerg project.. And still, almost a decade later, there is no formal organization that steers the development of the area. It is the individual leadership in the key organizations that drives its development.

The municipality plays several roles in the area. It facilitates discussions among key stakeholders, it works on branding (through its Internet sites and otherwise), it sets the legal margins for the area, and is responsible for masterplanning and district plans. Its influence is limited, however, as none of the property in the area is owned by the municipality but by other actors. However, strategic relations are quite good, and this model has worked relatively well. In late 2006, the 'Katrinebjerg Working Group' created a Masterplan for the area.

It is an open question whether the realization of the ambitions and action plans can be achieved without some kind of formal organization. On the strategic and visionary level, it was sufficient to have commitment of a few leading people and organizations, but it may be more difficult (or less efficient and effective) to realize all the daily 'executive' tasks that derive from the Master Plan without some institutional umbrella. Moreover, it is a core challenge to keep the area on the local political agenda and to make sure that the public sector remains committed to develop the area into a world-class IT city.

Bialystok: Technology Park
Type of location: Greenfield technology park

Location

Białystok, with a population of almost 300,000 is a city located in northeastern Poland. It is the administrative, economic, and academic centre of the Podlaskie region. The city is developing a science park, in order to promote the local knowledge economy and create an environment for knowledge based firms. The "Białystok Science and Technology Park" is being constructed on a plot of land (about 3 Ha large) at the southern edge of the city, on an accessible location.

Development & concept

The city owns the land and undertakes initiatives to create a science park at that location. Currently, the city is preparing the infrastructure for the park. The first stage of implementing the project, planned for execution in 2009 – 2013, involves the preparation of the land, the development of an incubation area with the Technology Incubator base, the Technology Centre and the park administration offices – 13,000 sq. m. in total.

The Science and Technology Park: Artist impression

Nevertheless, the concept of the science park is not yet elaborated. The city considered the REDIS Implementation Lab as an impulse for this process.

During the lab, it was concluded that the science park can become a catalyst for regional co-operation between business and academia, and can help to build a knowledge-based economy. Given the fact that the vast majority of companies in the region are not very innovative or knowledge intensive, it makes sense to have the S&T park playing a role in the upgrading process of the regional economy.

Magagement & stakeholder involvement

The park involves an investment of €36m, 90% of which will be funded by European funds. This European funding comes from the Operational Programme (2007 – 2013) that has been created for the 5 provinces in Eastern Poland. The infrastructure and buildings should lay the basis for investments by companies.

So far, the city has been the main actor. It owns the land; it prepares the investments in infrastructure, and organizes the funding from the operational programme for East Poland. But as a next step, the ambition is to design a new management model, more at a distance from the municipality. The institutional form of the park should be in line with the regulations and guidelines of the Operational Programme for East Poland.

The city, albeit the main funder and initiator, does not want to unilaterally determine the exact set up of the park and its mix of occupants. Rather, it promotes the co-operation between firms and university/research institutes, and hopes that it will result in consensus about the park's setup, its concept, and its management model.

The universities are, up till now, not deeply committed to the science park. They have few incentives to collaborate with business, and also, the university is creating its own new campus site, fully independent of the Science Park, not very far from the future location of the science park. Also, the university wants to create its own incubator, without any alignment with the incubator to be created at the Science Park.

Some local entrepreneurs are interested in locating at a science park. Moreover, some company representatives are involved in the planning and conceptualization of the area.

A key issue for Białystok is how to create a common vision, a realistic and feasible strategy, and implement it.

Dublin: The Digital Hub
### Type of location: Creative city quarter

Location

In Dublin, capital of Ireland, the 'Digital Hub' is being developed, since the year 2000. The Digital Hub is a dedicated cluster of ICT and new media firms. It is located on the edge of Dublin's city centre, in a distressed neighbourhood named The Liberties. This is a typical blue-collar working class area for the workers of the Guinness brewery. Over the last decades, the Liberties area has been in decay.

Development & concept

Over the last decades, a strong ICT industry has developed in Dublin, though it was mainly based on back-office functions of multinational firms. In the last years, policymakers in Ireland and Dublin seek to promote innovation and the development of a 'home grown' knowledge industry. The Digital Hub is to become a flagship for the Irish digital industry.

A key catalyst for the cluster's development was a major investment of the renowned MIT media lab –with hundreds of qualified staff- in Dublin. The government managed to win the Media Lab as an anchor tenant for the Digital Hub, and convinced the firm to locate there. A few years later, however, the Media Lab closed down. It had not managed to develop a sustainable business in Dublin. Evidently, this was a blow to the Digital Hub's development, but the policy makers decided to make a new start for the area and focus on smaller-scale development. Over the last years, the brewery area has become a new face. The offices and buildings were upgraded and refurbished, and made ready to house ICT and media companies, thanks to contributions of the city and the national government. The ambition is to develop the area as
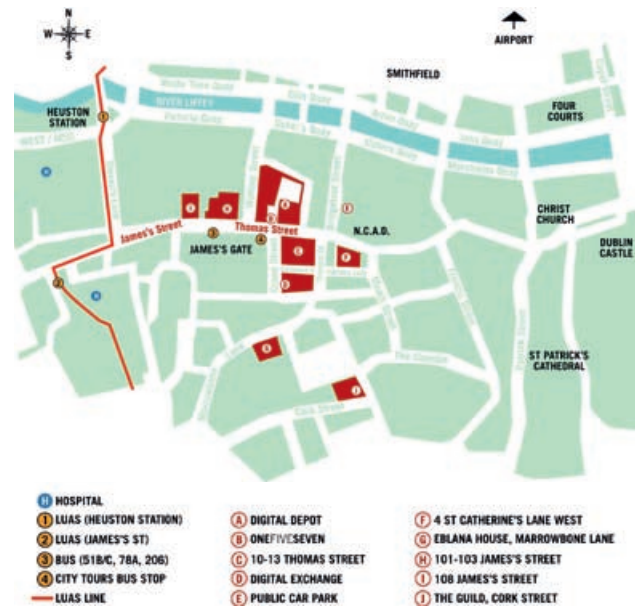
a world-class knowledge cluster for ICT and new media firms. The Hub should become a symbol for Dublin's economic transition. Meanwhile, 84 companies have located in the Hub, among which big names like Google and France Telecom.

Magagement & stakeholder involvement

In 2003, the state created a special development organization – de Digital Hub Development Agency (DHDA), to enable the redevelopment of the area. This organization acquired the land, and was assigned to develop a concept for the area and to make deals with private developers for the development of commercial functions (retail, housing). The severe economic crisis of the last years has made the latter very difficult.

The government did not want the Digital Hub to become an 'elitist island' in the middle of this area, and therefore took several measures to link the Hub with its surroundings. One of the ambitions has been to make the residents benefit from the hub as well.

The idea to explicitly link the Hub with the Liberties area was elaborated in a consultation process with the main stakeholders. A 'Community-Public-Private-Partnership' (CPPP) was set up before the start of the development. Through this vehicle, residents could express their wishes and ideas. The CPPP developed a set of conditions and guidelines that to be applied in the development process that followed. Private developers commit themselves to comply with these guidelines.

All stakeholders signalled the importance of training and education as a link between the Digital Hub and the Liberties area. The Digital Hub Development Agency (DHDA) has signed agreements with 16 schools in the area, and a special agency was set up to elaborate the co-operation: The 'Diageo Liberties Learning Initiative' (DLLI).

Diageo is the owner of the Guinness brewery, and still has strong ties to the brewery and the surrounding neighbourhood. It funds the training and educational programmes, and co-funded the rollout of state-of-the-art ICT facilities at schools in the Liberties area.

In these schools, the DHDA provides training sessions on ICT and new media, typically in co-operation with tenants of the Digital Hub. Moreover, it organizes excursions for schoolchildren to the Hub, and during holiday breaks, it offers all kinds of workshops, for example on making rap songs using digital technologies. For older students, there are courses about how to start a business. The programme appears to be a success; a recent study shows children in the Liberties area are relatively good at using computers and digital techniques.

The Digital Hub

Eindhoven: the High Tech Campus
Type of location: Open technology campus

Location

Eindhoven is the 4th city of The Netherlands. Over the last decades, it has transformed from an industrial city into a leading high-tech hub. Philips played a key role in the development of the city. However, the mutual dependency has declined strongly. Philips relocated many production facilities, and moved its headquarters to Amsterdam. At the same time, the city has diversified its economic structure. Still, Philips has a strong R&D presence in the city, and its legacy is everywhere. One such place is the High Tech Campus Eindhoven. It is a knowledge park for open innovation, situated at the edge of Eindhoven, south of the city centre. The High Tech Campus is generally considered to be an excellent example of an area-based development for a working environment in the knowledge economy. Especially the strong focus on concept value and the involvement in development on the highest management level of key tenants are crucial in this respect.

Development & concept

The High Tech Campus is a private development, initiated by Royal Philips Electronics as the owner of the property. Philips Research is the 'lauching customer'. Other anchor tenants are NXP semi-conductors (2,500 employees and 46,000 m^2 floorspace), and Atos Origin.

At the moment of writing, app. 5,300 people are working on the campus, and the number is growing steadily (it has capacity for 8,000 – 9,000 people). The functional program consists of 8,000 m^2 cleanrooms, 50,000 m^2 labo-ratories, 100,000 m^2 office space, 125,000 m^2 of additional development space, and 10,000 m^2 of col-lective facilities. The total investment amounts to app. € 506m.

A key goal of the High Tech Campus is to create an environment for open innovation. Employees and visitors are encouraged to walk to their destinations on the campus, enlarging the chance of casual encounters in a nice environment. Buildings at the campus cannot have meeting rooms beyond 8 persons. For larger meetings, firms have to use the central, collective facilities, which form the heart of the campus. These collective functions (restaurants, shops and meeting rooms) are organized in one building called 'The Strip'. Next door, there are shared facilities containing clean rooms, laboratories and specialized spaces.

The High Tech Campus has a selective acquisition/admission strategy, which defines three types of potential tenants: 1) 'Triple-A-Tenants', for which the brand of the location is an important location-factor, 2) small tenants, for which the accessibility of external, specialized facilities is an important location factor, and 3) techno-starters. All potential tenants have to be R&D intensive organizations, which are related to (one of) the five main technological domains on the campus: microsystems, life-tech, high-tech systems, infotainment and embedded systems. The campus management decides which tenants are allowed at the campus, and thus safeguards the concept.

Magagement & stakeholder involvement

The Campus is actively managed in order to foster innovation. A 'Technology Liaisons Office' maintains close contact with tenants and creates potentially valuable connections between them. It organises workshops, business meetings and network happenings to enhance knowledge diffusion. It has also initiated the 'Campus Technology Liaisons Club', which is a network organisation of decision-makers and 'influencials' on the campus. The office essentially tries to build and maintain a community of practice. "In the end the purpose of this community is, to have the feeling you work on the campus instead of with an individual company". Furthermore, the campus management created an 'Intellectual Property & Standards-office',

that searches the campus for new ideas that may be patented. The campus organisation also promotes the creation of company spin-outs and start-ups. There is a special fund for new technological entrepreneurs named Technostar, which helps start-ups not only to find funding, but also with strategy, development, networking and coaching. In the past three years fifteen spin-outs have started. The start-ups are located in a multi-tenant building with reduced rents and dedicated spaces.

Eindhoven High Tech Campus - The Strip

Helsinki: Arabianranta
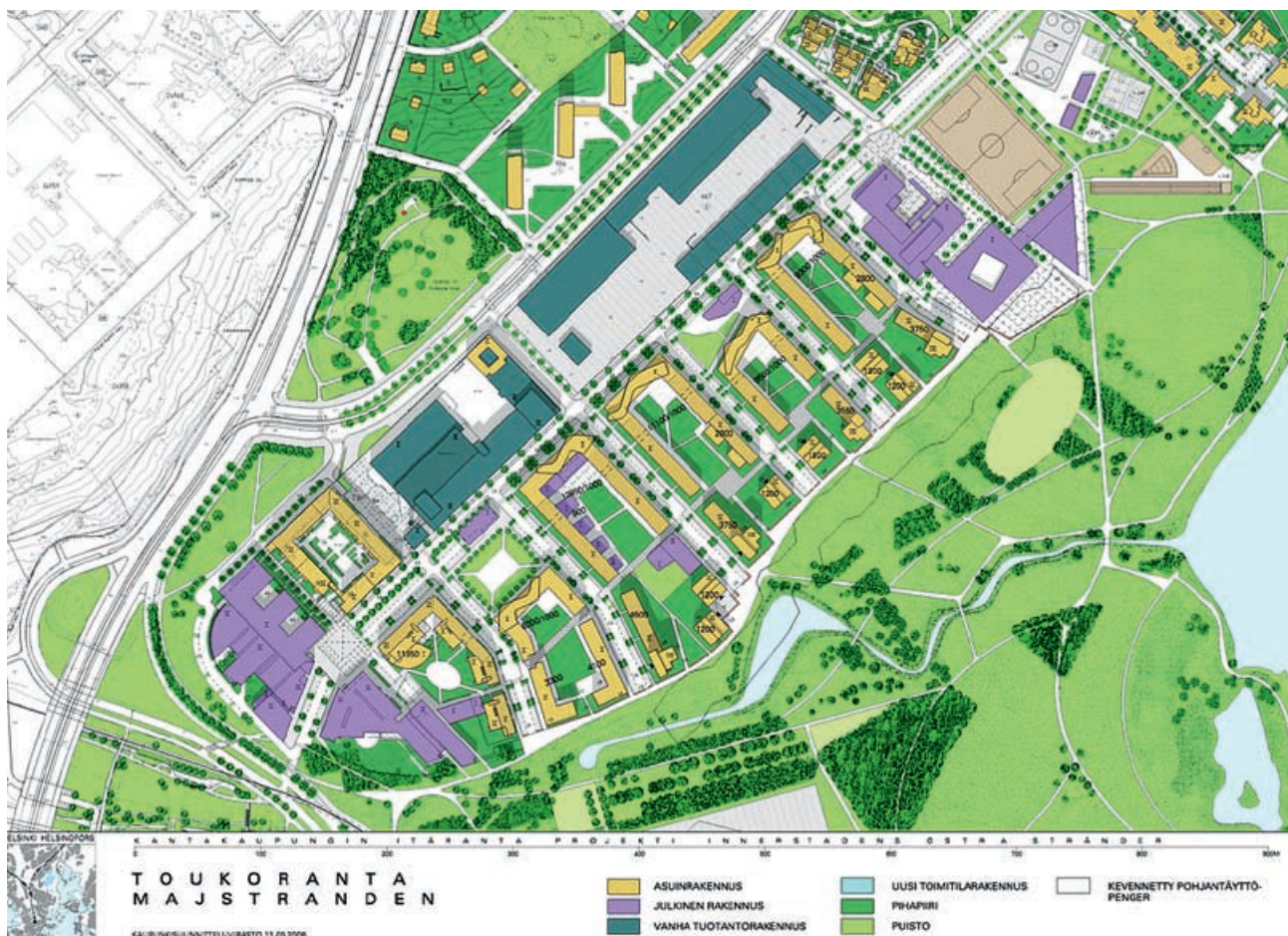**Type of location: Creative urban quarter**

Location

Arabianranta is a redeveloped industrial area in the Northwestern part of Helsinki, Finland's capital. Since the mid-1990s, the area has been redeveloped into a mixed district including leisure and housing functions but also offices, business premises and education. The area has one central theme: Art&Design, and this theme has consistently guided the redevelopment over the last two decades. The success of Arabianranta has attracted the attention of urban planners all over the world.

Development & concept

For long, the industrial area was dominated by a porcelain factory Arabia, once one of the largest of its kind in Europe. Decline set in during the second halve of the 20th century. Factories closed down, and the area became a polluted wasteland.

In the early 1990s, a plan was developed to regenerate the area. In that period, Finland went through a severe economic crisis. The government searched for new growth opportunities, and

TOUKORANTA
MAJSTRANDEN

ASUINRAKENNUS
JULKINEN RAKENNUS
VANHA TUOTANTORAKENNUS
UUSI TOIMITILARAKENNUS
PIHAPIIRI
PUISTO
KEVENNETTY POHJANTÄYTTÖ-PENGER

design was chosen as focal theme for the redevelopment. This theme related to the history of the area: The Arabia company had always been known for its excellent design. Moreover, Helsinki's world-class art&design academy had opened a temporary facility in an abandoned building in the area, and a small number of design firms were already located there.

Over the years, strong investments were made in art in public spaces, and requirements for the design quality of buildings were set exceptionally high. Moreover, each building is equipped with state-of-the-art broadband infrastructure, which made the area an interesting 'playground' for innovating firms to develop and test new products and services. Nowadays, the area is a frontrunner in 'user-driven innovation' in which resident communities are involved in innovations.

By now, the area counts five institutes of higher education, a large number of renowned creative design firms, (among which many foreign), a mix of higher class residential areas and social housing, and high quality amenities. It currently counts some 10,000 residents – it is very popular – , 5,000 students, and 300 creative firms employing 4,000 people. Companies indicate that they like the area for its creative ambiance; moreover, they highly value the presence of the design academy. The area has gained a strong reputation as 'the place to be' for design firms. According to some entrepreneurs, being located in Arabianranta helps to sell products to business clients, and also makes it easier to find qualified staff. Many firms are located there to

stay at current with the latest design trends. For them, this 'buzz' aspect is more important than possibilities for networking and commercial cooperation.

Magagement & stakeholder involvement
Since 1995, the area is being redeveloped and managed by a dedicated development organisation ADC – Art and Design City Helsinki. It is owned by the main stakeholders, among which the City of Helsinki, the design academy, some larger design firms, and knowledge institutes. Together, they develop and implement the strategy for the area. ADC plays a role as initiator and network broker for new projects. ADC formulated the ambition to turn Arabianranta into the leading centre of art and design in the Baltic region, through the 'quadruple helix' approach: strategic partnerships between firms, public organisations, knowledge institutes and citizens.

Arabianranta aerial view

Magdeburg: Science Port & campus
Type of location: Urban Science Quarter

Location

The City of Magdeburg has 230,000 inhabitants, and it is the capital of the State Saxony-Anhalt. At the location of an old inland port (along the Elbe river), the city has been developing a Science Harbour. The area (30 Ha) contains a number of landmark buildings that stem from the glory days of the port, which gives it a distinguishing feature. The City of Magdeburg intends to integrate the historical port district with the adjacent neighbour-hood and the city centre. The Science Harbour is a highly strategic project for Magdeburg: it should reinforce local economic development, create new jobs, and contribute to the attractiveness of the city as place to live. The planning area contains the port area and a part of the city (the 'Old Newtown' quarter). The science harbour will be home to innovative companies, scientific institutes (some already set up shop in the area), but also to housing and leisure facilities.

Development & concept

The ideas to redevelop the area were born by the turn of the new century. As a result of a careful strategy-building process (in which also citizens were involved), the City of Magdeburg decided that the science port should become a location for science, innovation and knowledge transfer. There service activities in the area (catering, hotels, restaurants etc), and tourism should be part of he development (especially water-related tourism along the Elbe river, or using the old port basin). Moreover, housing should be included in the concept, as the area, with its attractive location along the river, has potential to develop as high-class living area.

Since 2001, new buildings have been construct-ed, and research institutes and several small companies have moved in. Electricity cables were put underground to enable the construction of higher buildings, and to improve the visual quality of the area. The Max Planck institute is now located in the southern corner of the area. In 2006, the Fraunhofer Institute VDTC (Virtual Development and Training Centre) settled in the area. The brand new building has state-of-the-art infrastructure for complex machines, plants and

The Science Harbour, © Michael Kranz

systems, and in 2007 the 'think factory' (Denkfabrik) was opened, a new building (4600 m²) for innovative firms.

Furthermore, over the last few years, some public spaces in the Science Harbour area have been improved or constructed, including a new square. The transformation of the Southern part (close to the city and the university premises) is now already well underway, but more to the north, the development has to be started yet. There, one finds a number of large and characteristic grain silos (often no longer in use, and owned by private investors or firms). It will be very costly first to acquire them and second to transform them into usable modern property. More recently, the ambition is to better integrate the Science Port with the adjacent University Campus (currently physically separated by a busy road, and also functional relations are weak). The city organised an architect competition, and selected a plan that takes care of a much better physical integration of the two areas.

Magagement & stakeholder involvement

The Science Harbour area is managed by a private company named KGE Kommunalgrund (KGE). This firm (working on behalf of the City of Magdeburg) is responsible for the integrated development of the area (i.e. housing, business locations and conditions, creation of new jobs). Overall, the development is strongly supported by the State of Saxony Anhalt. The City of Magdeburg owns most of the land in the port area. It has leased out the land to users, and many lease contracts will end (some have ended already) in due time. But a number of warehous-

es are in the hands of private owners. The main stakeholders in the area (apart from the city and KGE) are research institutes, 'new' companies (tenants), 'old' companies (the transport/logistics companies with lease contracts) and private owners of buildings in the area. Some large grain silos in the area are owned by private firms (some of which have become part of international groups). They are not particularly interested in the development of the science harbour. Some are unwilling to sell their property, or may wait for prices to go up in case the area is becoming more attractive. Meanwhile, there is hardly any economic activity anymore in these buildings, and the quality may deteriorate, as maintenance is poor. It is a large challenge for the city of Magdeburg how to deal with these stakeholders.

Another challenge is the co-operation between the science port and the adjacent University Campus. So far, the two areas have been developed separately, but it is the ambition of the city to create a more coherent and integrative 'science quarter'.

The 'Denkfabrik'

Manresa: Parc Central
Type of location: Technology park at Greenfield location

Location

Manresa (73,000 inhabitants) is located in central Catalonia, Spain, at some 70Km from Barcelona. In 2005, the city developed its strategic plan for the next decade. One of the key ambitions is to strengthen knowledge-based economic activity in the city, in order to modernise its industrial base and create future prosperity. Manresa is in the process of developing its 'Parc Central', that is to become a major focal point of the local knowledge economy. This new technology park is being constructed on a plot of land (150,000 m^2) at the Northern edge of the city, on an accessible location near a park and next to an industrial area. The Parc Central is situated on a hill, with excellent views on the Montserrat Mountains and directly connected to the transversal east-west axis. Spatially, the park is set up in a rather 'campus-style' way with few infrastructural connections to the surroundings, and one main entrance gate.

The park should become the location for companies that conduct research and development. It should put Manresa on the map as attractive location for talent and innovative firms.

Development & concept

Parc Central is conceived to complement a number of knowledge-based activities are already concentrated in this part of town: The Manresa Technological Centre, the university campus library, two university centers (FUB and EPSEM), one professional training centre, three secondary schools, an industrial estate and a fair centre. The new technology park is to

Artist impression of Parc Central

become the showpiece of Manresa's knowledge quarter. It will consist of one central building, and a number of smaller buildings for companies or units. The central building is 9 storeys high, and will host the technology institute CTM (among others).

The area will be car-free, and parking facilities are to be built underground, to give the park a 'green' feel and to promote interaction between the people who work on the park. Mass production activities are not welcome: only applied research and product development activities are allowed, or small-scale production of prototypes. Firms may sell or rent buildings, but not the land. In total, the envisaged buildings offer 77,000 m^2 of floor space. The size of the total park is 150,000 m^2. The park offers space for around 20 or 30 firms. Compared to other locations in Manresa, rent levels will be relatively high: the park will be one of the premium locations.

Magagement & stakeholder involvement

By 2002, two influential people were the main drivers behind the idea to create a knowledge quarter and a technology park: the former major of Manresa, and the former director of the local savings bank Caixa Manresa. The land where the park is built on was bought by a public-private company (PTB) that was set up to develop the park. Four architects were invited to create a Masterplan, and one was selected. The main partners in the project are the City of Manresa, the Government of Catalonia and the local savings bank.

The City of Manresa considers the project as a source of future prosperity, and strongly believes that the park will contribute to Manresa's image as a knowledge city. The Government of Catalonia considers the park as a desirable contribution to the more equal spread of economic activity over the Catalan territory. The local savings bank, finally, has commercial and 'charitable' considerations. Commercially, it believes that the Park is a good real estate project to invest in, as the concept will increase land values. But also, the local savings bank is obliged to invest some of its profits in projects with social and regional benefits, and it strongly believes that the Technology Park meets these conditions.

Another strong proponent of the Park is the Technology Centre of Manresa (CTM). It will move to new premises in the park when it is ready, and it hopes to benefit from the growth of knowledge-intensive industrial activity in the park. Some local firms see the park as an attractive future environment for their product development. One has already announced to move to the park. The Technical University is up till now, not very interested in the science park.

Parc Central Manresa

City of Manresa

Newcastle: Science Central
Type of location: Mixed-use science city

Location
The City of Newcastle is in a transformation process from an industrial city towards a city that thrives on knowledge, innovation and creativity. In recent years, the city has made progress in several respects, and it is clearly the main growth centre of the region.

To boost its knowledge economy, Newcastle has developed plans to create a science quarter in the heart of the city, at the location of the famous Scottish and Newcastle brewery, that moved its operations from the city centre and sold the land. This large site is being transformed into a science quarter, termed 'Science Central' because of the site's central location and proposed future status as a central hub for regional scientific activity. The ambitions are very high: Science Central is to become 'one of the world's premier locations for the integration of science, business and economic development' (Masterplan, 2007).

Development & concept
Science Central is to become a new urban quarter. It will encompass new streets, landmark buildings and public spaces which will open up this central site to the rest of the city. The site –now almost empty- will include commercial, retail, leisure, educational and residential uses. It should comprise, in an early phase, a specialist business support hub and state-of-the-art facilities for small start-up science companies as well as inward investors. Sitting alongside these academic and business neighbours will be homes and apartments, accommo-

Artist impression

dation for students at Newcastle's' Universities along with complementary leisure and retail facilities.

It will be the home of Newcastle University's Institute for Research into Sustainability (NIReS) becoming the central hub from which scientific research and commercialisation in areas such as energy, transport and marine sciences, will be led. Science Central will mainly focus on the creation and exploitation of cutting edge new technology, and given the regional economic structure it will rely strongly on spinoffs and spin-outs from academic institutes.

Magagement & stakeholder involvement
The management model was based on a partnership consisting of the City Council, Newcastle University, OneNorthEast (development corporation), and two 'hybrids': the delivery organisation 1NG (a joint city development company with Newcastle

Council Gateshead Council and OneNorthEast), and the Science City company. Each individual organisation has its own dynamics and interests, and the development of Science Central is the combined result of a large number of decisions. It proved rather difficult to streamline visions and views, or to have a clear and unified branding of the development. Recently, the decision of the UK government to abandon Regional Development Agencies has complicated the partnership.

So far, project partners including the city council and Newcastle University have contributed £8m each, along with another £8m awaiting

approval from the development agency One North East. The intention is to spend more than £40m on the project, including £8m of European funding. The partners hope that businesses will flock to the site to invest £250m over the next 15 to 20 years.

The rest of the site will be developed by these businesses, and when land sales are taken into account, regeneration chiefs believe partners could rake back £10m each.

Aerial view Newcastle Science Central

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Dr. Willem van Winden (PhD) is an expert in the field of urban and regional economic development and strategies. He was involved in numerous international studies and projects in these fields. Recent research and advisory work includes the following topics: the development of science parks and other 'knowledge locations' and clusters in cities; The economic aspects of local/regional 'green' policies; regional knowledge-based economic development; developing new methods of mapping the local knowledge economy. Dr. van Winden is (co) author of several books and many articles in the field of urban and regional development, strategies and policies. Currently, he is the CEO of a consulting firm, UrbanIQ; also, he is a professor in the Amsterdam University of Applied Sciences.

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