RESTART_4Danube

Boosting cREative induSTries in urbAn Regeneration for a stronger Danube region

D.T.3.2.1 Training Handbook- Urban Innovation Management (CCE)

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1. Introduction

Over 70% of the EU's population lives in towns and cities and this growth is set to continue in the coming years. Many of the social, economic and environmental issues Europe faces have an urban dimension and are most likely to have a larger impact in cities. On the other hand cities are where the potential for innovation lies to solve these issues. In Danube region as well, cities have become the engines of economic development and innovation. At the same time, cities have been forced to confront many of the world's most pressing challenges: poverty and inequality, migration, pollution, natural disasters, and other consequences of climate change. In the face of these complex challenges, urban resilience and smart city solutions have become important concepts in the urban governance agenda, providing a way forward for urban local authorities, city planners and urban policy makers. The main results showed that it was necessary to have a horizontal and vertical integrated approach to sustainable urban development, combining soft and hard investments and ensuring the involvement of stakeholders and citizens.

Urban innovation systems are run by actors, who can be firms, knowledge institutions, governments, and/or communities. Cities are made up of a complex network of actors, local resources and relationships that can mutually influence each other and generate change in many directions. All local actors are embedded in this system and have the potential to meaningfully change and improve it. These innovation ecosystems are made up of groups of local stakeholders and relationships that can generate, shape, and incorporate innovations and technology in the local context. Public authorities, private companies, knowledge providers and citizens are fundamental actors that can collaborate to generate meaningful change in urban centres.

Smart Urban Innovations are the result of interactions between various stakeholders from the local innovation ecosystem and their use of resources. Local authorities or city councils are the perfect orchestrators to mediate, orientate or support the different solutions that can arise from the local innovation ecosystem. This handbook aims to guide local public authorities on ways to develop better policy and other approaches that will allow them to identify, enhance, improve and generate smart urban innovations to address local challenges - using the resources they have available in their concrete contexts as well as through new and impactful collaborations with city actors.

This training handbook on urban innovation management focuses on strategies, frameworks and tools to strengthen cities' resilience: their ability to develop and adapt to modern challenges, through the support and development of creative industries.

- Here you will find information:
- Explanation of the Smart cities concept;
- How to develop innovation and operations management in practice?
- What is innovation and types of innovation?
- Innovation as part of the management process;
- How is national system of innovation and enterpreneurship composed of?
- What are the differences between innovation and creativity?
- What includes digitalization in the smart city and biggest challenges and opportunities?
- Presentation of a new business models.

In conclusion, the training handbook provides information for the new digital skills that are consistent with technological and industrial development within cultural and creative industries, focusing on the uptake of digital skills and e-Commpetences and the acquisition of the necessary skills.

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2. Smart City

Over the past two decades, the "smart city" concept has been largely supply-side driven, with the private sector having "taken the leading role so far in defining both the problem and the solution" (Kleinman, 2016) on how digital innovation can help generate new economic opportunities, improve public service delivery and facilitate citizen engagement in cities. This trend accelerated in a backdrop of rising demand for services, shrinking public budgets, and lowering trust in government. Smart cities are at the interface between social and technological dimensions. The concept encompasses "cities of all size", including smaller communities or regional municipalities where various inspiring examples can also be found. However, much of the discussion around smart cities has revolved around the technological dimension mainly due to the initial lead role by corporate organisations such as IBM, CISCO, Intel, and more recently by GE, Microsoft, Oracle, and Amazon. These initiatives tend to focus on the development of cloud based platforms and solutions for smart city projects. The role of technology has therefore been key for the enablement of new production, distribution and governance processes; the transformation of organisational and institutional arrangements; and the information of individual choices and behaviours. However, information and communication technologies are not the only components in providing smart solutions. Social innovation, which creates new social forms and forms of cooperation in society, is also essential. In this context, the capacity of municipalities to involve the various stakeholders (entrepreneurs, academics, non-governmental organisations and citizens) in planning and implementation processes should be emphasised, as well as their ability to agree on the best solutions for development, responsibilities and investments as a result of common efforts.

There are several definitions of Smart city currently used. According to European Commission, A smart city is a place where traditional networks and services are made more efficient with the use of digital solutions for the benefit of its inhabitants and business. A smart city goes beyond the use of digital technologies for better resource use and less emissions. It means smarter urban transport networks, upgraded water supply and waste disposal facilities and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces and meeting the needs of an ageing population.

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Figure 1 Common Characteristics of a Smart City

Source: Handbook on Smart Urban Innovations, UNDP Global Centre for Technology, Innovation and Sustainable Development

Policy implications of smart cities for the future Over the past two decades, different stakeholders have been at the forefront of smart city initiatives worldwide with different expectations and needs:

- The private sector, in particular large companies, has been an advocate, investor and gamechanger in the use of technologies to define and address a range of problems in selected sectors; it is now confronted with the challenge of considering new forms of public-private collaborations to facilitate the uptake of these initiatives in the face of megatrends, regulatory change and infrastructure needs;

- While urban planners have seen data and technology as mere tools to improve administration and services, they are well positioned to anticipate their high impact on policy making and planning and foster complementarities across sectoral initiatives and strategies;

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- The city leaders spearheading smart city initiatives have gained agility and efficiency in their administration, but are struggling to demonstrate tangibly the positive effects on residents' outcomes and the implications on decision-making and local governance;

- Finally, the potential of entrepreneurs, innovators and start-ups, who are also working closely with local governments to build smart solutions to improve life in cities, remains largely untapped.

While digital innovation can yield many opportunities, policy makers often lack a clear understanding of the policy implications, including the challenges, risks and trade-offs of digital innovation in cities, and evidence of how such innovation can be leveraged for more inclusive and sustainable outcomes.

Smart Innovations can help cities to achieve the Sustainable Development Goals and solve their challenges in a sustainable, inclusive, citizen-centric, efficient and collaborative way. As Smart Urban Innovations scale and increase in number in urban centers, they can pave the way for cities to become smart cities.

Smart Urban Innovation management is a way of solving a myriad of urban challenges while demonstrating many of the characteristics that define Smart Cities. Smart Cities are the sum of initiatives, solutions and collaborations that address urban needs and follow the basic Smart City principles presented on the previous page. When we look at these initiatives, we can find a diversity of bold approaches that have been applied in different contexts to solve all types of urban challenges. From flooding and urban mobility, to social cohesion and service accessibility.

Becoming a Smart City is a marathon, not a sprint. Cities are not monoliths or static; they evolve and change. Policymakers have the opportunity to drive specific changes, such as promoting an environment that is conducive to the emergence of other solutions.

Smart Cities have become synonymous with high tech—from 5G, to blockchain to Big Data. These are valuable tools in the urban environment, but a Smart City needs to have more than technology. It needs to be a place where all citizens are included and where sustainability is at the forefront. 'Smart cities' need to be liveable and human-centred.

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3. Operation and innovation management

Innovation and invention

Many people confuse these terms. If you were to ask people for an explanation, you would collect a diverse range of definitions. It is true that innovation is the first cousin of invention, but they are not identical twins that can be interchanged.

Innovation itself is a very broad concept that can be understood in a variety of ways. One of the more comprehensive definitions is offered by Myers and Marquis (1969):

Innovation is not a single action but a total process of interrelated sub processes. It is not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these things acting in an integrated fashion.

Distinguish innovation from invention by suggesting that innovation is concerned with the commercial and practical application of ideas or inventions. Invention, then, is the conception of the idea, whereas innovation is the subsequent translation of the invention into the economy. The following simple equation helps to show the relationship between the two terms:

Innovation = theoretical conception + technical invention + commercial exploitation

An example

Scientists and development engineers at a household cleaning products company had been working for many months on developing a new lavatory cleaning product. They had developed a liquid that, when sprayed into the toilet pan, on contact with water, would fizz and sparkle. The effect was to give the impression of a tough, active cleaning product. The company applied for a patent and further developments and market research were planned. However, initial results, both from technical and market specialists, led to the abandonment of the project. The preliminary market feedback suggested a fear of such a product on the part of consumers.

This was because the fizz and sparkle looked too dramatic and frightening. Furthermore, additional technical research revealed a short

shelf-life for the mixture. This is a clear example of an invention that did not progress beyond the organisation to a commercial product.

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4. Types of innovation

Product innovation- The development of a new or improved product
Process innovation- The development of a new manufacturing process such as Pilkington's float glass process

Organisational innovation - A new venture division; a new internal communication system; introduction of a new accounting procedure

Management innovation - TQM (total quality management) systems; BPR (business process re-engineering); introduction of SAPR3*

Production innovation - Quality circles; just-in-time (JIT) manufacturing system; new production planning software, e.g. MRP II; new inspection system
Commercial/marketing innovation- New financing arrangements; new sales approach, e.g. direct marketing
Service innovation - Internet-based financial services

An example

A $900 shop Looking to build a new office or shop? How about adopting the ultimate in recycling – a building made out of stacked shipping containers? It is generally too expensive to ship an empty container back to its point of origin so there are thousands of them sitting in docks around the world. They are strong, stackable and cost as little as $900. The Dordoy Bazaar in Bishkek, Kyrgyzstan is one of Asia's largest markets. It stretches for more than a kilometre and is almost entirely constructed from empty shipping containers stacked two high. Its success has been copied around the world: in 2011 Boxpark Shoreditch – London's first pop-up shopping mall made completely from shipping containers – opened. (See the case study at the end of Chapter 3 for further details on shipping containers.)

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5. Innovation as a management process

Innovation is not a singular event, but a series of activities that are linked in some way to the others. This may be described as a process and involves:

- a response to either a need or an opportunity that is context dependent;
- a creative effort that, if successful, results in the introduction of novelty;
- the need for further changes.

Usually, in trying to capture this complex process, the simplification has led to misunderstandings. The simple linear model of innovation can be applied to only a few innovations and is more applicable to certain industries than others. The pharmaceutical industry characterises much of the technology-push model. Other industries, like the food industry, are better represented by the market-pull model. For most industries and organisations, innovations are the result of a mixture of the two. Managers working within these organisations have the difficult task of trying to manage this complex process.

Innovation needs to be viewed as a management process. We need to recognise that change is at the heart of it. And that change is caused by decisions that people make. The framework in Figure 1.9 attempts to capture the iterative nature of the network processes in innovation and represents this in the form of an endless innovation circle with interconnected cycles. This circular concept helps to show how the firm gathers information over time, how it uses technical and societal knowledge, and how it develops an attractive proposition. This is achieved through developing linkages and partnerships with those having the necessary capabilities ('open innovation'). In addition, the entrepreneur is positioned at the centre. The framework in Figure 2 is referred to as the 'cyclic innovation model' (CIM) (Berkhout et al., 2010); a cross-disciplinary view of change processes (and their interactions) as they take place in an open innovation arena. Behavioural sciences and engineering as well as natural sciences and markets are brought together in a coherent system of processes with four principal nodes that function as roundabouts. The combination of the involved changes leads to a wealth of business opportunities. Here, entrepreneurship plays a central role by making use of those opportunities. The message is that without the drive of entrepreneurs there is no innovation, and without innovation there is no new business. Figure 2 shows that the combination of change and entrepreneurship is the basis of new business.

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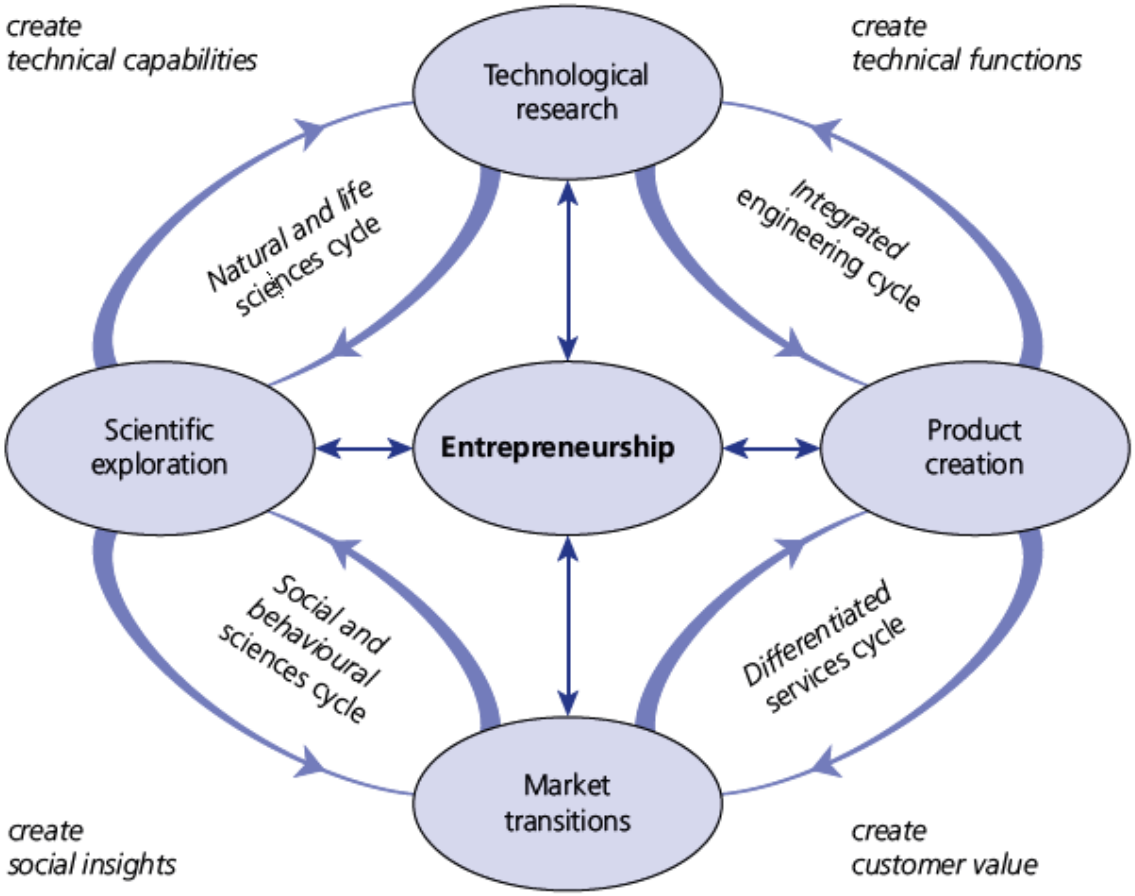
Figure 2 The cyclic model of innovation with interconnected cycles



Source: Berkhout et al. (2010)

The most important feature of Figure 2 is that the model architecture is not a chain but a circle: innovations build on innovations. Ideas create new concepts, successes create new challenges and failures create new insights. Note that new ideas may start anywhere in the circle, causing a wave that propagates clockwise and anti-clockwise through the circle. In an innovative society, businesses are transparent and the speed of propagation along the circle is high, resulting in minimum travel time along the innovation path.

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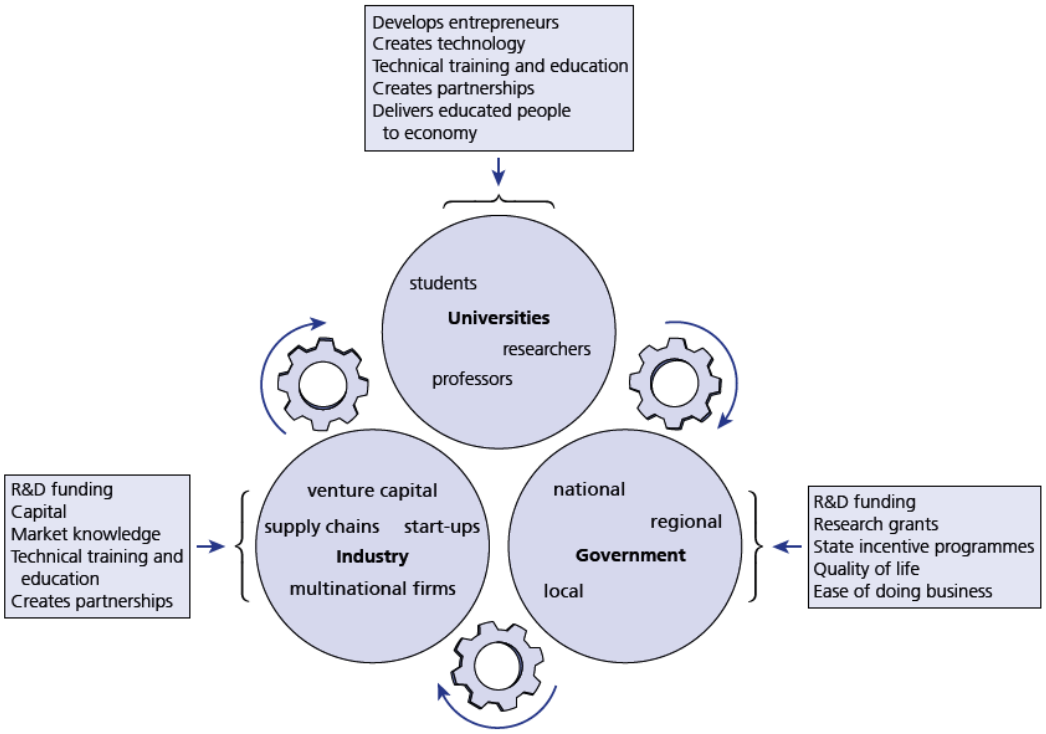
6. National system of innovation and entrepreneurship

Figure 3 Triple Helix of university–industry–government relationships that drives innovation



Source: Innovation Management and New Product Development; P. Trott, 2017

In this integrative model, university–industry–government relations were synchronised at the national level. Similarly, the Triple Helix of university–industry–government relationships initiated in the 1990s by Etzkowitz and Leydesdorff (1995), interprets the shift from a dominating industry–government dyad in the Industrial Society to a growing triadic relationship between university–industry–government in the Knowledge Society. The Triple Helix thesis is that the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university. Specifically regarding the production, transfer and application of knowledge. Emerging technologies can be expected to be more diversified and their life cycles are likely to become shorter than before.

7. Creativity and innovation

It's easy to get confused between creativity and innovation. In many ways they rely on each other. To be creative, an individual, group, or company must be able to come up with new ideas. But to be innovative, they need to act on these ideas.

What is creativity?

As the word suggests, creativity is about creation. It's about harnessing the power of the mind to conceive new ideas, products plans, thought experiments, tastes, sensations or art. Creativity can be a form of expression or a way of solving problems. Anyone can be creative, and in any context. There's creativity in the marketing department, just as there can be creativity on a football pitch.

Creativity has traditionally been left to those 'wacky' companies that are deliberately trying to do things differently, with the majority of businesses tending to favour a traditional and monotone approach to running their organisations. However, the changing business landscape means that companies are beginning to consider a more creative approach to working.

Creativity can help a company manage tasks, improve staff performance and create quality products. It is also vital in fostering a likeable and aspirational company image. With consumers now able to get a snapshot of what company life is like, businesses need to be able to depict their inner culture in a way that makes it seem appealing.

As new technologies continue to develop and become available, companies have to be flexible and able to keep up to date. Creativity allows them to easily identify new ways in which technology can be applied to help their businesses. Likewise, with social media and other interactive forms of marketing now available, it's never been more important for companies to be able to be creative.

Allowing employees to be more creative can inspire them to come up with more interesting ideas as well as improve their overall output. Many of the world's leading companies have started to adopt unorthodox methods of encouraging maximum creativity from their employees, such as sleeping pods and flexible working areas.

To live a creative life, we must lose our fear of being wrong.

Joseph Chilton Pearce

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Exploiting both creativity and innovation in business can boost performance and the bottom line. But first, you need to make space for both to happen.

Encouraging creativity can involve lots of different strategies, from enabling employees to work outside the office to letting people come into and leave the office when they feel ready to, not when they're expected to. The office itself needs to be creativity-friendly and there are ways you can adapt the working environment to support employees' talents.

It's important to let staff feel free when exploring new ideas – whether it's tweaking your existing product or developing a whole new concept. Involve the team, share accountability, reward good work and be ready to respond to market feedback. Remember, your ideas and innovation, no matter how amazing, still need to fulfil a need among customers.

There's no guaranteed source of great ideas, but they do tend to be generated by the most engaged, positive employees. They don't come from staff who are bored or stressed. Great ideas sometimes come from brainstorming sessions, but trying to force out ideas can be counterproductive. In reality, great ideas are equally likely to occur when a particular problem occurs that requires a solution, or even when an employee is on their way home, thinking about their day.

The key is to use your business's culture and processes to capture these ideas when they happen, wherever they come from. Staff suggestion boxes and allocated creative time can work well, but sometimes all that's required is a clear message from the boss that all ideas are welcome.

Three levels of creativity:

1. Creativity /discovery

This is the moment when the creative person comes to a discovery. It's a genuine idea that may come unexpectedly, but may also be the result of a lengthy thought process. For example, you get an idea to create a product that fills a gap in the market. The need for creativity will not stop at this point. It's the thread that connects the entire process.

2. Invention

Invention is creativity brought to a higher level. For example, Mark Zuckerberg's creative idea led to Facebook. But this is often something that would've still happened. If Zuckerberg didn't create Facebook, someone else would have created something similar. If you don't fill in this market gap, someone else eventually will.

3. Creation

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Now, this is the highest form of creativity. Mozart *created* music no one else would've created. When you relate creation to business, it's something that only your organization is capable of. Even if the company does not reach this point, it may still be successful. Innovation, however, is necessary for a business to thrive.

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8. Digitalisation

Digitalisation is one of several megatrends, including globalisation, demographic change and climate change that are reshaping policies from the ground up. For two decades, digital innovation has been at the heart of discourse around "smart cities" to build more efficient and liveable urban environments. In a first instance the concept of "smart cities" was largely supply-side and sector-driven, with the private sector taking the leading role in defining both the problem and the solution for digital innovation to generate new economic opportunities, improve service delivery and facilitate citizen engagement.

For example: smart grids help manage energy consumption; smart meters and pipes help track water quality and detect leaks; smart sensors improve traffic flow, transport efficiency and solid waste collection routes; mobile applications enable citizens to report problems in real-time and engage directly with city services; platform companies like Airbnb and Uber are now a mainstay in cities worldwide; low-cost mobilemessaging, telemedicine and video-consultations improve health outcomes and lower healthcare costs; and self-driving cars and car-sharing platforms alleviate pressure on land use.

More emerging technologies are poised to have strong implications for urban development such as additive manufacturing (3D printing), the Internet of Things (IoT), big data analytics, artificial intelligence (AI), advanced energy storage technologies, civic technology, unmanned aerial vehicles (drones) and Blockchain. While digital innovation remains central to the smart city concept, a key policy question for local and national decision-makers is how to make the most for citizens' well-being of the costly investment in smart technologies, applications and digital innovations.

Several emerging technologies are poised to have effect in cities through 2025 (Table 1). They are predicted to have particularly strong implications for urban development and management such as additive manufacturing (3D printing), the Internet of Things (IoT), big data analytics, artificial intelligence (AI), advanced energy storage technologies, civic technology, unmanned aerial vehicles (drones) and Blockchain. In the intermediate future, autonomous vehicles (AV) are also primed to have a strong impact on cities. In addition, many smart applications are already being used in infrastructure-based service services in the areas of security, healthcare, mobility, energy, water, waste, economic development, housing, engagement and community (Table 1). To name a few: smart grids help manage energy consumption; smart meters and pipes help track water quality and detect leaks; smart sensors improve traffic flow, transport efficiency and solid waste collection routes; mobile applications enable citizens to report problems in real-time and engage directly with city services; platform companies like Airbnb and Uber are now a mainstay in cities worldwide; low-cost mobile-messaging, telemedicine and video-consultations improve health

outcomes and lower healthcare costs; self-driving cars and car-sharing platforms alleviate pressure on land use; e-career platforms boost local jobs and cross-generational bonds; lastly, smart cities also provide opportunity for start-ups, service providers and consultancies related to digital innovation and attract skilled workers.

The concept of smart cities has changed significantly since the original (and narrow) usage combining ICT, digital usages and citizen participation and navigating a complex system of governance involving local administrations, public agencies, firms, citizens and communities. While digital innovation remains central to the smart city concept, a key question is whether investment in smart technologies and digital innovations ultimately contribute to improve the well-being of citizens. This is why the OECD defines smart cities as "initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process" (OECD, 2018a). This definition stresses:

- the need to document better the contribution of smart cities' to improving the life of people while continuing to deliver solutions to some of the most common urban challenges in a sectoral or multisectoral fashion;

- the importance of citizen engagement and collaborative partnerships to boost civic engagement (citizen participation and feedback; co-creation and co-production models; citizen-centred services and engagement platforms);

-the value of experimentation with public access to open data and collaboration within/between cities; private-public-people; national-regional-local scale; and

-the need for integrated, holistic approach to addressing urban challenges through digital innovation in a city's governance, planning, and infrastructure investment.

While digital innovation can yield many opportunities, policy makers often lack a clear understanding of the policy implications, including the challenges, risks and trade-offs of digital innovation in cities, and evidence of how such innovation can be leveraged for more inclusive and sustainable outcomes. On the one hand, there can be important efficiency and sustainability gains from digital innovation, which provides new ways to deliver public services and optimises the use of idle or surplus resources. For instance, the tourism sector in cities can benefit from improved dissemination management (e.g. seamless transport and timely provision of tourism information). Digital innovation can also enable new forms of engagement with a broader range of citizens, and co-production throughout the policy design and implementation process. Moreover, it can create strong impacts on the local job market – for example, new ways of delivering public services may

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provide an opportunity for start-ups, service providers and consultancies related to digital innovation, and attract skilled workers.

On the other hand, however, policy makers must also balance these opportunities with significant challenges to implementation of smart cities initiatives. For instance, there are legal ambiguities and breaches in regulatory frameworks, but also human and technological capacity gaps within city administrations. Digital innovation also comes with risks (e.g. privacy and consumer protection, fair competition, the potential to exacerbate exclusion in the case of a strong digital divide). Finally, digital innovation also requires managing trade-offs among policy objectives (e.g. "smart" initiatives may not necessarily result in more environmentally sustainable or inclusive outcomes).

Assessing and managing those policy implications requires understanding how well smart efforts ultimately deliver in terms of improving the functions of the city and helping city leaders reach their broader policy targets and goals, notably better lives for their residents. Key policy questions for decision-makers, which are targeted within the RDPC's 2019-2020 Smart Cities Programme include:

-How can smart city initiatives support a whole-of-government effort to deliver better urban services and improve the well-being of citizens, through more agile institutions and more transparent decision-making?

- Which tools and strategies can support multi-sectoral initiatives from local governments, building on policy complementarities that are at the core of the multi-dimensional, outcome-based and people-centred well-being concept?

-Which business models and incentives are needed to reap the full potential of the contribution of the private sector in its diversity– from large companies to entrepreneurs, social innovators and SMEs - to smart cities strategies, in a shared responsibility with local governments and stakeholders at large?

- How to measure how smart a city is vis-à-vis intended well-being?

The digital revolution provides a unique opportunity for policy makers to recalibrate local policies from the ground up. In 2016, 83% of all adults and 95% of all businesses in OECD Member countries had access to high-speed broadband. New technologies are transforming how policy makers engage with the labour market, with society and with public services. Around one-half of all people across the OECD have accessed public services or health information online. Digitalisation is enabling one-fourth of all workers in the OECD to work remotely, and e-health technologies have the potential to transform patients' experiences and health outcomes.

Emerging technologies are already becoming indispensable to citizens daily lives, whether they live in cities, towns or rural areas. One often thinks first of smartphones, but there is also artificial intelligence (AI), big data analysis, 3D printing, and industrial robots which produce goods, to name just a few. Other emerging technologies look to be on the verge of making a transformative contribution, like blockchain and self-driving cars. These technological innovations will affect all of society but cities, in particular, stand to be transformed by the digital revolution. Digital revolution brings opportunities for ground-breaking innovations in urban design, policymaking and infrastructure. Many cities are already tapping this potential, often with the close involvement of the private sector. Around the world, governments are making cities "smarter". They are using data and digital technology to help tackle climate change and to improve administrative processes by searching for efficiencies, cutting red tape, delivering better value for money and engaging citizens. Many sector-driven technologies have also contributed to new social initiatives, climate change actions and green growth in cities across a range of areas, through energy, water, clean air and other environmental benefits.

Much has been made of the opportunities generated by digital innovation in cities, in terms of efficiency gains, improved public service delivery, opportunities for more integrated urban services, lower barriers to entry for entrepreneurs and SMEs; greater citizen participation, as well as more transparency and accountability in the public sector. Key take-away messages and examples from select cities are provided in the following sections against some of the objectives of "smart cities".

Improve the integration and delivery of public services

Digital innovation is a means to fundamentally render urban services more efficient. Data-driven innovation in particular can increase efficiency and promote integration of urban systems ("system of systems"). For example, big data availability on transport flows, energy, and water and waste systems allows unprecedented depth of analysis and facilitates targeted real-time interventions for a better management of urban systems. Smart grids can also be connected to transport system (mainly with electric vehicles) and home devices to manage energy supply and demand more efficiently. The electricity grid is a good example of an increasingly integrated system through ICTs and real-time data. A key aspect of such "smart grids" is demand- and supply-side management, enabled by smart metres that contribute to energy savings. A wider potential of smart grids, however, lies in integrating fluctuating renewable energy supply as well as electric vehicles. Electricity grids can also be used to connect communicating devices, known as the Internet of Things (IoT). This includes all machines, devices and services connected via electricity grids and

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information systems, such as solar panels, weather stations, heating and air conditioning, washing machines, dishwashers' light bulbs, or electric vehicles.

The IoT technologies – which could have a total economic impact of USD 3.9 trillion to USD 11 trillion per year (Manyika and Chui, 2015) - can also support the efficiency of public service delivery in a number of ways. For instance, by enabling street objects (street lamps, parking metres) to communicate, which allows a continuous monitoring of their performance and scheduling maintenance only when it is needed – or predict when there is danger of a breakdown. Another example is to be found in the city of Rotterdam, Netherlands, where the Internet of Things (IoT) is used to better plan and manage shipping and reduce the ecological footprint of the port. In addition, innovations in public service delivery may contribute to broader objectives for environmental sustainability: car-sharing and home-sharing applications and platforms help to optimise the use of idle or surplus resources in the economy. Autonomous vehicles can reduce the space dedicated to parking (parking lots, parking garages) in cities, thereby freeing up prime urban real estate for other (potentially more productive or sustainable) activities. Transport provides an example of the promising effects of ICTs and data use in cities. Mobile applications, such as moovel and Citymapper, update commuters on the fastest transfer points, considering all available transport routes and traffic conditions.

Matching demand and supply in real time cuts travel times. This in turn can save people time and money and reduce pollution and emissions in cities. Transport systems can be further optimised by dynamic road pricing and other types of traffic management based on real-time data analytics.

An example

- The Intelligent Traffic Management System of London, United Kingdom not only uses near-time traffic information to constantly adapt traffic light circuits, but also learns from continuing statistical observations to increasingly predict traffic and traffic volumes. The system is estimated to have reduced congestion in London by around 8% annually between 2014 - 2018 (TfL, 2011);

- Hamburg, Germany is working on various policies to reduce the use of cars (e.g. building cycling ways), and adopting Intelligent Transport Systems projects to improve users' mobility experience, including a long term tract for automated and networked driving, investments to move towards green trucks in the harbour area, and a pilot project on urban air mobility;

- Saint Paul, United States also invested in data visualisation capabilities that provide powerful insights into critical service areas such as transport. One example is visualisation dashboards that

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provide in depth analysis for traffic stops within the city. Information includes demographics or motorists stopped, demographics for officers making the stop, reason for stops, vehicle searches, people searches.

- Through a co-creation process with citizens, the city of Umea, Sweden is developing new sustainable housing areas to counteract urban sprawl and allow for a lifestyle without car ownership. The new developments in the city are in line with "the city of 5 km", a dense mixed city reducing cars and promoting walking and cycling. Households are provided with positive feedback for sustainable behaviour, based on sensor driven demand-side management. Energy systems are also based on 100 percent renewable energy in the whole district.

Enhance environmental sustainability and resilience

Digital innovation can also bring opportunities for sustainability and resilience in cities. Unmanned aerial vehicles, for instance, could allow geospatial surveying, and more accurate and cost-efficient air and water pollution monitoring, where information can be shared with citizens in real time. Smart meters and dynamic pricing on electricity have the potential to drastically change the energy consumption patterns of firms and households. They can provide incentives to adapt energy consumption to energy demand. Moreover, electrically powered cars, bicycles and scooters could considerably reduce air and noise pollution. The circular economy, a concept that aims to improve economic and resource efficiency, can also be enhanced by digital innovation, which allows more accurate management of consumption and production processes. Early warning systems for floods and other types of natural disasters could improve preparedness, response and recovery.

Several cities have implemented ambitious smart cities programmes that seek to achieve better sustainability and resilience:

- An example can be found in integrated energy solutions such as district energy or heat pumps. For instance, the city of Yokohama, Japan, introduced a Community Energy Management System to achieve efficient energy management, including the installation of emergency management systems in 4,200 homes, the introduction of 2,300 electric vehicles and of 37 MW of photovoltaic generation, and the reduction of 39,000 tonnes of CO2 emissions (IEA, 2016).

- The city of Bristol, United Kingdom is another example of energy efficiency through smart equipment. Bristol is taking part in an EU-funded smart city project (REPLICATE), looking at how smart city solutions can directly benefit local residents and be scaled up and replicated. The project

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aims to promote new ways of reducing energy use, rethinking transport choices and using infrastructure. As a part of this initiative, Bristol is developing an Energy Demand Management System and creating smart streets with 24 street charging sites.

- In the city of Groningen, the Netherlands, smart bins automatically send text message to the city government when they are full. It allows reducing labour and petrol costs – and thus environmental impacts – by sending garbage trucks only to bins that need emptying.

- The Flood Early Warning System of the city of Austin, United States, combines flood maps, realtime data and predictive modelling to improve the efficiency of evacuation decisions and plans. The system predicts which streets will become flooded up to six hours beforehand and maps flooded areas and road closure. Before this system, evacuation mostly took place after the disaster had occurred.

Reduce barriers to entry for entrepreneurs and small firms

After an initial development of software, digital products can be produced with a very low (or even sometimes zero) marginal cost, resulting in extreme returns to scale. Successful innovators in ICT businesses can benefit from a temporary exclusivity based on first-mover advantage, intellectual property rights protection, brand reputation, and network effects. This exclusivity fosters concentrated market structures, so-called "winner-take-all" where only a few companies dominate the entire market. This market structure can generate growing income inequalities since most of profits of innovative firms are redistributed to shareholders, senior managers and key staffs who belong to the top income groups.

But at local scale, digital innovation for smart cities often requires much lower costs than other industries that call for large capital expenditures, and therefore provides avenues to engage with firms of all size. Digital innovation enables "creative destruction" which allows newcomers in the market to supersede leading incumbents such as large companies and firms, as well as reduces barriers to entry on many markets. Cities have an important role to play for new innovators with a brilliant idea and for disruptive technologies to be able to compete with dominant incumbents. For example, Umea, Sweden has been providing a level playing field for co-operation with universities, hospitals, rural areas in the surroundings, and industrial incubators (Uminova) to develop digital solutions. It provides an interesting related to biomedicine, thus increasing collaboration between start-ups, scientists and corporations.

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New ways to deliver public services can also create needs for new local business and jobs in cities such as service providers, consultancies, system engineers and IT related programmers, which can affect the job market in cities.

Improve city governance and innovation capacity

Digitalisation also provides cities with an opportunity to enhance their organisational and administrative capacity to overcome common challenges such as red tape, risk averse human resource management practices, a silo approach to policy development, hierarchical structures, and the lack of a talented and motivated workforce. In an era of intersecting, persistent policy challenges, coupled with a need to deliver more tailored public services in an increasingly constrained fiscal context, many local governments are rethinking how to best leverage capacity in terms of human, financial, institutional, physical and community resources to better serve residents.

Over the past few years, cities have started a process of transitioning from "importing" to "producing" and ultimately "utilising" innovation as a strategic asset. The smart cities movement to increase efficiency levels of local public administrations is an example is this trend. Adopting a formal, clear and inspiring 'innovation strategy' can create an environment that fosters risk-taking and organisational change.

Cities without a formal strategy seem to be more inclined to experience with data driven analytics and rethinking their approaches to financing and partnership. Leadership is an essential ingredient for detonating cities' innovation capacity according to 70% of cities that answered the OECD-Bloomberg Philanthropies survey on innovation capacity (OECD, 2018g). This suggests that in local governments, the role of politicians is likely to be extremely influential in the adoption of innovations. Political leaders at the head of local public administrations can determine and influence workplace culture in ways that human resources practices may not always be able to do. This may not just be the case of political leaders, since senior managers have a critical role in translating that vision into practice.

Dedicated innovation units, often located within Mayors' office, may have a major impact on cities' capacity to innovate and are an increasingly popular tool to support innovation work in the public sector. These units may perform a variety of functions to foster a culture of innovation in the local public administration. Their organisation and structure vary significantly from city to city.

Engage better with citizens

Digital technologies can improve citizen engagement through e-government services and civic technology to facilitate access to information, take better and informed decisions, and express opinions through online platforms, petitions and voting. Across OECD Member countries, the use of digital government services has tripled since 2006, with around 36% of OECD citizens submitting forms via public authorities' websites in 2016 (OECD, 2017). Across the European Union, the digitalisation of services has somewhat or even substantially reduced operating costs for 85% of cities (ESPON, 2017).

A greater use of digital technology may also enable innovative and experimental governance in cities and metropolitan areas. For instance, in 2018, Freetown, Sierra Leone launched a phone-based tax collection system through which citizens can pay their local taxes in five simple steps, which is expected to help the city council collect more taxes. As a result, the city has collected over 300% more taxes than the previous year. Another example is the use of behavioural insights for policy design, which is becoming more common in OECD Member countries (OECD, 2019a).

Governments also facilitate data-driven innovation by opening up public data and rewarding programmers and entrepreneurs, for example through hackathon events. In addition, governments increasingly use crowdsourced data to gain real-time detailed information on public service delivery and infrastructure needs, and facilitate appropriate real-time responses. For instance, in many cities, citizens can report and inform city employees through smartphone applications about the location of potholes, broken traffic lights, stray garbage, manage disasters or any other urban challenges they face on a daily basis. Key examples in this area include:

- Louisville, United States, where the Air Louisville project measures air quality through crowdsourced data - when residents are having asthma attacks (measured by a GPS-enabled device on inhaler medication). It led to greater transparency about hyper local air quality issues, which are then addressed through new policies dealing with traffic congestion and tree planting. Residents who participated learned about their asthma triggers and were coached by respiratory therapists leading to a 80+ drop in rescue asthma inhaler usage over the period of 18 months;

- Detroit, United States, where the Innovation and Emerging Technology team developed an application, Improve Detroit, which allows residents to See, Click, Fix right from their phones.

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Geotagged photos of potholes, downed trees, and other issues are automatically routed to the appropriate departments for resolution;

Going forward, there is room for governments to better identify and determine target groups for policy instruments through the completion of online surveys, primary data collections and IoT technologies. For example, wearable devices, telemedicine or e-health could send early warnings of citizens' health conditions, which would improve the responsiveness of the healthcare system and reduce medical expenses by avoiding emergency care and unplanned hospitalisation.

Improve tourism information and management

Technology and the emergence of digital distribution platforms have played a central role in the expansion of the tourism sector, along with cultural shifts by which consumers are increasingly willing to share resources. The rapid growth of the sharing economy - expected to reach USD 335 billion by 2025 – has provided policy makers with an opportunity to "re-think how tourists experience their country and how citizens can benefit from participating in this new form of economic activity" (OECD, 2016b). Accommodation and transport are two of the most important sectors that seized opportunities from the platform economy. In both cases, a small number of platforms dominate the marketplace: AirBnB had nearly 2 million properties in over 190 countries in 2015, while car-sharing options were largely provided by Uber and Blablacar.

There are several opportunities created by the sharing economy, including i) expanding and enhancing consumer options; ii) contributing to growth in the market for tourism services; iii) taking advantage of under-utilised or idle assets, and enabling product growth without significant investment; iv) stimulating new entrepreneurs; v) spreading tourism to less visited areas where new investment is limited; and vi) delivering the benefits of tourism to more people, as suppliers and users (OECD, 2016b). Yet there are also important challenges relating to consumer protection, unfair competition (vis-à-vis traditional companies that are more regulated), lower tax requirements or non-compliance (thus loss of tax revenue); limited employment and social protection for hosts and drivers (impacts on well-being), and impacts on local communities in areas of high provision.

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Challenges

Although digital innovations can contribute to making urban environments more liveable, they can be disruptive, and come with a range of challenges, trade-offs and hidden costs. Indeed, digitalisation can serve as a "double-edged sword", which may either improve the public policy response to other transformative megatrends, such as globalisation, demographic shifts and climate change – or, on the contrary, may reinforce their destabilising effects (OECD, 2018a). Without an integrated, multi-sectoral, and whole of government perspective, digital innovations can upend legal and regulatory frameworks safeguarding affordability objectives, consumer protection, taxation, labour contracts and fair competition. They can also jeopardise citizen data, privacy and safety thus generating trade-offs between disclosing data and perceived impact of smart city services. They can shake the decision-making powers and modalities in the era of real-time – and often asymmetric – information. And, equally important, they can deepen inequality among digitally marginalised groups unless local governments recognise that tech-driven solutions are as important to the poor as they are to the affluent.

To ensure that digitalisation does not widen the gap or contribute to further citizen discontent and a backlash against public institutions, the human element should not be forgotten, as not all technology trends are beneficial for societal health or personal happiness. In the case of smart cities, public and private actions have to be viewed through the lens of their value to society since social costs may arise through digitalisation, in particular during the transition period. Smarter investment in human resources, such as in life-long learning and more generally ensuring that people have the skills for the future work, including digital literacy, will need to be available in all cities and regions, and should be viewed as an investment and not a cost.

Responses to both opportunities and challenges of digitalisation need to be provided largely at regional and local level. Regional innovation strategies can help local economies to seize the business opportunities from emerging disruptive technologies in order to boost productivity and growth while supporting diversification. This requires strategy development, innovation in firms, access to finance, effective stakeholder engagement, leadership and foresight at all levels of government. It also requires extra efforts to ensure firms, particularly SMEs, fully benefit from these digital.

9. New business model

A business model describes the value an organisation offers to its customers. It illustrates the capabilities and resources required to create, market and deliver this value and to generate profitable, sustainable revenue streams. It is the revenue stream that is key here. Where is the money going to come from and how much of it will the business be able to retain? It includes considering issues like margins, allocation of profits to those within the supply chain. For example, Apple is extremely profitable partly because its margins on its products are so much higher than its competitors.

So, there is a key question that needs to be addressed: How will this business make money? To answer this question, it is necessary to address a series of additional questions, such as:

- Who is the target customer?
- What customer problem or challenge does the business solve?
- What value does it deliver?
- How does it reach, acquire and keep customers?
- How does it define and differentiate its offering?
- How does it generate revenue?
- What is the cost structure?
- What is the profit margin?

In principle, a business model does not matter to customers; it is important to the company and the organisation of its business. The business model determines the external relationships with suppliers, customers and partners. However, it is focused primarily on the company's business processes.

Parts of business model:

- Value proposition A description of the customer problem, the product that addresses the problem and the value of the product from the customer's perspective

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- Market segment The group of customers to target; sometimes the potential of an innovation is unlocked only when a different market segment is targeted
- Value chain structure The firm's position and activities in the value chain and how the firm will capture part of the value that it creates in the chain
- Revenue generation and margins How revenue is generated (sales, leasing, subscription, support, etc.), the cost structure and target profit margins
- Position in value network Identification of competitors, partners and any network effects that can be utilised to deliver more value to the customer
- Competitive strategy How the company will attempt to develop a sustainable competitive advantage, for example by means of a cost, differentiation or niche strategy.

The terms business model and business plan are similar but they are different. A business plan is a detailed document, typically 50 to 100 pages, with a lot of financial projections. To set up a new business and apply for a loan, the lending institution will demand a business plan. The lender wants to assess whether its customers will be able to repay the loan. A business model is much less detailed. A business model describes the specific way the business expects to make money. It should be on one page and it would be more clearly shown as a diagram. The business model itself is a single concept.

The concept of a business model is most useful for a new business (which explains the predominance of ecommerce-related references in recent years), and it is essential for a new business to establish a positive feedback loop. For example, word of mouth has to be effective and customers have to recommend other customers.

The business model should contain:

● a graphical representation (usually in the form of a flow chart);

● a list of activities, on the part of both the business owner and potential customers;

● a likely sequence for those activities (which may later be altered in the light of customer behaviour); and

● a set of indicators or metrics for measuring the linkage between the activities.

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Enterprise models focus on redefi ning the internal and external boundaries of the organisation to create a new business model. This includes moving up or down the value chain, leveraging a network of partners or outsourcing non-core activities. In some cases, this requires migrating up the value chain, like Samsung with chips for cell phones, or moving down the value chain, like Apple with virtual (iTunes) and physical storefronts. Another option is for companies to fi nd ways to leverage a network of partners that increases the eff ectiveness and effi ciency of production, off ering, distribution and sales. For example, Enterprise Car Rental has developed a network of insurance companies and car dealerships that help with sales and referrals.

Four key aspects to any business model:

- the offering;
- the customer side;
- the infrastructure;
- the finances.

An Example:

Blackcircles.com, a new business model Mike Welch left school at 16, eager to make money. He started by fitting tyres at a garage, earning £50 a week. After six months he was made redundant. He then went into wholesaling tyres, but they made him redundant, too. With little option, he decided to make money for himself. In 1997, a £500 grant from the Prince's Trust for a computer helped him set up an online business selling tyres wholesale over the internet. In the evenings, he did shifts at Tesco. Looking back, he believes the site was ahead of its time. Nobody else was doing it. The formula seemed right, but he could not scale it up because he did not have the money. He never made any money from the idea so, in 1999, he was lured by Kwik Fit to become its head of ecommerce. He lasted two years before leaving to set up Blackcircles.com, whose website today sells tyres of all sizes and works with about 1,400 garages that fit them. At its headquarters in Peebles, in the Scottish Borders, Welch employs 55 staff. The business had sales in excess of Ł30 million in 2013. In the beginning, he ordered a copy of every Yellow Pages in the UK and contacted each garage to ask if they wanted to join the Blackcircles network. In 2011, the former Tesco chief executive, Sir Terry Leahy, backed the business. Leahy and three others invested Ł400,000. He later became a non-executive director. Blackcircles now has eight shareholders, including Leahy. Welch owns 35 per cent. In 2015, Welch sold Blackcircles to French giant Michelin in a deal worth Ł50 million. This will net Welch approximately Ł17 million.

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