

New Century City Developments creating extraordinary value

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New Century Cities

Industry, government, and institutional action in several cities around the world are converging to create new geographic clusters that promote specific business sectors. The intent of this convergence is to develop the human and social capital that will make these sectors successful in the global economy. These clusters are being established within large-scale real estate development project areas that we refer to as New Century City developments, or NCCs. They are driven by inter-organizational and cross-industry collaboration, open systems for R&D, and workers who have the aptitudes and skills required by the networked, knowledge economy of the future. NCCs are an appropriate response to the current environment of industry transformation, rapid change, and uncertainty.

Distinctive Features

New Century City projects aim to deploy and test current and emerging ideas about city design, planning and development. As real estate projects, these places:

- Provide mixed use and working/living environments that anticipate emerging lifestyles
- Blend digital media into the physical cityscape
- Support business and social activity in physical and online venues
- Use advanced information and community-oriented technologies for efficient management of urban services
- Promote sustainability
- Express narratives that celebrate the experience of place and community
- Leverage transformation of educational systems
- Foster linkages between universities, and between universities and businesses
- Facilitate working relationships among small and large companies
- Foster new processes and arrangements for incubation

The 'science cities' and 'technopoles' of the twentieth century are the antecedents of New Century City developments. Those projects were conceived in the 1970s and 1980s as single use enclaves, built solely for the production of scientific and technological knowledge. NCCs are for the 2020s and 2030s and are being launched in very

different economic, social, and technological times. Strategic visions, not concrete plans, guide their development. They explicitly seek to leverage the synergies between learning, living and working through physical design and information and communications s infrastructures. NCC are launched as tests, rehearsals, and probes even as plans and agreements for implementation evolve. Instead of following a 'learn and launch' model, NCCs 'launch and learn.' They proceed with the assumption that their development is never finished; consequently, their structure and management is designed to be nimble – capable of changing as the economic and social milieu evolves.

Principles, Places, and Goals

The principles guiding the creation of NCCs more closely resemble those of modern enterprises than of traditional city planning. Those principles include:

- A strong narrative about intent and future context
- Guidance by strategic vision rather than by rigid master plans
- Agility—the ability to accommodate rehearsing, beta testing, and continuous improvement
- Guidance by evolving partnerships and the integration of multiple interests
- Decentralized authority and varying degrees of power and influence

New Century City developments are popping up in very different parts of the world: Abu Dhabi (Masdar City); Belfast (Titanic Quarter); Cambridge, Massachusetts (MIT-Kendall area); Copenhagen (Orestad Nord); Helsinki (Arabianranta); Salford/Manchester (Media City UK); Seoul (Digital Media City); Singapore (One North); and Zaragoza, Spain (Milla Digital). These projects vary in focus, size, and organization. They focus on different industry sectors, including: media (content and delivery systems); bio- and nanotechnology; clean energy; design arts; and information and communication technologies. Their sizes also vary. They range from 50onMasdar City in Abu Dhabi at the top end, to Belfast's 185-acre Titanic Quarter, which is neverthelessalso one of Europe's largest waterfront development projects. On average, the size of NCC districts hovers at around 200 acres, such as Helsinki's Arabianranta and the Salford's Media City UK.

Central authorities and master plans direct some NCC development, Seoul's Digital Media City being a prime example. Others, such as the area around the Massachusetts Institute of Technology (MIT), have taken shape over time, loosely guided by strategic visions, with different degrees of collaboration between the academic institution, local government, private developers, and R&D enterprises. Despite these differences, NCCs share a common goal: to promote human and social capital in support of a particular industry, and to do so quickly. NCC projects seek to jump-start and drive human and social capital development within a decade or two; many existing industry clusters, in contrast, have required scores of years to develop.

Organizing for NCCs

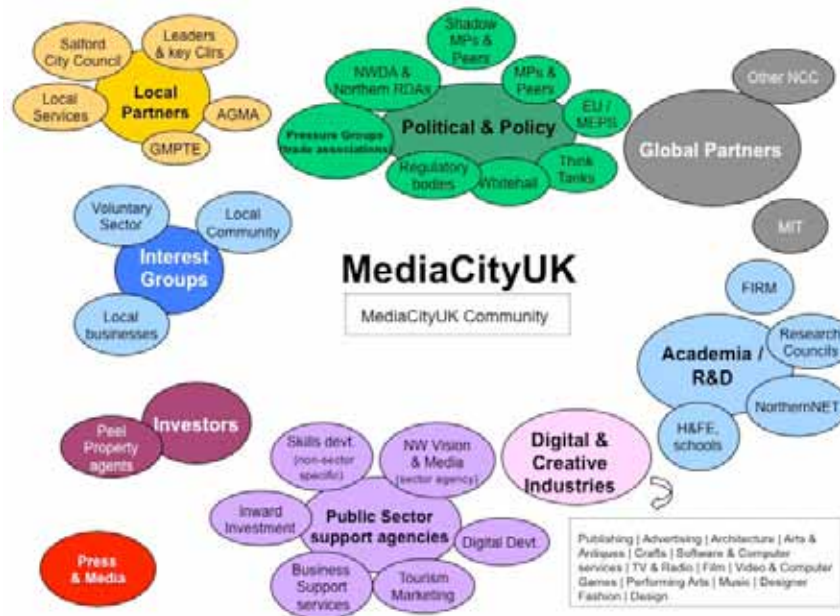
A Complex Array of Participants

New Century Cities have ambitious social, economic and business objectives, and weave together both physical and digital environments. To be successful, they must engage a wide range of organizations: commercial real estate companies, government planners, permitting and development authorities, cultural institutions, universities, public education authorities, industry associations, and manpower development agencies. Large corporations and small and medium enterprises (SMEs) are also players—as tenants and as parties interested in human and social capital development. Venture capitalists and organizations that ‘incubate’ talent also play a part. These projects also attract the active involvement of information and communications technology firms that provide infrastructure and use these places as ‘living laboratories’ in which to conceive and test new services and products. Enterprises in other parts of the world also become involved as business partners, consultants, or contracted agencies.

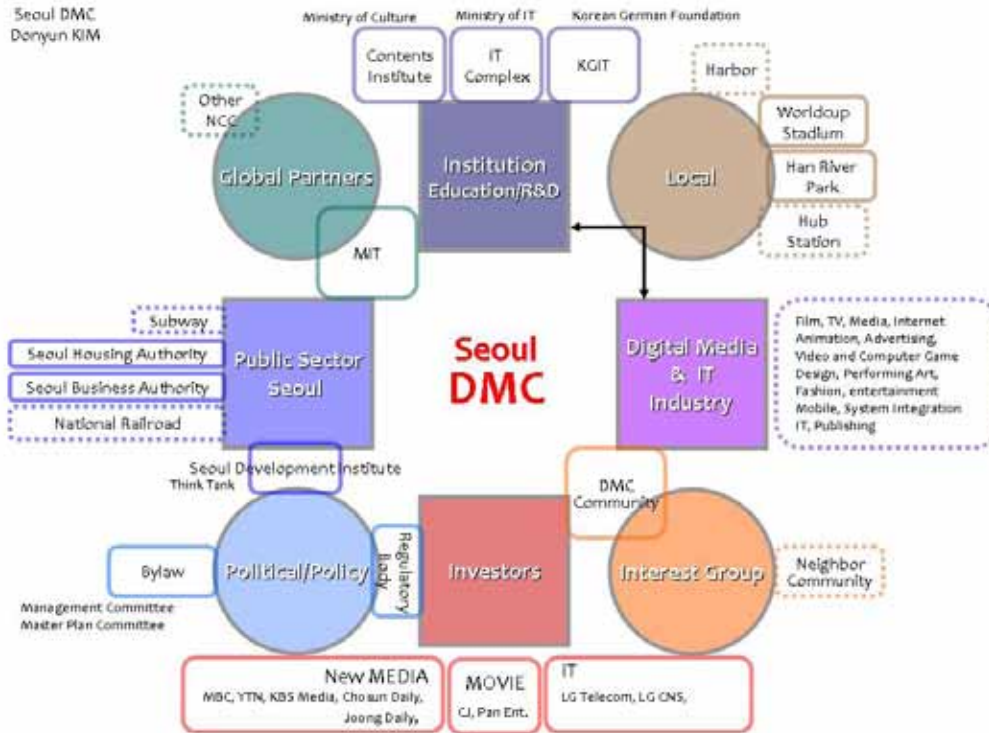
The diagram below describes graphically the convergence of many public, private, and cross-border participants

around the Salford’s MediaCityUK project. The array of NCC participants and stakeholders is more complex than appears on the surface. Of the involved organizations, few are monoliths: instead, they are composed of subgroups that participate at different phases of NCC development. These subgroups have divergent interests and different contributions to make. For example, a university involved in an NCC project may contribute faculty talent from several departments, high-level administrators, and the university’s external affairs staff. Each of these subgroups may act on its own or work through a single enterprise leader. Similarly, a corporate participant will likely harness the talents of one or more of its production divisions, its R&D center, and its new venture groups and will rely upon its corporate real estate and IT divisions to provide the needed systems to support work.

Organizational arrangements take different forms in each NCC, as illustrated by the diagram for the Seoul Digital Media City. Here too a complex array of partners with different objectives and varying degrees of authority and power are involved.



Participants in the MediaCityUK project (by C. Todd)



Participants in Seoul's Digital Media City Project (by D. Kim)

With many participants representing different interests, substantial coordination is required. That coordination must align the interests of real estate and human/social capital development, even when financial models and cultures collide. Real estate developers require predictable financial flows and time schedules represented in a master plan. The interests and tactics of human/social capital developers, however, are not bound by predictions and hard-and-fast plans; instead, they evolve over time and are bound up in strategic visions.

New Century City projects are organized in very different ways; consequently, power and authority among participating stakeholders vary widely. In one project, for example, the land belongs to the government, while in another to a private company. In one project a formally constituted task force of major stakeholders directs overall policy and strategy execution. In another, most decisions are made on a deal-by-deal basis, guided by loosely formed stakeholder coalitions. Some projects are formed around strong, formally organized planning and management groups; others rely on one or more groups to provide network management.

No matter how organized and directed, an individual or group is often designated or evolves into an 'integrator' of the NCC project. This integrator recognizes the objectives of all key stakeholders, speaks the technical or professional

language of each, works across boundaries to build consensus, facilitates joint development, and brokers the deals that must be made for a project to move forward. The integrator understands the project's story and helps key stakeholders shape it in terms that others understand and accept. In the hands of a skilled integrator, that story is a wellspring of creative ideas that serves the project as a whole, even as it respects the objectives of individual stakeholders.

NCC developments are qualitatively different than typical real estate projects. They involve more partners and contributors representing different industries and technical areas of expertise. They are guided by a different vision and a different set of principles. They are organized in different ways. They focus less on completion than on evolution and adaptation. Where traditional projects are fixed, NCCs are flexible. Given these substantial differences, we may be witnessing the rise of a new city building industry, one capable of driving twenty-first century developments that connect industry to industry, institutions to industry, people to people, and enterprises and people to places in new, evolving ways.

Mediated Environments

The Digitally Mediated Public Realm

Elements such as wireless networks, copper wires, fiber optic cables, sensors, radio frequency identification tags (RFID), digital kiosks and handheld electronic devices provide a nervous system for the public realm in New Century City projects. As in many cities around the world, this system is used to manage traffic, utilities, energy, security and other functions of modern life. This system also provides the channel for the flow of information and communication that is the lifeblood of modern organizations and personal life.

Several New Century City developments uniquely use digital media technologies throughout their public realm to create a rich public experience for those who live, work, entertain and shop in them. These are not solely 'technology' interventions, rather, digital technologies are used to enhance the sense of place, to foster community, to engage people in shaping their environment, to delight, and to provide unique experiences to anyone in the area. Technology provides the means but it is the sensibilities and behavior of the people themselves that will create these new environments.

Electronic displays, art and mediated events have long been features in public areas of cities around the world, and many cities have districts that are already full of media. Seoul's Myeong-dong, Tokyo's Ginza and Shibuya, Hong Kong's Nathan Road and Wan Chai, Manhattan's Time Square and London's Picadilly are just a few of the well known commercial streets ablaze with signs and lights, showering those who walk on them with information and sensation. But the mediated environments of New Century City developments are different because they interact with and are shaped by the actions of people. They serve a population, often young or youthful at any age, that is increasingly digitally savvy, accustomed to instantly communicating with anyone, anywhere, interested in experiencing the moment, impatient to satisfy their interests, and acutely wanting to be on the 'edge.'

The potential impact of these new environments for the commercial success of a real estate development project is straightforward: they make the development attractive and brand it as a place of the future. This, it is anticipated, will help to attract the kinds of commercial and residential



*A responsive, interactive media market.
(by D. Frenchman and A. Sanal)*

tenants and visitors that make these projects successful. The street level of buildings, architectural facades and street furniture in NCCs become tableaus for creating experiences. Digitally mediated streets, plazas and media markets appear as a new type of place for public engagement – and are new real estate products.

The elements of a mediated place include ambient technologies, digital systems, and places.

1. Ambient technology

Ubiquitous wireless access to the Internet within an area coupled with location-based services to users in a place, are the keys to mediating a responsive environment. This allows an open flow of information to and from people within the area and elsewhere, enabling them to work, learn, socially connect, inform and entertain themselves wherever they may be.

2. Digital systems

Display and interactive communication systems are incorporated into everyday objects of the city so that they can sense and respond to the environment and people around them. These include programmable and addressable street and building lights, signs, community bulletin boards, pavement, information kiosks, bus stop walls, café tabletops,

shading or awnings, and other elements that facilitate the use of the public environment. These traditionally inert objects can now adjust in real time and are controllable by the public, building or area managers, or the natural environment and social atmosphere of the place itself.

3. Digital places

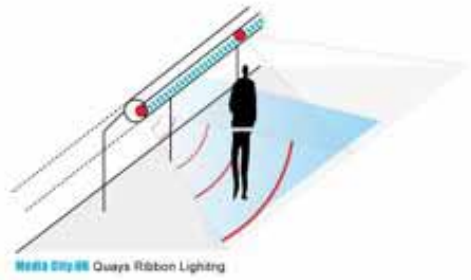
Digital places bring together ambient technology, digital systems, physical form and activity to create a set of specific experiences in geographically defined places. A park, a plaza, a street, a mall can be transformed as a place to celebrate a holiday, to create an event in a moment, to last a moment, for a predetermined time or only as long as people in the area wish. Careful orchestration of the digital and physical elements create a human scale and moderate the level of activity in these places without overwhelming the users, although at times, special events could call for more saturated engagement. These places also create new, often very rich venues for formal and informal education and create opportunities that blend consumption and production, enriching retail, education and entertainment experiences and creating new value. Open source engagement can be a characteristic of these places – that is, the users can access the programmable elements through personal or commonly shared devices (such as kiosks or programmable tabletops or wall surfaces) to modify them to address their interests and needs.

Examples of projects and events of the kind just described can be found around the world. But because New Century City developments are *places of and for the future*, their planners start development with a deliberate vision to create a ‘new’ environment that blends digital technology into the physical fabric. They install the technological backbone and nurture the organizational arrangements and imaginative programming that will eventually make the public realm of these projects engaging and delightful to the people that they host. Developers of several of these projects specifically use the public realm as *laboratories* to test new technologies and its acceptability and uses by the public and to estimate business values. Residents in some of these developments are drawn into this experimental milieu as active participants. For instance, those living in Helsinki’s Arabianranta district voluntary test new media technologies and applications for the development’s ICT partners.



top: in the Zaragoza Milla Digital, a digital framework is overlaid onto the physical framework for development. (by D. Frenchman)
bottom: A scenario for a responsive place system (by A. Sanal)

A new kind of public realm is emerging in several of these NCC developments that is not the slick, efficient, science fiction, highly organized city of tomorrow that is often envisioned in futuristic literature. In reality, the digitally mediated development is kind of messy, with activities and uses all mixed up and things in a constant state of adjustment and change. This kind of changing, responsive environment raises interesting questions concerning who manages the change and who is responsible for programming and adding content to the public realm. The city? Media companies? Real estate developers? The residents, workers or visitors in the area? Such policy questions have always been present in the public realm but



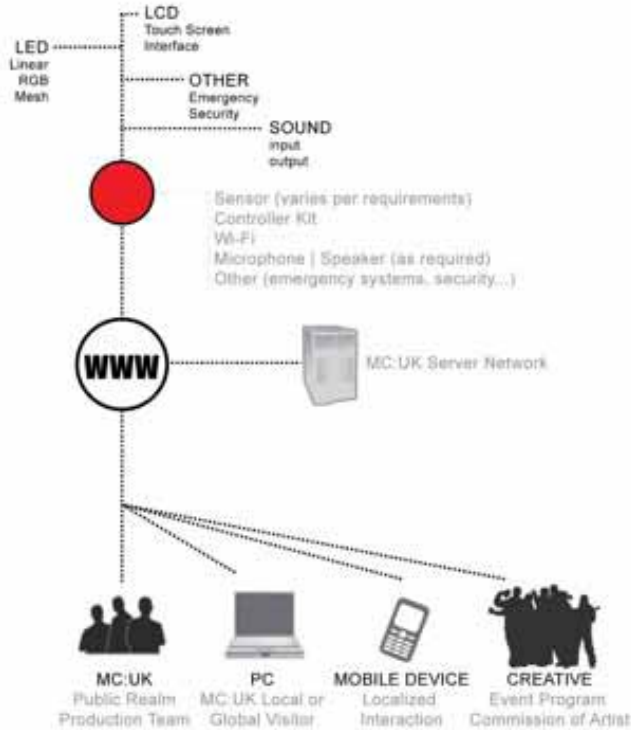
Media City UK Quays Ribbon Lighting



Media City UK Street Lighting



Media City UK Interactive Kiosk



An interactive street lighting system (by A. Sanal)

they become more imperative when change is ubiquitous and can happen in real time.

One approach being explored in Zaragoza is to make digital environments that are 'open source', in which a structure of use and content emerges from the bottom up based on a set of rules imposed from the top down – a kind of 'wiki' Milla Digital. A new cultural institution that engages a wide range of partners would manage this process. Zaragoza's 'open source' approach to civic engagement represents just one way to manage these new interactive, continuously shaping public environments. Here too the future is yet to be invented, and organizational design is likely to be one of continuous development, engaging a variety of partners whose relationships will be set by the particular circumstances that mark each New Century City development.

MIT/Kendall, Cambridge, MA

Location: Cambridge, Massachusetts, USA

Size: 160 acre (65 hectare) campus extending along the Charles River, as well as 95 acres (38 hectares) of MIT-owned land in Cambridge. Technology companies in Kendall Square area add an additional 100 acres (40 hectares)

Dates of Planning and Development: 1916 to present

Link: <http://web.mit.edu/evolving>

Purpose

The Massachusetts Institute of Technology (MIT) is a world-class educational institution whose guiding principle in teaching and research is relevance to the practical world. To this end, the institution has created, a physical, social and intellectual, “infrastructure of invention that fosters the unfettered cross-fertilization of ideas.” This infrastructure is made evident in the neighborhoods that surround MIT, Kendall Square and Central Square, which together form one of the world’s prime biotechnology and research centers.

Background

MIT and the area immediately around it – often referred to by the names of its surrounding neighborhoods, Kendall Square and Central Square– is not a New Century City development in the sense of those we see in Singapore or Helsinki. Those are single developments just coming into existence in the early years of the 21st century. The emergence of the area around MIT as a knowledge-based economic zone started in the middle of the 20th century, replacing an antiquated 19th century manufacturing district. The incremental renewal of the area was spurred by new science and technology based enterprises emerging after World War II, the needs of the Cambridge municipality to rebuild its economic base, and MIT’s desire to enhance the quality of its environment and to provide a supportive physical setting for startup companies emerging from MIT’s laboratories and workshops. What happened within this area illustrates the achievement of many of the human and social capital objectives that motivate NCC developments and its experience is qualitatively comparable to the NCCs.

Industry Focus

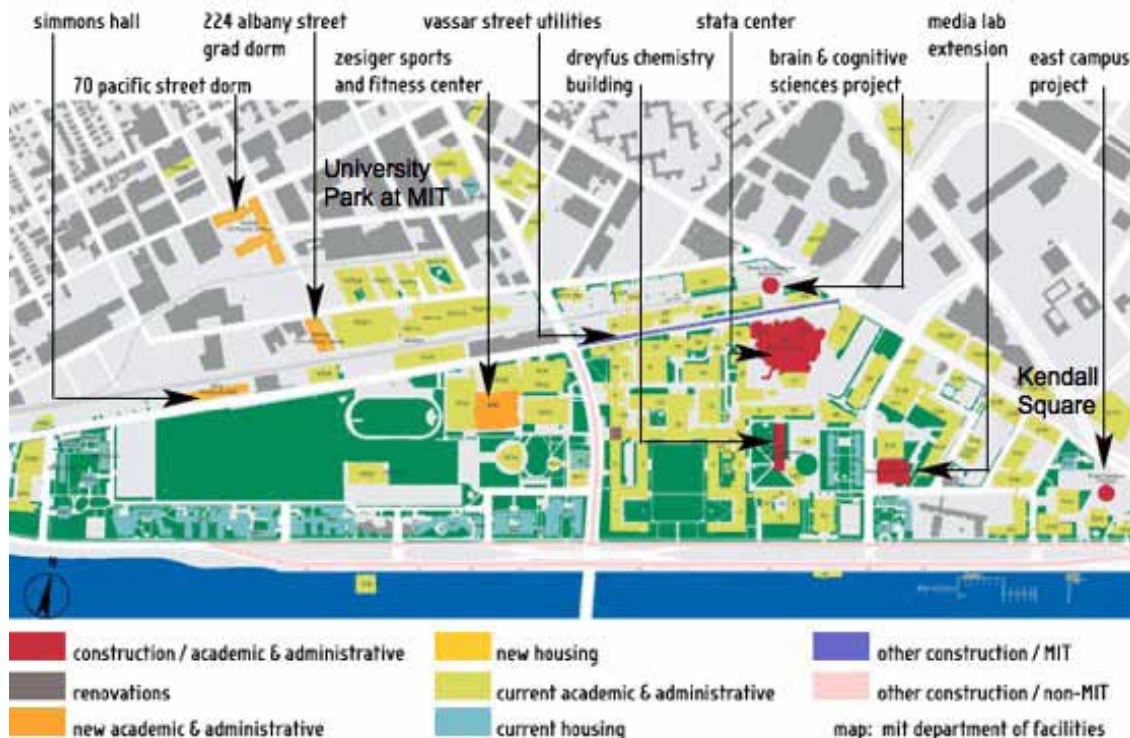
Today MIT and its environs are one of the world’s leading R&D centers and a world-class hub for life sciences, biotechnology, new media, artificial intelligence and nanotechnology. This capability builds upon earlier generations of innovation-based industrial concentrations,



Overview of MIT, Kendall Square, University Park at MIT and Downtown Boston. (Landslides Aerial Photography, from: www.forestcityscience.net)

focused initially on electronics and followed by computer hardware and software developers. The ability of the area to evolve is a tribute to the creative skills of its faculty and students, agile management by the Institute, government, and industry partners to respond to and, at times, drive the ever-changing frontiers of science, technology and society.

The breadth and depth of human capital within the area is extraordinary. The Institute alone has over 20,000 faculty, staff and students. Thousands more highly educated people work for the R&D centers and start-up firms that have gravitated to the area in order to take advantage of the human and scientific capital cluster around MIT and other first-rate research institutes located nearby (Harvard, Boston University, Tufts). If it were a nation, MIT and all of the businesses that it has generated, would rank twenty-fourth in terms of gross domestic product. And it continues



Map of the MIT campus. Buildings in red are recently constructed projects. Most of these are strategically located between Kendall Square and University Park at MIT.

to produce new scientists and engineers who, in turn, are creating new economic value in the private sector.

Innovation is the hallmark of MIT. Many members of the faculty are entrepreneurs as well as world-class researchers. The Institute promotes an entrepreneurial attitude through research, teaching and alumni programs and professional education networks. MIT has a highly professional and aggressive industrial liaison program that spans the globe and actively helps its researchers to commercialize their knowledge and discoveries through its technology licensing office. The Institute also reaches out to Boston area public schools at all levels to engage them in research projects and partners with them to teach science programs. Thanks to the Open Courseware Program, MIT's entire curriculum and teaching materials are made available over the Web to anyone with Internet access. Its researchers work with global partners and its educators teach students throughout the world through ICT networks, even offering doctoral degrees through the Internet.

Development Process

Today's MIT-Kendall Square area has its origins in several plans created in the mid-twentieth century by the City of Cambridge with citizen, industry and MIT participation. During the 1950s and -60s, the City desperately needed to rebuild its economic base, which had declined for many decades. The Post-War national program for urban renewal provided added impetus for addressing these problems. MIT faculty and students, seeking to exploit their extraordinary

research work during World War II, were looking for convenient areas next to MIT to accommodate companies that would incubate this research into commercial products. The Institute also wanted to encourage significant physical improvements to the very deteriorated, long-abandoned industrial area on the northern boundary of its campus. The shared objective was to revitalize the area as a mixed-use physical environment that would provide flexible accommodation for changing technologies, encourage communication between the university and industry, and provide a congenial environment for a knowledge-based work force. The vision that evolved from these plans continues to guide development in areas north and east of the MIT campus.

At critical points in the development of the area, MIT matched its research and development agenda with its real estate investment strategy to help leverage the development of areas adjacent to campus as a base for technology companies. In the early 1960s, at the behest of the City of Cambridge, MIT using a portion of its endowment created a partnership with private developers, Cabot Cabot and Forbes, and embarked on Cambridge's first large-scale commercial development: the Technology Square research and development park. The site of a former soap factory in Kendall Square, this pioneering effort set in motion the renaissance of Cambridge's economy. This was followed in 1965 by a Cambridge redevelopment project for the remainder of the rundown Kendall Square area. This initiative has acted as a long-term seedbed for start-up firms, which originally located in old industrial facilities, and

transformed the area into a landscape of modern buildings housing high-tech and related companies. MIT's financial assistance was an essential component for leveraging federal funds for this project. The decision of the federal government to locate a major research center in Kendall Square, influenced by MIT's immediate proximity, was a critical factor to induce private investment in the area.

Following on from these initial redevelopment efforts, MIT sponsored the University Park at MIT plan as a mixed-use development centered on emerging technologies. MIT invited private developers to undertake this venture on land assembled by MIT in the 1970s and leased to the developer. The Forest City Development Company was selected and they have developed 1.3 million square feet of office and R&D space, almost 700 units of rental housing, a grocery store, hotel and seven acres of parkland. On adjacent sites, MIT has located three MIT graduate student residences.

MIT has participated in the development of these project areas through adroit financial management, by providing support to the City to leverage federal and private funding, drawing industry into the area, providing land for development and generally helping to keep alive the long-term vision of the 1950-1960s plans. Over the past ten years, this vision has increasingly come to include the construction of housing units and retail space in the area around Kendall Square to foster a livelier neighborhood beyond daytime office hours. The City of Cambridge has been changing its zoning laws and creating incentives to foster a mixed-use neighborhood in the Kendall area so that its character shifts away from that of a traditional office park and capitalizes on transit accessibility and the area's location next to MIT, biotech firms, start-ups and other Boston employers. Since 2006, more than 1,700 high-end residential units have been built in the vicinity of Kendall Square, making this Cambridge's fastest growing residential area.

The partnerships that have driven the development of the area over the past half-century continue to operate today. Different parties have taken leadership roles and different partnerships are formed as the economic health of the area evolves and as municipal and MIT leadership changes. Nonetheless, interests always seem to coalesce to keep the mid-20th century vision alive. MIT and the industry in the



*top: new housing in Kendall Square (photo by F. Rojas)
bottom: Site plan for University Park at MIT developed by Forest City.
Buildings in orange are residential and buildings in blue are office
and R&D space (from www.forestcityscience.net)*

area make bets about technology frontiers, but at the heart of the vision for the area is a nimbleness of mind and action that allows key players to respond to technology evolution and the global economy. Technology Square and University Park have gone through at least two evolutions of use and many of the older buildings in the area have seen four different industry waves over the past 50 years.

The evolution of the area is also seen in its pattern of land ownership. The Institute has maintained strong management of its own campus but has been flexible in how it uses the land that it holds outside of the campus. For example, it provided a 75-year land lease to the developer of University Park. MIT also retains the land under the REIT owned buildings at Technology Square, in which MIT once had a major ownership stake. And the Cambridge

Center project, a privately held development within the Kendall Square Urban Renewal project area, was made possible by special provisions of the National Housing Act which encouraged institutions like MIT to help the City of Cambridge finance the public share of the cost of land acquisition, preparation and infrastructure.

MIT has also had a very purposeful agenda for its own campus properties. From the initial design of the university campus at the turn of the nineteenth century, MIT facilities have been designed to encourage cross-disciplinary connections and flexibility of use. Different departments are located next to each other to encourage the cross-pollination of ideas: a laboratory may be next to a classroom and an administrative office may be nestled among lecture halls and laboratories and teamwork spaces are built into computer centers. Facilities are designed to serve multiple purposes over time. For example a wet laboratory may be transformed into a classroom or a classroom may be converted into a research center.

Integrating ICTs and Digital Media

Information technology further links people and places within MIT. High-speed broadband networks exist throughout the campus and all interior and most outdoor spaces are serviced by wireless network connections. Moreover, students have created multiple social networks through a variety of electronic venues at MIT. As one of the originators of the Internet network, during the 1970s and 80s MIT was one of the few campuses in the United States that was served by Internet.

Ironically, although the work of MIT is underpinned by very sophisticated ITC and new media technologies, analog information is what is most visible throughout the campus and its environs. The fruits of the Institute's laboratories have not yet found their way into the public spaces of the Institute or the streets in the area. But this is changing. The MIT Wireless Museum Project, for one, allows visitors to download information to their cell phones or PDAs as they explore the campus. Several proposals for digital mediation of the campus are being considered. New visions for MIT's main corridor, the so-called Infinite Corridor, involve equipping the hallways with sensor-enabled displays personalized to one's preferences. Another proposed plan



A heatmap of the intensity of wireless network use on the MIT campus from the MIT SENSEable City Lab's iSpots project (senseable.mit.edu/ispots)

aims to revitalize the area's streetscapes with new amenities and media displays.

In summary, MIT and its environs constitute part of what every New Century City development aspires to be: a highly productive clustering of leading-edge commercial and academic enterprises connected with each other and with the world; and a producer of the human talent that will be the next generation of innovators and entrepreneurs.

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- MIT Open Courseware, ocw.mit.edu
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Ørestad Nord, Copenhagen

Location: Ørestad district of Copenhagen, Denmark

Size: 110 acres (45 hectares)

Dates of Planning and Development: Masterplan in 1994, inhabitants in 2005, completion 2025

Developers: Ørestad Development Corporation (infrastructure). Development by landowners, private enterprises, and the stakeholders' association, Ørestad Nord Gruppen.

Link: www.orestad.dk, www.orestadnordgruppen.dk, www.crossroadscopenhagen.com

Purpose

Ørestad Nord houses a unique network of research institutions, private enterprises and public organizations, which together strive to strengthen cooperation within the fields of culture, media and communications technologies. The vision for Ørestad North/Crossroads Copenhagen is to establish a place as a unique crossroads where people and creative ideas get together, and where knowledge is developed and used.

Ørestad North is a diverse and experimental city district where physical proximity between culture, business, universities and homes generates activity and life around the clock. Straddling traditional boundaries, it is a zone of inspiration for new projects, new products, new forms of social interaction and knowledge. It aims to be an international powerhouse of research, growth and user-driven innovation, accommodated in a physical place that stimulates quality of life, business and welfare, and where people have the capacity to develop and benefit from advances in information and communication technology.

Background

Ørestad Nord is part of Ørestad, a new development area in Copenhagen. Ørestad is located on 300 hectares (750 acres) between Copenhagen Airport and the City of Copenhagen, wherein Ørestad Nord takes up 45 hectares (110 acres). A residential and working community of over 20,000 people occupies this formerly vacant waterfront site, which is linked to central Copenhagen by a transit line and to Sweden by a bridge crossing the Øresund. Parks and canals within the site integrate water and open space.

Ørestad is divided into four city districts. Ørestad Nord is the most northern district, which is also closest to the historic city center of Copenhagen and has been at the forefront of the district's development. It combines residential uses such as student residence halls and apartment buildings, with institutions such as the Danish Broadcasting Corporation, the IT University and the University of Copenhagen, and the Royal Library. These large institutions have turned Ørestad



Ørestad Nord seen from the east overlooking the City and Harbour of Copenhagen. (courtesy Ørestad Nord Gruppen)

Nord into an international research and development center for culture, media and communication technologies.

Industry Focus

The Ørestad Nord Master Plan originally sought to create a university district combined with student hostels and family apartments. However, when DR - the Danish Broadcasting Corporation - decided to consolidate all of its divisions in a new multimedia center in Ørestad Nord, the original concept shifted in order to recognize the need for a broader mixture of activities in the district. Thus far, a portion of land has been sold to private investors for business premises, and the planning authorities are in the process of changing the original land use principles for Ørestad Nord. At full build out, it is estimated that the land in Ørestad Nord will be occupied by the following: 50% for public institutions (universities and public media), 25% for business and 25% for residential.

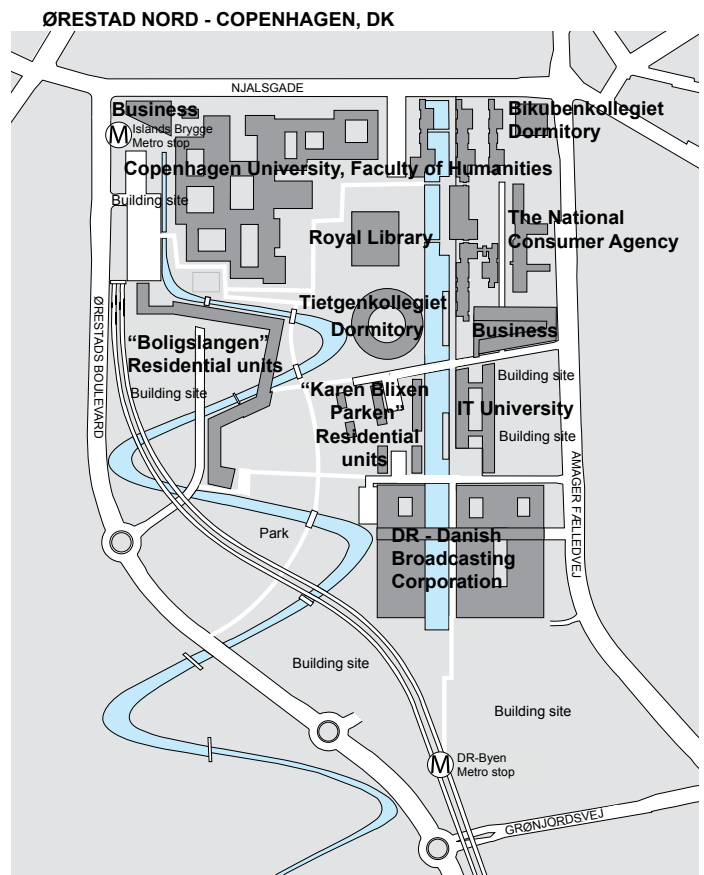
Key public institutions structure Ørestad Nord's industry

focus: culture, media and ICT. The Faculty of Humanities of Copenhagen University has been on site for more than 30 years, the IT University of Copenhagen moved into new buildings in 2004, the Danish Broadcasting Corporation established a new headquarters in DR Byen in 2006, and the Royal National Library has constructed a university library complex. These four main stakeholders – along with the leading Science Park in Copenhagen, Symbion – established the *Ørestad Nord Gruppen* (Group).

Ørestad Nord Gruppen is the organization that represents the users of Ørestad Nord. All the key stakeholders in the district are members, including private companies, public institutions and residents' associations. *Ørestad Nord Gruppen* has become the city development agency of the Landowner's Association and directs all projects in the public realm of the district. It is also charged with defining and maintaining a shared vision for the key stakeholders in Ørestad Nord. The project office of the group serves as the coordination and information center for the district.

Crossroads Copenhagen was created by *Ørestad Nord Gruppen* in 2002 as a platform for collaborative social innovation. It facilitates the realization of ambitious ICT-based projects, combining the talents of private companies, academia, and state institutions. The network was established on the assumption that it is necessary to cooperate across the traditional silos of society to make use of the many new possibilities that ICTs offer. *Crossroads Copenhagen* focuses on facilitating development within the areas of Lifelong Learning, Health, and Sustainability, and is subsidized by the Ministry of Science, Technology and Innovation with 10 million DKK for a period of four years. The members pay an annual fee of 25.000 DKK.

DR (Danish Broadcasting Corporation) is the main public media organization in Denmark, providing public service and programs on all media platforms relevant to Danish media users. *DR* has built a new, fully digitized media center in Ørestad Nord. Known as *DR Byen* (DR Town), it is in full operation and includes working space for 2,500 staff members, TV and radio studios, play-out facilities, public areas with shops and restaurants, and a concert hall for 1,800 people designed by the French architect Jean Nouvel, which was inaugurated in January 2009.



Site plan for Ørestad Nord (courtesy Ørestad Nord Gruppen)

The IT University of Copenhagen (ITU) is a teaching and research-based institution concerned with information technologies (IT). It is funded to undertake theoretical and applied research related to the interaction of information technologies with society. The mission of the ITU is to produce leading academic work that will enable Denmark to become exceptional in creating value with IT.

The University of Copenhagen's Faculty of Humanities is the largest of the University's eight faculties, enrolling approximately 11,500 students who study nearly 50 different subjects ranging from urban planning to Chinese. In order to make its research tangible and accessible to the public, the Faculty is actively pursuing partnerships with institutions and businesses both domestically and internationally. In accordance with this goal, the Faculty has expanded its work in the fields of innovation and entrepreneurship at the student level by launching an incubator for its master's students.

Symbion is the largest science park in Copenhagen and among the leading entrepreneurship players in Denmark. This science park is a dynamic environment where research meets trade and commerce. The mission is to help commercialize innovative and high tech projects in the fields of IT, telecommunications, biotech, pharma and medico. *Symbion* offers various development and growth

programs for high tech startup companies and operates the IT-Incubator 5th at the IT University. The '5th' is a partnership between Symbion, the Alexandra Institute/Innovation Lab Katrinebjerg, and Incubator Science Park. The aim with '5th' is to offer an attractive growth environment to entrepreneurs, students, scientists and established enterprises as well as to serve as a catalyst for establishing co-working and science projects, demos, and exhibition activities.

Finally, *Copenhagen Living Lab* is a private, Danish consultancy firm, operating in the field of user-driven innovation. It develops research methods as well as models and frameworks for open innovation processes. It also facilitates complex co-creation processes, where mutual business partners and customers become involved as active players in the development of new solutions. The company focuses on people-centered innovation, helping organizations to reconfigure their products based on insight into people's practices and perceptions. *Copenhagen Living Lab* takes its name from the Living Lab concept that uses urban environments as platforms for ongoing innovation projects in real world scenarios. With its culture, media and IT-centered population and institutions, Ørestad Nord is considered an ideal place for a large-scale living lab.

Development Process

As a new city district, Ørestad has been developed on the basis of a master plan produced through an international architectural competition in 1994. The City of Copenhagen and the Danish State transferred ownership of the 300 hectares of Ørestad to the Ørestad Development Corporation in 1993. The task of the corporation was to develop the basic infrastructure (roads, open spaces, parks, canals, water supply, electricity). The sales of the building lots financed the infrastructure and the investment in the Metro, which was therefore built without straining the budgets of either the State or the City. Private or public landowners develop their buildings according to individual plans approved by the municipality. When most of a city block is sold off, the responsibility for the further development and maintenance of the shared public areas is handed over to the district Landowner's Association. It is compulsory for all public as well as private landowners to be members of the Landowner's Association. The development process in

Ørestad Nord Gruppen manages the urban development in Ørestad North in cooperation with the Landowner's Association through different types of user-driven projects, and in close dialogue with the Municipality. One type of project is to use undeveloped building sites as temporary public spaces and test-laboratories for different types of activities. The 'test-results' create a knowledge-base for the future planning and development of Ørestad Nord. Other projects include physical interventions to improve the urban climate and scale so that people feel invited to use and stay in the district's public spaces. Temporary shops, moveable street furniture, digital light and media art, and cultural events are all used as tools for generating the experience of urban life in the early stages of development in Ørestad Nord.

Integrating ICT and Digital Media

Ørestad Nord does not have a specific ICT provider; any ICT company on the Danish market can be involved in any development project in the district. However, a number of national and global ICT companies are members of the Crossroads Copenhagen network, among them CSC, Nokia, TDC and HP members of the Board of Governors.

When Crossroads Copenhagen was established in 2002 it was conceived as providing a comprehensive IT infrastructure for Ørestad Nord. However, the private partners concluded that it was not feasible to invest in technical infrastructure before customers had moved into the district, since no public funds were available for the ICT infrastructure. As a result, there is no shared ICT structure integrated in the overall planning of Ørestad Nord.

IT solutions are developed and hosted individually by the different tenants according to their specific needs, such as wireless, cable, , info-screens, etc. When needed, new technical facilities are introduced for research and development projects. The consumer market for electronics, media and ICT is well developed in Denmark and consumers are fast buyers of new products. Consequently, all new residential buildings in Ørestad Nord include connections for cable TV, broadband Internet, and wireless networks.

Nevertheless, in the present conception of Crossroads Copenhagen, the intention is to develop future ICT-related

projects as cooperative, “living lab” style projects involving all of Ørestad Nord’s stakeholders such as its universities, businesses, media-developers and other institutions. For example, the City of Copenhagen is a central partner in a number of current ICT projects hosted in Ørestad Nord, such as the development of new digital teaching tools with the cooperation of DR, Copenhagen University, various ICT companies, and the teachers and students in elementary schools in Ørestad Nord and the high school in Ørestad City.

There are also plans to build a brand new science area in Ørestad Nord, to be known as “International Grounds for New Innovative Technologies, or IGNITE. The IGNITE complex is being designed to accommodate 4 different types of activities:

1. Development of start up companies focusing on technologies to improve life (health, assisted living, public welfare services, edutainment)
2. Research projects and lab/test facilities
3. “Test – housing”, to experiment with the use and functionality of new technologies in student dorms, apartments for the disabled, housing for elderly citizens, etc.
4. Hub and expo areas for future technological possibilities in construction.

IGNITE will be interconnected through high speed IT infrastructure and developed to adapt to new functionalities, changing the use of the various buildings, and testing technologies in real life environments.

Lessons Learned

Transformed from a university district to a vision about the crossroads between culture, media and ICT to a mixed-use residential area focusing on local needs to... what is next? The development of Ørestad Nord is still underway.

A transformation from vision to reality is a long journey. A fundamental question emerged from the first iteration of Ørestad Nord: What is the value of this district, and how is it created? A district is more than a business cluster, more than a knowledge area and more concrete than just an idea. The value of a district is what makes you consider locating there - whether you are a company, an institution or human



top: The Atrium at IT University. Meeting rooms are a part of the life of the building.

middle: Small temporary shops transform a traditional construction site fence into a living shopping zone

bottom: The yellow chairs promote the flexible use of public spaces. (all images courtesy Orestad Nord Gruppen)



The public spaces in Ørestad Nord are galleries for light and media-art exhibitions. This runner (by Epi) crossed facades and infoscreens connecting buildings. (photo by Liselotte Sabroe)

being looking for a home. But how can we describe and create district value?

Development in Ørestad Nord has thus far has been focused on individual projects, as establishing a new district occupies much energy and thus limits people's contribution to external activities. The small entrepreneurs in Ørestad Nord view collaboration as a need – but they don't have the energy and resources necessary to fuel large-scale networks. For the larger entrepreneurs, the idea of establishing networks has been considered a noble, though unimportant, function and may continue to be viewed as such unless they start building their strategies on an extended enterprise model. If they do so, networks might become a "need" and the "value of district" a competitive advantage.

In 2001, the idea of the intersection between culture, media and information technologies became the point of intersection for the founding members of the Ørestad Nord Group. Today, this vision is even more crucial since insight into the motivations for change - the fears, hopes and dreams of people - plays an increasing role in efforts for creating innovation and growth.

one-north, Singapore

Location: Singapore (Buona Vista)

Size: 450 acres (200 hectares)

Dates of Planning and Development: 1995 to the present

Developer: Jurong Town Corporation

Link: <http://www.one-north.sg>

Purpose

one-north is envisioned as Singapore's icon of the knowledge economy. Its focus is on the critical growth sectors of biomedicine, information and communications technologies and media. One of the planning objectives is to develop a dynamic and vibrant community of people working, living, learning and playing in this area. This is in line with one-north being a strategic national project for Singapore – to position the city-state for knowledge-based activities and to develop an innovation milieu with a wide range of stakeholders, including multinational corporations, government and private laboratories, public research institutes, tertiary institutions, start-up companies, incubator centers, and patent law and venture capital firms. Ultimately, the goal is to create a knowledge community bound not just by a place but by a collective identity of innovation.

Background

Originally conceived as Buona Vista Science Park, one-north has developed far beyond the traditional office park. In 1995, Singapore's Science Hub Steering Committee set a goal to develop a creative community centered on knowledge-based industries and the idea of innovation ecology, or efficient information sharing. A comprehensive mixed-use approach was taken to create office clusters that are interconnected by pockets of housing, live/work spaces, retail spaces, and parks. Transit stations and convenient highway access, both existing and planned, connect one-north to central Singapore. More than just "live/work," this community aims for a "live-work-play-learn" mix of uses.

Covering almost 200 hectares, one-north is being developed in phases over a period of 15 to 20 years. Being strategically located within close proximity to the National University of Singapore, National University Hospital, Singapore Polytechnic and Singapore's acclaimed Science Parks, enables one-north to remain connected to an integrated part of Singapore's R&D community. Its design showcases



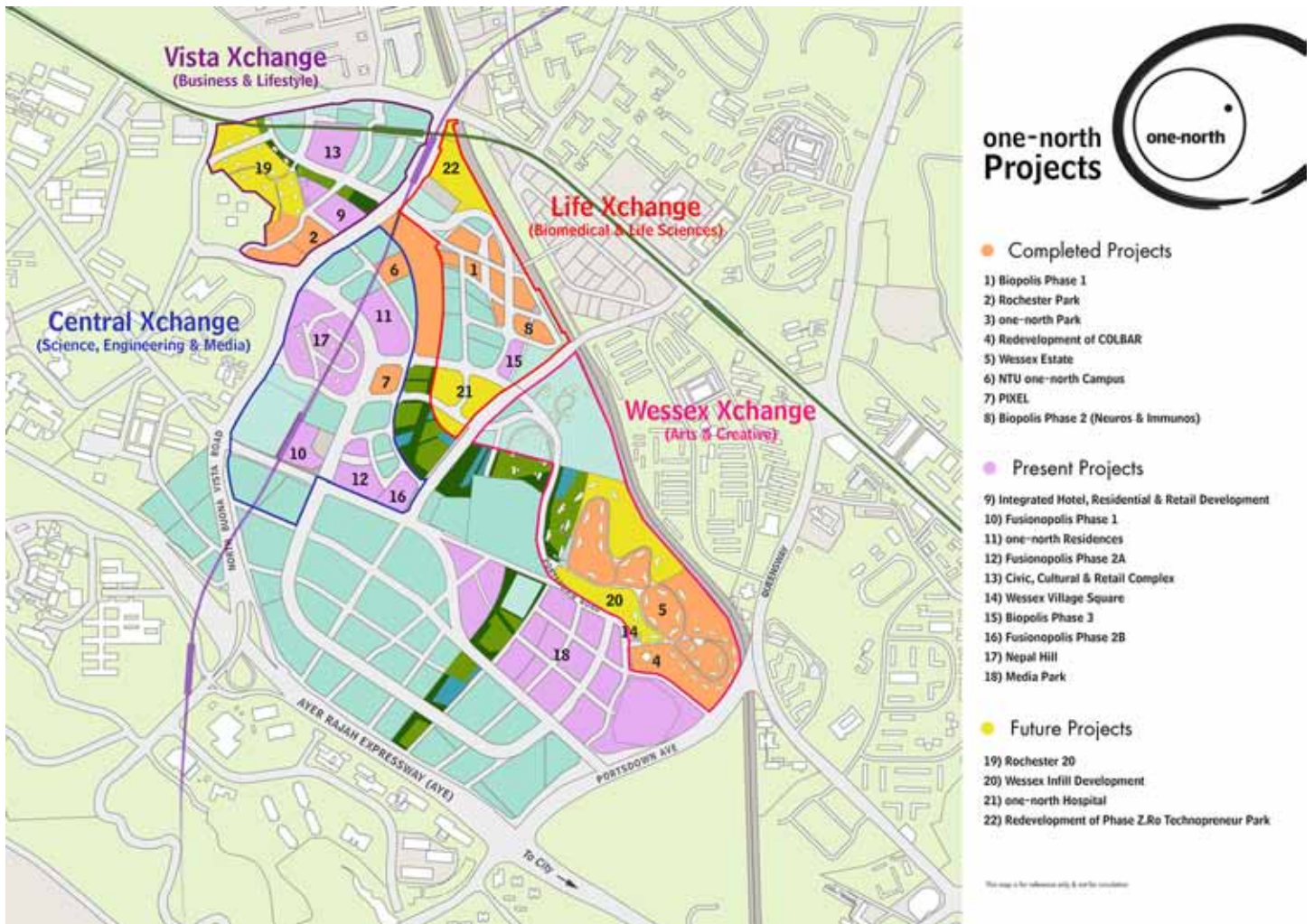
one-north Master Plan by Zaha Hadid (courtesy JTC corporation))

an innovative integration of commercial hubs, research institutes, residential units, educational institutes, sports facilities as well as green open spaces.

Industry Focus

The one-north development is explicitly designed to encourage connections, relationships, and interactions within and beyond one-north. These in turn creates opportunities for collaboration and knowledge-sharing that can lead to greater creativity and innovation.

one-north is organized around three industry clusters or "Xchanges". The development of these separate hubs, as opposed to one central core, was intentional. There is room to grow around each cluster, as well as spaces planned for future Xchanges. one-north is meant to fuse together as it grows, allowing urban spaces to shape their own identities as they develop over time.



The Phasing Plan for one-north (courtesy JTC corporation))

Life Xchange

The Life Xchange, which covers 20 hectares of land, focuses on the biomedical sciences. Biopolis, the purpose-built biomedical R&D hub and the first major development of one-north, is located in Life Xchange. Biopolis Phase 1 opened in 2003 and has a gross floor area of 185,000 square meters (sqm), which houses a mix of public and private biomedical R&D institutes and companies. It comprises a cluster of seven interconnected buildings, linked by skybridges, which are dedicated to biomedical players from the public and private sectors. Biopolis Phase 1 is almost at full occupancy.

Biopolis Phase 2 opened in 2006 to cater to the growing demand for biomedical and R&D space. It is over 80% occupied and offers an additional 37,000 sqm of built-up area.

Phase 3 of the Biopolis broke ground in April 2008 and is a designated multi-tenanted biomedical research facility. It will tap into the synergies of the Biopolis cluster and

support world-class research programs in clinical and translational research as well as medical technology research. The project was awarded to Crescendas Group (the first private developer in the biomedical hub) under a design-build-operate tender and its two buildings, measuring 41,505 sqm in Gross Floor Area, will be completed by the end of 2009.

Central Xchange

Central Xchange encompasses a mix of infocomms, media, science and engineering industries along with residential uses. It covers 30 ha of land with three major developments:

Fusionopolis (Phase 1) is the first major development in Central Xchange and was completed in 2008. It is a high-rise complex of two towers, which total 120,000 sqm of space. Sandwiched between the two towers is the new S\$20 million Genexis Theater, a 600-seat experimental venue known as "The Egg" that can accommodate the event needs of a scientists, engineers, and media people, such as science and arts festivals. Future phases of Fusionopolis will house laboratories covering the entire spectrum of science and

engineering research, adding an estimated 104,000 sqm of space when completed in 2010.

one-north Residences is a 405-unit condominium featuring fenceless and open floor spaces on the ground floor and the integration of two historic Slim Barracks buildings on the grounds. The condos went on the market in March 2007 and the entire development will be completed by 2009.

The Wessex Estate is a colonial style residential area, which has been re-adapted into a creative enclave by the Jurong Town Corporation (JTC). It comprises a total of 26 walk-up apartment blocks and 58 semi-detached houses covering 28 hectares of land. It is home to a diverse community of artists, actors, designers and architects. JTC is currently developing Wessex Village Square, an area offering specialty retail, among other services and amenities.

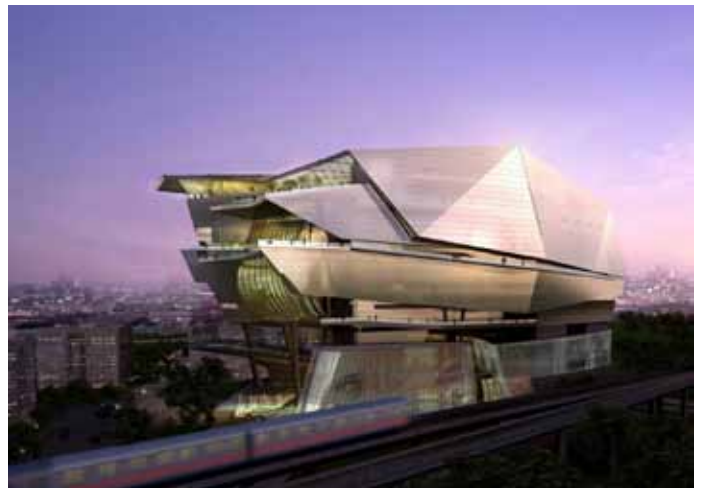
Vista Xchange

Vista XChange is the corporate and business service centre of one-north. When completed in 2011, it will house high-rise offices, a hotel, a retail and urban entertainment centre and residential developments on 17 ha of land. Vista Xchange is well supported by public transportation through the Buona Vista MRT station and a Circle Line MRT station, which is currently under construction. The three major developments in Vista XChange are:

The Hotel and South Park Quadrant mixed-use development which includes a business hotel, residential and mixed-use complex on 1.4 ha to be developed by the private United Engineers Development Pte Ltd. Scheduled to be ready by 2010, it is intended to support a range of accommodation requirements for one-north, providing hotel rooms, serviced apartments and condominium units.

The Civic, Cultural and Retail Complex (CCRC) is a fully integrated cultural and retail complex on a 1.9 ha plot, next to the Buona Vista MRT Station. The CCRC will comprise a Civic and Cultural Zone, measuring over 30,000 sqm in Gross Floor Area ("GFA"), and a 24,000 sqm Retail and Entertainment Zone. It is being developed by a private sector consortium is scheduled to be ready by 2011.

Finally, to create Rochester Park the JTC refurbished 11 of its historic bungalows into a dining and lifestyle hotspot



top: Biopolis, a 185,000sqm biomedical R&D hub comprising five public research institutes.

middle: Fusionopolis, an info-communication, media and sciences hub to be launched in 2008.

bottom: Civic, Cultural and Research Complex includes a 5,000 seat performing arts center. (from JTC corporation, one-north Development Group)

with a distinctive colonial-era façade, conserved to retain the heritage and rustic environment of the area. However, the interiors of the bungalows are customized to suit each tenant's requirements. A variety of retail uses have leased these bungalows including many restaurants and a holistic health spa. There are also plans to convert another 20 bungalow units into a top-class serviced villa resort.

Development Process

The Jurong Town Corporation (JTC), a quasi-governmental developer of industrial space, was commissioned by the Government to lead the one-north project. JTC was formed in the late 1960s as a developer of petroleum and petrochemical processing plants on Singapore's Jurong Island. The organization eventually expanded its scope to include science parks, start-up office space, and housing. JTC was appointed master developer for the one-north project in September 2000. Several government boards advise one-north, including the Economic Development Board, the Urban Redevelopment Authority, and the Singapore Land Authority. The principal national ministries involved are Trade and Industry, National Development, and Law. However, JTC has the necessary authority and operational independence to implement the one-north plan. Private developers and technology firms are involved in one-north through an RFI and RFP process. Opportunities include construction, ownership, and operation of biomedical research facilities, a business hotel, and ICT infrastructure and service contracts.

one-north's mix of uses are carefully selected, clustered, and interconnected. Flexible zoning allows for new urban patterns and a fine-grained mix of uses. A context for interaction is offered, providing an environment conducive to spontaneous, serendipitous interactions between groups that might not otherwise meet. The master plan creates opportunities for human interaction by paying attention to interstitial spaces. Streets are narrow and pedestrian-friendly. A "green river" park, also known as the one-north Park, connects the different clusters or Xchanges. At 16 hectares, the one-north Park is a continuous, multi-purpose spine of landscaped spaces that runs throughout the one-north site. It is also the first public park in Singapore to provide wireless Internet connections. All in all, through planning and design, one-north aims to bring together

talented people, which in turn will generate interesting interconnections among people and "knowledge accidents".

Integrating ICT and Digital Media

The basic ICT infrastructure for one-north involves an integrated wired and wireless network. This fiber-optic based campus network is operated by an appointed Managing Agent who offers high-speed broadband internet connections, VoIP, data hosting, CCTV and other services to tenants and residents. Each building includes a vertical fiber-optic backbone from which tenants and residents have access to the integrated network. The network provides a 100 Mbps connection per tenant and a 20 Mbps connection for each residential end-user.

Two high-performance data centers are linked across the one-north campus by two routes of fiber-optic cable. This dark-fiber connection allows the two data centers to perform as one with online, real-time synchronization of functions. In addition, a dedicated fiber-optic network has also established in the public areas of Fusionopolis, including the one-north Wireless network, to allow R&D firms to test-bed their new IT products or services on campus, similar to the case of the European Living Labs.

Arabianranta, Helsinki

Location: Helsinki, Finland

Size: 210 acres (85 hectares)

Dates of Planning and Development: 1999 to the present (completion expected in 2013)

Developers: City of Helsinki with Art and Design City Helsinki (ADC) Ltd.

Link: www.arabianranta.fi

Purpose

Arabianranta aims to be a leading center of art and design for the 21st century. As a pilot project for the rest of Helsinki, Arabianranta experiments with ‘delivering’ knowledge, just as the city delivers other services to its residents. Arabianranta is also conceived as a ‘futuristic business park’, that combines living, studying and working on the same site.

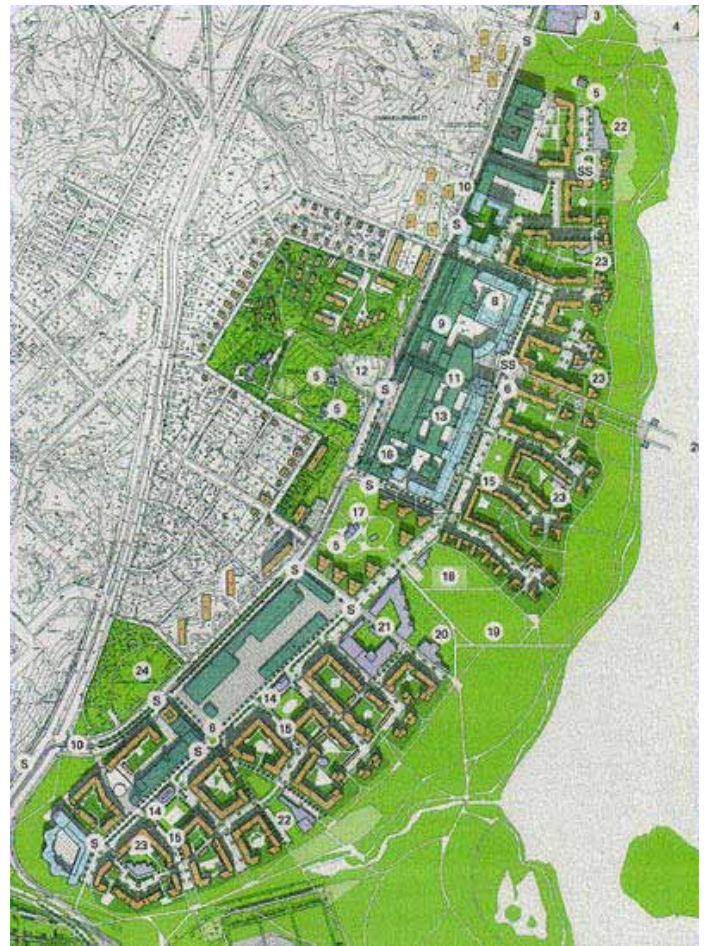
Background

Arabianranta is a waterfront district on the site of Helsinki’s original founding 500 years ago, and home of the famous Arabia pottery factory. As new production technologies allowed the ceramics manufacturer to consolidate its operations in the basement of its original factory building, the rest of the site became available for development in the late 1990s. Over the past ten years, Arabianranta has become a mixed-use neighborhood centered on the themes of art, design, and culture. By 2013 Arabianranta will be home to 10,000 residents of all ages and incomes; 13,000 university students in the fields of art, design and music; a network of waterfront parks and recreation facilities; a neighborhood retail center; and commercial office space, enough for 6,000 employees. Located in the original Arabia factory building are a community library, classrooms for the University of Art and Design Helsinki, and showrooms and stores for Finnish-designed household objects and furniture.

Industry Focus

Art and design is what people value about Arabianranta and the development reinforces this vision through its mix of land uses, urban design, and educational institutions. For example, all of the design and media schools in Helsinki are located in Arabianranta, including the prominent University of Art and Design.

Arabianranta’s development and management entity, Art and Design City Helsinki (ADC) also sponsors a program where public art is included in all buildings, parks and



Site plan for Arabianranta (www.helsinki.fi)

other public spaces. Developers must invest one to two percent of the total development cost on public art. This is a community process where artists and developers work with residents to determine how each building will incorporate art. There is also an artistic coordinator for the district. This program has resulted in several hundred pieces of public art made by 200 artists and showcased throughout Arabianranta.

Another feature of Arabianranta that helps to draw people to the district is its role as one of Europe's first Living Labs. The objective of the Living Lab is to test, evaluate and develop services related to new technologies in real places and not only in R&D labs. So the "learning by living" strategy mixes industrial development processes with real life test-sites. ADC manages the Helsinki Living Lab and determines what services are tested and who participates in the testing. Selected groups are chosen to test services according to their demographics and profiles. Arabianranta's heterogeneous demographics in terms of housing (40% social housing, 60% private housing, including special housing for people with disabilities) and other land uses (university, office, retail, etc.) serves as an asset for the Living Lab function of the district since it presents industry with a broad range of people who can test out services.

Development Process

The City of Helsinki, which owns 70 percent of land in the capital city, assembled the property for Arabianranta. To manage the new development, the city formed ADC Ltd. in 1997. It is a partnership between the Finnish Ministry of Trade and Industry, the University of Art and Design, the City of Helsinki, local landowners, and developers.

The first elements to be built on the site were housing, the parks, and the university buildings. Commercial office space has followed. A public transit line was extended to connect Arabianranta to the center of Helsinki within a 15 minute, one-seat ride.

In Arabianranta there is common ownership of services such as the broadband network, the parking spaces, and the neighborhood public spaces. To ensure that the community ICT network is available to all who live, study and work in Arabianranta, every developer who builds a new building in the district must commit to joining the Helsinki Virtual Village (HVV), a state-of-the-art telecom infrastructure that incorporates the very latest services.

Integrating ICT & Digital Media

A principal goal for Arabianranta is to make fast, modern technology available to everybody – the residents, the enterprises, and the students. The populations within the



top: The Arabia pottery factory building has been reused as a commercial center, community library and for university classrooms (photo courtesy Kari Halinen)

bottom: residential buildings in Arabianranta (photo by F. Rojas)

area are thus linked by the Helsinki Virtual Village network. Community members can access the seamless, ubiquitous system using cell phones, PDAs, digital television, and personal computers. This broadband network delivers a 10MB connection to everyone (with the option of an



upgrade up to 100MB). Users of the Helsinki Virtual Village do not need to register to use the network, they simply plug in their computer or other digital device to access the network. Information security is in-built, and the package includes a firewall and virus blocking. The Internet Service Provider for Helsinki Virtual Village at the moment is Elisa Ltd.

Each residential building has a moderator that takes care of the content in the house's own website. They update, upgrade and moderate their own community's site and determine what information goes on the house sites and what info gets exported to the outside community. Keeping up a discussion board is one of the main duties of the moderator. They also serve as mediators between ADC and its residents. Residents have been very active organizing groups and engaging in discussions via the www.arabianranta.fi web portal. Since all the residents within the project are newcomers to the area, they have a specific interest in meeting and building social networks with their neighbors.

The "Urban Screens" program also integrates the HVV network with the art and design activities within Arabianranta. It is a partnership where the 13,000 university students in Arabianranta provide content for screens placed throughout the district. A media designer collects and selects content for the urban screens and staff from ADC serve as chief editors for the screens.

Launched in 2009 is the www.livinglabs.fi portal, which is a common platform from which carry out the Living Lab projects and a workplace that joins all the different parties involved in Living Labs. Through the Living Lab project, companies and schools use Arabianranta as a real world experiment in community networking. Research related to the Helsinki Living Lab focuses on the social effects of new technologies and on the usability of the applications. Companies involved with this TEKES-project are Nokia, Saunalahti (Elisa), Kesko and Destia and the University of Art and Design, Universities of Applied Sciences ARCADIA and LAUREA, Centre for Knowledge and Innovation Research (CKIR).

Aerial views of Arabianranta (courtesy Kari Halinen)

Seoul Digital Media City, Seoul

Location: Seoul, Korea

Size: 135 acres (55 hectares)

Dates of Planning and Development: 2000 to the present

Developers: Seoul Metropolitan Government, Seoul Housing Authority (Seoul Metropolitan Development Corporation)

Link: <http://dmc.seoul.go.kr/english>

Seoul Digital Media City

Location: Seoul, Korea

Size: 135 acres (55 hectares)

Dates of Planning and Development: 2000 to the present

Developers: Seoul Metropolitan Government, Seoul Housing Authority (Seoul Metropolitan Development Corporation)

Link: <http://dmc.seoul.go.kr/english>

Purpose

The Seoul Digital Media City is a future-oriented, media industry complex that serves as a major center for information and communications technologies in northeast Asia. It is also an incubator for developing new working relationships between large, established companies and start-up ventures, academic researchers, and global R&D networks.

Background

In the late 1990s, the Seoul government first proposed a project that would capitalize on the status of Korea as the world's most wired nation, with its rapidly growing multi-media, information technology (IT), and entertainment industries. The Digital Media City (DMC) promotes these industries – as well as companies whose core business requires the use of information, communication, and media technologies – to grow and prosper in the global business environment.

The DMC project serves the nation's larger goals of transitioning from a manufacturing to an innovation economy and promoting Seoul as an east-Asian hub for commerce. The Seoul government is using the Digital Media City to establish partnerships with technology firms, which in turn serve to leverage the development of human and



*top: Aerial rendering of the Seoul Digital Media City
bottom: Seoul Digital Media City under construction
(courtesy D. Kim and SMDC)*

social capital in the region. The DMC is a major nexus that harnesses the innovations of more than 10,000 small-scale Internet, game, and telecommunications firms already located in Seoul.



The Digital Media City is part of the larger Millennium City project in the Sangamdong district of Seoul, 4 miles (7km) from the central business district. Millennium City is conceived as a new center for Seoul, and also includes the World Cup Park, a high-speed rail transportation hub (that will eventually link to North Korea), the Han River Park built from the restored Nanji-do landfill, and a forthcoming Inner Harbor project.

Industry Focus

The DMC is home to established information and communications companies such as LG Telecom and MBC, Korea’s largest broadcasting firm. It also hosts new media firms including digital publishing, broadcasting, and production studios; content production businesses in the areas of video games, soap operas, and film; and digital media R&D firms. The area also includes office space for start-ups, and other related companies that benefit from digital media technologies.

To ensure capability building in all the digital media fields promoted by the DMC, the Korean Ministry of Culture sponsors a Contents Institute that performs R&D in the fields of gaming, animation and film. Likewise, the Ministry of Information Technology supports an IT

Complex which houses research centers, venture capital firms, space for foreign enterprises such as the firm Intel, and publicly-accessible production and studio facilities. These organizations are located in the DMC. Also on-site is a Korean German Institute of Technology. Also located in or near the DMC are schools, 4,700 units of housing, commercial and convention facilities, entertainment zones, the World Cup Stadium, and 4 subway lines, including one that reaches the airport.

The digital media and IT industries are attracted to the Digital Media City because they: 1) value the project’s spirit of innovation and human capital development; 2) recognize that the project’s mix of tenants and R&D centers offer multiple opportunities for developing their industry; and 3) enjoy the amenities offered on-site including parks, housing, entertainment and retail.

Development Process

Initially, Seoul’s city government propelled the DMC’s development process. As the project has grown, the role of the private sector has increased and the national government has begun to contribute to the development by locating several Ministry-supported R&D centers in the area.

The Seoul Metropolitan Government first acquired the land – the former site of a railroad depot and waste dump near the Han River – for the DMC by eminent domain in 1994. The city government also provided the project's initial funding for the construction of the area's infrastructure, including the installation of a state-of-the-art fiber optic cables. This investment leveraged the involvement of private technology partners and developers.

In order to craft a vision and development strategy for the future-oriented, IT and digital media complex, the government partnered with the Seoul Development Institute (SDI), a public think tank, and with MIT's City Design and Development group. The Seoul Development Institute phased out its full-time participation in the project after the strategic plan was formulated and accepted. Several SDI people then shifted over to form a regulatory body for the DMC, establishing bylaws for development to ensure continuity of concept. Meanwhile, the city's development arm, the Seoul Metropolitan Development Corporation, took charge of implementing the DMC. A crucial aspect of the Development Corporation's implementation task became selecting the project investors in order to achieve the desired tenant mix and to ensure that the development of the project coincided with the city's initial vision.

In order to draw desirable tenants, the Seoul Metropolitan Government provided the IT broadband and wireless network investment to serve the area, constructed the infrastructure, and provided tax incentives and favorably priced land for 'magnet' tenants, which are expected to draw in other companies because of their business relationships and because their presence brands the area as a prestige location. These magnet tenants build their own buildings. The Seoul Metropolitan Development Corporation built two buildings for start-up companies, offering inexpensive space and incubating centers for future industries in Korea.

The DMC has grown incrementally since land went on the market in 2002. There are 51 lots available for development, each being sold separately, and as of 2009, 42 lots have been sold. Seven buildings have already been completed – such as the LG Headquarters – and twenty other buildings are currently under construction. In 2009 the Mayor of Seoul announced that the world's second tallest building would be constructed in the Digital Media City by 2015,



top: rendering of the Seoul DMC Landmark Building Project, to be the world's second tallest building.(from dmc.seoul.go.kr)

bottom: Digital Magic Space (courtesy XX)

measuring 690 meters and containing a convention center, aquarium, offices, residences, hotels, a department store and observation deck in 133 stories.

Integrating ICT & Digital Media

A major feature of the project is the Digital Media Street, an experimental space for cutting-edge media technologies and content. This is where technological innovation is integrated with the everyday experience of a conventional street, mixing entertainment and retail uses with technology applications and incorporating the most advanced digital

urban devices. The Digital Media Street is an opportunity to develop and test new technologies, and to refine them in a living laboratory environment. The street is a permeable realm that blurs the transitional edge between public and private space and joins digital information with physical places. New types of information-rich and responsive infrastructures, based upon wireless and sensor networks, will be installed on the street in several phases. As stated in the Seoul Metropolitan Government publication titled, "Digital Media Street: the new digital media technology laboratory":

The street will run smoothly: maintenance operations of light fixtures and utilities can be controlled digitally, while dynamic street marking and sensors will encourage efficient traffic flow. The street will be informative: interpretive maps and guides will be available on the street and through mobile phones or other personal devices. The shopping experience will be flexible: ubiquitous credit sensing will create stores without check-out lines while "thin shops" will allow people to feel the goods and order custom products for home delivery. Finally, the street will be rich and interesting: coordinated digital displays will set the mood for events, while portals to sister cities will afford glimpses into different places. Technology will effectively serve and manage, as well as entertain.

To guide the Digital Media Street through implementation, the DMC's regulatory body established urban design guidelines to determine the appropriate street-level uses along the street. While the Digital Media Street embodies a fluid integration between the digital and the physical realms, the urban design guidelines nevertheless remained faithful to traditional Korean streetscape design.



a range of new digital infrastructure to be integrated into the Seoul Digital Media Street (courtesy D. Kim and SMDC)

Titanic Quarter, Belfast

Location: Queen's Island, Belfast, Northern Ireland

Size: 185 acres (75 hectares)

Dates of Planning and Development: Master Planning 2004-2006. Phase 1 completion 2009. Phase 2 by 2012. Further Phases up to 2023

Developer: Titanic Quarter Limited – a subsidiary of Harcourt Developments, Dublin.

Link: www.titanicquarter.com

Purpose

Titanic Quarter is a mixed-use waterfront development project firmly rooted in the history and character of Belfast. The project aims to drive high quality investment and economic development in Northern Ireland, and become a high-tech hub for the telecommunications, connected health, education and creative media sectors. It seeks to become a major social and business meeting place with housing, commercial space, academic activities, galleries, theatres, parklands and water sports all easily connected to Belfast's city center. Titanic Quarter aims to be a place for tourism, working, connecting, relaxing, living and learning.

Background

Titanic Quarter's waterfront development will transform a 185 acre site on the banks of Belfast's river Lagan into a new maritime quarter with a mile of water frontage and diverse uses, including over 5,000 apartments; 180,000 sq.m. of business, education, office and research and development space; hotels, restaurants, cafes, bars and other leisure uses totaling some 41,000 sq. m. It stands as one of Europe's largest regeneration projects. The onsite residents,

institutions, and research and commercial activities will benefit from both virtual and physical connectivity: world-class 'Open Access' data networks are coupled with proximity to George Best Belfast City Airport, a new rapid transit system, direct access to the main motorway network, provincial bus and rail links as well as direct pedestrian access to the city center of Belfast.

Titanic Quarter will bring new life to a part of the city that is rich both in history and potential. The site is centered upon former shipbuilding land from which vessels such as the RMS Titanic, Olympic and SS Canberra were launched. Titanic Quarter is co-promoted by Belfast Harbour and Titanic Quarter Limited. The £7 billion plus development project is expected to create at least 20,000 new jobs over the next 15 years.

Titanic Quarter includes the 24 acre (10 hectares) Northern Ireland Science Park (NISP), designed to encourage and support the start-up, incubation and development of innovation-driven, high growth, knowledge-based businesses. NISP has used several strategies to attract start-ups and promote research; one being the Innovation Center's leasing structure, which is short-term and bundled



with a pre-provided advanced data networking service incorporating secure virtual LANs (wired and wireless) for each tenant and high capacity Internet access.

Industry Focus

In addition to the Northern Ireland Science Park, Titanic Quarter consists of three residential neighborhoods and a 'village heart' of commerce and enterprise surrounded by local retail/services and tourism/leisure uses. The development has a significant educational component housing Northern Ireland's largest college, the Belfast Metropolitan College, along with an international creative media campus. Belfast Metropolitan College broke ground on its £44 million campus in May 2009 with a planned opening date in 2011. Already operating on the site is a 64,000 sq ft film studio housed in one of the large waterfront buildings where ships were once painted. There are also plans for a financial services center (Citi already operates two facilities on site employing approximately 1,000 people) and up to five hotels, including a five star boutique hotel based in part of the building where the Titanic was designed. The European Connected Health Campus has also based itself within Titanic Quarter and work is progressing well on a new headquarters for Northern Ireland's Public Record Office. The first residential phase of Titanic Quarter, encompassing 500 apartments, has been completed.

Titanic Quarter seeks to highlight in its urban design the significant maritime industrial heritage of the waterfront site. The waterfront setting includes the atmospheric places where the RMS Titanic was designed, built and launched. A high quality public realm that honors the site's industrial past also links the district's layout, giving the area a strong identity as well as a robust sense of place and personality. At the heart of these heritage assets will be a £100m Titanic visitor attraction which is due for completion in time for the centenary of the ship's maiden voyage in 2012.

Development Process

Titanic Quarter is a co-promotion between Titanic Quarter Limited, a subsidiary of Harcourt Developments of Dublin, and Belfast Harbour. Harcourt Developments Limited acquired Titanic Quarter in 2004 from Belfast Harbour with the Harbour remaining as co-promoters of the project. A



wide range of stakeholders are involved including: the East Belfast Partnership Board (a regeneration authority), the Department of Enterprise Trade and Investment, the Northern Ireland Tourist Board, Belfast City Council, NI Screen (Northern Ireland's Film and Television Commission), the Department of Culture Arts & Leisure, Belfast Metropolitan College, the Strategic Investment Board, the Department of Regional Development, Queen's University Belfast, the University of Ulster, Invest Northern Ireland, Economic Development and Inward Investment, and the Northern Ireland Science Park.

These stakeholders work on a highly cooperative basis, as only some of the relationships have a contractual form. The developers play a major coordinating role but many of the stakeholders are active participants, facilitating the involvement of others. A priority is given to keeping this "governance" fluid to avoid creating a rigid, bureaucratic situation.

Corporate & Community Social Responsibility

As Northern Ireland's largest regeneration project, Titanic Quarter is a strategically important development, not just for Belfast but the wider region. Titanic Quarter is conscious, therefore, of its responsibilities, particularly to communities located in close proximity to the development,

but also to the wider community. Although the development is primarily concerned with physical regeneration, an integrated approach has been adopted that fully recognizes the importance of economic, social and regional cohesion aspects of regeneration.

Titanic Quarter’s view is that such change can only happen successfully if accompanied by a strategy that paves the way for change - by understanding the needs of and enabling local people to influence and seize the opportunities arising from the development. To help deliver this change, Titanic Quarter has entered into a mutual partnership agreement with Belfast City Council that commits both parties to work with relevant public, private, voluntary and community sector organizations to create the necessary conditions to maximize community benefits from the Titanic Quarter development.

Further to extensive consultation, six key Corporate Social Responsibility (CSR) priority areas for action have been agreed:

- 1) ‘TQ Work’ (Employment, Education & Skills)
- 2) ‘TQ Access’ (Accessibility & Transport)
- 3) ‘TQ Outreach’ (Community Outreach)
- 4) ‘TQ Housing’ (Affordable Housing)
- 5) ‘TQ Tourism’ (Tourism)
- 6) ‘TQ Space’ (Quality Open Spaces & Public Art)

Delivery of the CSR Plan will be carried out by a three-tier governance structure comprising of a ‘Strategic Advisory Board’, ‘Co-ordinating Steering Group’ and six ‘TQ Thematic Action Groups’ (one to address each priority area).

Integrating ICT & Digital Media

Titanic Quarter’s infrastructure will provide a fully fibered and resilient network operated on a carrier-neutral, ‘Open Access’ basis. The local network operator’s role is to manage the network and maximize the number of communications service providers (including TV, Internet, telephony, and a wide range of other services) interconnected at the primary and secondary Gateway nodes.

This network design represents a radical realignment of

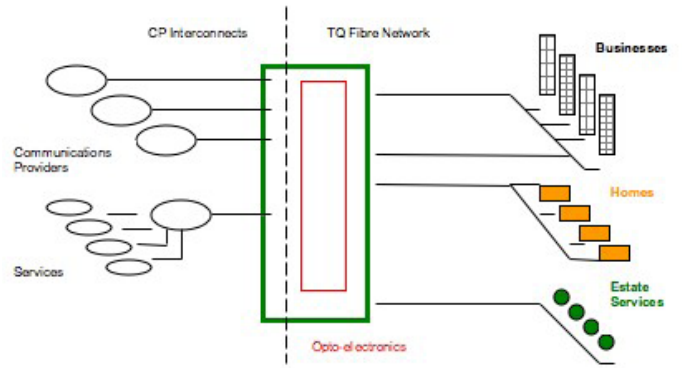


top: Abercorn Apartments, a completed residential project

middle: Belfast Metropolitan College under construction

*bottom: the Public Records Office under construction
(courtesy Titanic Quarter)*

network infrastructure investment models and serves to overcome the reluctance of the incumbent Telcos to provide an adequately future-proofed and resilient network that will attract the widest possible range of innovative and competitive services. A fundamental design principle is that the historic linkage between ‘Access’ route provision and the ‘Services’ that run over that route is irrelevant in an era of



Titanic Quarter outline network schematic for an Open Access Carrier Neutral Communications Infrastructure (courtesy Titanic Quarter)

fully fibered ‘next generation access’. Regulatory remedies for lack of competition such as ‘local loop unbundling’ will not be required at Titanic Quarter because the local access routes are independent of (not dedicated to) any specific telecom services provider.

In this Open Access model, Titanic Quarter’s appointed operator will charge telecom service providers a wholesale fee for use of the local network. It is essential to be able to ensure that their chosen service providers are able to offer effective Service Level Assurances and that diverse routing and business continuity services are readily available.

The benefits of the Open Access network model are:

- **Assurance of future proofing** – the local network capacity can easily cope with uncertain future needs.
- **Service Concurrency** – a single fiber to each household or business office can be used for the *concurrent* operation of several different services (e.g. TV, telephony, security, Internet access) from several different service providers. This concurrency allows the local network to maximize its wholesale revenues.
- **Resilience** – unlike traditional copper networks, the managed fiber network does not have any single point failure. Furthermore the estate does not have the disruption of different Telco’s trying to maintain their networks or related issues of duct sharing.
- **Service Innovation** – the ‘Open Access’ model encourages service innovation (including societal applications aimed at promoting ‘social cohesion’) by removing barriers to market entry.
- **Marketing differentiation**
Titanic Quarter is able to control delivery of a high-quality, world-class local network without reliance of other providers who may have different market priorities.

This local network plan has now been complemented by the opportunity for direct access to a new direct fiber route to North America. ‘Project Kelvin’ has added a spur into Northern Ireland from an existing transatlantic fiber route

– providing both competitive international capacity and lower ‘latency’ for heavy duty real-time applications such as banking transactions, high-definition video editing and graphics rendering. These latter capabilities are key to the successful development of an international creative media campus clustered around the re-purposed ‘paint hall’ film studios.

The connectivity options also include a new secure 4th Generation mobile data service based on the recently-approved IEEE802.20 standard. This is currently being trialed for Connected Health applications (such as remote patient monitoring) and other public sector requirements where the highest standards of information integrity and security conformance apply. Northern Ireland is developing a strong reputation in Connected Health, largely as a result of a major government commitment in the treatment of patients with chronic conditions. The European Connected Health Campus (backed by industry, academia and the health & social care communities) has a remit to develop the European market by addressing four strategic areas: *Governance* (the way health & care services are regulated), *Engagement* (how citizens and professionals are made aware of the need for healthcare transformation), *Procurement* (the tools and techniques for a transition towards purchasing improved health outcomes) and *Implementation* (the ‘Knowledge Transfer’ and learning processes that arise from each deployment).

It is in the combination of these clusters, Connected Health, Creative Media, Education, Finance and Tourism, in addition to world-class housing and leisure provisions, that Titanic Quarter is redefining the term ‘mixed use’ and creating a destination in which to live, to work, to learn and to play.

Milla Digital, Zaragoza

Location: Zaragoza, Spain

Size: 264 acres (107 hectares)

Dates of Planning and Development: 2005-present

Developer: Zaragoza Alta Velocidad with planning by City of Zaragoza

Link: www.milladigital.es

Purpose

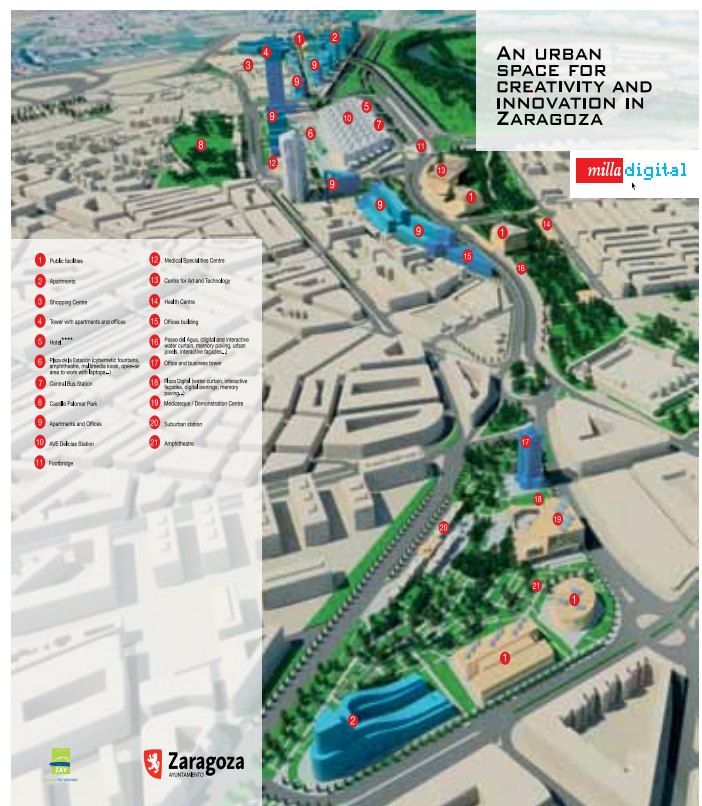
The Milla Digital development is a key element in promoting Zaragoza as a *City of Innovation and Knowledge*, where housing, private firms and public facilities are fully engaged in knowledge-intensive activities. The city seeks to join a high quality urban environment with advanced telecommunications infrastructures from which residents and businesses alike will benefit. It is anticipated that the Milla Digital development will herald the historic city's arrival into the information age, helping companies, institutions and citizens position themselves to form part of the 21st century knowledge economy.

Background

Zaragoza, the seat of the historic Kingdom of Aragon, is a city rich in culture. Located halfway between the much larger cities of Barcelona and Madrid, the city is challenged to position itself as a modern center of business, a desirable place to work and live, and an attraction of significant tourist interest. A new high-speed rail line has brought Zaragoza within commuting distance of both Madrid and Barcelona, creating an opportunity to establish the city as a significant economic center. In order to leverage the city's increased accessibility, Mayor Juan Alberto Belloch has conceived the Milla Digital as a place of recreation, learning, modernity and vitality to help to:

- Create a global identity for Zaragoza;
- Position the city as a regional center of technological innovation;
- Build local skills in the use and development of information technology;
- Activate currently underutilized urban spaces; and
- Express the evolving history and culture of Zaragoza.

The project incorporates digital media into everyday aspects of the public realm, making places that respond to their users, change to accommodate multiple activities, provide stories, information and services, and become deeply



The Milla Digital illustrative site plan (courtesy City of Zaragoza)

meaningful to the rich array of people in Zaragoza who will live and learn within them. The Zaragoza Milla Digital is conceived as an area of parks, offices, housing, and cultural and educational institutions. It connects the Portillo and Aljaferia districts in the city's historic center to the Delicias high speed rail station and to the site of the 2008 World Expo.

Residential areas border both sides of the Milla Digital: one side is occupied by long-term city residents while the other is the home to many of the city's recent arrivals

from South America, Eastern Europe and North Africa. The Milla Digital aims to visually and functionally knit together these disparate elements of the city through a network of community and educational facilities, public spaces that serve multiple users, and digital features to create a public realm that people will find interactive, flexible, and adaptive to different users, activities, and moods.

Industry Focus

The Mayor has expressed his hope that the Milla Digital will become the “technological neighborhood” of Madrid and Barcelona. The Milla Digital will be designed to attract information technology and digital media firms to locate on-site in commercial buildings at Portillo and Delicias – the development’s two nodes of activity. Other amenities, which structure this technological neighborhood, include live/work spaces, recreational infrastructures, and educational facilities. Each node is an “event place” where people are invited to interact in the public realm through digital elements such as water walls, digital pavers, and urban screens. Each node also features two important attractions: the Centro de Arte y Tecnologías in Delicias, a digital art and technology center for exhibitions, creation, research, and education; and the Museo de la Milla in Portillo. These buildings are two branches of a single institution designed to both develop the skills needed to contribute to the knowledge economy and engage residents and visitors with digital media. The Centro de Arte y Tecnologías is where locals and visitors can occupy R&D and lab spaces to innovate in the fields of information technologies and digital media, specifically designing digital interfaces and elements for the Milla. The Museo de la Milla is an interactive museum and acts a content archive for the digital elements of the Mile.

Development Process

The Milla Digital project has been managed by the Mayor’s Office in partnership with Zaragoza City Council’s Department of Science and Technology. To propel the project forward, the city council staff works closely with the Mayor’s office and the Fundacion Ciudad del Conocimiento, a quasi-private foundation established by the Mayor to promote economic development in Zaragoza. These stakeholders also collaborate with Zaragoza Alta Velocidad, a development



top: aerial view of Expo site (foreground) and Milla Digital site on the far side of Zaragoza's Ebro River.

bottom: Zaragoza Expo 2008 (courtesy City of Zaragoza)

corporation representing the national railroad and the Aragon regional government, which is charged with redeveloping the area around the former Portillo rail station and the new Delicias high-speed rail station.

The plans for the Milla Digital evolved in several iterations, beginning with an international consulting firm that developed a high-level, very optimistic first concept. The city's Planning Department then planned the redevelopment site for mixed use and did the initial traffic planning to connect rail and automobile traffic between the entrance to the city and its historic core. The Mayor's office promoted ideas to capitalize on the opportunities afforded by the high-speed rail station and the 2008 Expo. The City Council and the Mayor's office brought in MIT as a "think tank" to expand the notion of a "city of knowledge" and further develop the concept of the Milla Digital into a overall plan that embedded digital media into the fabric of the area and to help the City develop an open source concept into the area's design and management. The Mayor also established a Committee of Experts including thought-leaders from around the world to guide the ideas behind the project and to help expose the concept to the citizens of the Zaragoza.

The project's initial implementation began in 2007 and will carry forward over the coming years. In 2007 the City received a €28 million grant from the national government to kick-off investment on the site. As host to the 2008 Expo, Zaragoza was able to leverage that sizeable development, which is adjacent to the Milla Digital site, to implement the first two mediated projects for the Milla. Opened to the public during the summer of 2008, the Digital Water Pavilion and Paseo del Agua are the two signature projects that have introduced the Milla Digital to the world. The Paseo del Agua is a promenade linking the Delicias rail station to the Expo site along the area where the Milla Digital will be built. In its preliminary stage, it is activated by impressive, interactive, digitally-controlled water fountains and lighting displays. Local residents are heavy users of this area, in particular during hot summer nights, and proclaim to be amazed. The Digital Water Pavilion serves as a place for pedestrians to rest at the terminus of the Paseo del Agua and as an information point about the Milla Digital. TIME magazine declared the Digital Water Pavilion to be one of the best inventions of 2007 in the field of architecture and all reports confirm that it is a building especially loved by children. Another notable architectural work soon to be built on the Milla Digital site is a cultural center sponsored by La Caixa, Spain's largest savings bank. Designed by Spanish architect Carme Pinos, the Caixa Forum cultural



top: pedestrian bridge linking the Delicias train station to the Milla Digital site

bottom: a rendering of the CaixaForum and park in El Portillo (courtesy City of Zaragoza)

institution will open in 2012 and will blend seamlessly with the Portillo park. The building is designed with a virtually transparent lobby so that the building itself appears to float over the park in Portillo.

Integrating ICT & Digital Media

The plan for the Milla Digital intertwines physical and digital frameworks to achieve its performance goals.



the Digital Water Pavilion (photo by Walter Nicolino)

Physical Elements

The Milla Digital reflects Zaragoza's historic and highly regarded urban form to guide the physical framework of the site. Urban design elements are organized along a pathway, termed the Paseo del Agua because of its innovative use of water. The Paseo is anchored by the two event places marked with towers displaying digital media at Portillo and Almozara. A new pedestrian bridge connects the Milla Digital to the high-speed rail station at Delicias and surrounding neighborhoods. This pedestrian bridge is a symbolic gateway to Zaragoza, spanning the highway that leads into the city from Madrid. The Paseo del Agua continues north to the Expo 2008 site, which is accessed by a second pedestrian bridge across the Ebro River. Together, the pathway, bridges, towers and event places knit together the Digital Mile and provide an armature for many uses.

Digital Elements

A proposed digital framework overlays and completes the physical framework:

1. *Ambient technology* – All of the spaces, parks and buildings in the Digital Mile include free, public wireless connectivity as well as access to the responsive media elements on the Mile.

2. *Systems* – Digital systems facilitate the public use and understanding of the environment and are concentrated along the Paseo del Agua. Proposed systems include intelligent street and building lights that can be accessed and programmed to change color or intensity in response to the time of day, demands for use, or artistic desires. Digital street furniture – café tables, bus stops, and signage -- will display information about food content, where your bus is located, or available parking spaces.
3. *Digital Places* – Nodes on the Milla Digital include responsive elements that support different activities and facilitate users' personal association with the urban environment. Elements proposed for the Mile include digital facades; digital awnings, or moveable components that provide shade or modify spaces along the edges of buildings; a memory walk, or digital paving that reflects patterns of use; a programmable water wall that responds to ambient conditions and human interaction; and urban pixels that delineate the boundaries of the site.

In this blended physical and digital design for the area,

buildings, landscape and media lose their traditional boundaries and meld into a layered cityscape of fine-grained places, visual images, and multiple shifting activities. The simple devices proposed for the Milla, when taken together and animated through “open source” software take on an extraordinary organic quality, responding to light, people, and events with subtlety and imagination that forms a new kind of public realm.

Open Source Engagement of Citizens

Guided by the Mayor’s International Advisory Committee and University of Zaragoza and MIT partners, the city of Zaragoza is exploring an open source approach to urban development. This open source approach will go beyond engaging citizens with artifacts created by technology; instead, it gives them opportunities to shape the content of Milla Digital and program its daily use. The City believes that this open source approach will allow Milla Digital to better express the heart and soul of the community, encourage technological skill-building among residents, and establish a sense of resident ownership over the place itself.

In essence, Milla Digital aims to democratize the programming of public spaces. Users will not only be able to modify the activities that occur in those places, but will also be able to change the physical and sensual qualities of the environment through digital interventions.

Three layers of functional operation are necessary for this scenario to be realized:

- A network layer of physical hardware and digital connections, (such as fiber and WiFi) links to various communications networks;
- A code layer through which components of a single installation are made to communicate with and understand each other; and
- A content layer that tells the hardware, through interfaces, what to do.

In the Milla Digital, the content layer will be the most participatory and programmable. By manipulating the content layer, the public will be able to modify what the various technologies do, how they communicate, and what information they carry.

In February 2007, the Mayor’s office convened a group of citizens with IT backgrounds and experience in community development to develop principles under which an open source Milla Digital must operate. These principles elaborated by the Zaragoza stakeholders to guide an open source, participatory process for the Milla Digital include:

- Allow anyone to contribute to the Milla Digital – from the site, from within Zaragoza or remotely;
- Digital systems should be designed to make contributing “not so easy as to be boring, yet not too hard to achieve.”
- Credit all digital contributions to their authors, but guarantee that they be non-proprietary and freely available to everyone for non-profit, creative purposes, both within and outside Milla Digital;
- Encourage the iterative development, review, editing, and modification of all contributions;
- Support self-selected “voluntary communities of interest” that coalesce to develop and manage contributions; and
- Assure that all legitimate contributions (i.e. not profane or copyrighted) form part of Milla Digital in one way or another.

MediaCityUK, Salford

Location: Salford, United Kingdom

Size: 200 acres (81 hectares)

Dates of Planning and Development: 2007 to 2015

Developer: Peel Holdings, Ltd./Peel Media, Ltd.

Link: www.mediacityuk.co.uk

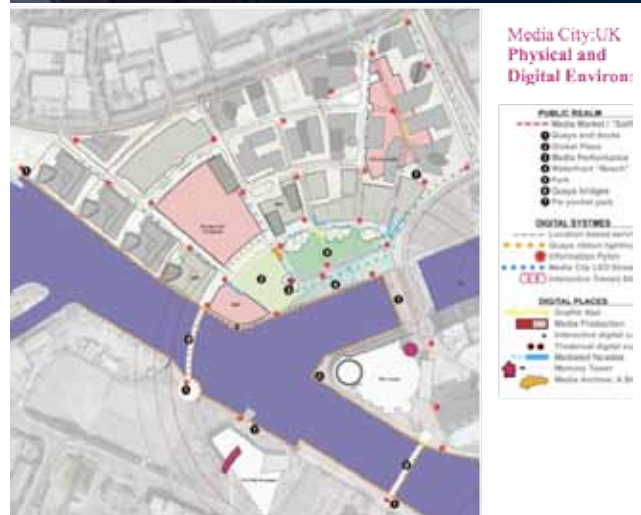
Purpose

MediaCityUK is a creative hub for the United Kingdom's media industry – a place for people working in the creative and digital sectors – from TV production to publishing; gaming to software development. It positions the UK to be globally significant in a context of radical changes in technology, content development and consumer behavior and demand. The enterprises involved in MediaCityUK are networked to spur open innovation across disciplines and with organizations around the globe. Production and research companies join with regional and city authorities to provide the academic training, on-the-job learning, and entrepreneurial support that empowers the next generation of creative professionals.

Background

Salford Quays, at the head of the Manchester ship canal, was once a great port from which England's goods were distributed to the world. Now the Quays is emerging as one of the UK's great portals to the national and global community, through which knowledge, culture and creativity pass into and out of the country. MediaCityUK's development on the Quays significantly builds upon many activities already transforming the regional economy of the greater Manchester area and the Northwestern UK region. MediaCityUK is the second largest construction project in the UK after the London Olympics.

The Quays were unused and deteriorated throughout much of the twentieth century. As the century drew to a close, Salford City Council and several real estate developers, including Peel Holdings, Ltd., initiated an aggressive program of regeneration. They cleaned the polluted canals, established a world-class museum and a repertory theater, built new facilities to host some 13,000 employees and created several hundred units of housing. Peel Holdings, a real estate asset developer with a successful track record of projects with long-term business horizons, had purchased the entire Manchester ship canal, and its considerable land,



top: MediaCityUK under construction

bottom: design framework plan (by D. Frenchman and A. Sanal)

long before MediaCityUK was even envisioned.

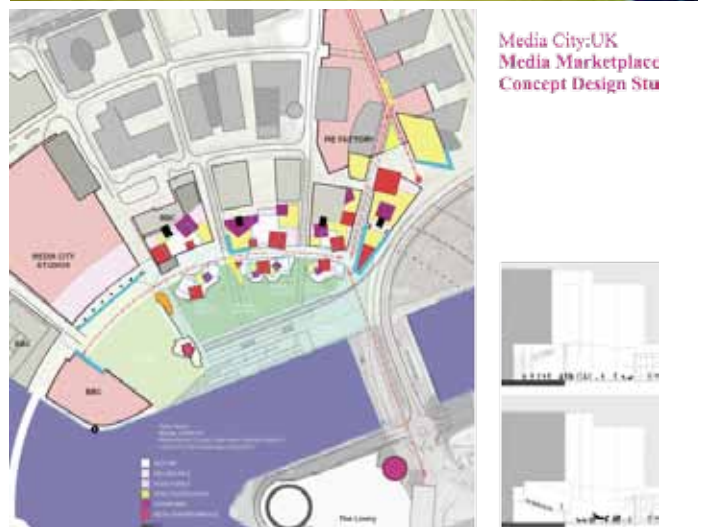
In 2006, the British Broadcasting Corporation (BBC) announced that it would relocate a number of its divisions, and 1,600 staff, out of their long-term base in London. The stated intent was to move to the Northwest, onto a site that would be chosen by a competitive tender. Central Salford Urban Regeneration Company, Salford City Council and Peel Holdings created a bid team that would build on

a cleared 200-acre site completely owned by Peel. This site was bounded on two sides by canal waterfront, was located directly opposite the museum and theater, and was contiguous to a number of recently developed, first class office buildings, most of which had been developed by Peel or on land that Peel had sold to others. Competition for the BBC was fierce, particularly after the search narrowed to two sites. The final proposals to the BBC were quite different, presenting the BBC with a clear choice. One proposed a scheme for several first-rate buildings located next to a regional university, while Salford's proposal was to create a "media city", with considerable, contiguous room to grow on the 200 acre site owned by Peel. The Salford proposal envisioned the real estate development as a way to create a new industry cluster that would help propel the entire UK media industry into the 21st century. In this scheme, the BBC would be a significant tenant, but only one of many. The Salford proposal included provisions for networking among community institutions, the region's schools and universities, and the business enterprises on the Quays to yield the human and social capital required for the future of the industry.

The BBC Trust selected the Salford proposal in June 2007 and site preparation began within weeks. Phase one of MediaCityUK, to be completed in 2011, will cover more than 36 acres accommodating five London-based departments of the BBC and its existing Manchester-based operations, totaling 2,500 staff overall. There will also be a high definition television production studio, three BBC-dedicated (but not BBC owned) buildings, several additional office buildings, a hotel, retail facilities, housing, and a public realm designed for large scale community events for up to 4,000 people. In phase one Salford University will relocate several of its academic departments housing 700 students and staff to MediaCityUK. This will complement an onsite R&D center which will serve as a nexus for the R&D units of companies in the Northwest region and a number of other enterprises and universities; centers for manpower training and enterprise incubation; a media-oriented High School academy and a number of retail activities. When completed, MediaCityUK will host some 15,000 jobs in several digital and creative industries.

Industry Focus

The essence of MediaCityUK will be a network of knowledge



MediaCityUK Media Marketplace rendering and concept design (by D. Frenchman and A. Sanal)

sharing and development activities that create content and delivery systems aligned with 21st century consumer demands and opportunities in the digital and creative industries sector. These activities will take place within a cluster of co-located enterprises on Salford Quays *and* within a network of physically and electronically linked enterprises throughout the UK and the world.

Since MediaCityUK's Spring 2007 launch, the visions and expectations for a "media city" have grown with an increasing number and diversity of stakeholders. Companies that will locate in MediaCityUK expect that the experience of being there, which will facilitate working across company and disciplinary lines, will shape future content and delivery systems. These companies, along with leaders of public agencies and educational and cultural institutions, hope that MediaCityUK will provide jobs and education, culture, and entertainment opportunities particularly suited for the 21st century interests of the citizens of England's Northwest, the host region.

Although these are generally shared visions, how MediaCityUK will evolve as an organizational, business and economic development venture is still being explored. Most stakeholders consider the MediaCityUK endeavor as a phenomenon to be invented. The invention of MediaCityUK is happening in an environment of flux, characterized by the emergence of disruptive technologies, transformative consumer demands, and continuous changes in the organizational landscape of the media industry. What is clear is that the technologies that underpin content production and delivery will continue to evolve, whereby content and production functions will blend and consumers will become producers as well as consumers of media.

MediaCityUK is envisioned as a force for economic and social development beyond its base in Salford, extending through all of the Northwest and the UK. Its influence in this regard is seen as extending beyond even the media industry. It is one of several major nodes in the greater Manchester area that is likely to contribute to the growth of this region as a viable "second city-region" in the UK, complementing the dominance of London as the base of the UK's economic vitality. Thus MediaCityUK adds to the larger context of the region, which includes the downtown of Manchester, the 70,000 seat Manchester United Stadium, Lancashire County

Cricket Ground, cultural hubs such as the Lowry arts center and the Imperial War Museum North on Salford Quays, and as a tourist destination en route to the major retail draw in the Greater Manchester borough of Trafford, with one of the UK's largest, most successful shopping centers, drawing people from the entire north of England. Moreover, the entire area is tied together by the renewal of the canals that run throughout the region.

Development Process

Immediately after the BBC formalized the selection of Salford Quays as their Northwestern location, much of the attention of the developer and BBC turned to construction given a tight deadline of 2011 for move in. This is a deadline that has little flexibility given that the BBC's sports department will have to cover the 2012 Olympics in London from its new home base in Salford.

Key project stakeholders made an important decision soon after the BBC decided to establish Salford Quays as its northwestern base. A dynamic activity in the area was to be immediately launched, even as construction was beginning. The aim was to provide a statement of intent, marking the area as a place for the media sector and giving the area a buzz in advance of completion. An existing but abandoned pie factory on the site was renovated as a television production facility, an incubator and a training academy. Known as The Pie Factory, this popular, always busy place helps to brand the area and provides a place for activities that demonstrate the culture that is expected to emerge in MediaCityUK.

The first phase of development will include 700,000 sq. ft. of office space spread over five buildings, two residential towers with 378 apartments, 80,000 sq. ft. of retail, a hotel and a multi-story car park. The production facilities include 250,000 sq. ft. of studio space made up of seven high definition television studios, two audio studios, and a technical block (control rooms, dressing rooms, workshops, etc.). All of this development will serve as a pilot project for BREEAM Communities, the UK-based Building Research Establishment's Environmental Assessment Method program for sustainable communities. Features of MediaCityUK that make it a good candidate for BREEAM's pilot project include the reuse of formerly



(by D. Frenchman and A. Sanal)

industrial, centrally-located waterfront site and access to the Manchester Metrolink tram system. An on-site heat-and-power (CHP) tri-generation plant, simultaneously providing electricity, heat and cooling will power the area.

In parallel with construction of phase one, the key public sector partners of Salford City Council, Central Salford Urban Regeneration Company and the Northwest Regional Development Agency have set up an innovative partnership to ensure that MediaCityUK has far-reaching and sustainable benefits for the local community and northwestern region. Working closely with site developers Peel Media and a number of other stakeholders, the partnership has committed to a wide-ranging program of interventions and initiatives across three areas: place, sector and economy, and people and communities. A number of projects across the three strands have an overall aim of engaging with and driving the potential of local and regional communities and businesses.

The MediaCityUK development process is now shaped by a constellation of overlapping planning and activity. Each of the key stakeholders in the project – the BBC, the several business arms of Peel Holdings, the University of Salford, public sector agencies, regional tourism authorities, and the association of small and medium technology and media organizations – have been individually working to define their own benefits and future role in the development of MediaCityUK. Gradually, the full vision of MediaCityUK is beginning to emerge as the different groups define their own goals and further shape it with others. Even short of a fully shared vision, key stakeholders understand that something new is being created, something with a unique character and role that will complement the major media cluster in London and, perhaps, even go beyond that as a contributor to the future of the industry. An example of this coalescence of interests is the Framework for Research

and Innovation in MediaCityUK (FIRM), a multidisciplinary consortium of universities and business programs working to inject a powerful research and innovation ingredient into the MediaCityUK development. FIRM is a comprehensive, open-ended, flexible approach that brings together strong technical and social perspectives around major sector challenges, whilst balancing long-term visioning with practical experimentation. This will involve creating a test bed for next generation ICT networks and stimulating joint activity with digital innovators.

Integrating ICT and Digital Media

The MediaCityUK development requires state-of-the-art connectivity to support the substantial demands of media production and transmission. For phase one, Peel Media is installing 18 million meters of fiber, which will deliver high speed broadband to all buildings and which will connect MediaCityUK to every significant media cluster across the North of England through a chain of Media Access Bureaus. There will also be site-wide WiFi for public and private networks, and connectivity to global media and broadcast networks. Discussions are also at a formative stage with a number of global ICT suppliers with regards to provision of a state-of-the-art cloud computing infrastructure.

Scenarios have been developed to create the public realm of the area as a future-oriented mediated environment that will both engage and be shaped by people in the area. The key buildings in MediaCityUK will be centered around a five-acre public area along the canal that has a paved piazza and a landscaped park. The piazza will accommodate events for up to 4,000 people and will include a large display screen among other interactive digital features.

Masdar City, Abu Dhabi

Location: Abu Dhabi, United Arab Emirates

Size: six square kilometers (36,000 hectares, approx. 8,900 acres)

Dates of Planning and Development: 2007 to completion in 2016

Developer: Masdar/ Mubadala Development Company

Link: www.masdarcity.ae

Purpose

Masdar City (“masdar” means “source” in Arabic) is the world’s first clean-technology cluster located in a carbon-neutral, zero-waste smart city. This six square-mile, US\$22 billion special economic zone in Abu Dhabi seeks to become a global center for innovation, research, product development and light manufacturing in the fields of renewable energy and environmental technologies. It aims to be a functioning blueprint for sustainable living around the world.

Background

The government of Abu Dhabi has made a strategic commitment to be a leading participant in the global effort to develop and deploy renewable energy and sustainable technologies. Masdar City is the embodiment of this goal and the engine for its realization. This commitment reflects a desire by Abu Dhabi to achieve sustainable growth, diversify its economy beyond oil, and become an exporter of cutting-edge technologies. Masdar City is one of five units of Masdar, a wholly owned subsidiary of the Mubadala Development Company, the Abu Dhabi government’s investment vehicle.

Masdar City, located in the outskirts of Abu Dhabi, has been designed to be a first-of-a-kind test bed for the large-scale trials and deployment of early-stage, clean energy technologies and practices. It is a place that will play out what it means to be an environmentally sustainable city – from its urban design to its economic base. Projected to ultimately house 50,000 residents and attract 1,500 clean-tech businesses, Masdar City will be car-free and powered almost entirely by the sun. The development is being master planned in a phased manner, precisely so that it is easy to incorporate emerging technologies into the infrastructure and buildings of each new phase, without affecting, or being constrained by, technologies embedded in previous construction. It also has a feedback mechanism built-in, collecting data about all of the city’s systems – buildings, waste, energy, transportation – at the individual level hoping to inform the development of better models of sustainability.



Aerial rendering of Masdar City (courtesy Masdar)

Industry Focus

The six-square-kilometer city will be home to leading multinational companies in the clean technology sector, as well as small- and medium-sized enterprises and entrepreneurial start-ups. The city will be anchored by the Masdar Institute of Science and Technology – a PhD-level, research-driven institution developed in collaboration with Massachusetts

Institute of Technology (MIT) that is focused entirely on education and research in alternative energy and sustainability. It is expected that its graduates will develop innovative ideas, spin off their own start-ups and as such, will be able to access capital from the Masdar Initiative itself. By bringing together intellectual and financial resources from academia and the public and private sectors, Masdar City will create a symbiotic community focused on innovation and deployment for the clean-tech industry.

In light of its desert location and other factors, Masdar City will focus on attracting firms and pursuing research in four primary areas of the clean-tech industry: solar, green buildings, water and power storage, and secondarily in the areas of smart grids, efficiency appliances, electric vehicles and waste.

Masdar City provides a unique setting for companies, institutes and organizations operating across a wide spectrum of activities, from research and light manufacturing to marketing and legal services. It is expected that companies will base R&D labs, global headquarters and regional offices in the city. General Electric, one of many anchor partners, will build, in cooperation with Masdar, its first Ecomagination Centre, a 4,000 square-meter facility that will support the development of energy-efficient products in the region. Masdar City will also host the secretariat of the International Renewable Energy Agency (IRENA), bringing to the city the latest in policymaking and global best practices, and marking the first time an international organization of this size has chosen a Middle East city for its headquarters.

Development Process

Construction on Masdar City began in February 2008, with the first phase reaching completion in 2013. The first building to be completed will be the Masdar Institute of Science and Technology (MI), which welcomed 100 students in September 2009. The building will be ready for students and faculty in 2010.

Masdar City was master planned by renowned architectural firm Foster+Partners, which drew its inspiration from the traditional Arabic city – with its narrow streets, thick-walled buildings, sun shading, courtyards, vegetation, walkability and architecture that capture natural wind

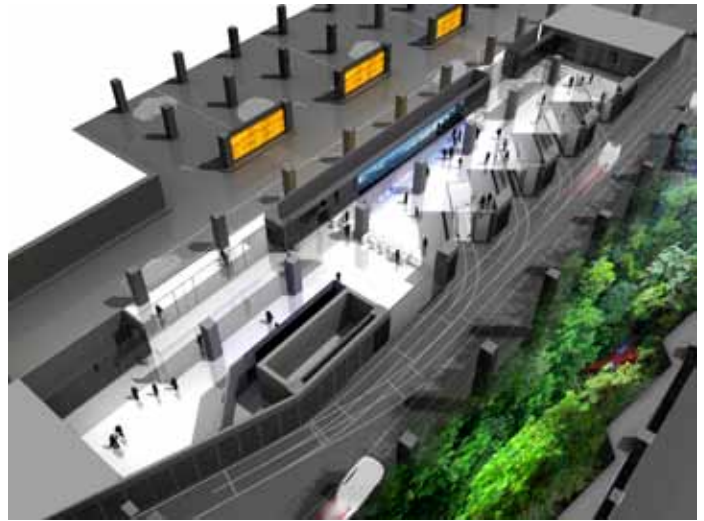


top: Illustrative site plan for Masdar City

bottom: rendering of the town square
(courtesy Masdar)

flows. By removing the need to accommodate cars within the urban fabric of the city, designers were able to narrow rights of way to seven or twelve meters wide, close enough for shade but wide enough for indirect light. As a result, outdoor temperatures will be cooler, making it possible to comfortably be outdoors longer than is currently possible in Abu Dhabi's summer heat and humidity. Carefully planned landscape and water features will also aid in reducing temperatures, while enhancing the quality of the streets and other public spaces. The city will reduce its carbon footprint by developing in a compact area that makes it easy to walk from place to place and by expanding the comfort zone of the city through control of sunlight and wind.

Masdar City is the first city to feature a large-scale transportation system that is carbon neutral and emission free. The entire development is raised seven meters off the ground to accommodate the electric Personal Rapid Transit (PRT) and Freight Rapid Transit systems that, together with pedestrian and public transit methods, will safely move



people and goods throughout the city and ensure that nearly all destinations in the city are no more than 150 meters from the public transportation system. The PRT will connect to a light-rail line linking Masdar City to downtown Abu Dhabi and parking garages outside the city. Also located underneath the city is a vacuum tube system that will relay garbage to a central location where it will be sorted and recycled or composted.

Integrating Clean Technologies

Through the implementation of innovative clean-tech strategies, Masdar City will achieve unprecedented levels of demand reduction for both power and water. Masdar City will require approximately 250 MW of installed clean power versus more than 800 MW of installed capacity to power a similar city based on conventional design.

Masdar City will generate its clean power requirements primarily through photovoltaics, concentrated solar power, and waste-to-energy technology, and will provide an environment that enables zero-waste in residential, retail, commercial, light manufacturing and leisure settings through the reduction, reuse, recycling and recovery of waste materials. The project also employs water recycling, the use of advanced technologies to treat water and achieve an overall reduction in water demand. To test the real performance of the city against predicted performance from lab models, designers and engineers will measure energy consumption and energy production at a very small scale. Sensors in water fixtures will track water consumption and RFID tags in people's security badges at the Masdar headquarters will provide data on how people individually use water and energy.

The Masdar Headquarters building, designed by Chicago architecture firm Adrian Smith + Gordon Gill, will be the world's first large-scale, mixed-use "energy-positive" building, producing more energy than it consumes. The building also will accommodate the IRENA secretariat. Design plans for the headquarters include numerous systems that will eliminate carbon emissions and reduce liquid and solid waste. The complex will use sustainable materials and will feature integrated wind turbines, outdoor air quality monitors and one of the world's largest building-integrated solar energy arrays.



top: rendering of a Personal Rapid Transit (PRT) station

right: cross section of Masdar City detailing the underground infrastructure systems (courtesy Masdar)

During construction of Masdar City, a 10MW photovoltaic plant, the largest such solar plant in the Middle East, powers the temporary Masdar site administration buildings and many ongoing construction activities of Masdar City, including construction cranes and the onsite concrete plant. Built across 55 acres by Abu Dhabi-based Enviromena, the plant was connected to the Abu Dhabi power grid in May 2009.

