Chapter 7

Happy Cities in a Smart World

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1. Introduction

Making cities happier is the core focus of this chapter. By describing activities undertaken by city custodians who are working to increase levels of happiness and well-being in cities, we will explore how to make cities happier. The term 'happiness' is used here in the sense described by the *World Happiness Report* (Helliwell, Layard, & Sachs, 2017), and is based on the *OECD Guidelines on Measuring of Subjective Well-Being*. The definition of subjective well-being, interchangeable with 'happiness', is a combination of three elements; "Life evaluation, a reflective assessment on a person's life or some specific aspect of it. Affect, a person's feelings or emotional states, typically measured with reference to a particular point in time. Eudaimonia, a sense of meaning and purpose in life, or good psychological functioning." (OECD, 2013b, p. 10). However, in the context of a city, it is also important to add more basic needs for people living in the city; such as the availability, simplicity and usability of services. Fulfilling these needs would lead to increasing happiness. Further, aspects of the social environment such as trust, fairness and autonomy are seen as 'enablers' of happiness.

However, since this chapter is focused on happiness activities and interventions that are applicable across wider city contexts and cultures, consideration is given to fundamental and common characteristics of city life, which require a broad set of city themes. Nonetheless, since we live in an increasingly technological world, with exponential advances, the discussion also considers how such activities are enabled by technology, and innovations in general, outlining worldwide case-studies and best practice, and highlighting recommendations for maximising success in a digital and smart world. Particular consideration will therefore be given to how technology can help deliver these activities and interventions in a more efficient manner, or in ways not possible without such technologies.

For the purpose of this chapter outlined above, there are many ways to organise activities and organisational focus in a city. There are perhaps obvious functional taxonomies, such as transport department, municipalities, police etc., or a long list of life domains such as listed in the OECD Better Life Index (BLI) (OECD, 2017c). This was developed to measure well-being across countries, and assesses the following: housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety, and work-life balance. However, the OECD Regional Well-Being (RWB) (OECD, 2016c) measures essentially the same items as the BLI, but swapping work-life balance for access to services. Another relevant measure, though countrywide, is the Social Progress Index (SPI), which measures three dimensions using data that is publicly available at various sources; *basic human needs* (e.g. shelter, water, nutrition), *foundations of well-being* (e.g. health, environment, information & communication, basic knowledge), and *opportunity* (e.g. personal rights, freedom of choice, tolerance, inclusion) (Porter, Stern, & Green, 2017). However, one taxonomy that has had a lot of traction within the context of 'Smart Cities' is that offered by a report commissioned by the EU (CRS/EU, 2007), where such cities emphasise the use of technology towards efficiency and enhanced experiences, including well-being. The EU report explores various ways of ranking cities as far as 'smart' activities, and in doing so, the authors investigated various ways of categorising the activities. They settled on the following dimensions:*economy*,*people*,*governance*,*mobility*, *environment*, and *living*. This arrangement was also found to be a rational choice for this chapter (though with some adjustment, described later), especially given that some cities have already adopted a smart city approach, and will therefore find it easier to map the content of this chapter to their own activities. All the dimensions and sub-items will be defined in their respective sections.

This chapter is organised into several sections. The first section reminds the reader to ensure an approach that considers attention to essentials of well-being with well-known interventions, before looking further to newer methods and approaches, and considering technology as a way to enhance such interventions, as well as ones made possible by new methods. The second section uses the simple concept of the feedback loop to highlight the need to structure any approach with the need to measure outcomes, to justify decisions with data where pertinent data exists, before responding with any interventions. The third section focuses on six organising dimensions, based on well-known themes in the city

previously mentioned. This section examines each theme to illustrate them with examples. Each section also contains elaborated case studies that have led to improved quality of life in the city. The concluding section summarises the takeaway messages, which are helpful for city custodians in their city plans.

Though this report is not intended to provide an exhaustive list of cities, nor the activities they undertake towards making their cities happier. The intention is to show enough variety and examples to cover the urban dimensions discussed, in order for the reader to have broad understanding of current best practice. The aim here is to offer a set of standalone recommendations that are useful and practical. In the second report from the Global Happiness Council, the subsequent contribution from the cities sub-council intends to add further value by focusing on new economies and business models, city design and urban planning, choice architecture, and service design.

2. Happiness in the City

Plato's assertion that the "city is what it is because our citizens are what they are" is a good reminder of the extent that people are central to any consideration of a city, and therefore the well-being of people in the city is paramount. This is especially important since 75% of the world's population is predicted to be living in cities by 2050. Such views may be contrasted with definitions devoid of the spirit of a city, and is seen as "an urban geographical area with one (or several) local government and planning authorities." (ITU, 2016).

However, when considering the origins of the cities as economies of agglomeration, historians have describes them as "the most enduring and successful socio-political unit to emerge in Mesopotamia ... [where] the first large-scale communities began to develop in which people began to profit from a system beyond subsistence to produce a surplus, diversify their cultural activities, and in increasingly large numbers" (Leick, 2001). Thus creating the city, "a new form of collective community." Therefore, central benefits of the city are sociality, commerce, safety, and social stability, amongst others, and as such, a city must support these benefits.

Good governance and transparency will also foster a sense of fairness and trust, which are known contributors to enhanced well-being (Helliwell et al., 2017; Starmans, Sheskin, & Bloom, 2017). Still, public health, mobility and living spaces in a healthy physical environment are key aspects to enable the above benefits.

The emphasis on people and citizen-centricity is seen in much of leading narratives in modern architecture, and urban planning literature, such as Gehl's four key objectives for 'cities for people' (Gehl, 2010). For Gehl, city planners should aim to create *Lively*, *Safe*, *Sustainable*, and *Healthy* cities. These objectives may be "strengthened immeasurably by increasing the concern for pedestrians, cyclists and city life in general" and making a city more walkable for its "homo sapien residents". The importance of 'walkability' was also highlighted by Speck in his heuristics for a happier city (Speck, 2012). In order for a city to be walkable, he emphasised four attributes. For him, a walk should be *useful*, *safe*, *comfortable* and *interesting*. In this way, walking is encouraged, leading to increased likelihood of social interactions as people pass each other at walking pace, rather than at speed with the physical barrier of cars.

So, how can technology play a role in a happy city? From the start of the evolution of cities 1000's of years ago in Mesopotamia, technology played a strong role in their development, directly in terms of infrastructure such as sewage and sanitation, documentation, and various crafts that underpinned commerce, and indeed the invention of the wheel. Technology is an inseparable part of city life, and how people experience technology is certainly a well-established domain (Al-Azzawi, 2013). The difference now is that digital technology, as it becomes ubiquitous, provides even more opportunities to enhance the quality of life. The world is currently experiencing the fourth industrial revolution (4IR) where technology is fusing physical, digital and biological worlds, promising even more value for people (Schwab, 2015). City design (physical, organisational, informational etc.) must therefore support the above outlined benefits of the city, and technology may be used to enhance such support, and therefore has the opportunity to lead to a happier city.

Still, any mention of technology, should be subservient to the ultimate goal of serving the people. Further, the essential building blocks for building healthier, happier cities have not changed. Focus on novel technology must not obscure the crucial importance of essential principles such as mixed land-use planning, coordination of land-use and transportation investments, and the emphasis on active travel and walkable neighbourhoods (Montgomery, 2013). A truly smart city is one that responds to evidence from public health, behavioural psychology and other disciplines with smart design and system infrastructure, that takes advantage of the exponential growth and availability of data using various modelling techniques (Pentland, 2014; Ratti & Claudel, 2016; Social Glass, 2014), spawning a new science of cities (Batty, 2013). Therefore, city managers should not only rely on high-tech methods, but also use robust sources such as behavioural psychology to create data-driven designs and also support their policies with defensible data as much as possible. Such an approach would more likely lead to liveable neighbourhoods and communities and better public health. There are many cases of city rejuvenation projects, such as Moscow's "My Street", the largest project in its modern history, to make the city more liveable, by reconstructing facades and improving lighting. There is much that can be done without involving complex technology.

There are also many projects that aim to promote walking, like the case of Pontevedra on the Spanish Atlantic coast, where they have reduced traffic in the historical city centre by 97% since 1999, and more than 50% in the city as a whole. The city then promoted walking by publishing "Metrominuto", a walking map (similar style to the London Tube map), which shows destinations and walking time between them. This has resulted in improved air quality, where people are more likely to be walking around, whilst still recording less traffic fatalities. Such project pay attention to the basics in making a city more liveable, before focusing on technology. However, there is still room for technology to provide that extra push towards a happier city, as illustrated in the following sections.

Various cities are making their intentions explicit, like Smart Dubai's vision to ensure Dubai is the

Happiest City on Earth, while Barcelona's smart city CTO is reviewing the brief to "rethink technology and what it can do for the people" (Tieman, 2017), and Amsterdam and London employing interdisciplinary teams finding ways to sustainably improve citizens' lives. Smart cities are not about technology; they are about people. The focus now is very much 'technology for people'.

3. Feedback Loop: Measures, Tools, & Interventions

At some degree, any organisation operates a feedback loop, at various levels of sophistication, where actions are based on some rationale and insight derived from data. This is the classic *feedback loop*, and for a city (smart or other-wise), the data may be obtained using various sources, such as observation, surveys, and digital sources including IoT (Internet of Things), data repositories, and even general knowledge. The processing and insight gathering may be done manually, using basic algorithms, or even more advanced Artificial Intelligence. The response may be in various ways, such as instantaneous delivery of personalised services, or an adjustment of general service parameters perhaps to increase efficiency. There are many examples of how cities are reinventing city hall and taking advantage of data in the digital age to improve the quality of life, becoming more citizen-centric and data-driven, and indeed compete with other cities (Townsend, 2014). For a smart city, with such sophisticated feedback loops, this is also referred to as a *conscious* and *responsive city* (Goldsmith & Crawford, 2014; Palti & Bar, 2015), or *data-driven urbanism* where "cities are becoming ever more instrumented and networked, their systems interlinked and integrated, and the vast troves of data being generated used to control urban life." (Kitchin, 2017, p. 44), and in in the Fourth Industrial Revolution (4IR), *data-driven cities* are becoming more prevalent (World Economic Forum, 2017). This section shows the various components and examples in the feedback loop, analogue and digital, that may be used by civic leaders to fulfil the promise of new sophisticated ways of engaging citizens, not just asking, but real time responses to behavioural data, and creating an efficient city working towards delivering happiness. The basic components

Figure 1: The classic feedback loop
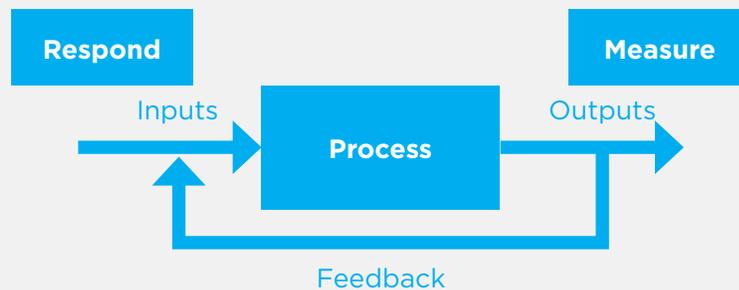
(Figure 1), digital and analogue, of the feedback loop are:

- **Measure:** Gathering behavioural data (e.g. telecommunications, retail data), and reported data (e.g. satisfaction scores).

- **Process:** Analysing data and input and converting them into insights and recommendations (e.g. modelling and evaluation tools).

- **Respond:** Acting in response to insights, automatically or manually, based on set criteria (e.g. activities, interventions, and policies).

Rather than focusing on a couple of examples that use data, it is more useful to give several ones that show the breadth in the applications of the feedback loop. Readers may wish to follow references and focus on ideas more relevant to their context and opportunities Nonetheless, some of the examples shown below will be discussed in some detail. One such example is Dubai's Happiness Agenda, which renders the feedback loop in the form of portfolios of projects, that are focused on each aspect of the loop.

The Happiness Agenda is an initiative launched by HH Sheikh Mohammed, Vice President and Prime Minister of UAE and Ruler of Dubai, in May 2016 with the vision of making Dubai the happiest city on Earth. The initiative is a collection of programmes and projects organised around the feedback loop, into four portfolios; Discover, Change, Educate and Measure. The Discover portfolio is concerned with ensuring a continuous assessment of baseline information gathering, including segmentation of residents of Dubai, finding out people's needs, as well as benchmarking scientific methods and interventions around the world. The Change portfolio is then focused on turning these insights into localised interventions, while the Educate portfolio aims to disseminate findings and knowledge around happiness to the general public and the workforce in the city, as well as organise relevant training. Finally, the Measure portfolio concentrates on implementing and developing methods of measuring happiness and well-being, as well as the efficacy of the Happiness Agenda itself. These portfolios therefore map to the feedback loop, ensuring any action taken is based on data, and continuous measurement helps in making adjustments accordingly, in order to achieve the given vision.

3.1 Measure

In a citizen centric world, a key activity is to gather data in various types, like behavioural data (e.g. mobile telecommunication, or retail data), or self-reported data from surveys. Of course, the notion of collecting data to drive decisions and improve the quality of life is by no means a new idea. More recently in the past decades, city halls provided telephone hotlines to allow residents to report issues within the city. However, the advent of digital mobile changed things forever. Deployed in 2009, soon after the launch of first iPhone in 2007, *Citizen Connect* (now called *BOS:311*) was the first smartphone app to help a city to make it easy for residents

to collect high quality data by reporting GPS location and images of problems they encountered in the city. There are now hundreds of such apps around the world, and such types of data sources are now taken for granted. These are important because they avoid technical barriers and inconvenience, and make it easy and convenient for residents to use, thereby increasing adoption of engagement channels, whilst also making it easier for the city to respond and track issues, resulting in accelerated benefits to the city and its residents.

For self-reported survey data, many cities also monitor the quality of transactional services using satisfaction scores. A good example of a simple citywide system is Dubai's Happiness Meter. The simplicity in deployment and of the design of the user interface (UI) for citizen engagement were key factors for helping increase adoption rate, by reducing conceptual and usability barriers, which led to an increase in the quantity of available data. Still, there is a balance to be achieved, since over-simplified systems have reduced richness, and may limit the quality of insights. However, to measure happiness, there are also more direct measures, such as the Cantril ladder, as used in the World Happiness Report (Cantril, 1965), compound measures such as the Happy City Index (Hiscock, Wren-Lewis, Sabel, & Manley, 2016).

However, data does not have to be 'pulled' by city hall, it can also be crowdsourced and 'pushed' by residents, as was the case in Chennai in India (Hamill, 2014). A city of seven million people, and slums with a dearth of basic services in some parts, the residents chose to systematically record the location and quality of services within the city. Having such data visible on maps on a publically available platform, and showing a disparity between reality and acceptable international standards, drove politicians to act, with consequent improvement in the quality of life. As stated in their goal, the *Transparent Chennai* platform organisers aim to "enable residents, especially the poor, to have a greater voice in planning and city governance." The platform therefore generates the data and places it in the feedback loop ready for city managers to process it.

There are also various ways of measuring city sentiment using technology, for example by

analysing social media feeds (e.g. hedonometer. org). These methods have had varying successes, though controversial, and more sophisticated *sentic* analysis have also been growing in popularity, combining sentiment and semantic analysis to obtain more meaningful data (Cambria & Hussain, 2015). Another simple way of engagement is to use Tech-Totems (see an example from London in Figure 2, or New York's LinkNYC), where the device acts in both directions; collecting general feedback, or using the input channels (e.g. touch or voice), as a way to provide general or contextual information or guidance to individuals.

In the digital age, there is however a constant dilemma for citizens, regarding the availability of data. The main issues are around human rights and privacy, and accountability, and some cities are working to find ways to deal with these questions (e.g. www.tada.city). The more data is available, the more beneficial and personalised a city experience can be, yet potentially expose people to undesirable consequences by unscrupulous users, thereby necessitating legislative frameworks to protect people (Dubai Data Establishment, 2015; EU, 2016).

Figure 2: London's Tech Totem, interactivity and happiness measures

3.2 Process

Once data is available, it is analysed and converted into insights and recommendations. In the case of qualitative data, this may be done by thematic analysis, amongst many other methods (Willig, 2001). For quantitative data, simple threshold detection may be used, or more complex analysis. There are three main ways of analysing quantitative data. Descriptive analytics mine historic data to find patterns and correlations. Predictive analysis creates models that give insights into possible futures. While prescriptive analytics go further by suggesting decisions and possible impact.

The Boston CityScore, described in more detail later, is a good example of a compound index that monitors various city Key Performance Indicators (KPIs) (e.g. emergency response times), giving users an easy way to spot limit transgression. Another example of a processing system is the Happiness Impact Assessment tool, part of the UAE Happiness Policy Manual (HPM). The manual itself is meant to help government entities align their policies with the happiness of society, by adding a happiness lens on the policy-making process. The mandatory use of the impact assessment tool serves to screen policies submitted for approval, to ensure that happiness is viewed holistically in policy-making. The tool assesses the expected impact of any policy based on six evaluation domains; economy, health, education, society and culture, government services and governance, and environment and infrastructure. As a complementary tool, the Smart Dubai Office is developing SHAPE (described later), which is a system that allows users to evaluate their projects in terms of the extent that the project will serve to increase happiness as well as improve smart city KPIs. Though the HPM and its tool were deployed at a national level, they also apply at a local level, and complement the SHAPE tool, and are good examples of national and local initiatives working well together towards happier residents.

3.3 Respond

Ultimately, in order to close the feedback loop, some decision or action needs to be taken in response to insights. This action could be automatic or manual, based on set criteria, which may be to undertake certain activities, conduct an intervention, or release a policy.

For example, in an effort to increase the citizen-centricity of citywide projects, the Mayor of the Smart City of Seoul has lead a strong push towards increasing transparency of data (through an open data portal), directly listening to residents by engaging them through various digital channels, as well as using city data to directly improve the quality of life. For example, the data from three billion night-time mobile phone calls were analysed to improve the scheduling and routing of night buses to better suit the patterns of late-night travellers. The response was pilot new routes and schedules, which ultimately resulted in reduced unnecessary costs of taxi rides, and increased convenience and adoption of public transport. The city took action based on data, and succeeded in improving the quality of life for its residents.

However, currently available technology also allows for responses to be personalised at the level of minority groups, and even at the level of an individual, similar to methods employed by the likes of Amazon.com to provide recommendations based on personal preferences and past behaviour. For example, the *Happy Maps* app was developed to find optimal travel paths, not by shortest or quickest route, but the 'happiest' route. The algorithm takes into account preferences, levels of street noise and attractive scenery (Quercia, Schifanella, & Aiello, 2014).

3.4 Evidence-based interventions

While conducting the research for this chapter, an interesting finding was the general lack of description of evidence (or scientific method) in the way city interventions are conducted or reported. Though there are many scientific studies for smaller scale interventions (King, 2016; Lambert D'raven & Pasha-Zaidi, 2014; What Works Wellbeing, 2017), there are fewer studies by the way of controlled well-being measures associated with large scale citywide interventions. Certainly, there is little in a classic experimental form where well-being is measured, an intervention is made in a city, followed by another measure of well-being. However, other experimental designs may be possible (e.g. quasi experiments), or alternative measures of well-being may be used instead. For example, increased use (aka adoption) of a service is a proxy for satisfaction or preference, and in the case of Melbourne, increases in pedestrian and static activity are seen as measures

of success (Melbourne City, 2005). This is because, unless people are forced to use a service, it can be inferred that increased use is because they feel it has utility. This leads to challenges in finding fully evidence-based citywide interventions.

These challenge may be seen as analogous to those associated with innovation in general. In order to avoid stifling innovation and being too bureaucratic in the selection process, a framework of evidence was developed by Nesta, that proposes a "standards of evidence" approach that "balances the need for evidence with [the need for] innovation." (Puttick & Ludlow, 2013). The framework proposes the following levels of evidence:

- **Level 1:** You can describe what you do and why it matters, logically, coherently and convincingly.

- **Level 2:** You capture data that shows positive change, but you cannot confirm you caused this.

- **Level 3:** You can demonstrate causality using a control or comparison group.

- **Level 4:** You have one (or more) independent replication evaluations that confirms these conclusions.

- **Level 5:** You have manuals, systems and procedures to ensure consistent replication and positive impact.

Therefore, rather than insisting on only the highest level of evidence, the recommendation is to use a similar approach towards interventions that aim to increase happiness in the city. In this way, it is a more inclusive and pragmatic approach towards a wide variety of interventions, yet still able to distinguish between the quality of evidence, and therefore set expectations.

3.4.1 Case-1: SHAPE Tool (Dubai, UAE)

Within the 'response' part of the feedback loop, an important activity for city custodians is to develop tactical projects that will further progress their city strategy, and they must also be able to effectively and correctly prioritise such projects, based on the resources available, and other criteria. To this end, the Smart Dubai Office collaborated with the University of Oxford and the Gallup Organization to develop the 'Smart Happiness Index' (SHI). Derived from analysis of quantitative data, this compound index provides

a link between happiness and the six dimensions of the Smart Dubai 2021 Strategy: economy, people & society, governance, mobility, environment, and living. This project has since been taken to its next phase, which is to develop a decision tool called the Smart Happiness Project Evaluation tool (SHAPE).

Using data from a representative sample of over 4300 Dubai residents (from all segments of society, including resident expats and citizens), the tool takes into account the various KPIs within the six dimensions of the city strategy, and allows a weighting based on the correlation of these KPIs with the happiness of the sample. The tool also takes a number of other factors into account when calculating the index of each project. One such factor is adaptation, whereby the tool considers how long the benefits will last and the speed and extent to which people get used to new projects or improvements in services. Finally, based on the cost of the project being evaluated, the tool provides a cost effectiveness ratio, which represents the projected happiness gain per dirham spent.

Users simply enter answers to a set of structured questions via a simple online interface, and the tool provides the SHAPE score and SHAPE cost effectiveness ratio, and allows them to view these in comparison to other projects. This gives the user a sense of the relative meaning of the figures, rather than being too arbitrary. These outputs provide data-driven insights regarding the extent to which their project contributes towards the happiness vision of the city. This allows project managers to adjust and improve their projects to make them more effective.

The use of the tool helps support the planning and decision-making process in the public and private sectors, by allowing organisations to adjust projects for maximum longevity and impact on happiness (and will include policies in later versions). Thus, aiming for sustainable long-term happiness in a smart city, while avoiding a focus on short-term gains in happiness.

3.4.2 Case-2: CityScore (Boston, USA)

Happiness and well-being in a city context also covers being able to get the basics. As with many cities, the managers of the City of Boston decided that it was important to monitor their KPIs, and to show these in a single dashboard.

They then created a single score, which they call the "CityScore" (Boston City, 2017). The City-Score is a single aggregate number, where the value of one means that their operational KPIs are on target and within limits. Many of these KPIs have a direct relationship to well-being, such as feeling safe in the city. This simplicity makes it easy for a machine or anyone, including the Mayor, to spot a deviation from the norm, and to raise the alarm to investigate further.

Two examples show how this tool was used effectively. The first is when a drop in the score triggered an investigation that showed the source to be an increase in the average response time of Boston's Emergency Medical Services (EMS), beyond the target maximum of 6 minutes. The response time moved from 5:59 minutes to 6:11 minutes. Since every second counts in terms of the recovery time of a patient, this was a worrying development. Upon further investigation working with the EMS team, the cause was found to be a mismatch between the city population growth, due to increased number of visitors, and the available staff and ambulance services for the 911 calls. The Mayor took action to increase the number of EMS teams and the number of ambulances, returning the CityScore back to normal.

The second example is another drop in the CityScore which was found to be attributed to the length of time it took to install and maintain city signs, including road signs. Since this was a safety issue, again action was prioritised by the Mayor. The cause was attributed to a backlog of 90 signs. Attending to this matter immediately dropped the backlog to seven signs awaiting installation, and the CityScore returned back to normal.

4. City Dimensions & Best Practice

A city is the place where people's lives are played out, and their close proximity to each other creates benefits, opportunities and challenges. City custodians are charged with running the city to help address these opportunities and challenges to maximise the benefits for its residents and visitors, and ultimately the people's well-being and happiness. As discussed above, this chapter organises these activities within the city into six dimension, based on a common set described by the findings of research conducted

by an EU project (CRS/EU, 2007). The project was concerned with ranking smart cities, and was therefore required to create a framework that categorised activities into dimensions. In order to use the framework here, a small adjustment was made. The sub-items within the dimensions of *People* and *Living* were rearranged to be more consistent with the context of well-being as well as cities in general, not just 'smart cities'. Also, the two titles were changed from *'People'* to *'People & Society'*, and *'Living'* to *'Living Enablers'* to be more inclusive of wider issues and make a clearer distinction between the two dimensions. The dimensions used here are therefore as follows: *economy*, *people & society*, *governance*, *mobility*, *environment*, and *living enablers*. All the dimensions and sub-items will be defined in their respective sections.

Each section below describes each of the dimensions separately, listing example sub-items within. The sections highlight some example activities from around the world, where city managers have undertaken projects that promotes the well-being of residents and visitors, either directly or indirectly. The aim is to outline general trends, and highlight some examples in some detail. It is therefore out the scope of this chapter to consider an exhaustive list of examples for each dimension with its sub-items. This way of presentation of these dimensions is intended to give readers as broad a view as possible, rather than focus on specifics. In this manner, a general understanding may be gained of how to conceptualise happiness in the city and possible associated activities. As mentioned earlier, the use of technology is seen here as an enabler and certainly not the main focus. The emphasis is the experience of the residents, and is therefore a citizen-centric view.

Examples in the following dimensions are not intended to be seen as exclusive to a particular dimension, and they may overlap with other dimensions. However, they each illustrate an aspect of the project as considered in the context of the dimension.

4.1 Economy

One of the important dimensions in any city is its economy and its ability to support business and commerce. It is a primary reason for the existence of the city, and it is why people are there, as

cities are economies of agglomeration (Glaeser, 2010). Such support is especially important in the case for entrepreneurship, and small/medium businesses, as these form the lifeline of a city's economy. Cities may support business in many ways, such as increasing efficiency of interaction with government and reducing barriers to business. In the context of this document, the city's 'economy' dimension refers to various aspects such as; *efficiency, entrepreneurship, productivity, innovation, unemployment, and inclusive labour force* (see glossary for definitions).

Due to the importance of the city economy, to the existence of the city itself, and for the welfare of its residents, most cities work to help their businesses as a priority. Some cities provide online business-centric service platforms, as is the case in the city of Quito in Ecuador, which operates the *Citizen Services Platform*. The purpose of the platform is to tackle red tape problems making it easier for citizens to under-take procedures for different purposes through the web. Citizens can handle different procedures in just one place. This reduces the need for citizens to commute to public offices, losing time queuing in lines and also prevents corruption and discretionary practices. For example, citizens can get permission for starting a business within 24 hours (especially for business that have low risk to the public or potential hazards), without the need to go to the municipal offices. Further, the platform uses Artificial Intelligence to provide real-time answers to citizens' most frequent requests. Between 2016 and 2017 the amount of transactions done through the Citizen Services Platform more than doubled. While 365,197 transactions were done online, 317,973 transactions were done in person at a public office; citizens also use the platform to get familiar with the procedures and sometimes still prefer to conduct them in person. The platform seeks to make of Quito a more competitive city. Similarly, the Dubai Economy department has collaborated with Smart Dubai to use the latest IBM Watson AI technology to provide a multi-channel service called "Rashid" ("Guide" in Arabic), built on the multi-service omni-channel platform, DubaiNow. The AI service helps potential entrepreneurs navigate the commerce rules within the city, by providing a simplified chat interface that can answer their questions using natural language, and then provide them with precise directions

on their next steps, with a full list of requirements and documentation.

There is no doubt that such automated high technology services have the potential to make people's lives easier and more efficient, freeing them to do more with their time, and alleviating frustration and dissatisfaction, thereby raising happiness in the city.

Another project in Quito is the multiple-award winning initiative, *Agrupar*, which aims to develop urban agriculture in order to guarantee food security, fight malnutrition and become an alternative source of income. Agrupar is managed by ConQuito, the agency for economic promotion in Quito. The project uses data from the municipal *Open Government* platform (gobiernoabierto. quito.gob.ec) to find critical areas in Quito that show malnutrition problems and implement the project in these areas. Agrupar also organises the commercialisation of products from the urban gardens through WhatsApp chat groups. This has become a simple and successful way to help producers to distribute and sell their products in different markets through Quito. The Agrupar project was recently awarded the *Climate Change Award* 'Impulse for Change' as a sustainable agriculture initiative with the inclusion and participation of women in Quito. There are around 65,000 people that benefit from the project, of which 80% are women. By removing barriers and having an inclusive outlook, this project also helps feed the economy as well as increase well-being by giving people a sense of independence and purpose.

4.1.1 Case-1: Social Media Entrepreneur (Dubai, UAE)

A growing body of evidence suggests a strong connection between social capital and individual happiness (Kier, Fung, Fung, & Sproule, 2011). Fostering an entrepreneurial economic environ-ment is a common activity in cities pursuing a happiness and smartness agenda. There is a connection between social entrepreneurship and civic engagement that can impact the happiness and well-being of the people of a city. City custodians that support 'global entrepreneurs' at the local level have an opportunity to increase civic engagement by fostering a pro-social entrepreneurship environment. Research has shown that social entrepreneurs with 'born-global'

companies are driven by a motivation to give back, both to the host country that they are in and which is supporting their business, and also their country of origin if the two differ (Hochadel, 2017). Initial findings indicate that "those entrepreneurs building global companies and participating in transnational and transmigrant business networks are also embedded in and working for the improvement of their local context." As city custodians work to build a more entrepreneurial ecosystem as part of city happiness efforts, they may also be working to increase civic engagement through social entrepreneurship.

Therefore, to help with increasing entrepreneurship in general, and social media based businesses in particular, Dubai Economy, the local government organisation in Dubai which is responsible for trade licensing, created an online platform called *e-Trader*, to help fast track licensing for social media Entrepreneurs. The platform allows social media (YouTubers etc.) to be able to easily get a trade license, in order to have the benefits of operating within a legal framework, whilst still being able to benefit themselves, their clients and their city. To date, e-Trader platform has received overwhelming success, with 869 trade license applications since its launch.

4.1.2 Case-2: LISC - Local Initiatives Support Corporation (USA)

Societies that are more inclusive generally achieve better results on health and happiness (Montgomery, 2013). Also, the social inclusion approach should address need or alienation wherever it exists (UNDP, 2007). Such an approach means going beyond enforcing human rights, to reducing poverty and barriers to social connection in the city. The inclusive approach opens up pathways for everyone to access economic and civic opportunities, and includes all members of societal activities, such as economic and social processes. Cities can use evidence-based design and technology to ensure that the broadest range of people can access the benefits of city life.

There are organisations that take such a philosophy into the realm of practice, like the Local Initiatives Support Corporation (LISC), a non-profit that brings together governments, private companies and non-profits to revive poor communities

across the USA. Established in 1980, LISC has a clear mission to create "resilient and inclusive communities of opportunity across America - great places to live, work, visit, do business and raise families." Aside from many specific initiatives focused on areas such as health and education, LISC also operates the *Economic Development* initiative. This aims to improve the health of neighbourhoods by "investing in the physical and social assets of a community's business district. To make this happen, we support programs and invest in projects that cultivate entrepreneurship, attract new businesses, diversify the local retail mix and stimulate employment."

Across the US, people's home postal code can be used to predict their access to quality jobs, schools, safe streets and good housing - and their life expectancy. LISC's *Affordable Housing* initiative combines population need data with evidence-based design in cities such as Phoenix to drive grants, loans and equity investments in housing that give more people access to the city while reducing health care costs (LISC, 2017). For example, LISC has constructed medium-density affordable housing (4-6 story apartment buildings) in walkable neighbourhoods on a new light rail corridor in the Phoenix region.

The initiative adopts a Transit-Oriented Development (TOD) approach to urban development and situates affordable housing in walkable areas near high-quality transit. In this way, LISC brings residents closer to jobs, while reducing their expense on private automobiles. By encouraging more walking, this concurrently lowers public healthcare spending. In Brockton, Massachusetts, LISC financed a new health centre beside a grocery store. The synergy induced more walking, which tackled the neighbourhood's diabetes and heart disease challenges.

4.2 People & Society

There is no doubt that cities are for people and society at large. Therefore, in order to thrive, a city must support its people and strengthen its society, in its various guises and cultures. Specifically, there are key elements that require attention in this dimension, and these include domains such as ***health, education, continuous learning, culture, social services, human capital, and leisure, social cohesion, social inclusivity*** (see glossary for definitions).

A city is certainly a de facto arena for public life. In the *Mayor's Guide to Public Life*, public life is seen as what "happens in public spaces, on streets, and in between buildings... thrives when all people can enjoy being in public together." The guide further describes a vibrant public life such that it "promotes health, makes our cities safer... civic engagement... economic opportunity and mobility, builds social capital, and connects people to their local communities." (Gehl Institute, 2017). Studies do show that the lack of civic participation can lead to a wider degradation of the social capital of a society (Putnam, 2000). But, what kind of interventions can raise happiness in such an arena?

With their tagline "Credible Evidence for Better Decisions, To Improve Lives", the UK organisation called *What Works* aims to help others to ensure resources are well-spent on interventions that have a high chance of delivering the required outcome and positive impact on well-being, for people in general, and some are applicable in public life. They publish regular updates on their work, and one example of such is the "What is Community Wellbeing? Conceptual review" which is intended to clarify the various aspects of well-being in the community context, including measures, indicators and interventions (What Works Wellbeing, 2017). There are other sources of similar information, such as the Stanford University repository of evidence-based interventions *Social Psychological Answers to Real-World Questions* (SPARQ, 2017).

However, at a more personal level, physical health has a positive correlation with happiness (Ryff & Singer, 2003; Veenhoven, 2008). Happy people are more likely to be healthier. But also, physical health itself is of value to people, and since movement and exercise are associated with health, this creates a case for redesigning move-ment back into the lives of urban citizens. There is a growing movement marking the beginning of an active travel revolution. Trends in many global cities are seeing major policy, behaviour change and technology programmes to understand, encourage and design activity back into people's lives. This touches upon many areas of design, operation and management, and cuts across various lenses upon the city, smartness and well-being, bringing various actors into each other's lives in ways that was never previously the case. For example, land-use planning, long-

term infrastructure investment, public health outcomes, corporate wellness, and platform business models. Most fundamentally, it is being enabled by multidisciplinary research, thoughtful human-centric design, community and citizen co-creation, a spirit of city experimentation and digital technologies. In terms of drivers and outcomes, these deliver against major challenges including obesity and type 2 diabetes, congestion, dangerous air quality, social isolation and mental health. By way of context, the USA spends $3 trillion each year treating health problems. Health care costs constitute 17% of the USA's entire gross domestic product. Design, movement and a vibrant public life have an important role to play in reducing these costs while increasing happiness. Illustrative examples are thriving, like Amsterdam's *Healthy Weight Programme* (Amsterdam City, 2013a), and other cities like Paris, Santander, San Francisco, and Dubai. In London, *GoodGym*, has runners 'do good and get fit' by visiting and doing tasks for people at risk of loneliness. Some initiatives have had a wider scope. Canada's national *Public Health Officer* issued a report suggesting explicit urban design responses aimed at maximizing health and well-being, leading to lower public health-care spending. Such a report emphasises the link between the built environment and health, where it "raises awareness about how our built environment provides a foundation for healthy living and ultimately our health. It is possible to improve or worsen the health of populations by changing our physical world." (Chief Public Health Officer, 2017).

Many cities conduct citywide events aimed at boosting physical exercise and healthy habits. For example, as a way to boost both health and happiness in Dubai, the city leadership challenged the residents to a fitness drive. With a focus on fun and getting fit, the *Dubai Fitness Challenge* consisted of a "month of citywide events and activations, including more than 1,500 free workout classes at 88 partner fitness and sports facilities, 75 pop-up fitness locations for easy and convenient workouts, 16 partner sporting events, five weekend family fun carnivals and a whole range of sports and fitness activities." Participants were able to take part using a website and dedicated mobile app, who were further incentivised with access to over 1,500 free classes as well as e-vouchers. This challenge had a

large following amongst government and private sector organisations as well as individuals.

However, for mental health, the urban setting can be hostile. People living in cities are more likely to suffer from mental illness (Kwon, 2016). Though no direct examples have been found to show smart technologies being used to enhance mental health at a city scale, the scale of the opportunity and risks are too high to ignore (see chapter on mental health in this report). There are many mechanisms that would impact mental health in an urban context, including; social isolation and loneliness, excessive stimulation and stress, crowding and reduced privacy, economic stress, transport conditions, and inadequate interaction with nature (Litman, 2017). There are however, many examples of mental health being addressed at an urban, as well as at a country scale. For example, in the UK, the *Improved Access to Psychological Therapies* initiative (IAPT) and the *Centre for Mental Health*, and in various cities, the *Centre for Urban Design and Mental Health* (UD/MH) (McCay, Suzuki, & Chang, 2017). There is also a rich academic literature on the intersection of urban and mental health domains. In today's digital landscape it is possible to screen and profile health and behavioural data to find people with potential vulnerabilities and mental health issues, though such approaches are subject to data privacy and data availability challenges. For example, the Fire Services branch of the Canadian City of Surrey analysed data on mental health and emergency calls, and found a strong geographic correlation between the two, leading the department to invest in mental health services as a means of fire prevention. New York's *HHS-Connect* on the other hand used data-sharing as their key success factor. Their project connected different government departments to reduce the likelihood of homeless people finding themselves back in jail. The innovative system would identify likely individuals, and allow social services to prioritise them for assistance, which put the individuals on a more positive track. HHS-Connect became a primary tool for the New York Health and Human-Services team, being accessed over 60,000 times per week, and has now evolved into *NYC Opportunity*, a more holistic service which aims to reduce poverty and improve equity within the city (Gill, Dutta-Gupta, & Roach, 2014; NYC, 2017).

Based on their experience in designing for better mental health in Tokyo, some recommendations for improving mental health at an urban context are provide by the *Centre for Urban Design and Mental Health* (McCay et al., 2017). For example, they suggest to empower and incentivise residents to install nature everywhere (and easy access to out of town nature); nudge vehicles into larger streets to prioritise active transport, social street-life, green space etc.; popular indoor spaces like shopping malls can be green, active, and pro-social like a high street; innovative design interventions should include blue light and nature images in train stations; social interaction should be at the heart of more public space design; long working hours means the importance of commute and office design to promote better mental health; and increase awareness for urban planners and designers, as they need to appreciate urban design and mental health opportunities.

Education and continuous learning correlate with happiness (see chapter on education in this report), and human capital in general. Human capital approximately refers to the level of human traits such as education, knowledge, and culture that may be the target of investment in a society (Mincer, 1958). Interestingly, though income is reported to be the highest correlate of happiness at the national and personal level, this is not the case for societal forms in between. In a recent study exploring the various factors that contribute to *The Happiness of Cities*, human capital is shown to be the primary contributor to happiness in the city (Florida, Mellander, & Rentfrow, 2013). Therefore, in a modern digitally enabled city, there are many opportunities to invest in human capital using such technologies as online learning (e.g. Massive Open Online Courses - MOOCs), to increase the competence of the labour force in general, and in today's technological trends, in smart skills such as data science and artificial intelligence.

An example of municipal attention to education is seen in Quito with the *Bachillerato Virtual Inclusivo* (Inclusive Virtual Baccalaureate) (Quito City, 2014). The initiative launched in 2014 by the Municipality to offer a second chance to adults who had dropped out of secondary education. According to national data, around 26,000 adults in Quito dropped out of school during the last three years of secondary school. Bachillerato

Virtual Inclusivo allows adults to finish school through online education modules, in order to pursue a degree, find better work and be able to better support their families. The system allows the students to connect with each other at different Municipal community houses where they also get advice and support from a tutor. Online learning is also complemented with workshops focused on building life-projects and other recreational activities. The initiative prioritises those areas in Quito where school desertion is highest, as well as incidence of adults who have not finished school. Such a service raises social capital, leading to improved well-being as well as increases in economic opportunities for people, reducing the negative effect unemployment has on happiness.

4.2.1 Case-1: Healthy Weight Programme (Amsterdam, Netherlands)

Upon the recognition that 12% of ten-year-olds in the Netherlands, and one in four to five young people living in the city of Amsterdam are overweight, the municipality decided to act by launching the *Amsterdam Healthy Weight Programme* in 2013. They found that problem seems to be unequally distributed and localised to certain areas of the city, as well as being higher in concentration in communities of limited education and low income.

The municipality considered their sphere of influence and recognised other stakeholders who must be included in the plans, such as parents and the children themselves. They also used the *Rainbow Model* to conceptualise their policy, a widely used model for addressing social inequalities in health (Dahlgren & Whitehead, 1991, 2006). The policy model takes into account various layers, such as individual life-style, cultural and environmental factors, as well as themes such as education, poverty, housing, and working environment. The programme was then organised to "1) influence individual lifestyle factors by means of professionals, 2) influence children's immediate social and physical environments and 3) influence relevant living and working conditions." (Amsterdam City, 2013b). While the overall plan prioritises the heaviest neighbourhoods, as well as the heaviest schools, it uses a 'running' metaphor that recog- nises multiple phases from a *sprint* to a long term endurance *marathon*. The sprint phase (2015-

2018), the *5000 meters*, aims for a healthy weight for 0-5 year olds, the *half-marathon* for 0-10 year olds (by 2023), while the *marathon* for all young people in Amsterdam (by 2033). The phases are split into integrated clusters of activities, for example the sprint phase has; *prevention*, *cure*, and *facilitation*. In this way, the city managers have accepted their responsibility and role in creating a more equitable and healthier city, leading to increased well-being.

4.2.2 Case-2: Community Hub (Prince Albert, Canada)

In many cities, human services systems, such as police and social services, are response-driven. As such, they often fail to intervene before harm occurs to people who live at risk of abuse, mental health crises or illegal activity. For example, some at-risk youth in Canadian communities fall into the criminal justice system, in part because social services are not offered to them while their risk factors are elevating, as opposed to after a crisis.

Many smaller communities lack ready access to human service providers. The *Hub* model uses information and communication technology to overcome barriers of communication, geography, information sharing and service access in such communities.

This model, pioneered in Prince Albert, Saskatchewan, Canada, mobilises multiple human services in a highly-disciplined process of ongoing risk detect intervention. One example: Almost four years ago the police found a 13-year-old girl highly intoxicated and unconscious in a snowbank late at night. After receiving attention at hospital, she was returned to her mother. The police observed other indicators of elevate risk at the home. They brought this case forward at the Hub meeting the following day. Within 24 hours, a small multi-disciplinary team met with the mother and daughter. It was learned that a number of months earlier, the mother had recently entered into an abusive relationship with a man recently released from prison. The girl's grades had deteriorated, the family was under support by social services, and the mother exhibited clear signs of domestic violence. This relationship was having a profound impact on the family. Support was provided to get the woman out of the relationship, and the family was provided with the comprehensive social and

mental health supports required. The girl and her family have not required any additional support since this intervention.

This Hub model, by providing upstream and earlier service access, has led to a reduction of risk before harm occurs to community members (e.g. violence, overdose). Multiple evaluations have shown that the hub model of information sharing improves service access, reduces barriers to service, and decreases aggregate risk. Nationally [CM5], 95% of clients in Canada (N = 9,500) accept the services and supports offered to them through this upstream intervention model.

4.3 Governance

Ultimately a city needs to be governed, and the way it is governed and how the residents undertake civic engagement will influence the well-being of the residents. In this sense, there are many aspects to a city's governance that are important for a happy city, such as **leadership, transparency, participation, public services, and public-sector efficiency** (see glossary for definitions).

Today's successful leaders exhibit attributes and behaviours that foster an environment of better governance, with a focus on delivering on happiness. This can be seen at national levels, such as Bhutan's move away from GDP and adopting instead the *Gross National Happiness* (GNH) as the primary indicator of progress, and the UK government's well-being initiatives, as well as city managers like Melbourne's councillors, redesigning and transforming the city for people, or leaders like Seoul's 'Listening Mayor' spearheading the *Sharing City* initiative, and Dubai's ruler launching a state-wide and systematic *Happiness Agenda*. Such is the emphasis on moving away from traditional problem solving, towards a broader positive approach akin to design thinking, with open and transparent decision making.

The tradition of local leadership is pragmatic by necessity. Local leaders need to ensure the well-being and safety of the citizens and residents, which in modern times takes the form of meeting basic needs, such as safety and health. Local leaders need to ensure that waste is collected, the roads are safe, education and emergency services are provided and the local budget is balanced to provide for these basic services.

However, local leaders in emerging global cities working towards happiness take a broader approach to local governance, where some "elected officials have embraced a role shift from administrator and deliverer of city services at the local level to becoming an activist, a legislator and innovative political entrepreneur at both the local and national levels." (Hochadel, 2017). Leaders should be looking for opportunities to increase social capital and the quality of life in their cities, with residents gaining higher expectations, as they get to know more about what other leading cities are doing.

Rather than a solitary focus on local transactional activities, such leaders seek more global transformational activities to create a more thriving local ecosystem. It is these local leaders in emerging global cities, with a focus on quality of life, knowledge hubs and specialised economies, that are increasingly seen pursing a happiness agenda at the local level (Clark, 2016).

New research has identified qualities of local leadership that could facilitate the transition of a local area to one that seeks to improve well-being through global connectedness (Hochadel, 2017). These local leaders are combining local pragmatism with a more global, idealist outlook – a sense that through shared global alliances they can improve their local well-being. These leaders work to meet local needs whilst also achieving global solutions to shared problems – such as improving local air quality and the impacts of climate change. A local government that has built a global governance structure is the London Borough of Hackney. Hackney's economic turnaround during a time of austerity indicates it has an ability to be adaptable to global dynamics. However, it is unclear if the recovery can be sustained. During the last 10 years it has been able to brand itself as an arts and technology hub, thereby creating a compelling global identity which is recognised in many places around the world. Hackney's councillors are willing to experiment with new ways of working, test new partnerships and seek solutions abroad. It has shown that it can attract investment as well as tourists and that it is willing to engage in creative public/private partnerships to achieve goals. It is this type of local leadership, with a strong focus on creating a thriving local economic ecosystem, supporting social entrepreneurship, facilitating local-to-global connections and

encouraging a high level of civic engagement that helps to foster conditions for happiness.

Modern city leadership are also increasingly engaging city residents and visitors to find out about their needs, and giving them more room for inclusive participation, and in some cases co-design. One alternative form of civic engagement is crowdsourcing, which allows people a regular channel of communication to the city managers. This may be done by various means, usually through the web or mobile apps, as used in Amsterdam's crowdsourcing portal '*Voice of West*' (Amsterdam City, 2017), and Dubai's *Smart Majlis* (described below). However, the EU's *Sharing Cities* programme goes further, aside from sharing best practice regarding affordable smart city solutions, it offers a "framework for citizen en-gagement and collaboration at local level, thereby strengthening trust between cities and citizens."

However, although participation is important in order to allow the people of the city to voice their opinion, and to have a good platform to be heard, attention should be given to the biases inherent of crowdsourcing. A study exploring quality of idea and social effects within innovation platforms concluded that "Online consumer votes are unreliable indicators of actual idea quality" (Hofstetter, Aryobsei, & Herrmann, 2017). Social biases such as influencers having more 'likes' than their idea deserves, as well as reciprocal voting, which tended to skew data, reducing the meritocratic quality of the innovation funnel. The research recommends using a smaller crowd of specialist, rather a larger random crowd.

Such an approach to engagement also increases transparency in the way it also provides account-ability, including accountability to the 'promise' of increasing happiness, as is the case with Dubai's Happiness Agenda, making progress transparent with the published results of the Happiness Meter.

Still, some organisations are experimenting with further ways to innovate in engagement methods. For example, *HappyToPay*, a joint initiative by Smart Dubai and Dubai Police, where city drivers who have incurred a traffic fine, are presented with a special screen on the police mobile app, which gives them an opportunity to view the expenditure ratios of the city's annual budget, in terms of the expenditure on various domains in the city, e.g. health and security. The app also

provides them with a way to suggest their 'preferred' ratios. Such engagement, not only increases transparency, but also gives people a way to voice their opinion to the city leadership. Another example is the multi-partner EU funded project, *OrganiCity*, which explores how various stakeholders in the city; citizens, business, and the city managers, are able to collaborate and co-create "digital solutions to urban challenges" (OrganiCity, 2016). Again, such collaborative projects bring people's needs onto the design table, while maintaining a sustainable business case, to solve city challenges.

4.3.1 Case-1: Smart Majlis (Smart Council) (Dubai, UAE)

In 2015, Dubai's leadership launched the *Smart Majlis* by declaring a target to give "all members of society the opportunity to attend our Majlis [council] and to present their ideas and comments, consult together and work hand in hand to promote the development process. This can only be implemented if we integrate the traditional idea of the Majlis with advanced technology."

The Smart Majlis is an online and mobile app platform that allows participants, anywhere in the world, to submit suggestions, and innovative ideas aimed towards improving the city of Dubai. The initiative's stated objectives are to provide a direct channel to the senior leaders in the city. The system provides management of the ideation stream, while ensuring inclusivity, and rewarding innovation. A key part of the initiative is the transparency of the process. With over 41 government and semi-government entities registered in the system, participants are able to track their submissions as their ideas are; accepted, redirected or rejected. Receiving entities are accountable for the ideas they receive and must show clear reasons for rejections. Also, individuals submitting ideas remain the owners of the copyright of the ideas. An important part of the system is the trust users have, especially that the city's Ruler stated that he will personally follow progress of the ideas that make it through the process. Interestingly, 50% of the ideas came from local Dubai residents, while the remainder came from international "Dubai fans". The Smart Majlis system met with overwhelming success with state-wide adoption and use, and is managed by a team of 450 trained individuals across the city.

4.3.2 Case-2: Gobierno Abierto (Open Government) (Quito, Ecuador)

When cities are brave enough to be transparent and open with data, citizens can be empowered to create applications and initiatives that make life easier, more convenient and more affordable for all. Barcelona's *Open Data BCN* is a fine example in this regard, and *Transport for Cairo*, used crowd-sourced data to create the first ever map of that city's informal transit network, as well as Transport for London's elaborate data portal (Transport for London, 2017).

Further, residents of Jakarta use a mobile app, and back-end dashboard for the city managers, to help monitor many aspects of the city, such as flooding, bribery, and damaged roads. The basic idea is also used in Quito, with the *Open Government Platform* (gobiernoabierto.quito.gob.ec). Through "Gobierno Abierto" ("Open Government"), the municipality has been able to gather and update scattered data around the city. Quito´s open government platform is part of an open government global initiative seeking to; improve governance performance through the enforcement of transparency in public administration, foster collaboration between citizens for the development of solutions that can solve problems of public interest, improve public services through a platform that allows information management and interaction between citizens and public administration, and strengthen democracy and its institutions. The Open Government Platform is linked to Quito's development plan, which is guided by three principles: a smart city, a city of opportunities, and an inclusive city. To this end, the platform is supported by three principles: *transparency* regarding decision making, budget allocation, actions and outputs, *collaboration* to foster the coproduction of innovative urban solutions through technology, *participation* to foster the involvement of citizens in public affairs and strengthen the compromise of political organizations with citizens.

The platform gathers different layers of data about the city, including services, infrastructure, demographics, poverty indicators, access to services and others. The platform allows citizens to download city statistics and geographical data, as well as management indicators regarding the work lead by the municipality. Further work is underway to make the platform more available to citizens, with new features, such as participatory budgets through the web. Mostly, the data have been used by citizens, regarding economics, inclusion, tourism, housing, demographics and gender.

4.4 Mobility

People need to somehow move around the city to go about their lives and conduct their business. There are of course many ways residents and visitors travel within the city, and the quality of city mobility influences their well-being. There are several aspects to mobility, such as *autonomous vehicles, active travel/mobility, commute, public transport, and logistics* (see glossary for definitions).

Of the many types of travel within a city, commuting is of a high priority as it is a primary activity for people. However, long commute times are certainly negatively associated with well-being (Stutzer & Frey, 2008). Consistent with previous research, a study conducted by the UK's *Office of National Statistics* (ONS), concluded that "given the loss of personal well-being generally associated with commuting, the results suggest that other factors such as higher income or better housing may not fully compensate the individual commuter for the negative effects associated with travelling to work" (ONS, 2014). However, for people who change from driving to transit (and potentially Autonomous Vehicles (AV)) or active travel such as cycling, the research found that there is long term improvement in life satisfaction (Olsson, Gärling, Ettema, Friman, & Fujii, 2013).

Due to the various benefits of active travel to the city and its people, such as low cost mobility, reduced congestion, and increased environmental welfare, there has been a significant rising trend in the deployment of initiative like bicycle sharing schemes in many cities across the world; London, Chicago, Barcelona, and Warsaw, to name a few. Though there are also obvious benefits towards health and well-being, where "greater time spent actively commuting is associated with higher levels of physical wellbeing" (Humphres, Goodman, & Ogilvie, 2013).

Also when asking "Does active commuting improve psychological wellbeing?" one study concludes that "in addition to potential physical health benefits, the positive psychological

wellbeing effects identified in this study should be considered in cost–benefit assessments of interventions seeking to promote active travel." (Martin, Goryakin, & Suhrcke, 2014).

Another form of active travel which has also seen growing interest, is running. One particular hackathon event in London has tried to capitalise on this is *RunHack*. The event had a declared goal to "make our cities more run-friendly", by tackling real and perceived barriers to running happily, safely and with ease in cities. The event surfaced over 50 ideas - from products and services that increase feelings of safety and confidence; to ways of assisting people move between mass transit and active travel; to new road rules to help runners, walkers and cyclists. The outcomes are being used in start-ups and to influence city organisations, such as *Transport for London* and global transit body UITP with their own research, public policy, campaigns, products and services.

However, it is important to note that some studies reported that though active travel such as cycling or walking will improve overall physical well-being, the context of the environment of the activity, e.g. heavy traffic or undesirable neighbourhoods, will influences their overall experience as well as their anxiety levels (Bostock, 2001). Such findings suggest that adequate and safe provision for active travel is important to raise mental well-being. Nonetheless, being able to know what active travellers are doing within the current infrastructure may also be helpful to city managers, and such data could be obtained from a variety of sources. For example, Strava's new *Global Heatmap* shows where people are using the mobile app to track their physical exercise, including cycling and running (Strava, 2017). Many cities, e.g. Amsterdam, are now using such data to plan infrastructure, as well as using other sources and insights for better planning of activity areas (Social Glass, 2014).

Autonomous Vehicles (AV) also have the potential for improving well-being, not just active travel. However, this new option has mixed opinions, as some have also highlighted its potential to corrode well-being. The global transport body, UITP, suggests that AVs a potential game changer for urban mobility, and in their SWOT analysis of AVs, they highlight some strengths as "social inclusion: more mobility options for all (elderly people, disadvantaged communities, children, less populated areas), solutions for Last-Mile, Door-2-Door, neighbourhood and feeder services" (UITP, 2017). Others also suggest gains in health from AV operation in last mile travel (Woodcock, Givoni, & Morgan, 2013).

However, others have pointed out that aside from some benefits, due to the ease of use, AVs may increase travel miles and congestion, and therefore have the potential to spark a "resurgence of sprawled development and its interconnected impacts [such as] higher obesity levels or other negative health impacts intertwined with lower levels of walking and cycling." (Thomopoulos & Givoni, 2015). They also suggest that such an innovation may "exacerbate social segregation between those able to afford AVs and those who will not." On the other hand, they also highlight potential benefits of a "unique opportunity to de-privatise car use through sharing... (sharing can take place temporally and spatially)", where AVs make it easier to persuade people to leave their cars, in favour of a shared vehicle. Such an evolution could lead to further positive outcomes by reducing environmental impacts. In addition, they also encourage shifting focus from *private autonomous* to *public autonomous* where "gains can even be extended if such autonomous public transport is integrated with higher levels of walking and cycling especially for the last mile travel." (Thomopoulos & Givoni, 2015; Woodcock et al., 2013).

Therefore, with the increase in shared and autonomous vehicles, it is important for city custodians to consider how they regulate such a technology, and how they allocate its infrastructure with respect to other shared modes of transportation, as well as cycling and walking. Managers should therefore consider taking proactive approaches to ensure these innovative technologies do not worsen sprawl and congestion. Still, there are undoubtedly legitimate cases of various other forms of transport to access the city. However, the demand for such forms may be managed in order to incentivise and dis-incentivise appropriate users. This will reduce congestion, as well as improve well-being.

Mobility departments should therefore consider their remit to include well-being. By managing demand and creating better mobility choice architecture, they succeed in improving life

satisfaction by changing people's lifestyles and well-being. Just as cities such as Mexico City are using demand data to shape parking fee policy, regions such as Metro Vancouver are preparing responsive road pricing schemes that shape demand and residents' daily mobility choices in order to maximize ease, efficiency and healthy behaviour for all. In a bid to control traffic in the city, the Mayor of London's office introduced the *Congestion Charge*, which required drivers to pay a fee to enter the inner zone of the city. Five years after the introduction of the initiative, the number of cars in the zone fell by 41%, the number of buses rose by 19%, and bicycle use increased by almost 50% (Gehl, 2010). These cities are already undertaking, or planning, activities that shape demand using smart mobility pricing, or adopting autonomous busses in priority lanes, or using big data and policy to favour users who share vehicles and use carpooling options. Such activities 'nudge' people's behaviour towards happier and more sustainable living, are organised by various entities such as *Behavioural Insights Team* (UK Gov), and the *Social and Behavioral Sciences Team* (SBST) "Nudge Unit" (USA Gov). Some cities are also experimenting with various incentives to shift commuter volume. In Chicago the results of a pilot project showed that 18% of commuters were persuaded to travel at different times during a period with a predicted rise due to a major sporting event. Travelers were offered various incentives such as a refund or a charity donation. The data showed alleviated congestion and a better travel experience (UI Labs, 2017).

Nonetheless, the expectations of travelers for a better user experience are on a constant rise, and innovators such as Uber and Lyft take advantage of the ubiquity of smart technologies in the hands of travelers to create new markets and complement/compete with city transit. Many cities are riding this new wave of constant innovations to see how they can improve the travel experience, as well as reduce congestion. The *Office of Extraordinary Innovation* (OEI), in Los Angeles CA, teamed up with such companies to create various offerings, and most recently are piloting a service called *Metro MicroTransit*, which "performs like a continuous vanpool and will dynamically route vehicles to meet Metro rider demand, saving time compared with fixed-route options, and removing single-

occupancy vehicles from our streets and freeways." (Schank, 2017). Such alliances are springing up around the world and are seen as "private sector technology meets public sector policy goals, bringing the best of both sectors together for the common good."

The fast rate of change in technical innovations is not unique, as urban transportation models are very much evolving too. There are however major social, and legislative challenges to be overcome, with various providers having to rethink their operating commercial models. For example, in San Francisco and other cities, the Ford-owned minibus *Chariot* (which crowd-sources its daily routes), whilst popular with its customers, has caused congestion at bus stops, and has failed in some cases to ensure that drivers are properly licensed. The company has therefore been on the receiving end of other commuters complaining, and has certainly not raised their levels of happiness (Marshall, 2017). Such challenges have also been seen in many cities, as well as incumbents like taxi drivers complaining of turf transgression, and even officials of city transportation are unsure of the effect such new services will have on their own offering (Hill, 2014). As such, new 'smart' mobility systems are running up against old challenges in cities, such as the limits of public road space. When private service providers are invited to use data and network solutions to enable new ride-sharing systems, policymakers and transportation authorities need to ensure that traditional city infrastructure and services are not overwhelmed or disadvantaged.

Nevertheless, driven by the goal of improving the overall commuting experience in the city, some mobility authorities are using sophisticated traffic real-time optimisation systems, like SCOOT, used in London, Toronto, Beijing, and being deployed in Dubai. These systems have had typical reductions of journey times by 15% (Wang, Liu, Wang, & Li, 2013). Still, other city managers, e.g. in Amsterdam, look at the task from a positive angle. They ask about how can they change the seemingly negative language, e.g. 'traffic jams', into a positive action, e.g. 'get to work', and use technology to drive such initiatives from a positive experience point of view. Such a point of view will necessarily be looking at what are classically seen as problems, but turning them into citizen-centred design opportunities that look for ways of delivering

citizen needs, with a more inclusive stance, and using smart technologies to do so.

Safe mobility for pedestrians is also an important consideration. A major report on the traffic statistics in the USA showed that "overwhelmingly, children, older adults and people of color suffer disproportionately from traffic violence." (Smart Growth America, 2014). Though similar analysis may not be readily available for other countries, the fact that there is a significant disparity in the safety records within groups of race and age in the USA, raises an alarm that should be attended. This is an ethical concern, a public health challenge and a smart cities challenge. Transportation planners in the USA are pursuing a data and evidence-based approach to deal with it. The most widely-used traditional approach to setting vehicle speed limits uses the speed at which 85% of vehicles travel during uncongested times (NACTO, 2017). Although this approach was developed for rural highways, it has long been applied to busy, urban streets. But planners are now calling for a new approach driven by better data. The US National Association of Transportation Officials is calling for change. While others in the transportation profession are calling for the creation of a new network of sensors to measure not just vehicles (Lower, 2017), but the number and speed of vulnerable road users. With better data on vulnerable users (including pedestrians and cyclists) urban street networks can be redesigned and speed limits can be set to protect all travellers. Cities such as Vancouver and Copenhagen count cyclists. Meanwhile, urban streets are now being redesigned to ensure Vision Zero (or zero traffic fatalities) in cities from Vienna to New York City (Vision Zero Network, 2017).

The above are just some of the factors to be taken into account regarding mobility and well-being. In order to monitor these factors in a more systematic manner, in 2016, the Urban Mobility Innovation Index was launched, and aims to highlight the various aspects of mobility within a city, to ultimately help the city improve its mobility. The index also includes customer experience and well-being elements. For example, the seamlessness of the user's journey, connectivity across the system (providing multi-modal choices), the usability of the city's transport system, safety, accessibility, as well as fairness and equity of the transport system as proxies for happiness.

Data are collected globally from cities invited to participate in the index (UMii, 2016), which are then consolidated into a report. The index and its report provide insights into urban mobility and innovation in cities across the world. Such indices that include the human element into mobility suggest that it may be useful to consider redefining multi-modal transport experiences, and not consider commute time as the only main factor (e.g. traffic jams), but also the quality of the experience itself.

4.4.1 Case-1: Demand Management (Arlington County, USA)

Based on their research that supports the case for building transportation demand management to improve communities, Mobility Lab (an international think tank based in Arlington county, VA) are able to work in a living lab for transportation development. They take advantage of the prevalence of smartphones penetration (approximately two thirds in the USA), along with increasing availability of open data within cities like Washington D.C., New York City, Chicago, and Los Angeles. They build tools that allow people to consider new transportation options to combine various modes of transport like walking, biking, driving, ridesharing, and transit for getting to social activities and work. Their work has persuaded 40,000 people to switch from car to active travel. Also, their tools included real time transit information, crowd sourced bicycle station location suggestions, and heat maps for bicycle accident hotspots, giving people more options for travel.

4.4.2 Case-2: Autonomous Shuttle (Civaux, France)

Regardless of the various challenges, there is a time and place for autonomous vehicles. Transdev, the French mobility company, is already operating a fleet of AVs at the nuclear power plant site in Civaux, France, using autonomous shuttles to transport personnel around the site (UITP, 2017). Also, in mid-2017, they announced their plans in partnership with Delphi, the automotive company headquartered in England, to operate the first European on-demand driverless mobility services on open roads in Paris-Saclay and Rouen (Transdev, 2017).

However, aside from the many trials, one that is worth mentioning is the project in the Japanese town of Nishikata (Tajitsu, 2017). The town is the testbed for an autonomous shuttle. *Robot Shuttle* arrives at the door of elderly people's home to take them to places such as social gatherings, without the need for them to go to a bus stop. This is not yet operational but does demonstrate the viability of the concept. Such projects combine mobility with well-being by increasing social contact, especially for segments that most need such interventions towards increased well-being. These systems are also being explored in other cities such as Singapore and Dubai.

Such projects are able to provide better quality mobility, reducing the chances of accidents (with human error being the most likely cause of accidents), and also providing more frequent mobility in places where it is low, giving aging populations access to community and health services that would be otherwise not so accessible.

AV technology is already here, with AV-ready Tesla for private travel, and the above shuttle being ready for public travel. As mentioned in the UITP policy brief (UITP, 2017), cities should already be making plans, to integrate AVs into the city transport system, as viable last-mile mobility solutions, taking into consideration the various challenges and opportunities.

4.5 Environment

The quality of the natural environment of a city is a key contributing factor towards well-being in the city. However, this has both a direct local impact, as well as a global impact. Therefore, it is important to attend to various environmental aspects such as **air quality, waste, electricity & water consumption, and sustainability** (see glossary for definitions).

No doubt that many cities are keen to improve the quality of their natural environment. The large C40 consortium of city mayors, made the *Fossil-Fuel-Free Streets* declaration: "As mayors of some of the world's great cities, we are committed to transforming them into greener, healthier, and more prosperous places to live. Our streets must be safe and accessible for everybody and our air must be clean and free

from harmful emissions. This will improve the quality of life for all citizens, and help tackle the global threat of climate change." (C40, 2017). Such direct action by prominent mayors is indeed positive towards improved well-being, sustainability and efficiency in the city. However, to what extent do such interventions benefit the environment directly, or ultimately benefit the environment as an end product, but is initially targeting well-being benefits? For example, a business-centric initiative may help the environment (e.g. recycling), whilst also helping the owners and benefactors of the business, by providing employment, purpose, income etc. There are many projects that aim to positively change people's consciousness about the use of natural resources, with concurrent sustainability impacts, including the use of smart meters and associated incentives and persuasion techniques reduce consumption, such as gamification and social pressure. In Vancouver, the *Greenest City* action plan addresses GHG (Green House Gases) reduction and access to nature simultaneously. For example: capturing rainwater in 'rain gardens' to reduce load on storm water system, while creating biophelic environments for citizens to enjoy on every street. Another example is *Amsterdam Rainproof*, an initiative that supports citizens to take measures with regards to heavy rainfall. Besides affecting large infrastructures, the impact of local measures is also important, e.g. roofs and gardens (Amsterdam City, 2014). This program is supported by the water company (owned by the City), helping citizens to take measures and work together with insurance companies and local construction companies.

However, some programmes also contribute to the cities overall environmental KPIs, such as Quito's carbon and water footprint calculator. The aim is to create consciousness about the environmental footprint in the city. An online calculator allows a citizen to calculate their carbon and water footprint for different activities. Citizens may choose between different categories: home, school or business. The calculator compares every person´s footprint with the average target footprint. Once the footprint calculated, the citizen receives feedback from the municipality regarding tips and recommendations to reduce their footprint and how to compensate for it. The project is part of transforming Quito into a more sustainable

and environmental friendly city through citizen education and good environmental practices.

4.5.1 Case-1: Water Clearing Facility (Maribor, Slovenia)

With limited funding for major projects, the Slovenian government wanted to address the environmental decay of the river Drava, running through the city of Maribor, which was the result of neglect after a long period of war. The natural habitat for much wildlife had deteriorated, leaving health risks to the local inhabitants. The city managers wanted to fix the situation and return it to a better condition and to follow a strategy of a sustainable and circular economy. They understood that "having well-preserved natural surroundings is important for the well-being of inhabitants, it provides better air quality (in this area further work remains to be done) and it makes the city attractive to live in or just to come and visit." (U4SSC, 2017).

The city managers used the PPP (Public-Private Partnership) approach to clean up river water quality with a waste water clearing facility and improve many aspects of the quality of life in Maribor (U4SSC, 2017). Though they were already following the city's *Integrated sustainable urban development plan*, they wanted to end up with "further integration of the river in inhabitants' lives, with different activities on the river banks planned with the preservation of drinking water quality is kept in mind."

The project eventually reaped many benefits for the city and its citizens in many ways. The project created new green economy jobs, reduced dependence on materials from public utility companies; educated citizens on the "benefits of a sustainable way of dealing with waste and different materials", and water consumption was lowered, while cleared waste water was brought back into the city system. Upon completion of the project, aside from returning the water quality within standards and enabling wildlife to flourish again, residents were able to enjoy the river for sports and leisure activities without health risks, thereby improving the overall quality and comfort in the city.

4.5.2 Case-2: Goodwill Waste (Seoul, South Korea)

In the 'Sharing City' city of Seoul, the city managers were faced with the challenge of finding a workable balance regarding waste collection and disposal. The proposed method was the *Volume-based Garbage Collection Fee* (VGCF), which was different to the existing system which was a property-based tax (Kim, 2004). The new system was based on the principle of co-production, being a cooperation between citizen and city and is akin to volunteering, giving residents a sense of civic engagement. Another aspect was the fee which is based on the amount of waste being collected. These two aspects, gave residents an indirect incentive to recycle, by being motivated to sort their waste before collection, as this reduced the fee they paid. The scheme was indeed successful at shifting behaviour and resulted in a reduction of waste per capita of 30%, from the start of the scheme in 1994 till 2000. The scheme also resulted in increased amount of recyclable material collected, and importantly increase the sense of civic engagement by the residents, which is a strong contributor to well-being. This is in addition to the fact that people knew they were helping the environment, and the actual physical benefit towards a more sustainable city.

4.6 Living Enablers

Though life in the city is influenced by many activities, as shown in the various dimensions listed in the previous sections, there also exists the location and space itself as the physical substrate and the many other urban structures to enable living in the city. These structures take various forms, concepts and scales, such as ***green & blue spaces, housing, safety, infrastructure, urban planning, and connectivity*** (see glossary for definitions).

With regards to living in a city, the concept of a place is important to the extent that people have to live somewhere, and where and how they live is intimately connected with the quality of their lives. A *place* essentially has three elements; *materiality*, the physical part; *meaning*, as constructed by individuals or groups; and *practice*, what people actually do (Cresswell, 2015). Though in today's increasingly digital and smart world, the experience of 'place' may be

mediated by technology. Consequently, places can be simultaneously used for various activities (e.g. socialising, working, and shopping), all from the same place.

How people perceive such materiality of a place, or even their mental 'image' of the city as a whole, is a topic of longstanding academic interest (Gibson, 1979; Lynch, 1960). A typical recommendation is to make the city's form more vivid and memorable to the residents and visitors, leading to a more navigable, understandable and legible environment. Further, the nature of people's perception of their space occurs at various scales of a city relative to the human form (Hall, 1963, 1966). Equally, cities should be inclusive and accommodate all segments of society, with their different needs. This is especially important in the current growth of the aging population, and therefore attention should be given to "age friendly cities" (Handler, 2014). The scale can also be at various 'speeds' and perspectives, e.g. at walking pace, and driving pace, but rarely experienced at the helicopter view, which is unfortunately a common view for some architects looking at a model of the city during the planning process (Gehl, 2010).

Nonetheless, there is much to extol the virtues of the walking pace, in a walkable city. Walkable cities are deemed healthy cities, physically and socially (Speck, 2012), and many architectural firms actively promote and design for walkability, where "walking positively transforms a city's health, economic productivity, and ecological outlook. For us as individuals, it influences how we connect with family, friends, work, and nature." (Arup, 2016). Therefore, since walkability makes a city more liveable, encouraging such an activity has a positive influence on well-being. To mediate for such activities, and provide a more contextually relevant view, a particularly interesting depiction of a city is not to see it from a static distance or geographical point of view, but from a dynamic sense that takes action into account, such as walking, or more generically, reachability. An interesting novel way of viewing a city presents the user in the middle of concentric rings that show walking distance in terms of walking time (Lui, 2017). In this way, a person will be able to compare many destinations that are the same walking distance away. Such an interface would encourage people to walk by offering choice that is relevant to the way they experience the city.

Another walking related app goes further and rates cities in terms of walkability (Walk Score, 2017). Also used by real estate agents and buyers, the *Walk Score* app can scores walking routes, taking various qualitative aspects, such as amenities, street barriers, and delays due to crossings. Ultimately, living space has to accommodate these perceptions and scales, whilst still offering the opportunity for social connections, and even fun, since humans are a social creature, and places have a strong influence on well-being, even more than possessions (National Trust, 2017).

Increasing the sense of a meaningful place has been highlighted by Jane Jacob's emphasis on close and regular interactions between people, and the sociality of sidewalks (Jacobs, 1961), leading to better places. There are many publications that address how principles of place-making achieve "urban happiness" (Sepe, 2017; Silberberg, 2013). One such publication on "placemaking and the future of cities" suggests a bottom-up process, where place-making is a process which "results in a place where the community feels ownership and engagement, and where design serves function. Here, human needs will be met and fulfilled... [an] approach that empowers and engages people in ways that traditional planning processes do not. It draws on the assets and skills of a community, rather than on relying solely on professional 'experts'." (Project for Public Spaces, 2012). The authors explain in detail ten specific ways to improve a city from a place-making point of view in order to create "vibrant, safe, attractive public spaces." For example, they emphasise multi-use squares and parks, building local economies through markets, creating a comprehensive public space agenda linked to the public health agenda, and restructuring government to support public spaces. An interesting recommendation is what they call "the power of 10" which emphasises the exponential benefits derived from the multiplicity and variety of activities and uses within spaces.

Though the topic of urban planning will be given full attention in the upcoming report, as the follow-up to this chapter, it is still worth giving a brief mention here in order to contextualise it within the city dimension of *living enablers*. Therefore, to support people in being able to practice what they do in their city, it is important to consider the design of the city. In general, according to a study in New Zealand (Ministry

for the Environment, 2005), employing good urban design practice results in a better quality of life, and has the potential of improving the health and social fabric of a city. Such benefits may be realised by paying attention to basic elements of urban design, such as mixed land-use, density, connectivity/mobility (see mobility section), and user participation, (see governance section). Also, data on the psychophysiological effects of urban spaces and systems can be used to inform design decisions in order to create environments that boost feelings of restoration, place attachment and trust in strangers, as well as workplace productivity (Silberberg, 2013). Such insights may also be used to alter individual decisions regarding transportation choice, civic participation and likelihood of return to a place. The city of West Palm Beach in Florida, used research in neuroscience of place to inform a design competition on waterfront and downtown revitalisation (Happy City, 2017b). Tactical inter-ventions in New York, London and Bogota are also being used to test effects of evidence-driven design. In Vienna, city planners draw on the user experience domain to boost gender equity in public space design.

Also, as will be discussed further in the upcoming follow up chapter, the way that a built environment is laid out and organised, and the how it affects people's daily interactions with each other, has an influence on "our feelings of trust, our willing-ness to help strangers, and our happiness with our living conditions." (Ellard, 2015, p. 138). This has been demonstrated by many studies, ever since the classic "lost letter" experiment that explored trust in an urban setting (Milgram, Mann, & Harter, 1965).

Still, a city should also provide for connecting its people within the cityscape, not just physically, but also digitally. Due to the ubiquity of Internet connectivity, it may be easy for policymakers to forget that not everyone enjoys easy access to telecommunications. Since, Internet connectivity correlates to happiness as seen in Gallup World Poll data, it may be seen as a basic living enabler in a modern city. The provision of such a service has been a growing trend, and has many benefits such as fostering citizen interaction with the city, improve people's access to municipal data, support innovation, and improve tourism activities, and inclusivity (for those who cannot afford it). WiFi delivery in public places, has been provided

by various means, including PPP, as seen in London, Seoul, Dubai, and NYC. In Quito, Ecuador, the municipality installed the *#QuitoTeConecta* initiative, which seeks to improve connectivity in the city and provide citizens and tourists with free access to internet in public spaces. Since 2014, 460 WiFi points have been installed in strategic parks around the city, primary public transport stations, municipal communal houses, and jointly with university campuses. On average, 5000 users connect to the city internet network on a daily basis. New York City is also ensuring connectivity for all by transforming 7,500 payphones into *LinkNYC*, a free municipal Wi-Fi network offering up to gigabit speeds, free phone charging and free national calling. On-street advertisers pay for the upgrades. Thus, the program reuses existing infrastructure, while boosting the profile of local businesses and, most of all, gives more people more access to the Internet.

However, not just the layout of a city influences people's well-being, so does nature. The concept of *Biophilia* is interesting, as put forward by the biologist E.O. Wilson in the 1980s – the idea that there is a natural, instinctive bond between human beings and the natural world (Wilson, 1984). This topic has been well researched in environmental psychology, resulting in a wide body of knowledge about the experience of nature (Kaplan & Kaplan, 1989). For example, natural spaces have less crime, and people are happier; "Residents living in 'greener' surroundings report lower levels of fear, fewer incivilities, and less aggressive and violent behavior" (Francis E Kuo & Sullivan, 2001). Also, the availability of green and blue spaces is associated with better mental and general health (de Vries et al., 2016), and biophilic design can improve the quality of life, even in prisons (Söderlund & Newman, 2017). More recently, this has been recognized as a crucial aspect in the design of workspaces, due to the impact of greenery on productivity and creativity. At *Carlo Ratti Associati*, an urban design agency, they often apply this concept – such as at the *Agnelli Foundation offices* in Turin, where people can work in a well-designed garden. Access to parks and natural spaces strongly correlated with trust, neighbourliness, health, productivity. See the NRPA's publication on *Parks and Other Green Environments* for specific urban case studies (Frances E Kuo, 2010).

The concept of 'home' is being explored afresh, not only that of workplaces. The changing nature of household composition in many cities is having an effect on social well-being and urban efficiency. For example, the most common household in countries such as Canada, consists of one person. Architects and entrepreneurs are exploring new housing models, such as co-living spaces (www.roam.co in various cities, or London's *Collective Old Oak Common*), co-housing and adult dorms. Governments have been slow to prioritize such innovations or monitor their effect on social trust and well-being. One example of redefining living space has been seen as a result of increasing San Francisco rents, which are encouraging some people to extend their sharing philosophy into living arrangements. Young professionals in the city and greater Bay Area are taking over leases of grand estates and transforming them into communal living spaces. The *Open Door Development Group* is a real estate investment firm established to buy buildings and convert them into co-living spaces. By creating curated communities rather than luxury housing, its founders believe they can build diversity into the plan.

The City of Vancouver in British Columbia (BC), Canada, has also identified a relationship between residential towers and low social trust and social connectedness. Consequently, *BC Housing*, a public housing agency, and *Happy City* (an urban well-being agency), created an evidence-based toolkit on maximising social relationships in multi-family housing, connecting dozens of studies to specific actions in design (Happy City, 2017a). The evidence in this toolkit is now being used to guide design of private socially-supportive housing models such as *Tomo*, a 12-unit co-housing light project in Vancouver which includes unique and adaptable spaces to facilitate social group bonding at various scales (Bula, 2017).

4.6.1 Case-1: Making places for people (Melbourne, Australia)

Starting from a low point of "an empty, useless city centre" in 1978, the City of Melbourne, following the formulation and adoption of the 1985 Strategy Plan, reinvented itself as a "place for people", thanks to a clear and concerted shift towards "focusing on the needs of homo sapiens", as Gehl puts it. Commencing in 1985 the City started an incremental process of improving the pedestrian network, making gathering spaces of excellent quality, strengthening street activity by physical changes, and encouraging more people to live in and use the city. In 1993, the City invited Gehl Architects from Denmark, to collaborate in measuring the incremental changes designed to make the city safer, healthier and more liveable, whilst striving for sustainability. After conducting extensive research in the city itself, the City and Gehl Architects set a basis for future measurement and made some key recommendations to continue the process started in 1985 (Melbourne City, 1994). The City continued the incremental implementation of the Strategy and were able to report key results in 2004 (Melbourne City, 2005). They found that the city had a better pedestrian network, there were more gathering places that were welcoming to everybody, the city was livelier and having more active streetscapes, and more people were taking advantage of a 24-hour city. Though data on growth of use of public places were not controlled for population growth, which means that the rise could be simply attributed to an increase in overall population, still, the rise in itself is an indicator of the success of a city, being a place where people want to be.

Melbourne's mayor noted that the city has seen a "consistent application of a range of urban design strategies and individual initiatives of varying scales. It has focused on achievable actions, and aimed at reinforcing the existing qualities of the city.

The publication *Places for People: Melbourne City 1994* offered a vivid, factual picture of the quantity and types of activity occurring in the city's public places…the findings [in 2004] demonstrate Melbourne's remarkable success in attracting more public life through physical improvements to existing public places, providing additional public space … The nature of public life has quite radically changed with more people choosing to stay for optional rather than purely necessary activities until late evening. The results clearly illustrate that places designed to be people-friendly attract people, and public life will follow." (Melbourne City, 2005). The case of Melbourne demonstrates how systematic people-centric urban planning activities, following the feedback loop described earlier, can yield success in improving people's lives in a thriving city.

4.6.2 Case-2: Bájale al Acoso (No to Harassment) (Quito, Ecuador)

A good example of using technology to raise the sense of safety in the city, leading to increased happiness in the city, comes from Quito in Ecuador. "Bájale al Acoso" (roughly translated as 'no to harassment'), is a mobile platform used to report sexual harassment cases that occur at the municipal public transportation system. In 2012, 83% of the women who lived in Quito considered public transportation unsafe. Data shows that a third of women and girls in Quito have suffered of some kind of sexual harassment either on public spaces or at their homes.

The programme´s goal is to prevent sexual harassment in public spaces, such as the municipal public transportation system. It also seeks to improve social conscience about violence against women and work through social sanctions, where victims have the chance to report their case to the Police. The programme aims to increase the number of effective reports regarding sexual arrestment, which has historically not been visible; just 6% of girls or women end up making a formal complaint. Six safety spots are located at the main bus stations, with specialised staff trained in protocols for prevention and attention to the cases, as well as 220 drivers of the municipal public transportation system.

Any girl or woman who has suffered from sexual harassment can send a SMS or text message denouncing the incident and the number of the transportation unit she is in. A control centre gets the message and responds to the case within the next 3 minutes, meanwhile an alarm is activated in the bus.

The victim can seek for accompaniment from a public official who will wait for her at the next bus stop, and also deal with the perpetrator of the harassment. As smart phones are not wide-spread within the population that uses public transportation, the SMS platform guarantees universal access.

Before the project began, 91% of women who live or work in southern Quito, had experienced sexual harassment in public spaces in Quito (Source: UN Women and Patronato San José, Municipality of Quito, 2012), and 82% of women in Quito thought that public transportation is unsafe (Citizen Security Observatory, 2015), and

39% of women in Quito have suffered of some kind of sexual harassment in the public transportation system. Since the implementation of the program in March 2017, 768 reports have been received through the SMS platform, 28 cases have been judged, 14 cases have had a sentence. Five of these sentences included prison between 12 and 36 months. Nine cases ended in an acquittal sentence. 100% of reports were attended, either through a phone call or by Bájale al Acoso staff, as well as by the Municipal Police and the National Police.

The Bájale al Acoso solution is part of the programme "Quito, a safer city for women and girls", which seeks to build a safer and more inclusive city for girls and women. It is linked to the *Development Plan for the Quito*, which is guided by three principles: Quito as a smart city, a city of opportunities, and an inclusive city. This programme is a good example of the use of inclusive technology for the direct benefit of citizen, and directly influencing happiness and well-being.

5. Conclusion

Though this chapter no doubt has natural overlaps and areas of cross-over with other chapters in this report, e.g. personal happiness, and happiness in the workplace, the focus here is more on seeing the opportunities that are presented in terms of projects at a city level. The sections organise these projects along the dimensions of a smart city, and have shown many examples of projects that directly and indirectly lead to improving well-being and happiness on a city scale. However, conducting the research and collating the findings into this chapter has also highlighted some insights that are worth mentioning.

When discussing the notion of a 'smart city', people may think of technology as a key element in such discourse. However, a wider and more inclusive scope is worth considering in order to redefine smart cities to avoid an exclusive focus on technology. Such a view may help to democratise the notion of a smart city, to be inclusive of cities that do not have big budgets, but can still do a lot toward making their cities smarter for higher well-being. Smarter in this sense means to wisely use resources, methods and techniques (including high technology), for the wider benefit of all

stakeholders towards a more equitable and inclusive smart city (Wardell Ghirarduzzi, 2017). Actions and interventions cannot truly be considered 'smart' unless they provide benefit for the widest range of city residents and visitors. The biggest challenge for smart city providers is to ensure that actions respond to the needs of populations who have traditionally not benefited from technological innovation. It is perhaps easy to provide efficient, networked solutions for a city's wealthiest. However, it is harder to extend benefits to people who do not have smart phones, cars or credit cards.

Still, looking at some methods and techniques that may improve life in the city, might raise the question of confidence in such methods, that indeed they will have the desired impact. The topic of evidence-based interventions is of course important when considering wise use of resources. However, as discussed in the section on the feedback loop, such constraints have their challenges. Therefore, rather than insisting on only the highest level of evidence, the recommendation is to use a similar approach towards interventions that aim to increase happiness in the city (as used by UK's Nesta). In this way, it is a more inclusive and pragmatic approach towards a wider variety of interventions, yet still able to distinguish between the quality of evidence, and therefore set expectations.

Nonetheless, when the city managers shift towards using evidence-based interventions and are more inclusive in their interventions, the level of trust and confidence towards the managers, from the people in the city, will no doubt increase. There is plenty of evidence that a strong contributor to happiness is the sense of trust in the social environment a person is living, and the city is no exception (Helliwell et al., 2017). However, this sense is not limited to trust in the governance apparatus directly, but also indirectly through the use of technology channels. Therefore, much effort needs to be expended to increase people's trust in the technology itself, instead of the 'old and trusted' methods. Such increase in the trust of more efficient and convenient channels, will contribute to increasing the adoption of such channels, which would lead to increased well-being. Trust is needed for the success of interventions, and trust should also be the end goal of many interventions because

it is a correlate of well-being. City custodians may therefore aim to increase trust in two ways:

- Create interventions that specifically increase trust within society at large, as this will increase trust in the city; people to people, and people to city.

- Add 'trust' as an element in interventions, as this will increase happiness as part of the intervention itself, since trust is a known contributor to happiness.

Trust and well-being may be further enhanced as a result of investment in human capital, as there is evidence regarding the strong correlation of human capital with happiness at the regional and city scale. This suggests it is worthwhile further investigation and acting to invest in education and the knowledge base of a city, as well as cultural activities that not only increase happiness, but also makes cities more competitive. It is also worth exploring ways that technology may be able to help make such investments more efficient. Such investment in human capital as well as material capital must be sourced efficiently. Accordingly, smart cities custodians are leveraging existing and upcoming commercial interest to drive efficiency in the city through *Public Private Partnership* (PPP). This approach also applies to happiness. In this respect, by ensuring commercial sustainability of happiness project, the city will be able to increase happiness without directly paying for it, yet provide the platforms for the benefit of multiple stakeholders. There are many examples of joint-projects and interventions that are concerned with increasing happiness in the long term in a sustainable way, without the need for direct city operational resources. Such trends are redefining government, where it is seen as the broker for PPPs whilst upholding public interest.

With the aim of guiding city custodians towards the awareness required to increase happiness in the city, this chapter has considered the mechanism of systematically increasing happiness in the city, and has discussed various examples at different levels of detail. In order to be more relevant to the current digital context and smart city trends, examples were also drawn to help connect with these trends. The discussion also focused its attention on the different dimensions in the city, in order to give a breadth of the examples, and therefore a wider

understanding of happiness at the scale of the city. However, any plans to enhance a city should beware of how the "folly of building-centric urban renewal reminds us that cities aren't structures; cities are people." (Glaeser, 2012). Renewal programmes should be truly peo-ple-centric, striving towards using data-driven and evidence-based interventions, with a long-term view, to ensure that such plans are in sync with the essence of the city, and really do work to help all people be happy in the city.

Finally, it is worth noting that a lot of what gives the city its character and patina, are the activities of the people themselves, rather than the actions of the custodians. Much of what happens in the city is bottom-up. This is what gives a city or a place its authenticity, and people like such natural imperfect weave to the tapestry of the city. As discussed in the sections on place-making, this bottom-up creativity is what makes a place, and as such is of value. Indeed, the follow-up chapter to this one, will be exploring how cities organise this tapestry, and highlighting successful urban planning activities that encourage the development of happier and liveable cities, for all.

6. Glossary

To aid a common understanding of the terms used with this chapter, this glossary quotes from various official, academic and other sources. In order to show different points of view, more than one definition or context are given.

Economy

Entrepreneurship

Entrepreneurship can be defined as a private initiative that manifests itself throughout the economy in many different ways and focuses on generation of value. (OECD, 2017a)

Entrepreneurship can be defined as the "process of using private initiative to transform a business concept into a new venture or to grow and diversify an existing venture or enterprise with high growth potential. Entrepreneurs identify an innovation to seize an opportunity, mobilize money and management skills, and take calculated risks to open markets for new products, processes and services."(Evaluation Office UNDP, 1999)

Entrepreneurship may be defined as the "phenomenon associated with entrepreneurial activity, which is the enterprising human action in the pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets. In this sense, entrepreneurship is a phenomenon that manifests itself throughout the economy and in many different forms with many different outcomes, not always related to the creation of financial wealth, for example they may be related to increasing employment, tackling inequalities or environmental issues." (OECD, 2017a)

Productivity

Productivity measures the volume ratio of output to input in an economy. Productivity may be defined as a "ratio of a volume measure of output to a volume measure of input use. While there is no disagreement on this general notion, a look at the productivity literature and its various applications reveals very quickly that there is neither a unique purpose for, nor a single measure of, productivity."(OECD, 2001d)

Efficiency

Efficiency is the ratio of output to given input with focus on maintaining quality, and is defined as "Increasing output for a given input, or minimising input for a given output, with a regard for maintaining quality." (Jackson, 2012)

Efficiency is the "ratio of produced outputs (or what has been achieved) to the resources used to create them (money, time, labour, etc.). The effects of improved efficiency extend beyond obvious cost-saving factors, and recent research shows a direct relationship between public sector operational efficiency and economic growth (Public Choice 2008). Furthermore, higher efficiency in public sector organizations improves the image and public legitimacy of the government." (UNDP, 2011)

Innovation

Innovation involves the introduction of a new or significantly improved product, process or method using the most up to date and best-fit models. Innovation "involves the introduction of a new or significantly improved product, process or method, will increasingly be needed to drive growth and employment and improve living standards." (OECD, 2010)

In UNDP Innovation Facility document innovation is seen as "not an end in itself. It is about finding better ways to create impact for people and the planet, to strengthen resilience and more inclusive societies. It is about using the most up to date and best-fit models to get the best development result possible. Accordingly, UNDP's innovation framework calls for innovative approaches to development which employ a range of new methodologies, technologies and media to support national governments tackle complex challenges, improve service delivery and engage citizens". (UNDP, 2016b)

Unemployment

Unemployment is a state when a person is without work, is currently available for paid work or is actively seeking for work during a certain period of time. Unemployed are "People who during a specified period were (i) without work, meaning without paid employment or self-employment, (ii) currently available for paid employment or self-employment, and (iii) seeking work through active steps taken. A "relaxed" definition of unemployment includes just (i) and (ii) above. Some of these are discouraged from actively seeking work because of current employment conditions." (UN Viet Nam, 2003)

"Unemployment tends to be associated with an increase in crime, suicide, violence, drug abuse and other social problems that can increase personal insecurity. Jobs foster social stability and social cohesion, and decent jobs strengthen people's abilities to manage shocks and uncertainty."(UNDP, 2014)

Inclusive Labour Force
Inclusive Labour Force can be defined as providing equal work opportunities for everyone in the labour market, especially vulnerable groups. "The global financial crisis has reinforced the need for activation policies to make labour markets more inclusive. This means providing the unemployed and other groups at the margins of the labour market with the support, incentives and skills and training they need to move into employment. It also means providing better opportunities for workers in low-paid, insecure jobs to move into more stable, rewarding and productive jobs. This is fully recognised by the G20 Leaders who, at their Summit in Los Cabos in 2012, reaffirmed the commitment to put quality jobs at the heart of the recovery. In particular, they emphasised the need to promote policies that generate employment for youth and other vulnerable groups... Policies must tackle the long-standing structural obstacles that are keeping many youth, women, people with disabilities and low-skilled workers out of work or under-employed. In the context of rapid population ageing, successfully engaging these groups in the labour market is crucial, not only for improving their own well-being, but also for strengthening overall economic growth, equality and social cohesion." (OECD, 2013a)

"Policy action is needed to foster resilient, flexible labour markets that can weather economic downturns with limited social costs and to promote inclusive labour markets that allow under-represented and vulnerable groups to participate in rewarding and sustainable employment."(OECD, 2016a)

Social Inclusion
"A social inclusion approach implies addressing need or alienation wherever it exists". (UNDP, 2007) The UNDP's National Human Development Report 2007 describes the concept of social inclusion as being "at the heart of EU social policy-making, is very much congruent with both the human development and the human rights-based approaches to socio-economic

development. These approaches draw upon economic and social rights analyses and take into account all entitlements relevant for enlarging the choices of individuals to live a decent and meaningful life. In addition, they share a common concern about equity, non-discrimination and inclusive participation".(UNDP, 2007)

The UNDP report further describes "A social inclusion approach implies addressing need or alienation wherever it exists. Social inclusion reaches beyond the enforcement of rights in legal terms by tackling material deprivation, stigmatization and social separation and hence the approach seeks to understand this complex social phenomenon in terms of causes as well as outcomes. It also has an operational bias, devising workable policy responses, effectively recognizing that the State has a 'duty of care' to include and involve all members of society in political, economic and social processes". (UNDP, 2007)

People and Society

Health
"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (World Health Organization, 2017a)

"Functionings are the various things a person may value being and doing — such as being happy, adequately nourished and in good health, as well as having self-respect and taking part in the life of the community." (UNDP, 2016a)

An alternative view on health is suggests that "The WHO definition of health as complete wellbeing is no longer fit for purpose given the rise of chronic disease", and proposes changing the emphasis towards "the ability to adapt and self-manage in the face of social, physical, and emotional challenges". (Huber et al., 2011)

Education
The greatest inequalities are in education, with pronounced long-lasting effects on capabilities. (UNDP, 2016a)

"Education is the key that will allow many other Sustainable Development Goals (SDGs) to be achieved. When people are able to get quality education they can break from the cycle of poverty. Education therefore helps to reduce inequalities and to reach gender equality. It also

empowers people everywhere to live more healthy and sustainable lives. Education is also crucial to fostering tolerance between people and contributes to more peaceful societies." (United Nations, 2017a)

"Education should equip students with the skills they need to lead healthy, productive, meaningful lives."(World Bank, 2018)

Continuous Learning
Continuous Learning can be defined as any formal or non-formal learning activity carried out by individuals in order to improve knowledge and competencies. (OECD, 2001a)

"The concept of lifelong learning, or lifelong education, became current in the 1970s. In its early development the concept was equated with giving adults access to formal courses at educational institutions. In choosing the goal of "lifelong learning for all in 1996", OECD Education Ministers signalled a major departure by adopting a more comprehensive view. This goal covers all purposeful learning activity, from the cradle to the grave, that aims to improve knowledge and competencies for all individuals who wish to participate in learning activities. International organisations such as UNESCO and the European Commission have also adopted the more comprehensive approach." (OECD, 2001a)

"The lifelong learning framework emphasises that learning occurs during the whole course of a person's life. Formal education contributes to learning as do the non-formal and informal settings of home, the workplace, the community and society at large." (OECD, 2001a)

"People at each stage of life need not only to be given specific opportunities to learn new things, but also to be equipped and motivated to undertake further learning, where necessary organised and directed by themselves. Curricula, pedagogical practices and the organisation of learning all need to be examined from this perspective." (OECD, 2001a)

Culture
"Culture defined as 'the set of distinctive spiritual, material, intellectual and emotional features of a society or a social group' (UNESCO, 2001)." (UNESCO/UNFPA/UNDP, 2015)

"Culture should be regarded as the set of distinctive spiritual, material, intellectual and emotional features of society or a social group, and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs." (UNESCO, 2001)

Social Services
"Social service, also called welfare service or social work, any of numerous publicly or privately provided services intended to aid disadvantaged, distressed, or vulnerable persons or groups." (Pinker, 2017). However, some definitions include other societal themes such as health and education.

The following definition was approved by the IFSW General Meeting and the IASSW General Assembly in July 2014: Global Definition of the Social Work Profession:

"Social work is a practice-based profession and an academic discipline that promotes social change and development, social cohesion, and the empowerment and liberation of people. Principles of social justice, human rights, collective responsibility and respect for diversities are central to social work. Underpinned by theories of social work, social sciences, humanities and indigenous knowledge, social work engages people and structures to address life challenges and enhance wellbeing." (International Federation of Social Workers, 2014)

"Programs and services that improve the well-being of individuals, families, and communities."

Society
"The aggregate of people living together in a more or less ordered community." (Oxford University Press, 2017b)

"Sociologists calls this social structure [society] - the ordered relationships and patterned expectations that guide social interaction - and it is fundamental to life in all societies." (Thompson & Hickey, 2005)

Human Capital
"Human capital is the stock of skills that the labor force possesses." (Goldin, 2016)

"Individuals differ in both inherited and acquired abilities, but only the latter clearly differ among countries and time periods. Human capital analysis deals with acquired capacities which are developed through formal and informal education at school and at home, and through training,

experience, and mobility in the labor market. The central idea of human capital theory is that whether deliberate or not, these activities involve costs and benefits and can, therefore, be analyzed as economic decisions, private or public."(Mincer, 1981)

"Human capital as embodiment of skills is a convenient conceptualization of its role as coordinate factor of production in its contribution to national economic growth. Human capital as a source of new knowledge shifts production functions upward and generates worldwide economic growth." (Mincer, 1981)

"But that gradually changed, and since the early 1960s, there's been increasing agreement on one key part of the growth puzzle, namely, the importance of people – their abilities, their knowledge, and their competences – to economic growth. Or, in other words, human capital." (Keeley & OECD, 2007)

"Human capital is defined by the OECD as the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being." (Keeley & OECD, 2007)

Leisure
Leisure can be defined as activities that are enjoyable and pleasurable. (OECD, 2009)

"Leisure can be defined as specific activities conventionally thought of as "leisurely". A more thorough definition may be based on what the majority of people would list as leisure activities, such as television watching, participating in sports or exercise, reading, seeing movies, and so on. Finally, leisure can be defined as a state of mind, meaning engaging in enjoyable or pleasurable activities." (OECD, 2009)

Governance

Digital Government Services
Digital Government Services can be defined as government services provided by means of digital technologies in a user or citizen-driven setting. (OECD, 2016b)

A digital government environment is one that is "largely user-driven, with users voicing their demands and needs and thereby contributing to shaping the government policy agenda and the nature of and means for receiving integrated

direct personal services. Achieving Digital Government will, in some areas, require progression through a period of e-government, the middle stage in digital transformation. Under e-government, governments make greater use of digital technologies, particularly the Internet, to achieve better government, focusing on delivering services tailored to individuals needs in a user or citizen-driven setting, while also achieving improved efficiency and productivity." (OECD, 2016b)

Government Efficiency
Government Efficiency can be defined as government services provided with increased value for money. (Deloitte, 2013)

"The recent economic crisis has increased pressures on governments to achieve efficiency gains in delivering public services. Based on conventional economic theory, "efficiency" is defined as the relationship between one or more inputs (or factors of production) and one or more outputs." (OECD, 2015)

"Efficiency is about doing more for less. It involves maximizing outputs such as the volume of services provided, minimizing inputs such as the amount of resources or capital required to produce those services and maintaining or improving quality. Efficiency can be measured by how much it costs to deliver a program compared to previous years or compared to peers, or the relative outcomes that governments obtain from a certain level of expenditure. Rising citizen expectations, ageing populations and global economic volatility have put pressure on govern-ments to increase the value for money of public services" (Deloitte, 2013)

Participation
Citizen participation can be defined as people's ability to engage in dialogue with their govern-ment and to participate in the political process. (United Nations Department of Economic and Social Affairs, 2003)

Citizen participation implies "the involvement of citizens in a wide range of policymaking activities, including the determination of levels of service, budget priorities, and the acceptability of physical construction projects in order to orient govern-ment programs toward community needs, build public support, and encourage a sense of cohesiveness within neighborhoods. There are

many models of participation. At one end of the scale sits information provision – a one-way government-to-citizen provision in which a government simply tells its citizenry what it wants them to know through media or other means. At the other end is the active citizenship or empowerment model, in which citizen groups are involved in agenda-setting and decision-making and monitoring. Following the continuum model of participation, the International Association of Public Participation (IAP2) conceptualizes participation in five categories of relationships: inform, consult, involve, collaborate and empower." (UN Public Administration Glossary, 2017)

"The EParticipation Index assesses how relevant and useful these features are from the point of view of people's ability to engage in dialogue with their government as consumers of public services and to participate in the political process as citizens." (United Nations Department of Economic and Social Affairs, 2003)

Transparency
"Transparency refers to unfettered access by the public to timely and reliable information on decisions and performance in the public sector, as well as on governmental political and economic activities, procedures and decisions. (UN Public Administration Glossary, 2017)

Transparency refers to unfettered access by the public to timely and reliable information on decisions and performance in the public sector." (Armstrong, 2005)

Leadership
"Leadership is an important and crucial variable that leads to enhanced management capacity, as well as organisational performance. A leadership focus also plays an integrating role among various Human Resource Management components including recruitment and selection, training and development, performance management, public service ethics, and succession planning." (OECD, 2001e)

"Strong leaders can ensure that capacity development receives proper emphasis in all forums, which is why the relationship between capacity development and leadership is fundamental for transformation. It is critical to foster leadership to protect capacity investments from the beginning, because poor leaders can destroy decades of patient building of human

skills or institutions, or even use available knowledge to provoke social regression. They can confuse ownership claims and leave a vacuum that other less legitimate leaders, including experts, readily fill. The bottom line: high capacity with poor leadership can make an organization or country stumble, but even with low capacities, sound leadership can move a country forward." (Lopes & Theisohn, 2003)

"Leadership is a process whereby an individual influences a group of individuals to achieve a common goal." (Northouse, 2007)

Mobility

Autonomous
"Autonomy in general means the capability of a system, process or an item to design its input-, throughput- and output-profiles as an anticipative or reactive answer to changing constraints of environmental parameters. One specific criterion of autonomous processes or items is to render a decision by itself on the basis of parameters, which can lead to different but in principal predetermined process or order fulfilment steps." (Scholz-Reiter, Windt, & Freitag, 2004)

Active Travel / Mobility
"Active travel means a mode of transport which involves physical activity such as walking and riding a bike to get from one destination to another - including travel to and from the places we live, work, learn, visit and play. These are some of the most efficient and effective ways to incorporate regular exercise into our daily lives, reducing many long-term health risks and contributing to our mental and physical health and well-being." (Australian Capital Territory (ACT) Government, 2017)

Commute
"Travel some distance between one's home and place of work on a regular basis." (Oxford University Press, 2017a)

"Commuting, by nature of standing between work and home both physically and temporally, is a uniquely positioned time period when employees are neither at work, nor at home." (Jachimowicz, Lee, Staats, Menges, & Gino, 2016, 2017)

Public Transport
"Public transportation refers to all service involved in the transportation of passengers for

hire by means of street railway, elevated railway, subway, underground railroad, motor vehicles, or other means of conveyance generally associated with or developed for mass surface or sub-surface transportation of the public, but does not include any service involved in transportation by taxicab, airport limousine, or industrial bus." (US Legal, 2016)

"Formal public transport services are those available to the public for payment, run on specified routes to timetables with set fares, and within the context of this report, in an urban area." (UN-Habitat, 2013)

Logistics
"Logistics is defined as the process of planning, implementing and controlling the efficient and cost-effective flow and storage of raw materials, goods, equipment and personnel from the point of origin until the completion of an activity, in accordance with end-user's requirements. In its broadest sense, logistics includes all the elements that constitute a delivery infrastructure, however, in this context, focus will be on the aspects of logistics that are relevant to the procurement process." (UN IAPWG (Interagency Procurement Working Group), 2006)

Environment

Air Quality
"Air quality standards refer to levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area."(OECD, 2001b)

"Air pollutants are emitted from anthropogenic and natural sources; they may be either emitted directly or formed in the atmosphere; they have a number of impacts on health, ecosystems, the built environment and the climate; they may be transported or formed over long distances; and they may affect large areas." (European Environment Agency, 2015)

Waste
"The way a country manages its solid waste has significant long-term implications for public health, the economy and the natural environment. Therefore it is essential to promote an environ-mentally sound solid waste treatment and disposal programme. Generally, adequate waste management indicates that the authorities are aware of the health and environmental risks and

that they support or impose suitable measures to prevent or reduce waste." (United Nations)

For example, the EU's Landfill Directive defines municipal solid waste as, "waste from house-holds, as well as other waste which, because of its nature or composition, is similar to waste from households." (OECD, 2014)

Electricity & Water Consumption
"Water and energy are basic components of life, economic growth and human progress. This is a reality for the poor as securing access to both water and energy is still the cornerstone of alleviating poverty and breaking up the vicious circles and backwardness it creates. As well as for those already on the road towards develop-ment, where most of the growing demand for energy and food arises, and where making water and energy more abundant and accessible is an integral part of economic progress that comes through important challenges such as matching limited water and energy supplies with increasing demands and managing food security." (United Nations, 2014)

Sustainability
Sustainability refers to:
"(a) use of the biosphere by present generations while maintaining its potential yield (benefit) for future generations; and/or
(b) non-declining trends of economic growth and development that might be impaired by natural resource depletion and environmental degradation." (OECD, 2003)

"The publication in 1987 of 'Our Common Future' provided the most commonly used definition of sustainable development as development that "meets the needs of the present without com-promising the ability of future generations to meet their own needs." This formula has enormous human appeal and has stood the test of time." (Vitalis, 2003)

Living Enablers

Green spaces
"Green space (land that is partly or completely covered with grass, trees, shrubs, or other vegetation). Green space includes parks, com-munity gardens, and cemeteries." (United States Environmental Protection Agency (EPA), 2017)

"Green spaces such as parks and sports fields as well as woods and natural meadows, wetlands or

other ecosystems, represent a fundamental component of any urban ecosystem. Green urban areas facilitate physical activity and relaxation, and form a refuge from noise." (World Health Organization, 2017b)

"Urban green space includes everything in cities that has vegetation. Collectively it is sometimes referred to as 'Green infrastructure', encompassing the entire working landscape in cities that serve roles such as improving air quality, flood protection and pollution control". (UN-Habitat, 2015a)

Housing
"A housing unit is a separate and independent place of abode intended for habitation by a single household, or one not intended for habitation but occupied as living quarters by a household at the time of the census. Thus it may be an occupied or vacant dwelling, an occupied mobile or improvised housing unit or any other place occupied as living quarters by a household at the time of the census. This category includes housing of various levels of permanency and acceptability". (OECD, 2001c)

"Housing unit is a separate and independent place of abode intended for habitation by a single household, or one not intended for habitation but occupied as living quarters by a household at the time of the enumeration. It may be an occupied or vacant dwelling, an occupied mobile or improvised housing unit or any other place occupied as living quarters by a household at the time of the census." (United Nations, 2001)

Safety
"Personal security is a core element for the well-being of individuals, and includes the risks of people being physically assaulted or falling victim to other types of crime. Crime may lead to loss of life and property, as well as physical pain, post-traumatic stress and anxiety. One of the biggest impacts of crime on people's well-being appears to be through the feeling of vulnerability that it causes." (OECD, 2017b)

Infrastructure
"Investments in infrastructure – transport, irriga-tion, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. It has long been recognized that growth in productivity and incomes, and improvements in health and education outcomes require investment in infrastructure." (United Nations, 2017b)

"Infrastructure has been identified by the World Bank, for example, as critical for transformational change to achieve economic growth and transition to more sustainable development pathways (World Bank, 2012)." (Scott & Seth, 2012)

"Infrastructure decisions are long-lived. They influence the purchase of consumer durables and the location choices of households and firms. As such, they create substantial inertia in socioeconomic systems. Because the economic system reorganizes itself around infrastructure, this inertia can even exceed the physical lifetime of specific infrastructure investments." (World Bank, 2012)

Infrastructure are "many and diverse: roads, tunnels, bridges, railways, airports, harbors,

canals, subways and tramways, dams, irrigation networks, water pipes, water purification

plants, sewers, water treatment plants, dumps and incinerators, power plants, power lines and distribution networks, oil and gas pipelines, telephone exchanges and networks, district heating equipment, etc." (Prud'homme, 2004)

Urban planning
Planning also performs a crucial function for nurturing healthy and happy societies. Planning decisions influence mobility behaviour and social connections.

"Urban and territorial planning can be defined as a decision-making process aimed at realizing economic, social, cultural and environmental goals through the development of spatial visions, strategies and plans and the application of a set of policy principles, tools, institutional and participatory mechanisms and regulatory procedures. Urban and territorial planning has an inherent and fundamental economic function. It is a powerful instrument for reshaping the forms and functions of cities and regions in order to generate endogenous economic growth, prosperity and employment, while addressing the needs of the most vulnerable, marginalized or underserved groups." (UN-Habitat, 2015b)

Connectivity
Connectivity can be defined as people's ability to connect to the city's core physical infrastructure, as well as to other citizens, local governments

and entrepreneurs. (World Economic Forum, 2014)

For digital connectivity: "Connectivity is the foundation for the digital economy. The Internet has already connected more than three billion users across the globe and about 14 billion devices." (OECD, 2016b)

For physical connectivity: "One way of responding to our cities' connectivity needs is through the concept of a '30 minute city'." "A 30 minute city is one where, no matter where you live, you can easily access the places you need to visit on a daily basis." (Commonwealth of Australia, 2016)

There are also broader conceptualisations of connectivity where "connectivity has two types of components: hard and soft. Hard connectivity is the core physical infrastructure connecting people to energy, water and other services... Soft connectivity also refers to an environment of connectedness for citizens and entrepreneurs. It concerns the ability of citizens to connect with their local governments, express their opinions, get access to services and feel connected to their communities. In addition, it concerns the ability of entrepreneurs to connect with each other and to a wider innovative system." (World Economic Forum, 2014)

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