PASCAL SPECIAL INTEREST GROUP
Public Sector Interface

Theme: Cities as platforms and Smart Cities
Issue Two: Summer 2016

Introduction:

The purpose of this PASCAL Special Interest Group (SIG) is to examine the interface between PASCAL and the public policy sectors. While this topic is a very broad, it cuts across sectors and issues, including innovative resource sharing and the role of institutions of higher education, and those organizations that develop policy. It includes the development of intercultural activity.

In this second issue, the theme of Cities as platforms and Smart Cities is considered. The PASCAL network has previously linked debate about Smart Cities to the theme of Entrepreneurial Learning Cities (see Learning Cities Networks). The authors in this paper build on this work with a focus on Knowledge City models and other city frameworks; the role of technology and the value that Higher Education Institutes can add when they form strategic partnerships.

Ilpo Laitinen, of the city of Helsinki (Finland) and Chair of the SIG, introduces the theme of Cities as Platforms and Smart Cities. He considers the role of technology and a paradigm shift to a so-called fourth industrial revolution. This change comes at a time when cities face challenges and threats to their sustainability across all their core systems. He highlights the competing discourses of a) digital city, b) the sustainable and green city and c) the learning city which presents challenges for HEIs and other institutions preparing students for the future labour market. One option is to deepen collaboration within Smart Cities and develop eco-systemic approaches.

Jane Niall (Australia) explores the role of Higher Education Institutions in Regional innovation, entrepreneurship and start-up formation. She reflects on the key role of partnership with regional and national governments to encourage these activities. Niall appreciates the importance of cities in driving growth and highlights that there is no one size-fits-all model. While there are significant challenges, there are numerous opportunities for both major city and regionally-based universities.

Blanca C Garcia (Mexico) focuses on Urban Innovation and how that leads towards Equitable Cities. She links Knowledge-based development (KBD), and the Knowledge City (KC) to a range of city frameworks such as the Smart City, the Creative City, the Intelligent City, the Learning City etc. In using such frameworks the challenge is a lack of consistent benchmarks to identify those cities and regions that are generating knowledge-driven initiatives. What is our understanding of how urban communities are built and what social progress indicators identify that these communities are thriving?

Dr Leone Wheeler
Content Editor

Cities as platforms and Smart Cities

Ilpo Laitinen, Director of Administration, City of Helsinki, and
Chair of Public Sector Interface Special Interest Group

Smart cities have become hype, a fad and a significant trend. Major tech companies and multinational research and development (R&D) institutes and networks are developing futuristic smart cities designed to showcase cutting-edge technologies and self-sustaining energy systems, driverless vehicles and software that runs metro areas like operating systems run computers. HEIs have now very different roles being part of developing smart cities with major information and communication technology (ICT) companies and new organizational hybrids are emerging including those collaborators: Higher Education Institutions (HEIs), major ICT companies, digital business startups and municipal agencies.

An example from the city of New York; 16 December 2010 press release:

> *"Mayor Michael R. Bloomberg, Deputy Mayor for Economic Development Robert K. Steel and New York City Economic Development Corporation President Seth W. Pinsky today announced that the City is seeking responses from a university, applied science organization or related institution to develop and operate an applied sciences research facility in New York City. In order to maintain a diverse and competitive economy, and capture the considerable growth occurring within the science, technology and research fields, the City is looking to strengthen its applied sciences capabilities, particularly in fields which lend themselves to commercialization. The City will make a capital contribution, in addition to possibly providing land and other considerations, commensurate with the respondent's investment."*

Thus we are currently witnessing a paradigm shift to the so-called fourth industrial revolution, the emergence of new technologies like cloud, Internet of Things (IoT), mobile applications, 3D printing, nanotechnology, intelligent robots, big data and analytics. This revolution includes how value is co-created and is related to social collaboration. In this era of the fourth industrial revolution, local government, public services, for example, education and healthcare - leaders must be open to novel opportunities for collaboration with ecosystem partners to expand the resources and expertise necessary to succeed in the data-driven economy. This new era is based on exponentially increasing sources of data and information and ubiquitous digitization. To local governments that development means new expectations for citizen engagement and personalized services. Thus public sector organizations are challenged and must change their traditional organizational mindset. (IBM, Thought Leadership Whitepaper, 8-2015.)

At the same time, cities face challenges and threats to their sustainability across all their core systems, and cities need to address those challenges holistically. Combining these developmental drivers – to seize opportunities and build sustainable prosperity – mean that cities need to become "smarter".

To become a smarter city, a city needs to:

- To deliver the goals a city has set, city administrations will need to work seamlessly across organizational boundaries and partner effectively with other levels of government, as well as with the private and non-profit sectors.
- Rising to the challenges and threats to sustainability requires a city to be more than just focused or efficient; it will require the next generation of a city to emerge – one based on smarter systems. These systems are interconnected – people and objects can interact in entirely new ways.
- The interrelationships between the various systems mean that while cities obviously must prioritize, just "solving one" is not a viable long-term option. The challenges and threats to sustainability come from all angles and require a holistic strategy that addresses all factors and feedback mechanisms. (IBM Vision of Smarter Cities, 2010b, p 2.)

A Smart City is also an open system. In the public sector open government has become the dominant doctrine. According to it, citizens have rights to access documents and public sector information. The open government goals can be converted to local government/smart city government level as:

- City (government) as a platform. A cohesive collection of information assets, services and capabilities in which communities interact, engage, develop and propel their opportunities, markets and progress.
- Open data is an approach to managing data so that it enables the structured free flow of non-sensitive information to those who have a need or interest in reusing it, both within and across government agencies and to the public.
- Better collective problem solving. Public participation is infused in the process of addressing shared public issues in support of public outcomes.
- Policies, programs, institutions, services and resources are effectively tuned to citizens' needs and the public good, and efficiently managed.

(modified from IBM, Opening up government, 2011)

Thus cities need to apply advanced information technology, analytics and systems thinking better to develop a more citizen-centric approach to services in order to become smart cities. (IBM, Smarter cities for smarter growth, 2010a). The UK Department for Business, Innovation and Skills defined the Smart City (Smart Cities: Background paper, October 2013, 7) around five "strongly information driven" key aspects:

- *a modern digital infrastructure, combined with a secure but open access approach to public re-useable data, which enables citizens to access the information they need, when they need it;*
- *a recognition that service delivery is improved by being citizen-centric: this involves placing the citizen's needs at the forefront, sharing management information to provide a coherent service,*

rather than operating in a multiplicity of service silos (for example, sharing changes of address more effectively), and offering internet service delivery where possible (at a fraction of the face to face cost);

· *an intelligent physical infrastructure ("smart" systems or the Internet of Things), to enable service providers to use the full range of data both to manage service delivery on a daily basis and to inform strategic investment in the city/community (for example, gathering and analysing data on whether public transport is adequate to cope with rush hour peaks);*

· *an openness to learn from others and experiment with new approaches and new business models; and*

· *transparency of outcomes/performance, for example, city service dashboards to enable citizens to compare and challenge performance, establishment by establishment, and borough by borough.*

There are some slight differences with the definition mention above compared to how the smart city concept is typically defined. In those it is based on six focus areas: a smart economy, smart mobility, a smart environment, smart people, smart living, and smart governance. The definitions may vary, but there are common smart city characteristics in all those definitions: 1) utilize networked infrastructure to improve their development, efficiency or competitiveness; 2) have an emphasis on business-led urban development, 3) aim to achieve social inclusion; 4) involve high-tech and creative industries in a crucial role; 5) pay attention to social capital and 6) are sustainable. (Laitinen – Piazza – Stenvall, Adaptive Learning in Smart Cities – The cases of Catania and Helsinki, submitted article 2016.) These smart city dimensions can be illustrated as follows:

(IBM.com, Smarter cities 2016)

The main driver for smart city birth and development is technology. Thus the smart city is more or less linked to innovation in technology, management and policy to address the variety of challenges and threats associated with the cities and urban regions (Nam & Pardo, 2011).

It is important to note that the "smartness" of a city lies not only in infrastructures, but also in the social capital that a region can generate to promote social innovation and regional development (Laitinen – Piazza – Stenvall, submitted article 2016). Empowering citizens means that they not only have a voice, but they are regarded as a key stakeholder helping shape the Smart City (Smart City Council, 2015).

To summarise three competing perspectives are challenging the smart cities discourse. Those perspectives are: 1) the digital city, 2) the sustainable and green city, and 3) the learning city (Hambleton, 2014).

The ongoing paradigm shift obviously creates challenges for HEIs and institutions whose mission involves preparing students for a future labor market and future professions. More than half of educational service providers have identified that "keeping workforce skills current with technology changes" is one of their greatest challenges. In parallel, the HEIs itself are experiencing shock waves and need to change due the disruptive technologies; eg. Almost three-quarters of academic leaders believe that technology is disrupting traditional higher education models. (IBM Smarter Higher Education, 2015.)

One option is to deepen the collaboration within the smart cities and develop ecosystemic approaches. That is, to work together to prioritize practical and applied educational experiences; hybrid solutions that improve access to Smart City big data, to interpret that big data, to co-create and innovate new solutions, and do that all that in strong relationships between private and public organizations and local people. Those strong relationships can be nominated as new education ecosystems, which use smart cities as platforms. That, in turn, also refers to social capital, and that ecosystemic approach has many linkages to the triple-helix model of smart cities. In the triple-helix model of smart cities, cities have been considered as densities in networks among three relevant dynamics: the intellectual capital of universities, the wealth creation of industries, and the democratic government of civil society. These interactions generate dynamic spaces within cities where knowledge can be exploited to bootstrap the technology of regional innovation systems (Leyesdorff &Deakin,). Universities, research institutions and hi-tech companies have been identified as the main actors in the smart city (Dameri, 2013).

Pascal Considerations

Smart city development offers and challenges Universities to new roles. The options for PASCAL could include, for example, the following:

· The smart city as a place of learning through community consultation. How to encourage the public to share their ideas, needs, understanding and perceptions in different urban environments where new tools and practices are changing the ways in which urban planners and policy makers seek

information to achieve socially sustainable outcomes? (See also Caldwell, Foth et al 2013; McFarlane, 2010)

· The smart city as a service innovation platform; the ultimate goal of the smart city is to develop various city services and services within the city, which is supposed to take place through information sharing, triple-helix collaboration and service innovations. (See also Nam & Pardo 2011).

· Triple-helix collaboration: the implication of the triple-helix metaphor is that universities need to transition to a compatible notion of knowledge production with commercialization. This collaboration evolved into the ideas of the entrepreneurial university, as a hybrid organization embracing the third mission of economic development in addition to scientific research and higher education through patenting, spin-off companies, business incubators, and research parks. (Mendoza, 2015). Universities are the sleeping giants of place-based leadership and social innovation, universities can assist stakeholders to deepen understanding of public learning and radical innovation in the smart city (Hambleton, 2014) Another challenge for HEIs is to create a more practical, applied and city problem solving curricula (see also IBM, Smarter Higher Education).

· Build and expand relationships with HEIs, employers and other partners within comprehensive and far-reaching educational ecosystems (IBM, Smarter Higher Education).

· Ecosystem development and collaboration: identify and evaluate new opportunities to find and co-create problem solving and leveraging capabilities, resources and ecosystem's assets (IBM, Smarter Higher Education).

· Education and support requirements of new smart city start-ups.

References:

Caldwell, G. A., Foth, M., & Guaralda, M. (2013). An urban informatics approach to smart city learning in architecture and urban design education. *IxD&A (Interaction Design and Architecture (s)), 17*(Summer).

Dameri, R. P. (2013). Searching for Smart City definition: a comprehensive proposal. *International Journal of Computers & Technology, 11*(5), 7.

Department for Business Innovation & Skills. (2013). Smart Cities: background paper. London: Department for Business, Innovation and Skills.

Hambleton, R. (2014). *From the Smart City to the Wise City: The role of universities in place-based leadership*. Paper presented at the Smart City: New Media, Social Participation and Urban Governance International Workshop, Shanghai University.

IBM Institute for Business Value. (2011). Opening Up Government: How to unleash the power of information for new economic growth. In J. Bourdeaux, D. Chenok, S. Dijkstra & R. Docktor (Eds.). Somers, NY: IBM Global Business Service.

IBM Institute for Business Value. (2010a). Smarter cities for smarter growth: how cities can optimize their systems for a talent based economy. In S. Kirks, C. Gurdgiev & M. Keeling (Eds.). Somers, NY: IBM Global Services.

IBM Institute for Business Value. (2010b). A vision of smarter cities. How cities can lead the way into a prosperous and sustainable future. Somers, NY 10589: IBM Global Services.

Laitinen, Piazza, Stenvall (unpublished) Adaptive Learning in Smart Cities – The cases of Catania and Helsinki, submitted article 2016

Leydesdorff, L., & Deakin, M. (2010). The Triple Helix Model and the Meta-Stabilization of Urban Technologies in Smart Cities. *arXiv.org*.

Mcfarlane, C. (2011). The city as a machine for learning. *Transactions of the Institute of British Geographers, 36*(3), 17.

Mendoza, P. (2015). Industry-Academia Linkages: Lessons from Empirical Studies and Recommendations for Future Inquiry. In B. M. Paulsen (Ed.), *Higher Education: Handbook of Theory and Research: Volume 30* (pp. 469-523). Cham: Springer International Publishing.

Nam , T., & Pardo, T. A. (2011). *Smart city as urban innovation: Focusing on management, policy, and context* Paper presented at the 5th International Conference on Theory and Practice of Electronic Governance https://www.ctg.albany.edu/publications/journals/icegov_2011_smartcity/icegov_2011_smartcity.pdf

NYCECD. (2010). Mayor Bloomberg Announces Initiative to Develop a New Engineering and Applied Sciences Research Campus to Bolster City's Innovation Economy. Retrieved from http://www.nycedc.com/press-release/mayor-bloomberg-announces-initiative-develop-new-engineering-and-applied-sciences

Smart Cities Council. (2015). Smart People. *Smart Cities Readiness Guide: the planning manual for building tomorrow's cities today*

The Roles of Universities and Cities in Innovation, Entrepreneurship and the Generation of Start-Up Businesses and, in this context, the relationship between them.

Jane Niall, DIIRD, Department of Innovation, Industry and Regional Development, Government of Victoria, Australia

Summary:

The roles played by Universities in regional innovation, entrepreneurship and start-up formation have been the focus of attention for at least two decades, with regional and national governments devising programs designed to encourage these activities. Many of these programs have emphasized commercialization, or the translation of university sourced inventions into commercial applications, using institution-wide models often based on the technology sector.

With the recognition of the importance of cities in driving growth, and the development of the "smart cities" concept, the importance of innovation, entrepreneurship and start-up formation to regional growth and prosperity and the roles that cities can play in this space have been well documented.

The literature is clear; there is no one model for success; cities are not all the same and different cities and regions have different needs. In addition, different industries and sectors within them also have different requirements and pathways. The processes are complex with no one-size-fits-all model.

On the face of it, partnerships between two of the key players in regional innovation systems, universities and their host cities would appear to be beneficial. Formal documents, including Strategic Plans and position descriptions for senior management reflect this recognition. However, anecdotal evidence would indicate that effective partnerships do not happen without positive action from both players.

Significant barriers exist, in particular relating to access, resources and culture. A clearer understanding of the capabilities and objectives of both sides by universities and their host cities along with a flexible but focused approach can assist in achieving stronger and more effective partnerships capable of driving innovation, entrepreneurship and start-up formation. Both parties then have to make a conscious effort to ensure the partnership works.

Role of Universities in Commercialization, Entrepreneurship and Start-up Formation.

In the context of entrepreneurship, innovation and start-up formation, universities traditionally provide:

- Skilled graduates in a range of disciplines
- Cutting edge research
- Technological innovation
- Business support.

In addition, the presence of a university, particularly in a smaller, regional centre, can of itself be a significant source of innovation, economic activity and community vitality and leadership.

Universities have a major role in knowledge generation, including and beyond scientific and technological inventions. Consistent with their role in research, many universities have a focus on the protection and commercialization of the intellectual property they generate. There is a question as to whether this is in fact the most appropriate focus for a university's attention and resources.

Scott Andes of the Bass Institute, Boston, questions whether Universities create new companies or create new patents and concludes that generally it is the latter (Andes, 2016). Many universities and research organizations spend significant resources maintaining patent portfolios which are of little to no commercial value. Even for those universities seen as leaders in commercialization, it is rare that a start-up based on intellectual property developed as the result of curiosity led research is a commercial success. Successful start-ups tend to be the result of identification and exploitation of a business opportunity, that is, \ market pull rather than technology push. In addition, intellectual property generated in a university tends to be very early stage greatly increasing the risks associated with commercial development. If this is the case then there are further reasons to question the focus universities have on commercialization of their intellectual property rather than exploitation of business opportunities.

> An initiative of Monash University, Melbourne, Australia, aiming to support start-up companies established by entrepreneurs from within the university community, currently has 60 companies on its books, with only four of these based on University intellectual property. However, consistent with the University's focus on the traditional commercialization pathway only those four companies are eligible for financial assistance from the University.
>
> Source: Monash University personal communication

In a recent presentation, Dr Erol Harvey, CEO MiniFab (Melbourne) Australia mapped the Research Pathway from grant application to the graduation of a student, and demonstrated that this pathway intersects with the typical industrial Product Development Pathway in only one area of activity – invention, concept generation, and IP capture (Harvey, 2016). As Dr Harvey pointed out, the chances of a piece of serendipitous IP being at this point of development at the same time as a matching industry requirement is identified, while possible, are remote. Dr Harvey then pointed out opportunities for improving the interactions between research and product development largely involving improved industry–researcher (university) interactions, particularly in the early stages.

While smaller universities have challenges finding the resources to support initiatives to strengthen their local innovation ecosystem, many of the larger, better resourced institutions are investing in a range of programs. Models are often based on the more successful US and English universities.

The University of Melbourne is strengthening its innovation ecosystem through a number of initiatives:

· *The Melbourne Accelerator Program. This program aims to drive cultural change and is modeled on programs in the US designed to support start-up businesses. Following a selection process each successful team of students receives a $20,000 grant, incubator support, mentors, and local, interstate and international introductions.*

· *A program of Master Classes and public forums to inspire students to consider entrepreneurship as a career choice.*

· *An alumni program to assist entrepreneurial students make useful business connections.*

· *A Masters Course in Entrepreneurship supported by the Faculties of Engineering and Business and Economics and delivered by the Wade Institute.*

· *A year long program modeled on courses at Stanford and the Hebrew University of Jerusalem where students work to develop medical devices based on needs identified by hospitals supported by the Melbourne Business School with the Faculties of Engineering, Medicine, Dentistry and Health Sciences.*

In addition, Melbourne University has provided a building to house the Carlton Connect initiative which is a place based program that aims to build a community of innovators by bringing public and private sector organizations together to drive innovation. This is a new experience for the university as it is less about purchasing research and more about being part of a community. Several major Australian companies are locating R&D groups in the precinct.

Source: Project Director, Carlton Connect personal communication

One factor that would appear to increase an institution's chances of creating the desired innovation ecosystem is the existence of an attractive lively, vibrant surrounding area. Universities located adjacent to a dynamic city centre, with its economic, social and cultural life will find it easier to create a lively innovation system than a more geographically isolated institution with no activities on or around the campus once the university staff and students have ended their working day.

The Role of Cities in Innovation, Entrepreneurship and Innovation

While economic development is not the primary focus of cities, they play an important role in driving regional growth. In this context cities can play a major role in fostering entrepreneurship, innovation and start-ups. There is no single model for success as different cities have different ecosystems and different requirements. Based on their areas of responsibility, there are a number of things a city can do to drive economic development.

Land use planning and zoning: Land use planning and zoning conditions can support the development of innovation precincts. The planning framework can foster or stifle the development of new companies in new industries with different requirements from traditional industries.

Provision of space: Cities often have access to space, particularly accessible city centre space, that can be made available for incubators and innovation support services at affordable prices.

Networking and connections: Cities can use their local knowledge and relationships to identify opportunities for collaboration and develop and support networks aligned with the interests and needs of local industries. Cities can also actively encourage and support the development of clusters and precincts.

Local database: Cities hold data about the industries and companies based in their jurisdiction. This can inform traditional roles of the city including land use planning, zoning, and training, as well as cluster and precinct development, and fostering the development of effective networks.

Recent studies of the manufacturing sector by Andes (2016) demonstrated the need for industry specific strategies to grow urban economies. This work showed that different manufacturing industries employ different innovation pathways. Pharma tends toward the traditional discover, protect, and transfer, market based approach while at the other extreme software, machinery and small business tend to rely on informal mechanisms to source new ideas and non-market channels to transfer these to the ultimate user. The study showed that in general the most important source of innovation for manufacturing companies is not research institutions but rather customers and suppliers. The information held by cities detailing which companies are based in their jurisdiction can assist in the identification of the innovation channels likely to be used by local firms, particularly the non-market innovation channels, and the development of innovation support programs tailored to the local industrial profile.

The Relationship between Universities and Cities – Ships that Pass in the Night?

Williams, Turner and Jones (2006) in their paper "Embedding Universities in Knowledge Cities" note that for centuries universities have had relationships with the economic life of the cities in which they are embedded. They found that although both parties recognize the potential of such relationships, most higher education institutions and local authorities remain less clear about how best to work together to mutual benefit.

In Brisbane, Australia, the City Council is very active in promoting the innovation economy, primarily by enhancing the innovation infrastructure by funding innovation spaces in the city centre. However, while the Council is working with industry there is not much evidence of close working relationships with the universities, all of which are active in promoting innovation and commercialization.

Real challenges have been identified to the building and maintenance of relationships between universities and cities. These include:

- **Alignment of objectives:** While driving the local economy is important for cities, it is not core business for universities and rarely counts against their performance ratings. The different institutional objectives will impact at the project level making early identification and articulation of objectives important to ensure alignment of key players and clarity for those involved in delivery.
- **Tension between global and local focus:** Universities generally have a focus beyond the region in which they are based. Larger, research based universities, for example, tend to have a global focus.

Cities, on the other hand, rarely have permission from their constituents to operate beyond their own region.

- · **Resources:** For both cities and universities, finding uncommitted resources to fund partnership activities is difficult. In both cases, resources are scarce and generally tied to particular activities and/or outcomes. Generally, for universities, involvement in regional partnerships is discretionary and non-core. For many cities, economic development is a second order activity, with ratepayers judging their performance on delivery of local services, in particular roads, rubbish and recreation. For example, in Australia, cities do not have taxing powers so increased economic activity does not automatically lead to increased tax revenue.
- · **Access:** Cities and universities can be large, opaque organizations making it difficult to identify and gain access to the right players. Defining the city and who runs it can be difficult for an external body, including a university, while finding the right person, or group, to partner within a university is often a matter of luck. Significant amounts of time can be wasted if entry into the wrong area or at the wrong level leads to ineffective interactions, making players on both sides reluctant to attempt to build relationships. Effective relationships are often between individuals deep within the participating organizations, and are not transparent to upper levels of management making overall coordination difficult. Often these relationships are dependent on the individuals concerned and therefore do not survive personnel movements.

Based on their documentation including Strategic Plans and Position Descriptions, universities and cities recognize the potential for university-city interactions to be beneficial. Some have attempted to establish formal processes, for example, the role of the City of Melbourne Smart City Office includes a specific responsibility for collaboration with Melbourne's research and higher education sectors (Melbourne City Council, 2014). However, as referred to above, such interactions will only flourish if they are aligned with the objectives of both institutions and deliver outcomes for both.

Beyond the provision of city centre space, cities are well placed to lead and involve universities in networking activities that build links between the higher education sector and industry. However, again it is important that these activities are based on identified opportunities, focused and deliver outcomes that justify the time and cost of involvement. As discussed above, cities hold the databases that can inform this work.

The best city approaches are "enabling" – providing the environment and opportunities for new relationships to form, and existing relationships to prosper. A "city's role is to provide the environment for green shoots to thrive, not to choose an individual blade of grass to pull"(Clarke & Williams, 2014). Cities should not get involved in provision of funds for start-up businesses. This is a misuse of their resources and an activity much better provided by the private sector or national government programs.

From discussions with innovation and commercialization practitioners around Australia it appears that it is unusual for a city and its embedded university(ies) to work together as a matter of course. Rather they tend to be "ships in the night" unless collaboration is driven by individuals within the organizations who are convinced of the benefits of working in partnership. From the literature on city-university interactions in

the innovation and commercialization space it would appear that the Australian situation is not unique, that there is no single successful model and that developing partnerships requires conscious effort by both parties.

References

Ransom, J. (2015). The Future of Cities: Universities and Cities. 7. Retrieved from
https://www.gov.uk/government/publications/future-of-cities-universities-and-cities

Andes, S. (2016). How Firms Learn. Industry specific strategies for urban economies. Washington: Brookings Institution. Retrieved from https://www.brookings.edu/research/how-firms-learn-industry-specific-strategies-for-urban-economies/

Harvey, E. (2016). *Collaborating beyond contracts and formal programs*. Presentation to the Criterion Conference, Melbourne.

City of Melbourne. (2014). A Knowledge City Strategy. Strengthening Melbourne's Knowledge Sector Through Collaboration. 2014-2018. Retrieved from http://www.melbourne.vic.gov.au/SiteCollectionDocuments/knowledge-city-strategy-2014-18.pdf

Clarke, E., & Williams, M. (2014). Delivering change: Supporting links between universities and high-growth firms in cities. Retrieved from http://www.centreforcities.org/publication/delivering-change-supporting-links-between-universities-and-high-growth-firms-in-cities/

Williams, L., Turner, N., & Jones, A. (2008). Embedding Universities in Knowledge Cities *An Ideopolis and Knowledge Economy Programme paper* London: The Work Foundation. Retrieved from http://www.theworkfoundation.com/Reports/208/Embedding-Universities-in-Knowledge-Cities

Stanley, J. (2015). Cities and Universities Will Work Together in New MetroLab Network. *Next City*. Retrieved from https://nextcity.org/daily/entry/obama-smart-cities-program-cities-university-partnerships

Smart City Models: Advancing Urban Innovation towards Equitable Cities

Blanca C. Garcia, El Colegio de la Frontera Norte, México.

Antecedents

I came to the Knowledge-based development (KBD), and the Knowledge City (KC) dimension while doing my postgraduate study in the city of Manchester, in the United Kingdom. At the time, Manchester was undergoing a transformation under KBD schemes. I am originally from central Mexico, but came back to my country and settled with my family in the North of Mexico, in a city three hours far from the Mexico-Texas borderland. My city's name is Monterrey, in the state of Nuevo León.

Since 2003, the city has been working its way to create a distinctive long-term "knowledge city" offer, by developing partnerships in which Higher Education Institutions (HEIs) and parallel knowledge-intensive entities are mediators across sectors. The city is home to the largest software development firm and a national top quality educational system that includes private- and public-sector HEIs. Most importantly, the city has adopted a cluster development approach with a focus on software, biomedicine aeronautics, mechatronics and automotive sectors. An important inflexion moment in city development arrived between 2003 and 2009, when the state governor purposefully sought to lead Monterrey into a KC model by implementing a comprehensive series of initiatives of knowledge-based transformation and renewal. Acting governor Gonzalez Paras fostered the creation of 40 research centres in the state. Following Barcelona's example, the governor also sought and gained for Monterrey the responsibility of hosting the 2007 Universal Forum of Cultures, an event that the city of Barcelona had used to renew its own infrastructure in 2003.

A disruptive moment in the life of the city indeed came in 2007. And although it had a net impact on the city, such initiatives were financed through debt, and criticism and crisis rose. Additionally, the rising climate of insecurity and drug-related violence in this city-region disturbed the KC aspirations before due time. Today, Monterrey's present efforts are on the development of a knowledge-based cluster network, in which a good number of city stakeholders are involved. The vision still pursues quality education combined with intensive research to trigger value-adding innovation, which, combined with the entrepreneurial spirit of the city, is expected to leverage large intangible assets in its future. Being part of these first efforts in Mexico, and some others in Latin America, we are now able to collaborate in some of the timid but firm efforts in other parts of the country that will eventually follow the KBD/KC frameworks, such as Pachuca, San Luis, Aguascalientes, and most recently, Puebla. The following is an account of knowledge moments and experiences in the Knowledge City theory and practice.

Knowledge-based Development Models (KBDms) – An Introduction

In *Smart City* models, as in other Knowledge-based development models (KBDms), learning (through knowledge-generating science and technology) play a key role in the construction of urban communities. This is how we see cities (and their countries) that have invested explicit efforts in the education of its citizens, in the promotion of science and, most importantly, in linking both their productive and scientific sectors, becoming competitive and in some cases, more developed. A perceived virtuous relationship

between knowledge use and its explicit linkage with wealth generation and quality of life improvement has converged in a core concept: the *Knowledge Economy* (KE).

In the KE, conceptual tools such as *Learning Regions*, and *Knowledge Cities*, (as a subfield of KBDms), propose a comprehensive and different angle to city analysis: the most subtle levels of knowledge, revealing the value structure of the city; and facilitate the apprehension of its core identity. This brings an "epistemological shift from matter-centred to relation-centred knowledge" (Carrillo, 2002) in which notions of *learning* and *knowing* are undoubtedly the foundational basis of city building. However, at this point, we may ask, how can we design the knowledge-based Cities of the Future? In other words, *how do we build prosperous Knowledge-Cities?* (Yigitcanlar, et.al., 2012).

Knowledge City Concepts

The *Knowledge City* concept is a subfield of Knowledge-based Development (KBD) and stems from a convergence of Urban Studies and Planning with Knowledge Management (KM) (Carrillo, 2006:xiii). At the core of a complex field of the social, economic and technical sub-systems, sits the *system of learning* on which each of our societies relies on. Our systems of learning are historical, societal structures now seemingly developing into **systems of meaning-creation** (Tuomi, 2004a:2) as the basis of learning systems in emerging knowledge-based societies. For the analysis of these knowledge-based contexts, emerging frameworks that could include the emerging complexities were critical to the sense-making process of prospective and development of cities. In a reflection on how value-based concepts develop in urban settings, some considerations on the progress and historical evolution of KM as a discipline are highly relevant as part of this study. The perspectives of Knowledge Management (KM) scholars (Tuomi b, 2004; Huysman and Wulf, 2005; Carrillo, 2006) who have identified distinct and influential KM generations are essential to characterise the recent transformations in the discipline and their relevance in emerging research.

KBD models were triggered by knowledge conversion notions such as *learning regions* that started to emerge as a framework for understanding development in a multi-dimensional, highly networked setting beyond city limits (Florida, 1995). Other parallel notions shaping this third generation are *intellectual capital systems* (Stewart, 1997), *innovation clusters* (Porter, 1995), *global networks* (World Bank, 2002), *capacity building strategies* (UNDP, 2002) and other related concepts. Such rich blend of theory and practice, found in first instance theoretical expressions in frameworks such as the *Knowledge City* (KC): a city purposefully pursuing knowledge as a means for development (Carrillo, 2004). The *Ideopolis*: a city of Ideas and inclusive communities (Work Foundation, 2002). The *Creative City*, as a city driven by the creativity of its creative class and milieu and the *Intelligent City* which heavily relies on social intellect, IC mapping, virtual connectivity and the strong capacities of its citizen story-tellers (Pricewaterhouse-Coopers, 2005).

Knowledge-based Markets, Systems and Cities

In such context, we tend to see cities as productive entities and even knowledge-based *markets* (Amin, et.al. 2003:3; Carrillo, 2004:29). The *Knowledge City* (KC) concept is defined as "shorthand for a regional economy driven by high value-added exports created through research, technology and brain power", as it

---

"invests significantly more of the community's income (GDP) in education, training and research" (Melbourne City Council, 2002; in Ergazakis, et.al. 2004:6). In fact, it is

> "a region that bases its ability to create wealth on its capacity to generate and leverage its knowledge capabilities. In a knowledge capital, enterprises and people link to form knowledge-based extended networks to achieve strategic goals, cultivate innovation and successfully respond to rapidly changing conditions". *(Chatzkel, 2004:62).*

In brief, a Knowledge city is a city 'purposefully designed to nurture knowledge" (Edvinsson, 2002; in Dvir and Pasher, 2004:17); a city "in which its citizenship undertakes a deliberate, systematic attempt to identify and develop its capital system, with a balanced and sustainable approach" (Carrillo, 2004:34).

But although the terminology is new, there are some historical examples of cities that follow the KC pattern. They evoke historical elements of core cities of the past, where open, informal places were the space for knowledge to be liberally shared. As modern Agora, *Knowledge Cities* encompass the underlying assumption that knowledge and ideas are created mainly through *conversations* (Dvir and Pasher, 2004:17, 21). Such assumption positions learning, innovation and clustering at the core of some theories of knowledge-creation, strongly influenced by Michael Porter's work (1995). Not surprisingly, recent literature on the role of universities in the knowledge-based economy tends to highlight three essential functions: the training of highly qualified personnel, the performance of research and the transfer of knowledge for economic growth (Wolfe, 2004). In emerging Knowledge Cities, the dynamics of learning and clustering are encouraging knowledge-intensive organizations and institutions, characterising them as 'engines of innovation' and major agents of change and economic growth (Wolfe, 2004:1). Innovation is progressively understood as "knowledge-based innovation" or the creation and application of marketable goods and services exchanged in *knowledge-markets* for the advancement of society as a whole.

Knowledge Economy Indexes

From these perspectives, cities are depicted as intelligent, connected and networked units of analysis, and have become the focus of interest of a much wider group of professional communities, contributing to city analysis and benchmarking at the international level. Hence, there have been numerous attempts to generate awareness on international city *benchmarking*. Seeking to gather consensus on KBD practices to identify and recognize best practices in a number of aspects of urban communities: i.e. economic competitiveness, entrepreneurial activity, environmental sustainability, freedom of expression, e-government initiatives or innovation (cf. Kriščiūnas & Daugeliene, 2006).

Advancements on KE are now signalling a Social Progress *Imperative* (http://www.socialprogressimperative.org/publication/2016-social-progress-index-methodological-report/) as an observable index. But back in 1996, the Organization for Cooperation and Economic Development (OECD) coined the KE term to describe cities and countries that based their development and growth in the use of science and technology for knowledge-generated progress shifts that their own citizenship consciously created. Since then, the concept of KE transcends the simple use or mass consumption of high-tech or information technology instruments. The core KE principles are based on the creation, dissemination, use and appropriation of knowledge in its broadest conception. Countries and companies that benefit from KE models have their most valuable asset in the science and the technology they develop, as they use this knowledge in their businesses and systems of production. In practice, some cities respond to their needs of food, clothing, health and entertainment, primarily by means of products generated by the inventive action, or by linking scientific knowledge and production processes. They are examples of the KE models. While others, in the traditional economy schemes (i.e. as in many Latin American economies), ground their development in the exploitation of handwork, in production clusters focused on manufacturing or *maquila*, in the production of primary goods (as the oil) or even in financial speculation. Hence, indicators for these two distinct models are poles apart.

For instance, according to OECD, KE indicators convey 4 pillars, that are still valid today for these models:

a) A robust and well-structured education system.
b) Development and use of access to information and telecommunications infrastructure.
c) A dynamic linking system of innovation between academia and businesses.
d) An institutional framework of Government to promote the undertaking of a scientific basis and to manage efficiently and transparent economic incentives for innovation.

OECD measured the KE Index (KEI) on a scale of 1 to 10, the lower the index, the lower the capacity of knowledge-based development.

Moreover, a stream of awards of different nature have been recently created to recognize cities' efforts: Global Location Attractiveness Ranking, Global Competitiveness Report, Best Business Environment, Transparency International, Intellectual Property Rights Protection, Most Globalized Nation in the World, Green City, Innovative City, Most Network-Ready City and Most Walkable City in the World, just to name a few.

However, one of the difficulties in creating and sustaining knowledge-based city models is the lack of benchmarks to identify those cities and regions that are generating knowledge-driven initiatives, triggering development and collective value. Thus, to contribute to such criteria, we would like to briefly mention the case of the Most Admired Knowledge City Award (MAKCi) consultation exercise, of which we have taken part in the aim to bring a practical application of a purpose-built framework (a generic Capitals System) for city benchmarking purposes. It stems from recent research on knowledge city index pursuits, built on data available on urban communities. The following paragraphs depict emerging knowledge value-creation assumptions to identify city benchmarking potential and uses in the MAKCi consultation exercise as a practical example of value-based indicator construction. The framework incorporates eight knowledge capital dimensions to stand for indicators for the whole exercise as the visible drivers of collective capital creation in knowledge-based development city-regions:

1. Identity capital: clarity and differentiation
2. Intelligence capital: external entities and events
3. Financial capital: economic sustainability
4. Relational capital: social integration and cohesion
5. Human individual capital: health, education
6. Human collective capital: cultural inheritance, cultural fitness
7. Instrumental-material capital: natural, man-built
8. Instrumental-knowledge capital: production systems in electronic and non-electronic repositories.

This framework allows a rich data-gathering of primary, secondary and tertiary data on any given city (virtually all information available/accessible) under the criteria. Orderly observed through the lens of MAKCi, the city Capitals System emerges for interpretation, academic research, public policy information and foundation. The eight dimensions observed strike a balance for a city's KBD diagnose and perspective. Through this framework, a few Knowledge City cases can be identified as follows:

UniverCities and Ideopolis:

These two Knowledge City models, demonstrate the close and ageless relationship between universities and cities. In analyzing university–city interactions, these two key social institutions are put together as the engines for development, especially if working together alas not except of certain tensions (Perry, 2011). Between universities and cities, a particularly important unifying principle seems to be mediation. Mediation, or the art of facilitating the development of strategic partnerships across sectors in a city (between citizens, civic authorities, private practice and academic institutions), is the triggering factor for *UniverCities* to flourish (Perry, 2011).

On the other hand, an *Ideopolis* combines the generic idea of the Knowledge City concept with that of *UniverCities*. An I*deopolis* is "a large city, driving growth within the city-region and working with medium sized cities to play a key economic role within the wider region and at a national level" (Williams, Lee, Jones, & Coats, 2006, p. 9). An *Ideopolis* could include:

· high levels of economic success;

- high levels of knowledge intensity;
- a diverse industry base including distinctive specialist niches;
- a university that has a mutually beneficial relationship with the city, leading to building industries based on research strengths, transferring knowledge to businesses and the retention of graduates;
- strong communications infrastructure and good transport links within the city and to other cities, including air, rail and road;
- a distinctive long-term "knowledge city" offer to investors and individuals alike, created by public and private-sector leaders;
- strategies to ensure that deprived communities also benefit from the economic success associated with knowledge (Williams et al., 2006).

InnovaCities and Catalyst Cities:

Given the tight link between innovation, learning and knowledge-generating processes, an *InnovaCity* category is worth noticing. An Innovation City profile is seemingly linked to urban communities that have earnestly sought for solutions to their sprawling suburbs, declining economic activities in their inner cities, the spread of out-of-town shopping centres, and/or grim threats to their urban environment, economic development and cultural tradition. These cities sought to strike a balance between focused conversion of new knowledge and socioeconomic and environment-conscious initiatives. Clearly, cities can be catalysts of knowledge and innovation: "the city is not necessarily a cradle of ideas; it is rather a conduit through which vast economic resources are channelled and so they help to bring ideas to fruition, in the shape of practical, marketable solutions" (Shearmur, 2012, S15). In the case of some they become Catalyst Cities, also known as Breakthrough Cities because at a critical moment of their development process, "they disrupted the conventional paradigms of development" (Scheel, 2011, p. 380). In some cases, through challenges, crisis and uncertainty, cities have found the key inflection moments to make a swift transition possible. By doing so, large-scale changes usually have had a positive impact throughout the city, "creating interdependent spaces in which the citizens, the social communities, the businesses and their local natural environments, moved into a harmonious and balanced regional development" (Scheel, 2011,xx).

Today, to these KC frameworks we can add a multiplication of knowledge-based models such as Sensitive City, Smart city, Open-source City.

Pascal Observatory: Knowledge and Learning Indexes in Latin America

In 2015, between 28th and 30th September, the UNESCO Institute for Lifelong Learning (UIL), Mexico´s Federal government (the host country) and a number of sponsors hosted the 2nd International Conference on Learning Cities in México City. It built on the work of the first conference held in Beijing in 2013, and made Mexico the country base for the United Nations Sustainable Development Summit and program for the next two years. Of particular relevance to Learning Cities are Goals 4 and 11, which are: Goal 4 - "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." Also Goal 11 - "Make inclusive, safe, resilient and sustainable cities". The Learning City approach was advanced to work towards a better community life and envisaging sustainable learning cities as saving them money and helping the most disadvantaged. This core conference set the pace for a number of conferences in the

Knowledge-based model: for instance, the 2nd Smart Cities Conference, which emphasis was made on Urban Innovation towards Equitable Cities.

Smart Cities Puebla: Urban Innovation and Equitable Cities

From February 16th to 18th, 2016, the City of Puebla, Mexico, hosted Smart City Expo in Puebla, a city about three hours far from the capital city, Mexico City. The Smart City Expo Puebla: Urban Innovation Towards Equitable Cities in Latin America represented some of the most relevant actors potentially acting on the urban development process in Mexico, and the organizational competence from multiple scales of territory: national, state, metropolitan and local levels. It succeeded in bringing together over 80 businesses and 36 Latin American Countries under the common goal of a more sustainable, healthy and equitable future for Mexican and Latin American cities. For instance, at the congress, a few presentations were delivered under a session named "Urban Resilience". The session focused on the multi-stakeholder, multi-sectorial, multi-hazard approach to resilience. The speakers were asked to present the new challenges and opportunities arising from the implementation of resilience actions in urban areas. In addition, views from other organizations were represented by university networks, as well as the links to smart technologies applied to community-based resilience. The panel raised large interest from the audience and agreed on the necessity of a change of paradigm in urban planning. A more social based, integrated approach including all aspects from management to more flexible planning and an adequate regulatory framework for urban development was dimmed to be required. In that sense, some researchers (Honeywill, 2010; Surowiecki, 2004), have compiled a number of characteristics in creative, intelligent cities that show some key elements such as:

a) higher than average social evolution (high social intelligence);
b) well-developed knowledge-intensive activities and diverse clusters of such activities; (c) embedded routines of social cooperation, allowing knowledge and knowhow to be acquired and adapted;
c) developed communication infrastructure, digital spaces and knowledge/innovation management tools; and
d) a proven ability to innovate, manage and resolve problems appearing for the first time.

Variables and indicators such as these advance knowledge-based cities with a strong commitment to cultural capital, innovative environments, diversity, high social intelligence and digital leadership (Honeywill, 2010; Surowiecki, 2004).

Open Source Cities

On the other hand, through an inter-institutional collaboration between two higher education institutions in Monterrey we made possible a pilot inquiry on Open Source City models and its application in the city on a prospective exercise for 2021. Students first joined forces with a local NGO, whose mission is to find solutions of public and social problems using technology; activating communities towards new forms of citizen participation. On the other hand, the project identified the cities of open source such as those that have the following characteristics:

a) active and participative citizenship,

b) open and efficient government policies, open data public policies,

c) a transverse economic development plan and

d) several concentrated hubs of open source innovation and open source firms.

The working group evaluated the feasibility that these features are incorporated into the development model of the city of Monterrey in 2021 with a panel of experts from four different areas, and a five-year time-frame was considered, taking into account the exponential acceleration of technology. As for scenario visualization, the Regnier abacus method was used to identify possible scenarios and the IGO technique were used to propose a concrete and relevant strategy for local organizations. The working group attempted to create prospect scenarios about the future and the links between technology and new forms of citizen participation in the northern city of Monterrey, which along with the panellists constituted a valuable contribution to encourage the understanding and forward thinking about the possibilities of implementation of the model of open source cities in the city.

Closing Remarks

Increasingly, cities, like individuals and organizations, are relentlessly choosing to foster a culture of learning and knowledge conversion from which they can capitalize the city's knowledge-based capitals. Emerging models to identify and explore such efforts could be the ones that study knowledge and information markets. Some scholars have described knowledge markets as a group of related circular knowledge-service value chains that function collectively as a sector to embed, advance and extract value to yield sector outcomes and individual benefits. Some of the KC cases parallel processes in their city's identity and intelligence capitals, in which not only the branding of the city plays a major role, but also the city's watchful account of its knowledge-based macroeconomic activities. In such a context, a glimpse of the role played by different capital systems has revealed them as articulators of knowledge-based urban development within the urban communities. Hence, a qualitative change in KBD perspectives is deemed to be identified where practitioners, academics and policy makers truly converge with benchmarkings and indexes that can more clearly convey the new conditions that interplay in the international context of the Knowledge Economy.

Furthermore, following a deeper sense of urgency, this contribution has aimed to thread into the uncharted KBD territories where knowledge city schemes for sustainable development are also more than ever likely to be revealed. In fact, as more radical KBD frameworks converge, they could portray a more balanced and realistic outlook of complex capital systems in the global KBD arena. Indeed, as notions of knowledge cities continue to be present in KBD practice, further theoretical aspirations could develop the shapes of the cities here presented. The gap in the literature regards the understanding how urban communities are built and how they thrive in social progress indicators. Because the challenges and findings of this research are on the table for discussion, further advancements of the knowledge city in theory and practice are earnestly expected. Moreover, a lot of the measurable social progress index of human communities is triggered by interactions in the marketplace. The internet, extranets, and intranets, are increasing those interactions exponentially (i.e. e-Bay, Amazon, Twitter, Uber etc.). That's also a promise for *knowledge markets* (Davis, 2007). This vision of **Knowledge Cities** is conglomerating notions of knowledge-based agents, development and learning through conversations, in which observatories such as Pascal will play a prominent role in structuring and scaffolding the framework of knowledge-based urban communities.

References:

Amin, A.; Massey, D. and Thrift N. (2003). Decentering the Nation. A radical approach to regional inequality. Catalyst Paper 8. September 2003. London: Central Books.Carrillo, F. J. (2002). Capital systems: implications for a global knowledge agenda. *Journal of Knowledge Management*, 6 (4), 379-399.

Carrillo, F. J. (2004). "Capital cities: a taxonomy of capital accounts for knowledge cities", in ***Journal of Knowledge Management,***. Special issue on Knowledge-based development II: knowledge cities Vol. 8, no.5, pp. 28-46.

Carrillo, F. J. (Ed.) (2006). ***Knowledge Cities. Approaches, Experiences and Perspectives.*** Burlington, MA: Butterworth-Heinemann (Elsevier).

Chatzkel, J. (2004) "Greater Phoenix as a knowledge capital", ***Journal of Knowledge Management***, Special issue on Knowledge-based development II: knowledge cities Vol. 8, no.5, pp. 28-46.

Davis, B. E. (2007). *Harnessing knowledge market innovations for business advantage. Wealth Creation & Knowledge Value Innovation in the New Economy.* Toronto: Kaieteur Institute for Knowledge Management. Retrieved on 3 October 2011 from: http://www.kikm.org/downloads/LeveragingKnowledgeMarketsStudy.pdf

Dvir, R (2006). "Knowledge City seen as a collage of Human Knowledge Moments", in Carrillo, F. J. (2006). (Ed). ***Knowledge Cities.*** *Approaches, Experiences and Perspectives*. Burlington, MA: Butterworth-Heinemann (Elsevier).

Dvir, R. and Pasher, E (2004). "Innovation engines for knowledge cities: an innovation ecology perspective" in Journal of Knowledge Management, Special issue on Knowledge-Based Development II: Knowledge Cities. Vol. 8, no.5, pp.16-27.

Ergazakis, K. (2009), 'Rethinking the Development of Successful Knowledge Cities: An Advanced Framework', ***Journal of Knowledge Management***, (Special issue on Knowledge-based development II: knowledge cities), **13**(5), 89-113.

Florida, R. (1995). *"*Towards the Learning Region*"*. ***Futures*** 27 (5), pp. 527-536.

Garcia, B. (2007). "Working and Learning in a Knowledge City: a Framework for Knowledge Workers". *Journal of Knowledge Management*, October 2007 Vol. 11, No.5 pp: 18-30. Annual Special Issue on Knowledge Cities.

Honeywill, R. 2010.What is an intelligent city? How we live, work and play is changing. Retrieved May 6, 2013, from http://rosshoneywill.com/articles/what-is-an-intelligent-city/

Huysman M. and Wulf D. (2005). "The role of Information Technology in building and sustaining the relational base of communities", in ***The Information Society***, Special issue No. 21, pp 81-89.

Kriščiūnas, K. and Daugeliene, R. (2006) 'The assessment models of knowledge-based economy penetration', Engineering Economics, Vol. 50, No. 5, pp.36-46.

Lave J. and Wenger E. (1991) *Situated Learning. Legitimate Peripheral Participation* Cambridge University Press.

OECD Report, (1998). Organisation for Economic Co-operation and Development (1998). *Schooling for tomorrow: what future for our schools?* Paris, CEDEX: OECD.

Perry, B. (2011). Universities and cities: Governance, institutions and mediation. Built Environment. 37 (3), 245-260.

Porter, M. (1995). "The Competitive advantage of the Inner City", in **Harvard Business Review.** May-June 1995.

PriceWaterhouse Coopers. (2005). **Cities of the Future**. *Global competition Local leadership*. Available from www.pwc.com. Accessed February 2007.

Stewart, T. (1997). **Intellectual Capital: The new wealth of Organisations**. New York: Doubleday/ Currency.

Shearmur, R. (2012). Are cities the font of innovation? A critical review of the literature on cities and innovation, in *Cities*, 29 (2), December 2012, S9–S18. Available from http://www.sciencedirect.com/science/article/pii/S0264275112001047 (Accessed 12th March 2016).

Scheel, C. (2011). Innovacities: in search of breakthrough innovations producing world-class performance. *International Journal of Knowledge-Based Development*, 2(4), 372-388.

Stewart, D. (2001). Reinterpreting the Learning Organisation. *The Learning Organisation*. 8(4), 141-152.

Surowiecki, J. (2004). The Wisdom of Crowds. New York: Doubleday-Random House.

Tuomi, I. (2004a). 'Future Challenges of the European Knowledge Society' discussion paper presented at **Institute for Prospective Technological Studies**. IPTS, 11th August 2004. Available at: http://www.meaningprocessing.com/personalPages/tuomi/articles/TheFutureOfTheEuropeanKnowledgeSociety.pdf

Tuomi, I. (2004b). "Knowledge sharing and the idea of Public Domain" Paper presented at the Unesco 21st Century Dialogue on **Building Knowledge Societies**. Seoul, 28 July 2004. A conference organized in the occasion of the 50th anniversary of the Korean National Commission for UNESCO. Available at: *http://www.meaningprocessing.com/personalPages/tuomi/articles/KnowledgeSharingAndTheIdeaOfPublicDomain.pdf*. (Accessed 3rd March 2006).

United Nations Development Programme, UNDP (2002). Developing Capacity through Technical Cooperation: Country Experiences. London: Overseas Development Institute.

Williams, L., Lee, N. & Jones, A. & Coats, D. (2006). *Creating an Ideopolis. Case Study of Manchester*. The Work Foundation, for the Manchester City Council. Retrieved from http://www.manchesterknowledge.com/_filestore/mkc/creating-an-ideopolis-pdf/original/Creating%20an%20Ideopolis.pdf

Wolfe, D. A. (2004). The Role of Higher Education in Regional Innovation and Cluster Development. Jones, G., McCarney,P & Skolnick, M. (Eds). *Creating Knowledge, Strengthening Nations*.Toronto: University of Toronto Press.

World Bank (2002). ***Global Development Learning Network.*** available at: http://*www.globalknowledge.org*/

Work Foundation (2002). Manchester: Ideopolis? Developing a Knowledge Capital. London: The Work Foundation.

Work Foundation (2006). ***Manchester: Creating the Ideopolis.*** Knowledge City Consortium Research Project. March 2005-Feb06 available at: http://www.theworkfoundation.com/research/ideopolis.jsp

Yigitcanlar, T., Metaxiotis, K. & Carrillo, J. (2012). J. (Eds.) *Building Prosperous Knowledge Cities: Policies, Plans and Metrics*. London: Edward Elgar Publishers.