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A Smart City for Public Value

Digital Transformation through Agile Governance – The Case of Smart Dubai

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Executive Summary

What makes a city "smart" in the digital age? How can a complex urban fabric develop intelligence that drives planning, decision-making and positively affects the lives of its population? What ingredients—be they organizational, technological, cultural or regulatory—enable a metropolis to re-invent its *modus operandi* and achieve sustained developmental strides? In short, how can a local government build a "smart city" and generate public value? In exploring these questions, this study provides an in-depth analysis of the critical first phase of Dubai's mega-transformation into a smart city. Dubai's stated objective in building the smart city is to improve the quality of life and raise the levels of public "happiness". Its vision is not just to be the "smartest" city in the world by 2017, but also to be one of the "happiest" places on earth to live and work. Achieving these two ambitious goals requires addressing numerous organizational, technological, cultural and policy challenges. This study analyzes these challenges as well as the milestones reached, through tracing the paths taken by different stakeholders and documenting the multifaceted lessons learned. The findings provide ample evidence suggesting that the technological infrastructure, regulatory frameworks and organizational structures are now in place as critical foundations for building the smart city. More importantly, indicators suggest that public value is being generated throughout the evolution of the project, which is potentially improving the quality of government. The first phase of the Smart Dubai's journey has already triggered important cross-government cultural transformations. The government's agility and its entrepreneurial approach enabled it to bridge entrenched silos, infuse a culture of openness and transparency, in addition to fostering a collaborative governance style. This mode of governance also created a shift in collective thinking across the government; in particular from its traditional sectoral view into a city-wide view, with people's wellbeing and "happiness" at the center. Reflecting on the lessons learned from Smart Dubai's digital transformation will be critical for the next phase of its development. Moreover, studying the policy challenges, the barriers and the enabling factors in the city's transformational journey provides timely insight to support wider regional urban development initiatives. Beyond the region, the experiences of "Smart Dubai" in digital-era urban development, and the way it manages—and measures—the accompanying socio-technical impact at a city level, also provide valuable policy learning opportunities at a global level. At this stage, the question then becomes: Had Dubai achieved its vision of becoming the smartest city in the world by 2017; going forward, what does the city need to do to maintain that status and ensure it remains one of the "happiest" cities to live and work? This question is explored here based on the rich findings of the study.

Introduction

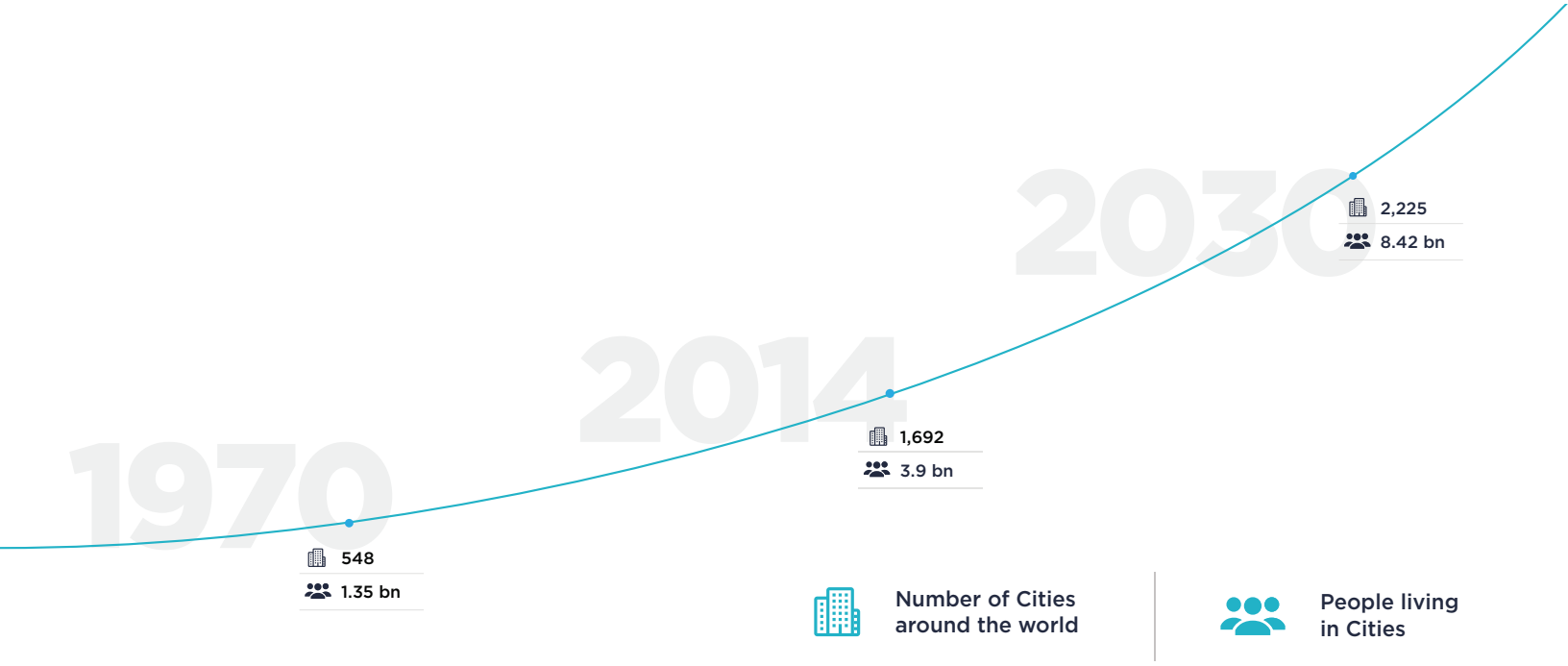
When it comes to large-scale digital transformations, Dubai has been the regional risk-taker. For almost two decades, the city proved to be a trendsetter in terms of embracing digital technology. This included adopting cutting-edge digital governance approaches, utilizing information and communication technologies for development, adjusting policies and regulations to adapt to rapid societal changes and technological advancements, providing enabling infrastructures for internet businesses, and creating a hub for a knowledge economy that extends to the wider region. This time around, Dubai's new ambitious endeavor is to create the "smartest" city and one of the "happiest" cities in the world by 2017. The city is planning to expand its utilization of advanced digital means for sustained development, growth, better governance and public wellbeing. To achieve this goal within a fast-approaching deadline, the government needed major coordination efforts and agility. Moreover, the teams managing this urban transformation needed to create a cultural shift in how the government operates and infuse a practice of collaborative governance. Given previous experiences in major digital transformations on local and global levels, it is clear that this is no easy task. However, the study suggests that the "Smart Dubai" initiative, with its teams, organizational structures and operating culture, managed to record important progress in the first phase of Dubai's smart city journey, generating public value and putting together the foundation for development of the smart city. This critical foundation is an essential element for seamless alignment of cross-government efforts towards the next phases of the city's transformation. Achieving the city's vision will largely depend on maintaining Smart Dubai's digital-age entrepreneurial leadership approach, as well as a functioning collaborative and networked governance style. Such new mode of governance promises to minimize future barriers and expedite efforts to achieve the city's ambitious goals. Beyond Dubai itself, Smart Dubai's extended vision is not just to be a model in a region starving for successful developmental achievements, both in terms of quality of life and governance. The champions of the Smart Dubai initiative view the city today as a global "pilot" that potentially can contribute to influencing wider global development efforts, affecting almost four billion people who live in cities around the world.

Across Dubai, there are already experimental initiatives with 3D printing, drones, wearable devices, IoT sensory systems, advanced analytics, robotics, driverless vehicles, virtual reality and artificial intelligence applications. Collectively, these cutting-edge experimental attempts by private sector entities, academia and government bodies are contributing to building the

city of the future. However, they also trigger numerous societal, cultural and policy challenges related to digital transformation. These challenges require innovative and holistic responses to enable systematic generation of public value and channeling the outcomes towards raising the standards of living and enhancing quality of governance. To widen the impact of this fast-paced innovation in society, a smart city initiative needs to act with authority across all components of the city, not just across the government. As such, "Smart Dubai" is not just seen as an entity or an initiative; it is envisioned as a long-term socio-technical transformation of the city as a whole in the digital age. Furthermore, the objectives of this journey is to radically change how governance is practiced, how business is done, and most importantly, how society as a whole and people as individuals live in the city of the future. Going forward, objective evaluation is required of Smart Dubai's impact on the environment, public wellbeing and quality of government. For this, Dubai's smart city journey should become a continuum, beyond it ambitious timeline. This will be Dubai's next challenge.

Smart Cities and Digital Transformation

In less than five decades, the number of cities (1) around the world has more than tripled from 548 back in 1970 to 1,692 in 2014. Today, more than 54 percent of the world's population live in cities; a percentage projected to grow to 66 percent by 2050 (UNDESA, 2015).



Urban Population Growth Worldwide – Data source (UNDESA, 2015)

With close to four billion people living in cities today, a global wave of digital-era urbanization is taking place. An increasing number of urban agglomerates, ranging from small to mega cities, are expediting their "smart city" development efforts. This global movement is driving policy innovations and aggressive global investments in new technological implementations and data utilization approaches, with the objective of solving chronic urban growth and social problems.

The concept of a "smart city" is still evolving and what defines it is not a matter of agreement. For example, there are at least 120 diverse definitions of a smart city in practitioners and academic sources (Gil-Garcia et al., 2015, ITU, 2014b). In reality, what defines a smart city highly depends on political agenda, capacity and vision of the city itself and its many

(1) Cities of 300,000 inhabitants or more, based on the UN's definition of urban agglomerates. Source: The World Urbanization Prospects: The 2014 Revision – Source: UNDESA 2015. UN World Urbanization Prospects: The 2014 Revision. Population Division, Department of Economic and Social Affairs.

stakeholders. However, all existing mainstream definitions share a key aspect of "smartness" in an urban context: utilization of information and communication technologies (ICTs) as the enablers of "smart" transformation of the city. The promises of a smarter city are made feasible today by the ubiquitous internet connectivity, social acceptance of technology, feasible largescale interoperability of connected 'things' and the maturity of advanced data analytics. Globally, cities with the technological infrastructure, resources, vision and the political leadership are viewing digital technology as a key facilitator and an infrastructural enabler to addressing the rising challenges of urbanization, population growth, environmental and fiscal pressures. As such, an inclusive description of a smart city would be that it is an urban structure that utilizes information and communication technologies to enhance livability, improve workability, maximize sustainability and transform the practices of governance, urban planning and management. A more data-focused definition is that it is a city that is able to produce, collect and analyze data to enable 'intelligent' decisions and predictive analysis for better planning and development. Given these commonly used concepts, a universal definition of the smart city adopted by the UN is that it is "*an innovative city that uses information and communication technologies and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects*" (ITU, 2014b).

Based on this conceptualization, the underlying areas of development for a smart and sustainable city include: 1) quality of life and lifestyle, 2) infrastructure and services, 3) ICT, communications, intelligence and information, 4) people and society, 5) environment and sustainability, 6) governance and administration, 7) economy and finance, and 8) mobility and transportation. In more technical terms, the key pillars of a smart city are its digital governance capacity, its urban systems of mobility, its infrastructure of energy and water smart grids, its buildings and structures, in addition to its data-related and public inclusion initiatives. In short, the smart city project is a major socio-technical urban transformation that promises to revolutionize the ways hundreds of thousands of people live in and interact with the city, with digital technology and data as core enablers.

The Case for "Smart Dubai"

Dubai has not always been a "city", let alone one of the fastest growing worldwide as it stands today. Back in 1970, Dubai was a small seaside town of roughly 80 thousand inhabitants. A year later, the United Arab Emirates (UAE) was formed, which today belongs to the "very high human development" group of countries. The country is considered the second largest economy in the Middle East and North Africa region with a GDP of US$ 401.6 billion and an annual growth rate of 5.2% according to latest official data (WEF, 2015a, UNDP, 2015, Ministry of Economy, 2014). As for Dubai, during the past two decades, the city managed to position itself as a key global economic hub, boasting a diversified economy worth US$ 92 billion in real GDP (Dubai Statistics Center, 2014). In an oil rich region, it is impressive to note that only 6 percent of Dubai government's revenues are oil-dependent (2). Economically, Dubai ranks among the fastest five growing metropolitan economies globally, registering the highest GDP per capita growth in any city in the world in comparison with the national growth levels (Parilla et al., 2015). In terms of population, the UAE has an estimated population of more than 9.2 million, which is projected to grow at an average rate of 2 percent each year until 2020, reaching 10.6 million (UNDESA, 2015). Dubai itself has grown rapidly in the past 35 years from that small town of 80 thousand to a city with around 3.5 million people active in its economy on a daily basis (Dubai Statistics Center, 2016). 2.4

Within this socio-economic context, Dubai has actively re-invented itself at each economic and developmental juncture in its modern history. With the emergence of the internet, it became a leading regional example of digital transformation, whether on societal or governmental levels. Today, as cities around the world explore digital technologies for 21st century urban development, it was natural for Dubai to be part of this wave. The reasoning behind Dubai's vision towards a smart city is not just about maintaining the historic global and regional status as a leader in the digital age. It is about an aspiration towards utilizing cutting-edge digital technology to solve real chronic problems, achieving sustainable development, maintain economic competitiveness, as well as providing high levels of quality of life for its inhabitants. The many stakeholders engaged in the smart city development efforts in the city collectively agree that the key drivers for Dubai's smart city transformation are the following:

1- Population Growth:

More than 90 percent of the UAE's population lives in urban areas. Dubai itself, ranks among the fastest ten cities worldwide in terms of population growth over the past 25 years

(UNDESA, 2015). Today, at least 2.4 million people live in Dubai (3). However, given its large economy, the number of people who work in Dubai daily is closer to 3.5 million. This has

Dongguan	China	6.31	7,435,000	10.39
Shenzhen	China	1.00	10,749,000	10.03
Zhongshan	China	6.39	3,691,000	8.95
Abuja	Nigeria	5.93	2,440,000	7.99
Foshan	China	1.12	7,036,000	7.77
Xiamen	China	7.53	4,430,000	7.74
Huai'an	China	5.84	2,000,000	7.2
Shantou	China	1.72	3,949,000	6.78
Dubai	UAE	6.76	2,415,000	6.52
Yantai	China	3.48	2,114,000	6.44

Fastest Growing Cities Worldwide (based on annual population growth rates between 1990-2015) – Based on data from (UNDESA, 2015)

created several pressure points on the city's infrastructure and affected the quality of life. For example, with a growing population, traffic congestion is a chronic problem despite introducing numerous multi-billion dollar investments in highways, metro, trams, ferries and other public transport options. The projected growth in the number of visitors in the next few years with the city preparing to host Expo 2020 means that another transformative approach is needed in the way this problem is tackled. The promises of the smart city are seen to be the way forward in managing such future growth challenges.

(2) Official estimates based on Dubai's 2016 budget –Source: EMIRATES NEWS AGENCY. (2015b.)

(3) The UN estimated the population of the UAE in 2015 at 9.58 million. The official estimate of the UAE's population is 8.6 million in 2013 according to latest available official data by the UAE Ministry of Economy. Dubai's population is based on Dubai Statistics Center estimates.

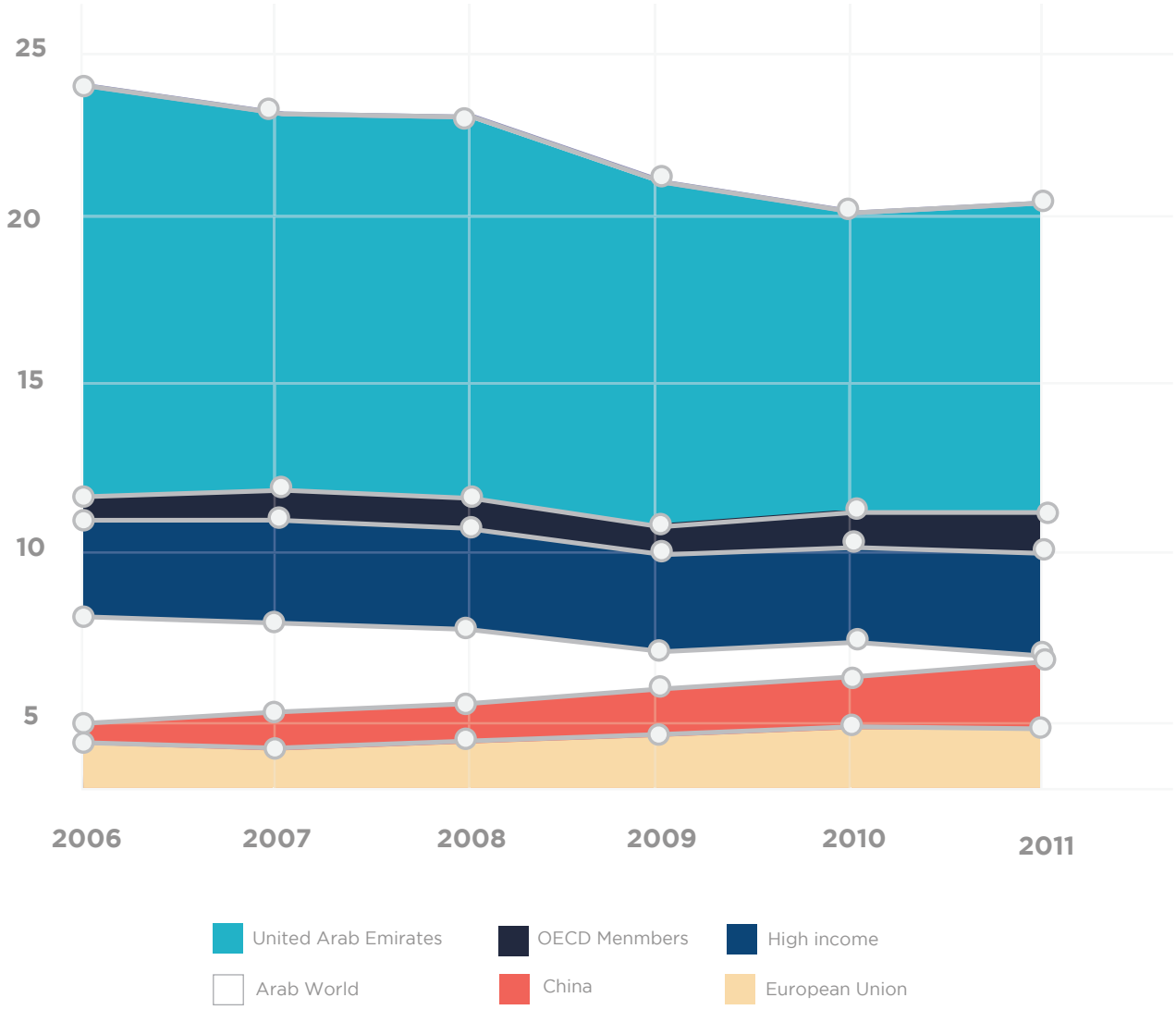
2- Economic Competitiveness:

The vision of the smart city in Dubai extends to sustaining the status of the city as a global hub. Holding this growth momentum in the digital era needs constant re-invention of the ways the city is managed, planned and operated. For this, the city needs to make sure that it is well integrated in the digital economy and able to attract a constant flow of global talent. Maintaining the city's levels of attraction towards global talent and businesses in new emerging economic sectors are critical for its sustainable development. This is reflected in public statements at the highest levels. For example, Sheikh Mohammed Bin Rashid Al-Maktoum, Ruler of Dubai, Vice President and Prime Minister of the United Arab Emirates, repeatedly highlights that "it is imperative to have a competitive edge over other countries and nations, for the day that we lose such an edge will mark the beginning of our regression". Rapid development, economic prosperity, population growth and the cultural diversity have boosted the city's global status to become a world-renowned economic hub. However, this has also created numerous policy and infrastructural challenges. As such, sustaining Dubai's global competitiveness requires the government to constantly re-invent the ways services are delivered, infrastructures are developed and policies are adapted. The smart city's ability to support advanced predictive analysis and evidence-based future planning are at the center of the radar screen of policymakers as drivers for the smart city development.

3- Environmental Sustainability:

In December 2015, 195 countries jointly adopted a historic agreement at the United Nations Climate Change Conference (COP 21) in Paris, committing to limit global warming (UNFCCC, 2015). Globally, cities occupy 2 percent of the surface of the earth, but produce around 70 percent of global CO2 emissions. The UAE has a small number of cities, however, it has one of the highest rates of CO2 emissions per capita in the world (The World Bank, 2015, IEA, 2015). This high carbon footprint is one of the critical growth drawbacks acknowledged by policymakers and developmental agendas. Dubai, as one of the most populous cities in the country, has its important share to play in environmental sustainability. Reducing the negative effects of rapid urbanization on the environment is a key priority dimension of the smart city

for this generation and the next. In turn, this is one of the key areas where Dubai can improve quality of life for its current and future inhabitants.



CO2 emissions (metric tons per capita) in the UAE compared to different regions – Source: World Bank's Worldwide Development Indicators (The World Bank, 2015)

4- Quality of Life:

With Dubai's society enjoying some of the highest technology adoption rates in the region, matching public expectations about living, development and quality of life requires the city to continuously adopt cutting-edge approaches. Hence, Smart Dubai is seen as an ambitious long-term initiative with the objective of sustaining development, while ensuring that the challenges of growth are minimized, with the ultimate objective of enhancing the public quality of life. This is evident in the city's chosen underlying mission statement for its smart city journey: *"Our mission is to create happiness, by embracing technology innovation—making Dubai the most efficient, seamless, safe and impactful experience for residents and visitors"*. Smart Dubai is then envisioned as a journey towards better quality of life, utilizing digital age tools to ensure inclusive "happiness" of the city's current and future inhabitants, whether citizens, residents or visitors.

Dubai's "smart city" focus on happiness is a simple, yet unique, philosophy in comparison with the directions of other smart city initiatives globally. Given these drivers, a deadline has been set for the city planners to achieve that vision and become the smartest city in the world by 2017. The question for those watching the city's progress towards a smart city is: Can Dubai achieve this ambitious goal in such a short period of time? The rest of the study provides an in-depth exploratory analysis of the enablers, processes, milestones and challenges in Dubai's transformation into "Smart Dubai".

The Infrastructure of the Smart City: Dubai's 15 Years of Digital Transformation

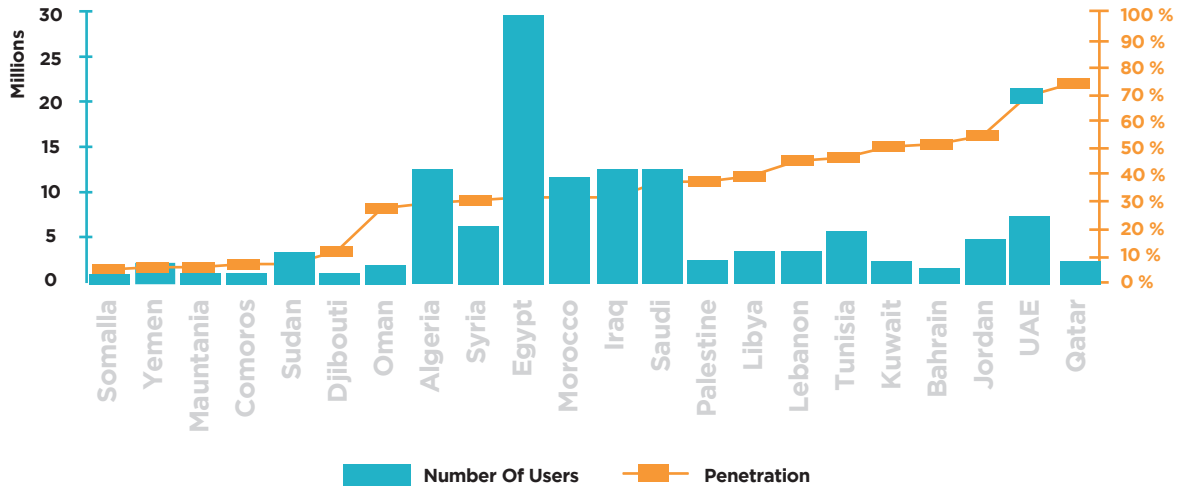
Dubai's initial plans towards a smart city transformation started back in 2007. The government then initiated a study on the transformation to a "Digital City". At the time, the world was just about to get hit by the global financial crisis, which had major impact on Dubai's economy, creating critical budgetary constraints and changing government's priorities. Several countries in the region were exploring digital transformation agendas, however the wider environmental factors put many of these projects to halt. In addition to the budgetary and financial limitations, transforming the government—or the city—in the digital-era requires advanced societal readiness and technological maturity. Until recently, not all these ingredients were in place.

Technologically, the foundations of the smart city depend on the readiness of its society and government. First, the society in Dubai has achieved impressive levels of 'technological trust'—or acceptance of technology—during decades of sustained supply of cutting-edge digital technologies by the existing two telecom service providers, as well as numerous government initiatives. Second, the structural building blocks of Dubai's smart city were put together systematically by the digital governance initiatives over the past 15 years. By the turn of the millennium, the Crown Prince of Dubai (now Ruler of Dubai, Vice President and Prime Minister of the United Arab Emirates), Sheikh Mohammed bin Rashid Al Maktoum launched the "Dubai Electronic Government initiative". At the time, the objective was to transform key traditional government services to become internet enabled in 18 months (Geray and Salem, 2012). Today, electronic services are mainstream with more than 1,000 government services online, representing close to 95 percent of all public services. By 2013, a second ultimatum was given to government departments to widen the reach of public service delivery further and enable services to be available 24 hours a day through smart phones and mobile devices. In a city where active mobile penetration is skyrocketing above 260 percent, mobile government was seen as the best way to enable inclusive access to services in the palm of the hand of each resident or visitor to Dubai. Today, this readiness for digital transformation is built-in within government practices and development agendas in Dubai.

Over the past 15 years, these top-down transformational initiatives laid down the technological infrastructure of the smart city. Dubai's eGovernment, and then Smart

Government initiatives, created a momentum for developing the technological infrastructure, regulatory frameworks and most importantly, acceptance and take-up of digitization by both government bodies and Dubai's rapidly growing society. Dubai's digital governance drive also influenced the national digital government agenda of the UAE, driving more digital services and wider acceptance of technological innovation in society and government. Today, the UAE is one of the highest ranked countries globally in different digital governance indicators. For example, the country sits at the top position worldwide on the indicator measuring the "Importance of ICT to Government Vision" according to the World Economic Forum (WEF). It also ranks second worldwide in "Government Success in ICT Promotion" (WEF, 2015b). Similarly, the UAE is among the twenty highest ranked countries in "Online Service Delivery" according to the UN E-Government rankings (UNDESA, 2014).

In addition to government readiness, social acceptance of technology in the UAE is relatively high according to different measures. For example, the country is ranked 32nd in the UN's ICT Development Index and 23rd in the WEF's Networked Readiness Index (WEF, 2015b, ITU, 2015). The UAE enjoys the region's highest penetration rates of internet, smart phones, broadband and social media accounts by society. For example, internet penetration in the UAE stands above 90 percent while the penetration of mobile subscriptions is close to 117 percent (ITU, 2015). Meanwhile, close to 70 percent of the population are active on social media in all walks of life, including engagement with government (Salem, 2014). With its advanced technological infrastructures, proactive government promotion of digital and "smart" approaches, the society of the UAE has truly adopted a digital lifestyle.

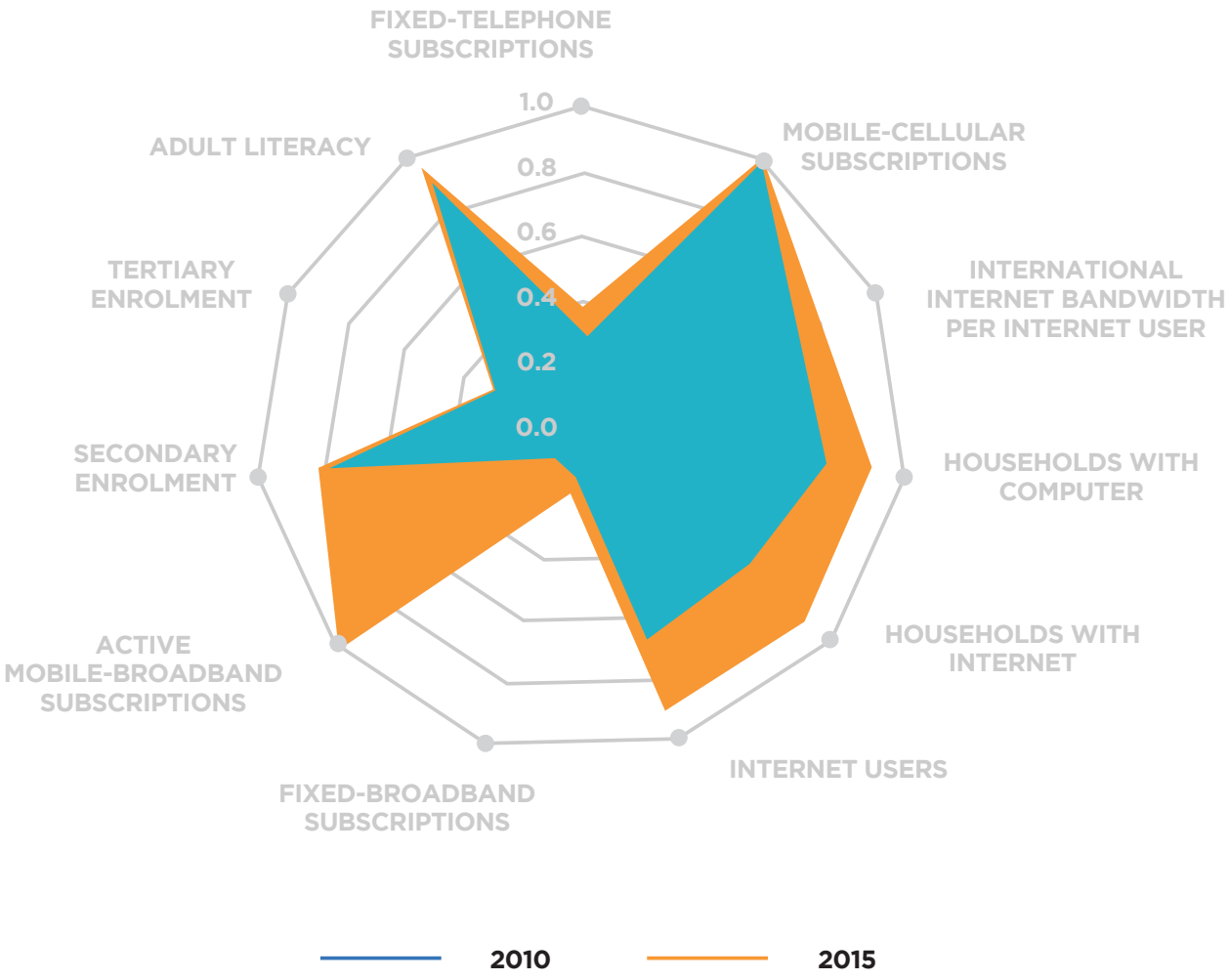


Social Media Users and Penetration in the UAE, Compared to the Arab Region (based on analysis of Facebook users) – Source: Interim findings of the forthcoming 7th Arab Social Media Report (2016)

INDICATOR	GLOBAL RANK	YEAR	SOURCE
Importance of ICT to Government Vision	1/140	2015	WEF
Government Success in ICT Promotion	2/140	2015	WEF
Online Service Delivery	20/193	2014	UN DESA
E-Participation Index	13/193	2014	UN DESA
ICT Development Index	32/167	2015	UN ITU
Networked Readiness Index	23/143	2015	WEF

UAE Rankings in Digital Transformation-Related International Indicators

This societal readiness was a critical decision-making factor for the leadership of Dubai envisioning Dubai as the "smartest city" by 2017. These high levels of 'technological trust' by the populace removed the many hurdles cities around the world are facing in terms of take-up and adoption of technological innovations. Smart Dubai's initiative today stands on solid foundational grounds in terms of technological readiness by government and society while stepping into the next phase of its digital transformation.



ICT Infrastructure and Development in the UAE between 2010 and 2015

A Smart City for Public Value: The Philosophy of Smart Dubai

The top-down diffusion of digital technology is raising society's expectations on the potential public value that can be generated by its government. Conversely, innovative applications of digital technologies by society are expanding the potential public value governments can potentially extract, if the right societal enablers are in place. In policy contexts, public value is sometimes defined as the various benefits for society, including goods or services, just and fair production choices, efficiency and effectiveness, organized, productive and representative public institutions, fairness and efficiency of distribution, legitimate use of resources, as well as innovation and adaptability to changing preferences and demands (OECD, 2014, Moore, 1995). Given that digital transformation is at the core of a smart city's development, the changing interface between the public and government in a smart city has a large potential of generating public value. For example, the government can potentially enable the generation of public value from society by allowing a bottom-up use of government data to develop new or better services, enhance policymaking and increase inclusion, equality and social coherence. Likewise, society can expect the smart city's government to use digital means to generate public value by creating fitting and inclusive services, transparent government functions, enhanced infrastructures and sustained development. Ultimately, the sum of these iterative bottom-up and top-down utilization of smart technologies should lead to better quality of government, and more importantly, higher quality of life and more "happiness".

The Focus on Happiness and Quality of Life

For Smart Dubai, what a smart city resembles is best stated in its founding vision: "to make Dubai the happiest city on Earth". Towards this vision, a deadline was set to transform Dubai into "the smartest city" by 2017. Quality of life, wellbeing and happiness of Dubai's population are embedded in what defines "Smart Dubai", its founding literature, and most importantly, the way of thinking among member of the teams engaged with building the smart city. In other words, the primary objective of Dubai's smart city drive is to raise the quality of living and governance. As such, generating public value is at the core of smart Dubai's vision.

"Happy living" as celebrated in Dubai's smart city material – Source:

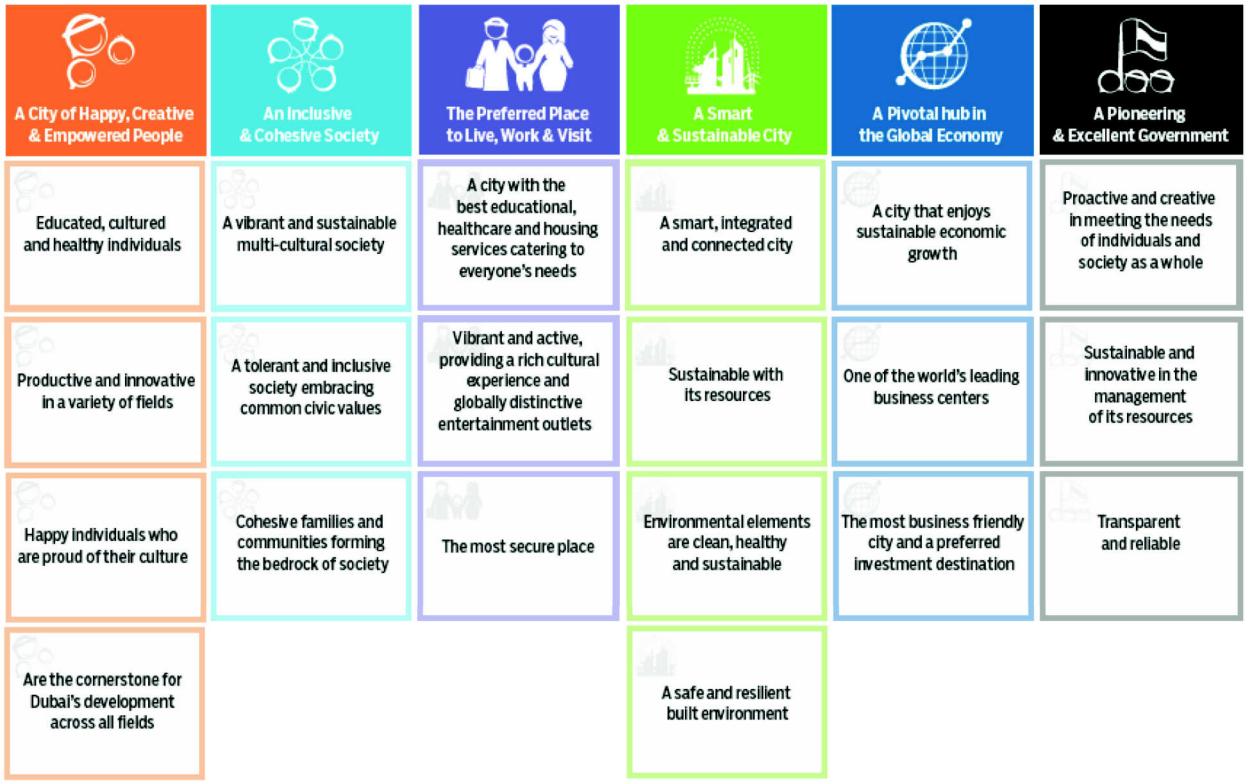
(Smart Dubai Office, 2016)

As such, this philosophy of raising the population's happiness has become the driving force behind most new major government initiatives in Dubai. The government has formally engendered this objective in Dubai's developmental agenda and strategically communicated it in political discourses at the highest levels. For example, the themes of Dubai's official vision for the year 2021, which sets the future path and developmental plans of the city, stresses on creating a "city of happy, creative & empowered people", within an "inclusive and cohesive society" in a "smart and sustainable city". This is an important realignment of priorities compared to the earlier Dubai's 2015 strategic plan, which had rapid economic growth and development at its core (The Executive Council, 2007, The Executive Council, 2014).

This objective is also aligned with the wider UAE's federal National Agenda and the country's 50th Jubilee vision for 2021. The UAE's National Agenda aims for the UAE to be "among the best in the world in the Human Development Index and to be the happiest of all nations" (PMO, 2015, The Cabinet, 2015). Currently, the UAE is one of the 49 countries enjoying "very high human development", according to the categorization of the UN's Human Development Index (HDI). It now ranks 41st out of 188 countries, scoring 0.835 and advancing 15.1 percent since 1990 at an annual rate of 0.59 percent (UNDP, 2015). In terms of wellbeing and happiness, the UAE ranks 20th in the World Happiness Report which measures subjective wellbeing and people's own evaluation of different aspects of their lives (Helliwell et al., 2015). These rankings draw a relatively positive picture in general with regards of the state of development, wellbeing and quality of life in the country. However, the road to achieve the Government's National Agenda objectives by 2021 and be "to be the happiest of all nations" and "among the best in the world" according to the HDI rankings, are monumental objectives which require an exponential increase in efforts and a revolutionary method that transforms the way development is planned and operationalized.

Based on the city's earlier experiences in digital transformation, and while realizing the potential of leveraging digital technology in re-creating the city, Dubai decided to embark on a digital transformation journey with the ultimate objective of enhancing quality of life and

happiness of the public. In this context, digital technology is seen as a wellbeing enabler. "Digital is all about the people" in the smart city, as put by Dr. Aisha Bin Bishr, former head of the Smart Dubai Task Force, and now Director General of the Smart Dubai Office.



Key Pillars of Dubai Plan 2021 (The Executive Council, 2014)

The Inclusive Smart City

Inclusiveness is one of the key philosophies of Smart Dubai. This is evident in the internal discourses, communication, official literature and the practiced operation culture of the team tasked with (re)creating Dubai of the future. Currently, more than 180 nationalities already live and work in Dubai with the overwhelming majority of the population being expatriates, making the city multicultural *par excellence*. Given this reality, no societal or demographic preferences are made when setting the targets, objectives and outcomes of Smart Dubai. The potential benefits of the smart city are neutral to the origins of its inhabitant. In other words,

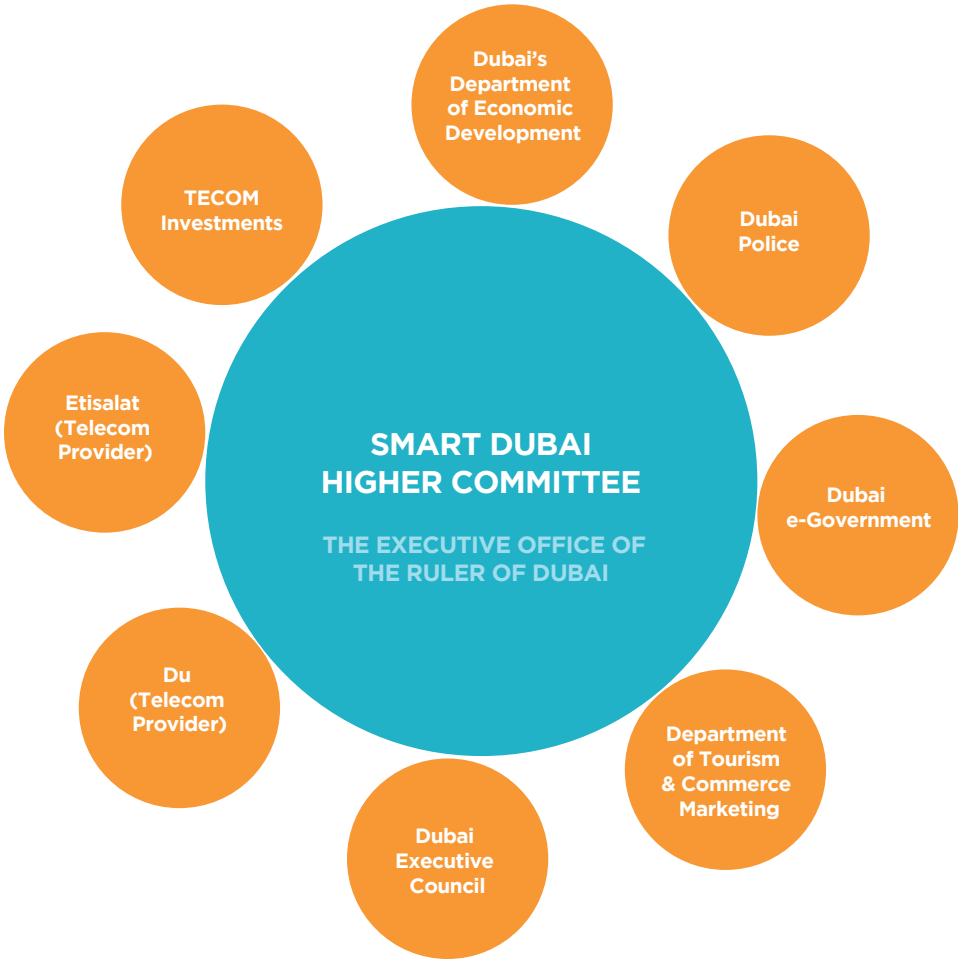
there are no hierarchies of beneficiaries of Smart Dubai, whether citizens, residents or visitors. As a smart city, Dubai is to be inclusive of all members of its society.

This philosophy of inclusiveness and equality was engendered in Smart Dubai's norms and operational culture from the very top. The members of Smart Dubai team overwhelmingly emphasized this philosophy at every juncture of each initiative adopted. In essence, this reflects the founding principles of Dubai itself since the days of the late Sheikh Rashid Al-Maktoum, the founding father of new Dubai. The city was historically a hospitable ground were people from all parts of the world were welcomed to live and do business with open arms. Since then, Dubai's openness was viewed as one of its core competitive advantages. This tradition is followed across Smart Dubai's vision, plans and roadmap, where initiatives are designed to make the city even more welcoming to attract an inflow of talent, visitors and investments from around the world.

Smart Dubai's Roadmap, Organization, Structure and Leadership

Building a smart city is no straightforward mission. Like all major digital transformation initiatives, the organizational aspects of such a large and complex transformative project are never a task of one entity. Looking at few existing experiences in smart city development, multi-stakeholderism seems to be the only way in city transformation. Usually this takes place under the umbrella of a mayor's office that has a cross-government mandate as well as oversight on all aspects of development in the city, not just the government. In the case of Dubai, there is no mayor's office. Managing the city is largely decentralized to the many powerful government departments, with direct engagement from the Ruler of Dubai through multiple initiatives, offices and programs. To find the fitting organizational structure for Dubai of the future, the city went through several stages and followed an entrepreneurial approach during the first phase of planning the smart city, where informal cross-governmental bodies were formed to plan and drive "Smart Dubai".

On the 20th of October 2013, the "Smart Dubai Higher Committee" was formed within The Executive Office of the Ruler of Dubai. The committee was tasked with initiating early conceptualization of the smart city and designing a multi-phase plan for executing the project. The early work of the committee focused on paving the road towards transforming Dubai into a smart city. It was set to be accountable to Dubai's Crown Prince, Sheikh Hamdan Bin Mohammad Bin Rashid Al Maktoum, providing it with strong political backing. Since day one, the private sector was invited to sit on the table, with the committee formed of nine members, from both public and private sectors. This sent a strong signal on Dubai's view of this transformative project as a task not only for government, but the city as a whole, with all its stakeholders. Historically, public-private partnerships were the core route followed by Dubai in developing its earlier mega-projects. While partnering with a practiced norm, this public-private partnership on transforming Dubai into a smart city was celebrated by the Dubai's Crown Prince as "the largest of its kind" (Emirates News Agency, 2013).



Structure of the Smart Dubai Higher Committee (2013)

On 4th of March 2014, Dubai's smart city strategic plan was launched, culminating the work of the Higher Committee over less than since months since it was formed. The strategic plan included six dimensions envisioned for the smart city of Dubai:

1- Economy:

Provide innovative economic conditions to fuel entrepreneurship and global competitiveness.

2- Governance:

Deliver transparent government services with public, private and civic engagement.

3- Environment:

Sustainably manage resources, pollution and assets

4- Living:

Provide exceptional quality of life, accessible education and culturally vibrant lifestyle

5- Mobility:

Design an infrastructure for seamless, efficient transport of people and "movement of ideas".

6- People:

Infuse a culture of continual learning, innovating and participating in an inclusive society.

Additionally, the strategy featured 100 initiatives in areas of infrastructure, urban planning, transport, electricity, communications and economic services. The ultimate goal was "to bring about happiness to all" as stated by Sheikh Mohammed as he launched the plan. Particularly, the strategy puts forward plans for 1,000 government services contributing to smart city development to be launched by 2017. However, at the time, Dubai's Crown Prince made it clear that the vision is not about increasing "customer satisfaction" or just to developing numerous services, but to change the way of life in Dubai and contribute to happiness of the city's inhabitant (Emirates News Agency, 2014a).

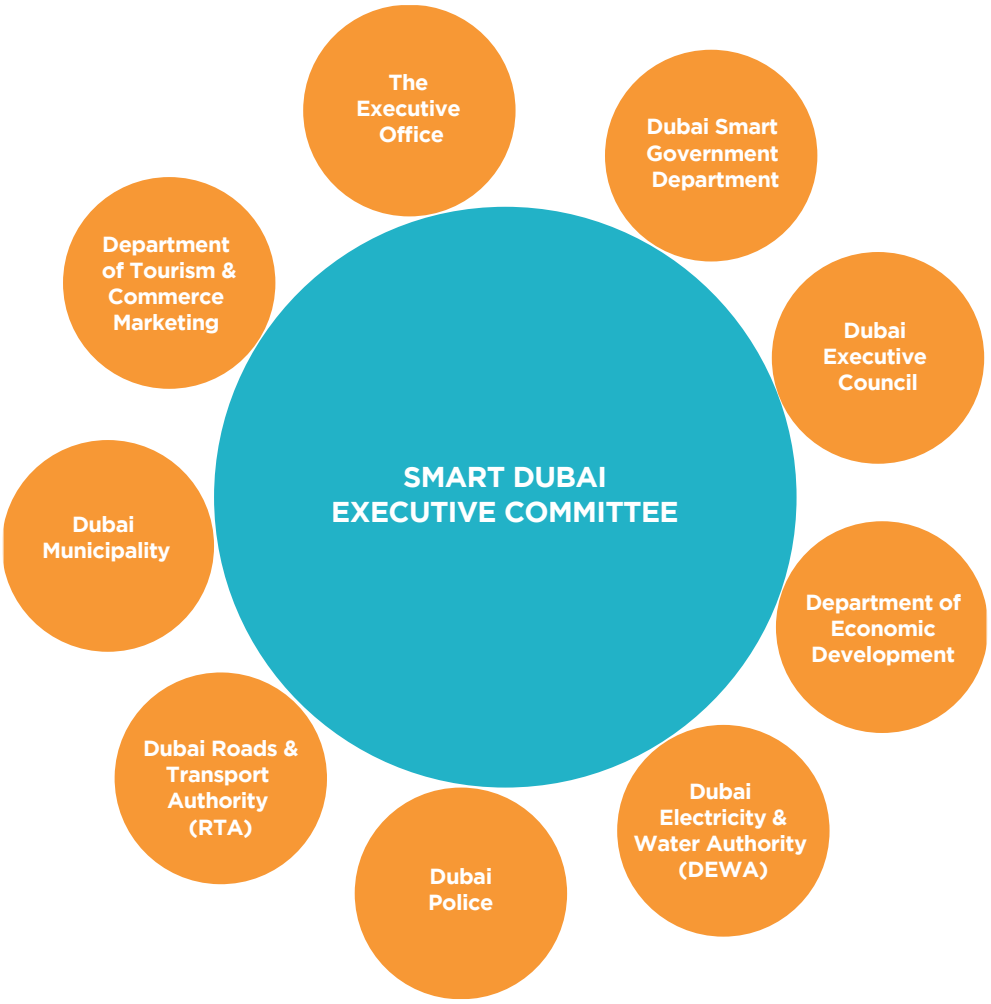
The underlying philosophy of the strategic plan was based on three key concepts: Communication, integration and cooperation. The plan was that the smart city will nurture collaboration between the public and private sectors to achieve the targets in each of the six dimensions (Smart Dubai, 2015a). Some of the initiatives put forward in the plan included:

- Enhancing communication across the city through setting open data and shared data frameworks.
- Creation of personal dashboards for the city's inhabitants and a "Dubai smart platform"
- Launch hundreds of integrated new services for mobility and transport.
- Development of smart electric grid, among other initiatives contributing to environmental sustainability.
- Transforming the "Dubai Design District" (D3) into a smart district as a pilot and a proof of concept for smart building.
- Providing advanced analytics solutions to serve the retail and trade industry in Dubai enabling trends monitoring.
- Transforming and integrating hundreds of municipal services, including creating connected parks, beaches and urban planning initiatives.

The plan also envisioned that building the smart city of Dubai is to be structured as four connected layers: 1) An ICT infrastructure layer, 2) data orchestration layer, 3) service enablement layer, and 4) the application layer. This provided a conceptual framework for the city builders and planners as they plan and implement the components of the smart city.

The Four Layers of Smart Dubai – Source: (Smart Dubai Office, 2016)

With the strategy in place, the "Smart Dubai Executive Committee" was formed to carry out the implementation phase, with membership of additional entities in Dubai that were seen as core stakeholders during the implementation phases (Emirates News Agency, 2014b). For example, in partnership with one of the private sector stakeholder, in October 2014, the committee initiated a public-private-partnership to provide wifi coverage in all public areas in the city ensuring universal connectivity in public places for the first time. Similarly, another partner, the Dubai Electricity and Water Authority launched "Shams Dubai", an initiative to regulate generation of solar energy in buildings, where owners are encouraged to install solar panels to generate electricity and export the surplus back to the grid. Other different partners started to roll out the initiatives highlighted in the strategic plan.

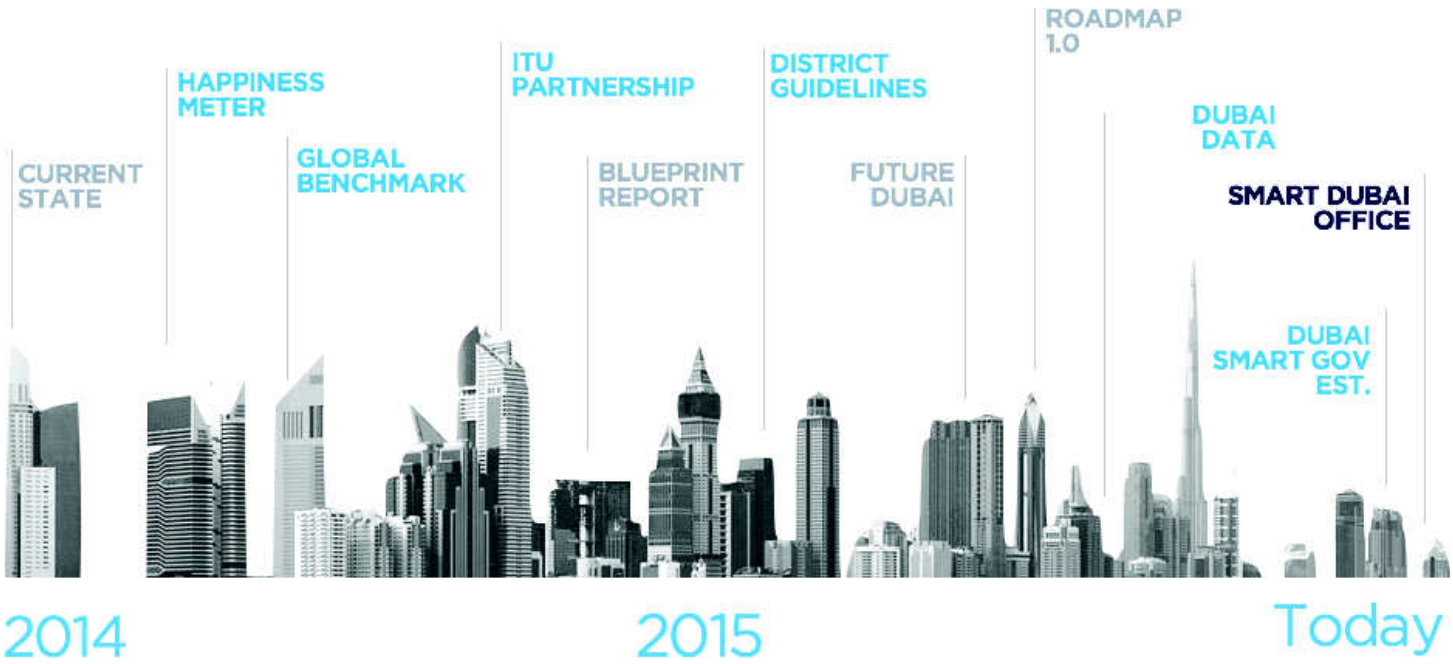


The Executive Committee of Dubai Smart City (2014)

The "Smart Dubai Task Force" was then set under the leadership of Dr. Aisha Bin Bishr, Assistant Director General of the Executive Office at the time. The small Smart Dubai team was tasked with ensuring that all related government entities and initiatives are aligned with the city's grand vision to become the "smartest city" in the world by 2017.

Outcomes and Achievements – Taking Stock of the First Phase of "Smart Dubai"

Tackling the ambitious objective of transforming a city into the "smartest city" is a monumental undertaking on its own. Not only does the Smart Dubai Task Force now need to ensure that this happens in less than two years, but it also needs to realize the vision of making it one of the "happiest" places to live and work in the world. The following milestones were achieved during the first phase of Smart Dubai journey toward building the Smart City.



Milestones achieved by Smart Dubai initiatives during the first phase of development

1- Current State, Benchmarking and Measurement Framework

It was clear that the Taskforce needed to overcome numerous challenges, but first it needed an objective scientific approach to analyze 1) where Dubai stands, 2) how it can reach that global top spot, and 3) how can Dubai measure its progress against others, both in terms of

how "smart" the city is and how "happy" the city's inhabitant are. The following were the steps taken by the Taskforce to reach that understanding:

1- Current State and Gaps:

As the first task, the Smart Dubai Task Force initiated a study analyzing the "current state" in Dubai. This study followed a mixed approach in data gathering and covered nine key government entities across the six dimensions of Smart Dubai. The findings enabled the identification of the current state of Dubai's ICT infrastructure, datasets available and existing applications and services. The findings also included an analysis of the infrastructure utilization and a data map of the city among other key ICT related findings. Eventually this study provided 1) a wide picture to enable projecting how 'future Dubai' will look like, 2) what are the gaps between the current state and where Dubai wants to go, and 3) what roadmap should be developed to overcome these gaps.

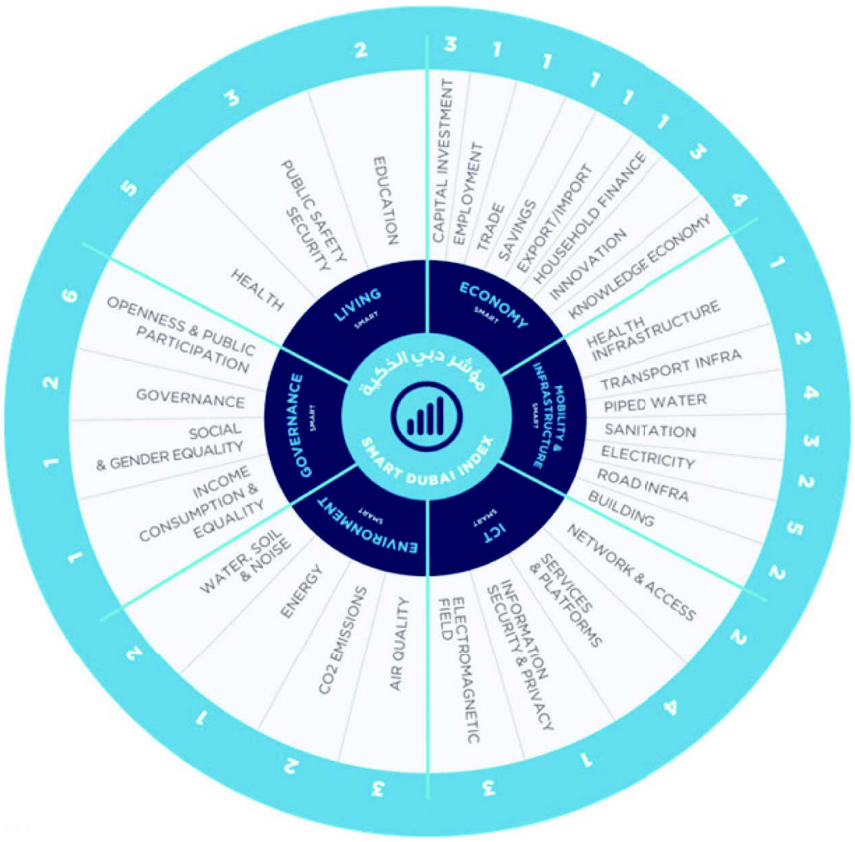
2- International Benchmarking of Smart City Progress:

The next step was initiating an international study comparing Dubai to ten cities considered the "smartest" cities in the world at the time. These cities were working towards similar objectives and within the same dimensions of Dubai's envisioned smart city. These included three cities in North America, three in Asia and four in Europe. In total 76 practices were benchmarked against their counterparts in these cities. The analysis of the results of international benchmarking led to developing an incorporated framework of international experiences. It also identified the key areas for development in Dubai, which were seen as essential for realizing the vision of Smart Dubai.

3- Measuring the Smart City:

To be able to identify if Dubai is truly becoming the "smartest" city on earth, an objective measure was needed. To measure its progress, Dubai decided to go global and build measurement indicators based on objective international standards. For this, Dubai partnered with the International Telecommunication Union (ITU) on a two years pilot project to measure its smart city progress. The Taskforce's wider aim was to contribute to international standardization of smart cities development, with Dubai being the first city to trial the key performance indicators worldwide. Moreover, the leadership of Smart Dubai

envisioned that putting its data and experiences forward for this pilot project will contribute to promoting urban sustainability at an international level. Based on this pilot, Dubai is now developing its own "Smart Dubai Index" in collaboration with the ITU and the Dubai Statistic Centre. The Index is split into six parts resembling the six dimensions of Smart Dubai and will include a set of key performance indicators (KPIs) to measure progress of smart city development. The KPIs are planned to help decision makers assess progress, and enable defining a common road towards a better smart city, in Dubai and beyond (Emirates News Agency, 2015a, ITU, 2014a).



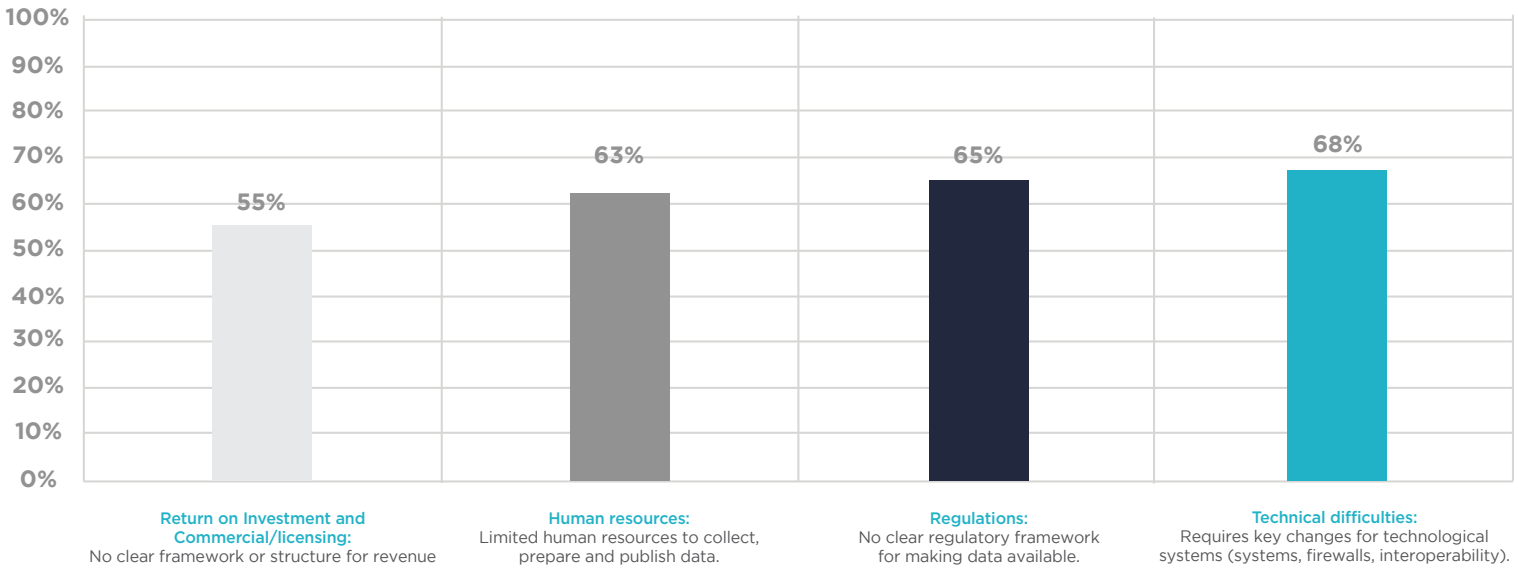
The Smart Dubai Index - Source:
(Smart Dubai Office, 2016)

Eventually, the Smart Dubai initiative established strategic partnerships with 11 government entities in Dubai, including: 1) The Dubai Roads and Transport Authority, 2) Dubai Electricity and Water Authority, 3) The Dubai Executive Council, 4) Department of Tourism and Commerce Marketing, 5) Dubai Police, 6) Dubai Health Authority, 7) Dubai Municipality, 8) Dubai Smart Government, 9) Department of Economic Development, 10) Dubai Silicon Oasis Authority, and 11) The Dubai Design District. These entities were then seen as the official partners where use cases and initiatives will be piloted.

2- Data for Development: Opening Up Data, Wiring the Smart City – The Dubai Data Law

Data is what wires a smart city and fuels its machinery. One key element that defines a "smart city" is its technical and organizational capacity to generate, consume and analyze data for timely and efficient planning and decision-making. Governance in a smart city entails applying "data-driven innovation"; or advanced analytics to enable innovation towards growth and wellbeing (OECD, 2013). Today, governments and societies are entering unchartered territory in the era of "internet of things" and "big data" (Mayer-Schönberger and Cukier, 2013, OECD, 2015b, ITU, 2015, Turner et al., 2014, Regalado, 2014). With the tidal wave of data generated in the digital era and the fast-paced technological advancements in the capacity to store, consume and analyze data, a historical shift is taking place in the way organizations, cities and states are run and managed. Cities that want to take advantage of this transformation need to build up capacity and rapidly update their organizational, regulatory and even political frameworks. This needs to take place in two directions: A smart city would need to be able to harness the vast amount of data produced by both the public living in the city and "things" that operate within its digital sphere. More importantly, it needs to take decisive steps to open up government data to public use to enable societal development and economic growth (Davies, 2015, OECD, 2015a).

Despite the levels of technological advancement in the UAE, as evident in international indicators, the country was lacking the infrastructure and frameworks that govern government data. For example, the UAE ranked 52nd among 86 countries on the Open Data Barometer which measures steps taken by governments to make their data open for better governance and development (Davies, 2015). Clearly, there are numerous barriers to streamlining the use of government data across government and society. For example, in a study conducted across the UAE Federal government, the challenges to making government data available were found to be linked to technological barriers, lacking regulations, human capacity and limited understanding of economic feasibility by government entities. These challenges are shared in Dubai. The few existing limited attempts by government entities to open up datasets—when available—lacked systematic frameworks or standards. Due to these challenges, these attempts tend to be one-sided initiatives where such datasets end up being under-utilized and do not feed into wider growth or development efforts.



Barriers for Making Government Data Publicly Available in the UAE - Source: Governance and Innovation Program, MBRSG (2014)

Furthermore, these problems were highlighted at every stage of Smart Dubai's efforts while analyzing the gaps and potential of the smart city. Providing the enabling infrastructure and environment for Smart Dubai required delving into uncharted area of orchestrating date, regulating data production and consumption at the wider city level. The government holds massive amounts of data in isolated data islands. While most of the city's data is digitized, thanks to more than a decade of digital governance implementations, these terabytes of data are unstructured, delinked and severely lack common standards. These are some of the common critical deficiencies facing governments worldwide. A foundational first step for the city—and its public—to be able to produce, collect, utilize, exchange and analyze data lies in providing common infrastructure, standards and regulatory frameworks. The city's leadership realized that in order to become a smart city, let alone the "smartest city", these deficiencies needed to be addressed early on. The problems were not just related to opening-up data but to managing data and enabling utilization of data across society, in line with the set objectives for the smart city.

To address these challenges, on 20 December 2014, a cross-governmental committee was formed under the name of "Open Data Committee" (ODC). It was tasked with "striking the balance" between making data openly available and maintaining privacy and security of city's data. The committee's mandate was not limited to government, but also to developing the regulatory infrastructure for making data readily available for all stakeholders of the city and to foster practices of data sharing. More specifically, the committee was to define the scope of

open data, set the classification measures and develop mechanisms for cross-city data sharing. The Committee was chaired by HE. Abdulla Al-Madani, CEO, Corporate Technical Support Services Sector, Roads and Transportation Authority with representatives from eight government entities.

The Open Data Committee (2014)

The committee estimated that the direct economic contribution of making data open in Dubai will be close to 1% of the GDP, and that it will be a key contributor to wellbeing, beyond its economic potential. However, there are numerous barriers with regards to opening up data. The key challenge facing the committee's work was overcoming the existing cross-government cultural barrier of letting go of data. Based on a predominant competitive culture, some government entities have established advanced data collection and utilization practices, however, sharing that data was not a followed practice, neither for public use nor for cross-government use. In many cases, data was seen as a competitive advantage that enabled entities to deliver better services and get more recognition. In other cases, "letting go" of data was viewed through an over-conservative lens, which looked at the terabytes of datasets held by government entities as "secrets" that should be kept away from public eyes, and sometime the eyes of other government entities too. Changing this culture and formally enabling government entities to produce and share data was a critical objective of the data committee. However, this meant changing existing norms and disrupting business as usual across the government. In order to achieve this, a legal infrastructure was needed with the following objectives: 1) send a clear signal that data is a public good, not a departmental resource, 2) limit the space of improvisation on deciding on

what is "secret" and what is not, and 3) guide entities in classifying their data. As such, the committee's key deliverables were to create the Dubai Data Strategy, data classification guidelines and to draft the Dubai Data Law. For this, the committee first created the concept of "Dubai data", which is defined as "any data relating to any aspect of the government, economy, culture and life within the Emirate of Dubai". This broad definition of data highlights a key message: The ownership over any dataset that benefits the city, its economy, culture, government or people, belongs to city of Dubai, not the entity that currently holds the data. This definition of data enabled the committee to structure the strategy and legal framework, with data defined as a public good that can be utilized in generating public value.

"Open by Default" – The Dubai Data Law

On October 17, 2015, the Dubai Data Law was finally issued. The law mandates that: all data that is not personal, sensitive or confidential, is to be made open for public use by default in reusable formats. There is no approval process for such data. Government departments will be required to make this data available by law. However, the law does not only govern data held within Dubai's local government, but also data related to Dubai held by Federal entities across the country.

Additionally, the data classification created by the committee includes three distinct types: 1) "Open Data", which is data that should be made available publicly, and 2) "Shared Data", which is data governed by a further classification framework of confidential, sensitive or secret. The "shared data" will comprise of restricted datasets, based on its impact on individual's privacy and security of government entities or other organizations. According to the law, this classification framework will govern the data sharing practices and will help identify and manage risks related to data sharing. It will also assure individuals and organizations about their rights and responsibilities. As such, any dataset that does not have any of these characteristics of sensitivity, secrecy or privacy, is to be made public by default. Eventually, the plan is to develop a unified data-sharing platform for the city in 2016 that streamlines data sharing .

The smart city's hunger for data does not stop at the government, whether its local and federal boundaries. As such, the Dubai Data Law is not limited to governing "Open Government Data" (OGD), in its universal definition. Instead, it also governs non-government data related to the city. Datasets held by strategic private sector entities seen as critical to planning or operating in the city itself are to be shared and made open, based on the data classification framework. Realizing that this entails a cost on private sector entities, the plans

put forward by the Open Data Committee suggest a framework where the city will provide financial compensations to private sector entities for the cost of collecting, cleaning and making such data available when necessary.

Eventually, the potential impact of the data law is seen to be contributing to economic growth and raising the standards of living through: 1) enabling new businesses and job opportunities, 2) enabling better communication between the government, the private sector and individuals, 3) improving the efficiency of managing and using data, and 4) creating new innovations and services in the city. In general, Dubai Data is seen as a critical infrastructural foundation for the smart city and is viewed as one of Smart Dubai's key strategic pillars.

3- The Dubai Happiness Meter

To form a high-level picture of the level of satisfaction—and "happiness"—of the city's inhabitants, as well as the specific areas of improvement, a city-wide happiness meter was launched across all government entities, both as online and real-life touch points. Each interaction by the public with the city now can be measured in terms of subjective response on the level of happiness with the service received. By early 2016, one million interactions with the public were gathered in 31 entities. The data gathered by the numerous data points are fed into a Happiness Meter Index (HPI); a newly created metric to measure happiness of the public with government entities and specific services. In its next phase, the happiness meter touchpoints will also be rolled out beyond the government and be available for private sector and other entities in the city. Once fully rolled-out, this meter will draw a high-level picture of levels of satisfaction in the smart city, and be part of the overall assessment of happiness of its inhabitants.

4- A "Real" Public-Private Partnership

Dubai's tendency towards partnership with the private sector is a historic one. In major transformative projects, strategic private sector entities are not dealt with simply as vendors by the government. Instead, once a roadmap is set, the fitting entities are granted full partnership status in building initiatives, products and services in the city and its economy. This has been the developmental philosophy in Dubai for decades. It was natural for the Smart Dubai team to follow this common approach. Moreover, the team made it one of its missions to partner with local companies where possible. These companies are entrusted with critical elements of

designing, planning and implementing Smart Dubai's roadmap. This fresh approach towards public-private partnership is unique in the government, as it builds on a combination of trust and alignment of strategic objectives. As Dubai-based companies, the private sector partners of Smart Dubai have aligned their success with the success of the city. This philosophy is driving the implementation phases of the city, where key strategic ICT partners are being identified in the numerous smart city projects, in addition to international players and market leaders.

5- Formalizing the Smart City

On December 4, 2015, several new legislations were issues aiming to enhance the organizational structure of Dubai's Smart City initiative. Thanks to the cultural transformation infused by the efforts of Smart Dubai team over the past two years, collaboration became the center of the new legislation. The new laws not only institutionalized cross-government collaboration as the new norm in government, but also made public-private partnership a core component of the smart city's legal infrastructure. The message was clear: it is now about the city as a whole, not just the government. Making the announcement, Sheikh Mohammed stated: "Work together as a single team and seek help from experts who can build the future of the UAE."

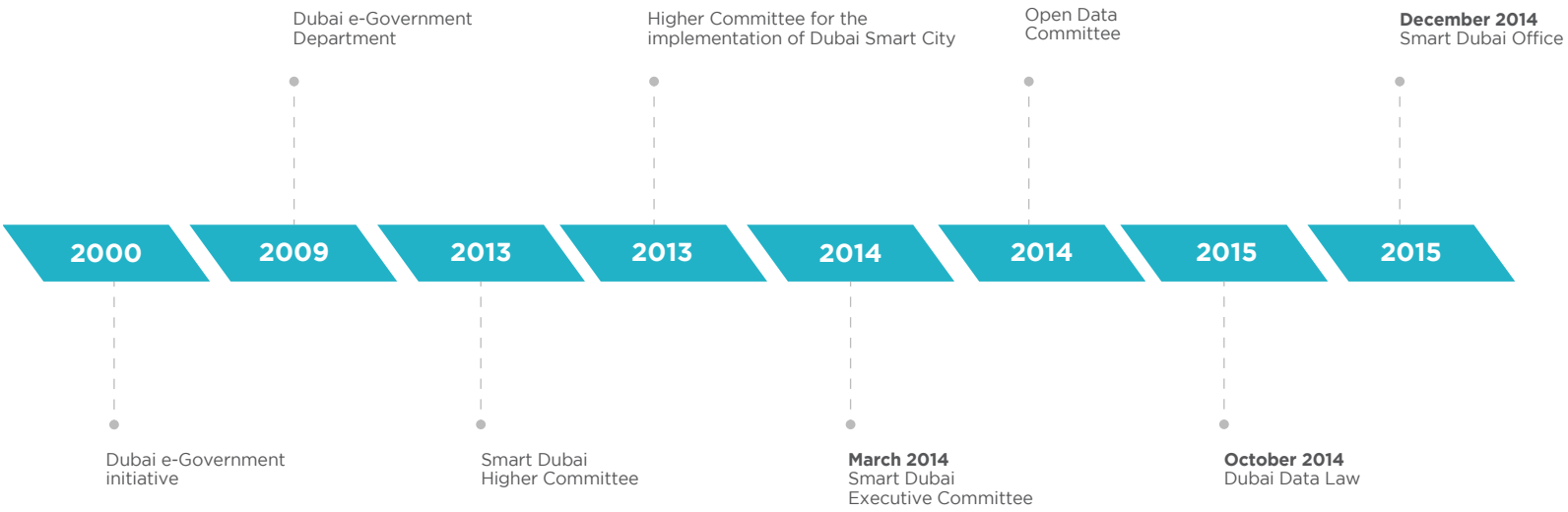
On the organizational level, the new laws established a new body with a cross-city and cross-government mandate, named the "Smart Dubai Office", under the leadership of Dr. Aisha Bin Bishr, its newly named Director General. This new mandate is planned to enable the Office to nurture collaborative projects and initiatives, not just between government entities, but also extends outside government to private sector, international entities and most importantly the city's society. The new body is to lead the smart city transformation, including developing policies, strategic directions and plans with regard to digital technology, data, ICT infrastructure and smart government in the city. It formalizes the Office's authority to supervise and guide the smart transformation process, including launching and approving initiatives, projects and services related to digital transformation in the city. Additionally, the Office will be able to create internal and external partnerships on behalf of the city, set and approve related budgets and utilize the city's resources to support the smart transformation and develop the infrastructure necessary for this purpose. Acknowledging the fast pace of transformation in the digital landscape and more specifically in the smart cities domain, the

law also provides the Office with authority to propose legislative amendments to drive the city's public and private sectors towards digital transformation.

On a more technical level, the regulations name the Office as the custodian of the city's central databases of all information pertaining to smart transformation initiatives. The Office is also mandated with establishing a city-wide portal regarding smart transformation and setting and monitoring key performance indicators (KPIs) to assess the implementation of relevant policies and procedures. The latter mandate is a critical one as the city embarks on measuring its progress towards becoming the "smartest city" in the world.

With these expanded powers given to the Office, the law disestablished the "Smart Dubai Higher Committee" formed in 2013 and the "Executive Committee of Dubai Smart City" formed in 2014.

Perhaps one of the key changes the new laws have created is substituting the Dubai Smart Government (DSG) department, the entity driving digital government initiatives in the city since 2009, with the newly established "Dubai Smart Government Establishment", under the DSCO. The smart government tasks are now one part of the mandate of the Smart Dubai Office, which now includes a "Smart Government Establishment" as one of its arms. This is a major restructure of one of Dubai's key government departments, sending a clear signal internally and externally in Dubai: "Smart Dubai" is not about the government *per se*. It is about the city, with its government sectors, private sectors and most importantly its people.



Digital Transformation Milestones in Dubai

To build on the work of the Open Data Committee, the "Dubai Data Office" was also established under the umbrella of The Smart Dubai Office. The data office is mandated with numerous critical tasks, including: overlooking data classification in government entities, regulatory compliance, data audit, monetization models, data portal, promotion of a data economy, encouraging data culture in the city and ultimately ensuring that "Dubai Data" feeds into development, growth and wellbeing in the city. According to Mr. Al Nasser, the Data Law will roll out in two phases, starting with a pilot with eight government entities as well as key private sector entities by the 2nd quarter of 2016. Meanwhile, the Office will engage in dialogues across the city to raise awareness and help develop a data culture. It will eventually design policies and launch a "Dubai Data Manual", as well as acting as a mediating party when needed.

By the beginning of 2016, Dubai's smart city project, which started almost three years ago, had a complete set of legal infrastructure and the organizational structures to help it in the remainder of its challenging journey.

Overcoming Barriers to Building Smart Dubai

Lessons from earlier large-scale digital transformation initiatives on local and international levels suggest that many of such initiatives fail partially or completely in achieving their goals. Many of these lessons are valid in cases of major smart city transformations. These include for example: the infrastructural limitations, gaps between technological potential and developmental needs, technological determinism by policymakers, outdated regulatory frameworks, resistance to change, government silos, public concerns, talent and capacity deficit, among other barriers (Salem, 2006, Heeks, 2006).

Unlike the case of many cities around the world, the common technological barriers related to the infrastructure while building the smart city are not keeping city planners in Dubai up at night. In contrast to previous major digital transformation initiatives in the city, when the ambitious deadline to transform Dubai into a smart city was announced, none of Dubai's government entities seemed to have been taken by surprise. Members of the Smart Dubai's leadership team repeatedly express pride—and relief—in that fact. This was a stark contrast to the not so distant case of electronic government transformation, almost fifteen years ago, when the Crown Prince of Dubai at the time, and now Ruler of Dubai, announced that government entities had eighteen months to shift gear and transform their traditional old-fashioned manual ways of delivering services into electronic government services. At the time, that tight deadline and the many uncertainties around such transformation sent a wave of panic across government entities. This time around, everyone seems prepared. The foundations laid down by the digital government drive during the past fifteen years meant that both the government and society were largely ready to adopt a new transformation. However, naturally, every disruptive transformation will have its new set of challenges and barriers, including those emerging with new technological and innovations. The first phase of Smart Dubai's journey was the stage where the following key challenges emerged.

1- From Competition to Collaboration

During the past decade, the work culture within government departments in Dubai shifted from a traditional 'silos mode' of governance into a 'competitive mode', where government institutions competed in a race for excellence. This shift contributed to advancing efficiencies and enhancing ways of doing business by government.

However, this competition has also enforced a strong perception of data, information, knowledge and innovations as the main sources of competitive advantage. In turn, this competitive view also limited the informal and formal information and data flow across government and reduced the level of trust among competing individuals and institutions. Consequently, this enforced new forms of silos, increased overall government cost of doing business in many cases and ultimately limited cross-governmental innovations (Salem and Jarrar, 2010). This negative outcome has been observed at an international level where New Public Management approaches were implemented to increase competition and incentivisation in government (Hood and Dixon, 2015). In Dubai, this competition was institutionalized by norms and regulations over more than a decade. For the Smart Dubai team, this culture was one of the main barriers at early stages of planning the transition into a smart city and creating the data-sharing culture. In reality, this competitive mindset, meant that departments and individuals were holding back on sharing data, information or even innovations beyond their departments, to raise their competitiveness compared to peers. This culture helped create a new form of data silos, and sometimes a culture of mistrust. Most important for the smart city, this created remote and disconnected data islands and numerous repositories.

Realistically, collaboration has never been the standard approach in governing. Moreover, openness to collaboration and sharing of data, information, ideas and knowledge is not an intrinsic behavior in public sector organizations. According to an earlier UAE-wide government survey, cross-governmental perceptions on the costs of collaboration include 'losing ownership of ideas', 'losing control', and 'undermining managerial hierarchy' (Salem and Jarrar, 2010). As such, in these organizational structures, data, information and ideas are perceived as sources of power.

Hence, barriers to achieving better collaborative government are cultural, structural and technological. On the other hand, enablers of better collaboration in public sector of the UAE include 'sharing common goals', 'openness to expressing ideas' and 'availability of direct communication channels'. Given these enablers and barriers, building smart Dubai required an

approach ensuring that trust is nurtured and openness is exercised through direct communication channels, towards a common goal. Realizing the magnitude of the challenge ahead and the cultural characteristics of the government, a soft approach was followed by the Smart Dubai team. The objective was to build trust, a culture of openness and willingness to collaborate, not just between government entities, but also between government and private sectors.

From "My Department" to "My City"

The Smart City team needed to take bold steps to break silos and infuse a culture where sharing data and innovation can be nurtured across the city. This can only start within the government. One traditional managerial approach is to break information silos by enforcing rules and norms that 'force' employees and departments to share data, information and ideas. In such cases, earlier experiences of enforced knowledge management approaches in government suggest mixed results, where "collaboration"—when it takes place—can vary from genuine to cosmetic. Another approach was to create a network of collaborations by applying soft measures, instead of hard ones, especially at the early stage of development. In contrast to competition, collaboration cannot effectively be enforced by norms and regulations. The concept of collaborative government emphasizes nurturing trust and thereby triggering willingness to collaborate and share data, information and ideas. This can create an intrinsic culture based on instilling relationships of trust among groups and individuals, as well as on understanding and appreciating the shared mutual benefits of cooperating and data sharing.

In such major transformative project, it is expected that different agendas, political turfs and competition over resources will arise among the multiple stakeholders of the city. Based on lessons learned from major digital transformation initiatives over the past two decades, one of the key barriers in these scenarios is the resistance to change that emerges from the fear of losing power in the new era. Acknowledging the steep road ahead, the Smart Dubai team adopted an open collaborative philosophy since day one, in the form of cross-governmental committees and teams. Unlike traditional developmental projects, in which planning is centralized and implementation is outsourced to concerned entities, the development of the smart Dubai in its first phase was an inclusive process.

While designing the Smart City roadmap, this approach of creating active committees that include selected members from each core government body was meant to engender collaboration among the key stakeholders of the city. Emphasis on multi-stakeholderism and

peer-partnerships were instrumental for progress and alignment, while minimizing resistance to change and fear of losing power. For example, since day one, the eleven entities identified as the strategic partners for Smart Dubai's first phase of development were engaged at each step of the way. Likewise, members in the Open Data Committee, which was tasked with building a roadmap to open, regulate and de-silo the data islands in government were drawn from all key government bodies and were closely coordinating on developing all aspect of the city's data framework.

Eventually, as all aspects of planning and decision-making processes were taking place inclusively, this collaborative approach reduced the resistance to change and aligned political agendas towards a single objective. This inclusive collaborative approach had a clear impact on the way policymaking and governance are practiced in the city. As a by-product of the first phase of the smart city development, each of the powerful government entities now has ownership in "Smart Dubai". This way, the different government bodies shaped the direction towards the future of the city together. The outcome of this approach was the emergence of what seems to be an effective cross-government partnership and a shift in the way of thinking from "my department" to "my city", at least among the many stakeholders involved in the development of "Smart Dubai".

2- Public Concerns of Privacy and Security

Dependence on digital technologies in everyday life is growing much faster than the global capacity to secure these technologies. The integration of IoT, big data and universal smart implementations across the city is seen by some in government as an "explosive" matter, which could open the door for numerous security risks. This matter is on the radar screen of policymakers and city builders worldwide. Issues related to data confidentiality, privacy and information security are commonly discussed whenever plans for smart city development are approached. Globally, there have been numerous cases of hacking smart cities implementations, such as smart meters, industrial IoT systems among many others. This took place either in the form of commercial eavesdropping, injecting fake data or issuing false commands to smart systems. In Dubai, this is a critical matter that has been addressed at the core of the Smart Dubai's developmental plans and its new regulations, such as the Dubai Data Law. However, regardless of the layers of security the city puts in place, building public trust in technologies associated with the smart city implementations is crucial. This would require time and maturity, but it also requires developing guidelines, assessing risks and

designing responses. More importantly, it requires public awareness efforts that provide assurances to the public.

Similarly, in such environment, public privacy concerns are widespread. In Dubai, developing a comprehensive Data Law was a critical step for transparency. With increased personal data acquired, there would be a need for implementing codes of conduct and ethical approaches that governs the practices. Dubai's data law is an essential foundation for developing practices and codes at micro levels across the city. The law itself may already be sending signals of assurance to the public and businesses in the city. However, with technological advancement, this will require continuous reviews, amendments and supplements to align with usage trends and emerging risks.

3- Skills and capacity

Despite ranking relatively high in indices measuring the society's adoption of ICT, the UAE ranks behind at 97th globally in the UN's Skills Sub-Index measuring educational attainment (ITU, 2015). Skills required for the digital economy require a critical mass of advanced science and technology research and development capacities. For Dubai's population—as well as that of the wider UAE—reaping the potential benefits expected by the emerging smart city ecosystem requires building societal capacity. In turn, this puts the onus on government to invest in educational reform and scholarship. More importantly, this requires adapting policy frameworks and aligning educational and developmental policies for the digital age. For Dubai, its economy has traditionally attracted talent from around the globe. Building the smart city will requires attracting new types of skills and talents. While Dubai's economy remains one of the most attractive in the region for talent, the global—and more importantly regional—scarcity of talents linked to smart development is a key barrier. Even if Dubai has all the incentives in place, such as high quality of living and income levels, there are still few with the skills required to fill the growing appetites of smart cities around the world.

Lessons Learned: The Enablers of Smart Dubai

What are the preliminary enablers of Smart Dubai? The city's first phase of the journey towards becoming the smartest city in the world suggests that the following elements have been critical factors for progressing towards seamless implementation of the smart city roadmap:

Leadership and Political Support:

Taking steps towards a mega-transformation in the city would not be possible without a clear vision and strong political backing. The stated scope and nature of the initiative and its ambitious objectives of becoming one of the smartest and happiest places to live and work entails political risk-taking. This is not new to the entrepreneurial leadership style of the city's ruler. The strong political backing at the critical early stages of development phase sent a clear message to all stakeholders of Smart Dubai. This removed numerous barriers related to change management across the city.

Political Trust:

For more than four decades, the UAE has been enjoying sustained political stability and social development over the past two decade. This has enabled the government to amass what seems to be a comfortable reserve of public support and 'political trust' (Blind, 2007). This is clear when one looks at international evaluations of the perception of government corruption or public trust in politicians (WEF, 2014, Transparency International, 2014). For example, the UAE ranks second worldwide on the WEF's indicator measuring "Public Trust in Politicians", up from 3rd a year before (WEF, 2014, WEF, 2015a). With continued political and economic stability, numerous indicators and observations point to a steady rise in levels of public trust in the government. This has been a significant factor in driving government development efforts, including taking bold steps towards major transformative initiatives, which usually trigger resistance to change and clashes in political agendas.

Economic Prosperity:

The UAE is a high-income economy that boasts one of the world's most advanced infrastructures and considered as an "innovation-driven" economy (WEF, 2015a). As a key contributor to the UAE's global standing, Dubai is considered the financial and tourism center of the country and trade hub for the wider region. For decades, this national and regional status provided the Emirate of Dubai with sustained levels of economic development and prosperity. This status stood the test of historical economic crises such as the burst of the dot com bubble and the global financial crisis. Today Dubai's diversified economy and financial resources are critical contributors to its plans for transforming the city in the digital era. Additionally, one of the key driving forces behind Dubai's move towards becoming the smartest city is to sustain its regional economic status and to become the international destination for doing business in the 21st century. Estimates on the value of the global smart city market range between USD 408 Billion USD to 1.56 trillion by 2020 (BIS, 2013). Keeping with Dubai's historical positioning as a regional hub, Smart Dubai's pioneering drive is partly intended to position the city as a global hub for businesses within that smart city domains. In that sense, Dubai's economic prosperity is both a potential outcome, and a contributor to its smart city vision.

Governance Agility and Collaboration in the Digital Age:

Governance in the digital age requires adapting management and leadership styles. It requires introducing mechanisms that minimize risk while innovations and disruptive changes take place. However, this creates a "dilemma" within the government; a public sector digital innovation dilemma. In such digital transformation contexts, a need for change and innovation is acknowledged, however, this usually leads to major disruptions and "casualties" in the government. Most major government digital transformations require changes in the very structure of the government for change to succeed. This means that some government functions—or whole departments—may disappear or have to radically change their mandates. This is a common source for resistance and a critical hurdle in transforming a government—or a city—in the digital age. Dubai needed to fix this well-known challenge quickly.

Traditionally, governments are not open towards changing the way they do business easily. Usually, bridging silos, though acknowledged as necessary, take long periods of time, creating waves of resistance in the process, which leads in many case to silos resurfacing in different forms. In today's fast changing world, for a major digital transformation to take place in a short

period of time, a networked governance style where collaboration is genuinely practiced is a must. For example, horizontal collaboration is critical to quickly align agendas and expedite outcomes. In a smart city project this is universally true. This "wiki" style of governance sounds too good to be true, where government entities work simultaneously to build policies and develop roadmaps, and then work together towards achieving the goals they already set seamlessly. Working horizontally in the widely hierarchal and politically-driven world of governments requires a cultural shift, which cannot be enforced by hard measures.

Through acting entrepreneurially, and applying soft measures in the form of cross-government bodies and committees, Smart Dubai has so far, been successful in adopting this wiki governance style and applying an effective collaborative approach in managing its smart city transformation. Smart Dubai team was effectively leading from behind, taking the seat of a facilitator and organizer. This approach minimized resistance to change, reduced risk of failure and introduced a cultural shift in the way government operates, removing common barriers in any digital transformation project. Additionally, this approach enabled sharing innovations and learning from cross-government practices. It was also successful in bringing the different government entities up-to-speed and enabling them to take ownership of the city's planned vision. As such, these entities are not merely the implementers of someone else's roadmaps and plans. They will be implementing the plans and visions they jointly built. This was important at the first phase of thinking, designing, planning and conceptualizing the smart city.

As the roadmap is set, and as Smart Dubai enters its next phase of development, implementation will have to be carried out at a much faster and more structured manner. At this critical juncture, many digital transformation initiatives hit another wall where entrenched government structures block such implementations due to egos, aspirations and competition over resources and political clout. With agendas aligned and a roadmap jointly set, another disruptive step was required to expedite implementation. At this stage, bold leadership steps were needed. Eventually, the government of Dubai quickly changed some government structures that were in place for decades to enable Smart Dubai to lead the next phase with clear mandate and authority. The new structure of a Dubai Smart City Office at the center of the city development efforts, ensures that the leading entity building the smart city now has authority over the city as a whole, not just the government. This is reflected in the ways of thinking within the new team, as well as in the structure of the Office, which now has the smart government body as just one of its arms. This agility is a critical factor moving forward in the next phases of Smart Dubai's transformation.

The Potential Impact of Smart Dubai: Towards a Regional Network of Smart Cities

Smart Dubai's ultimate objective is to increase happiness, wellbeing and improve quality of life for people who live, work and visit the city. In addition to the 2.4 million people who call Dubai home, another million individuals are "active" in Dubai's economy. This includes people who commute or travel to Dubai daily, bringing the population of the city during peek hours to around 3.5 million daily. Additionally, the city hosts around 20.5 million visitors each year, who come for tourism or business (Dubai Statistics Center, 2016). As such, the potential impact of Smart Dubai is to enhance the lives of around 25 million people who live in the city or interact with it each year. Moreover, by 2020, the city expects to welcome 50 million visitors as it prepares itself to host Expo 2020. This is a massive increase of more than 240 percent of visitors in four years. The city's infrastructure and governance approaches will need to revolutionize to accommodate this increase.

In addition to improving quality of life and happiness for its people, Dubai's smart city is also planned to contribute to better planning, improved decision-making, reduced cost and enhanced quality of government. In Dubai, it is estimated that the value of IoT applications alone will contribute around USD 1.17 billion to the public sector by 2019. This is based on a conservative estimate assuming that only 60% of possible IoT applications are implemented in the smart city ecosystem by then. For the private sector, the estimated value of IoT is around USD 3.7 Billion by 2019 in Dubai (Reberger et al., 2014). This is just a portion of the potential economic impact of Smart Dubai on the city's economy and growth.

THEME	5 YEAR VALUE AT STAKE (AED M)
Public Sector Productivity Telework, Collaboration, BYOD, Smart Building	**1,892**
Transport Buses, Parking, Street Light, Travel Avoidance	**1,094**
City Management Video Surveillance, Water, Electricity, Waste	**378**
Other Incl. cases in healthy, learning, transmission grid and smart payment	**949**

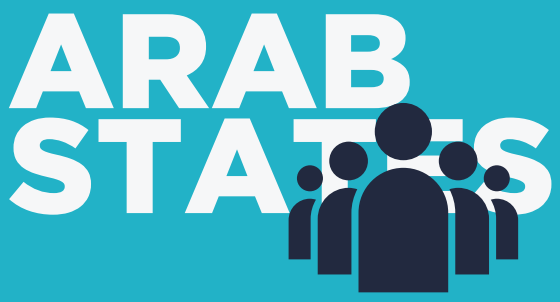
Projected value of Internet of Things (IoT) applications for Dubai's public sector by 2019 – Source: (Reberger et al., 2014)

The Potential Regional Impact

Several governments in the region have been experimenting with different smart city developmental concepts. Masdar city in Abu Dhabi, the "economic cities" in Saudi Arabia and Lusail city in Qatar are current examples. However, these experiments are based on custom and newly built urban areas were policies on sustainability and smart systems are implemented at the design stage—which are usually referred to as "greenfield" developments. The multifaceted challenges of digital transformation do not apply there. However, in a turbulent region where more than 288 million people already live in cities, there is a dire need for applying smart and sustainable development approaches to limit the damage inflicted by urban growth on the social fabric, infrastructure and environment. Moreover, the region is marred with numerous conflicts and warzones affecting large urban populations and cities. Once the dust settles, there will be numerous opportunities to apply smart initiatives in reconstruction, resettlement, rebuilding and post-conflict humanitarian and reintegration efforts.

To put things in context, the percentage of the population living in cities in the Arab region is close to 58% while it reaches 85.1% in the neighboring six Gulf Cooperation Council (GCC) countries (UNDESA, 2015). The potential for smart city development in the Arab region is not to be underestimated. Dubai is the first city in the region where a major digital transformation is taking place across a city, in the traditional understanding of the term. Smart Dubai has engaged in several new "greenfield" pilots where new districts are custom built as a proof of concept cases of a smart city development. This is in addition to the city's plans for "brownfield" developments—or upgrading and refitting its already built fabric and infrastructure with smart implementations. In that sense, Dubai is a regional pilot where many other cities can look to for inspiration and policy learning. Looking at the recent history of Dubai's leading role as a model and trendsetter in embracing the digital era, many anticipate Smart Dubai to influence a regional trend.

Having one of the world's "happiest" and "smartest" cities in a region starving for successful models may trigger a regional ripple effect, at least affecting a number of the existing 122 cities across the Arab region. This is not farfetched if one considers the history of digital transformation over the past two decades, where Dubai had played a pioneering role and contributed heavily towards efforts of policy learning, shared best practices and common challenges.



Number of Cities with more than 300 thousands inhabitants (2015)
122

Total Population (2015 in millions)
385.119

Number of People living in Cities (2015 in millions)
223.498

Percentage of Population in Cities (2015)
58 %

Total Population (2020 in millions)
422.211

Cities in the UAE compared to GCC and Arab region – Data Source: (UNDESA, 2015)

While it is justified to be skeptical about such influence given the turmoil in the region, the reality is that city builders and policymakers are already flocking to Dubai for lessons in digital-era policy formulation, change management, urban development and smart transformation. From Riyadh to Doha, cities around the region are reaching out to Smart Dubai team for lessons and guidance. For now, its pioneering vision in raising public happiness, wellbeing and quality of life by building a smart city made a first impact of inspiring potential change that may affect millions in the wider region.

Number of Cities with more than 300 thousands inhabitants (2015)
24

Total Population (2015 in millions)
50.927

Number of People living in Cities (2015 in millions)
43.348

Percentage of Population in Cities (2015)
85.1 %

Total Population (2020 in millions)
55.495

Number of Cities with more than 300 thousands inhabitants (2015)
5

Total Population (2015 in millions)
9.577

Number of People living in Cities (2015 in millions)
8.188

Percentage of Population in Cities (2015)
85.5%

Total Population (2020 in millions)
10.622

Conclusions – From Euphoria to Sustained Smart City Development

A Smart City for Public Value and Sustainable Development

Improving the quality of life of Dubai's inhabitants is the ultimate objective of Smart Dubai. This focus on happiness and wellbeing as a driving force in developing the smart city is a unique developmental philosophy. This objective is aligned with both local and national level strategic developmental goals and national agendas. Towards that goal, Smart Dubai sees digital technology as the core catalyst in achieving its ambitious vision of generating public value that feeds into public happiness. As importantly, Dubai's plans and approaches in building the smart city are also aligned—and measured against—universal sustainable development goals and the international drive towards environmental sustainability. Aligning with both local and international developmental goals from the very early stages indicates that "building the smart city" in Dubai is not a digital-era fad, but a core developmental philosophy. Likewise, putting people's happiness and wellbeing at the center of Smart Dubai's vision, while highly ambitious, should drive the city to continuously align with public needs and expectations, hence ensuring the generation of public value.

Over few short years, Dubai has achieved several milestones in its smart city journey. Beyond the city's data law or its smart pilots, there are deeper cultural and structural changes taking place as by-products of implementing the smart city roadmap. In addition, evidence documented in this study suggests that the ongoing transformation towards Smart Dubai is already generating public value. The findings of this study point to the following key transformations in the way the city functions today and to a cultural shift within government.

1- From Silos to Innovation Flow:

By implementing a combination of soft collaborative and hard regulatory measures, government organizational silos are increasingly bridged by default. As an outcome, this is also helping bridge many data, information and knowledge silos, potentially enabling increased innovation flow, not only within the government, but across different sectors in the city of Dubai. This in turn is shifting the thinking within government entities and government

employees, from thinking of "my department" and "us the government" to "my city" and "us the city". This removes a virtual cultural barrier that usually exist across government entities limiting the developmental viewpoint to a government, private or public perspective. By now, the common terms and language used by officials suggest that a shift towards an inclusive city-wide view is taking place. This new way of thinking now views members of the public, private and public sectors as "partners".

2- Openness and Transparency as the New Normal:

A clear cultural shift towards openness and transparency is in full force today. No more "transparency" and "open government data" are considered risky terms within government contexts. This is a shift away from previous prevailing discourses in the many layers of government, in which such concepts with suspicion.

3- Collaboration for Smart Transformation:

Collaboration is quietly being institutionalized as a government *modus operandi,* not just a nice enough catchphrase. This is replacing the negative residue of a decade-old New Public Management-style competitive drive, where collaboration was not willingly practiced to its widest potential.

4- From 'Customers' Satisfaction to People's Happiness:

Most importantly, there is a move away from a prevailing institutionalized terminology that viewed the public merely as "customers" of government services, towards viewing them as "people" whom government entities need to ensure happiness and satisfaction. This is another major cultural shift in government thinking in the city.

These important changes and transformations may not have taken place in such a relatively short period, if Smart Dubai did not act entrepreneurially, enabling collaborative governance style which aligned efforts, minimized risks and reduced resistance. The agility and flexibility of the government are critical in taking steps towards creating a mayor's-style office with a mandate that goes beyond the government towards a city as a whole. This could be a unique component of Dubai's DNA built over years of governance system and leadership style, many other cities may struggle to imitate. There are numerous studies on the leadership style in

Dubai. A critical component is the entrepreneurial and risk-taking governance approach through which the city is governed. This has been a key driving force in infusing these transformations, and in the development of the first phase of such a large-scale cutting-edge urban transformation in a relatively short period. Ultimately, the factors that enabled the government to expedite its implementation of the first phase of development are summarized as follows:

- Adopting a clear vision based on common universal value
- Applying methodological approaches in assessment of weaknesses, analyzing gaps and designing roadmaps
- Openness to learning from international practices
- Solid partnerships with local and international private sector entities
- Seeking international standardization in measures of evaluation
- Acting entrepreneurially beyond hierarchies
- Infusing collaboration across government through soft and hard measures
- Piloting, showcasing ideas and leading by example
- Agility in restructuring government functions and bodies as needed

The detailed analysis and preliminary lessons documented here on Smart Dubai's evolution in its critical first phase of development provide invaluable insights into a pioneering case of modern urban transformation. These achievements, challenges and milestones in Dubai's journey towards developing a smart city, as a national and a regional pilot, are key for other cities in the region planning similar developmental journeys.

Going forward, on a local level, the public value and potential impact of Smart Dubai on people's wellbeing, quality of life and "happiness" is yet to be measured. On a regional level, there are however early signs of a spill-over effect, where Dubai has historically been a trendsetter and a benchmark in digital transformation. More globally, Dubai is positioning itself as a pilot for smart city development, where it is leveraging international cooperation to help develop standards, indicators and measures for evaluating smart city progress. The next phase of Smart Dubai's development should reveal if the scope and level of impact that Smart Dubai will have on local, regional and international levels.

The Smart City Continuum - Smart Dubai's Next Challenge

The future of Smart Dubai depends on its capacity to maintain momentum and continue to remove barriers and overcome challenges, either those highlighted in this study, or those that are bound to emerge in the next phases of its evolution. Given the milestones achieved in the first phase of Smart Dubai's journey, its vision of becoming the "smartest" city by 2017 looks promising. However, given the rapid changes in technological advancement and innovative utilization of digital means by society, becoming the "smartest" city becomes a continuum and a journey with no end. Dubai may as well achieve its target to be the smartest city in the world by 2017 as measured by international standards and indicators. However, maintaining that global status will require the city to continuously re-invent itself and adapt to fast-moving technological changes, innovative societal uses and growing public expectations in the digital era. As Dubai raises the bar for urban development and digital transformation, this will only mean that the city will need to maintain its position at the cutting-edge of through exponential innovation. More importantly, as the city raises expectations of its inhabitants, maintaining its targeted objective of becoming one of the "happiest" places on earth to live and work requires continuous re-alignment with public needs. Acknowledging this challenge, Dr. Bin Bishr, Director General of Dubai Smart City Office said: "achieving the target of becoming the smartest city on earth is doable. Maintaining that number one position will be the real challenge". With a solid foundation in place, maintaining the "smartest city" status will depend on Dubai's agility and its capacity to re-calibrate its governance system with new changes and its ability to innovate and re-invent itself in the digital era. For now, as Dubai embarks on its second phase of smart city digital transformation, the sky seems to be the limit for the young and enthusiastic Smart Dubai team.

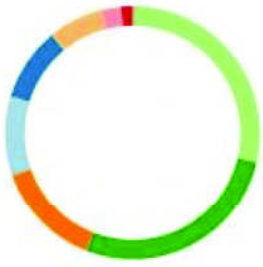
Annex

Dubai's rankings in the Global MetroMonitor 2014 report by Brookings Institution (Parilla et al., 2015)

OVERALL PERFORMANCE RANKINGS

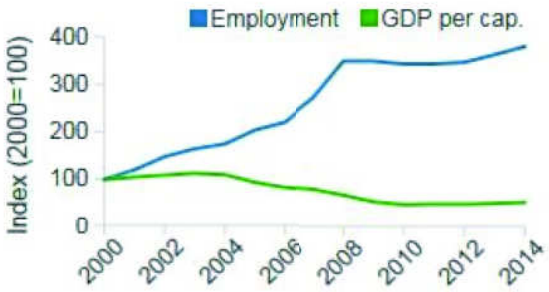
2013–2014		2009–2014		2000–2014	
5th		172nd		35th	
Emp. change	GDP per cap. change	Emp. change	GDP per cap. change	Emp. change	GDP per cap. change
+4.7%	+4.5%	+1.7%	-0.4%	+10.0%	-4.7%

SHARE OF OUTPUT BY INDUSTRY, 2014



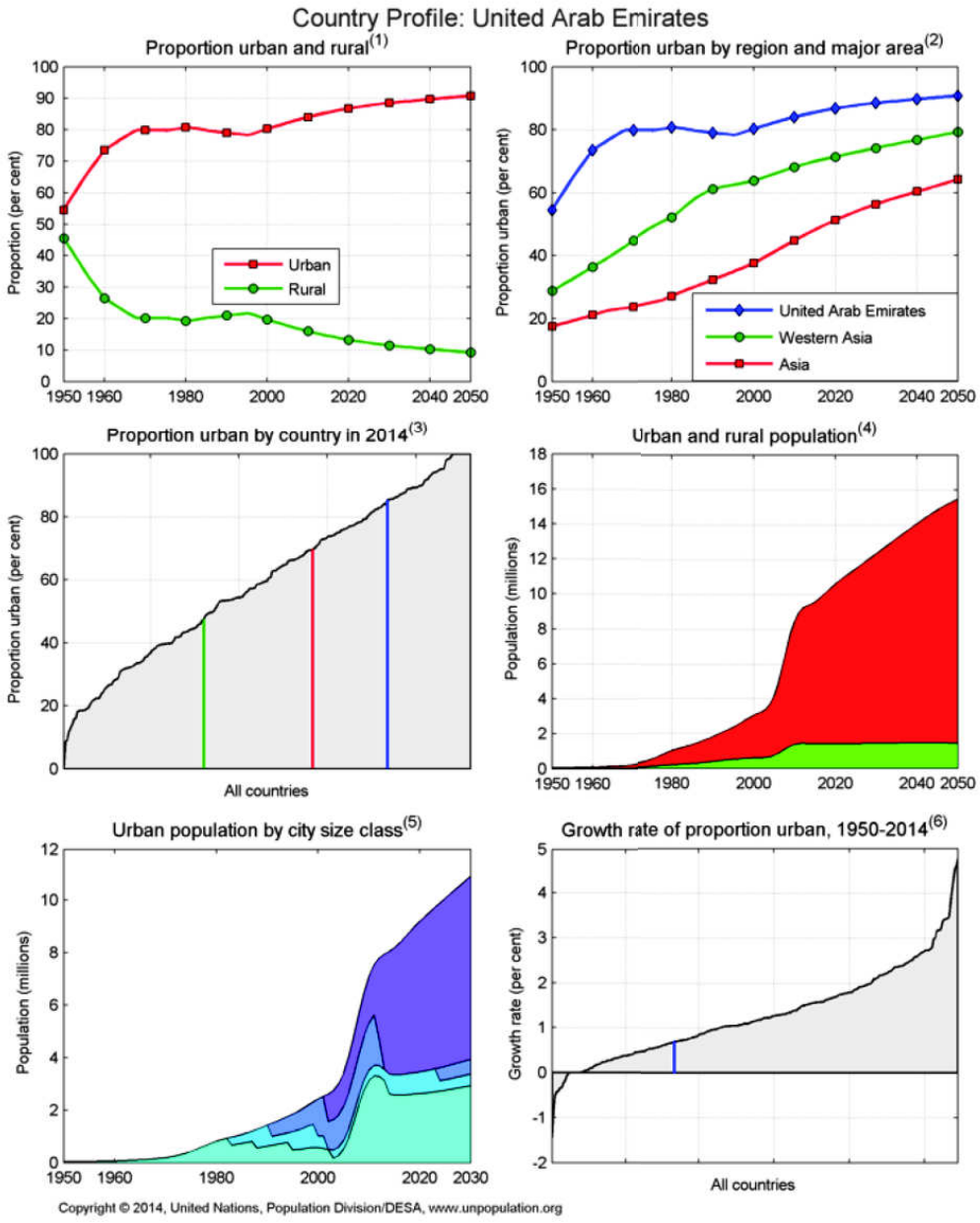
- Trade and Tourism
- Business/Finance
- Transportation
- Manufacturing
- Local/Non-Market
- Construction
- Utilities
- Commodities

CHANGE IN EMPLOYMENT AND GDP PER CAPITA, 2000–2014



SIZING UP, 2014

Population:	3,332,500 (131st)
GDP (PPP, $Million):	$82,867 (160th)
GDP per capita (PPP):	$24,866 (215th)
Employment:	2,079,900 (83rd)



UAE Urbanization 1950-2050 – Source: (UNDESA, 2015)

Internet Penetration
90.4%

Internet Bandwidth
44,503 Bits/second

Households with Internet Access
90.1%

Fixed Broadband subscription per 100 inhabitant
11.5

Active Mobile Broadband subscriptions per 100 inhabitant
114

Households with Computers
87.9%

Social Media accounts penetration
69.2 %

Mobile Subscriptions per 100 inhabitant
178.1

Technology adoption in the UAE – Sources: (ITU, 2015, Salem, 2016 Forthcoming)

PASSENGERS' MOVEMENT AT DUBAI AIRPORTS
78,640,425
- Q1. 19,749,695
- Q2. 18,759,579
- Q3. 20,471,045

PASSENGERS' MOVEMENT AT DUBAI PORTS (MARINE)
303,213
- Q1. 164, 524
- Q2. 41,971
- Q3. 20,915

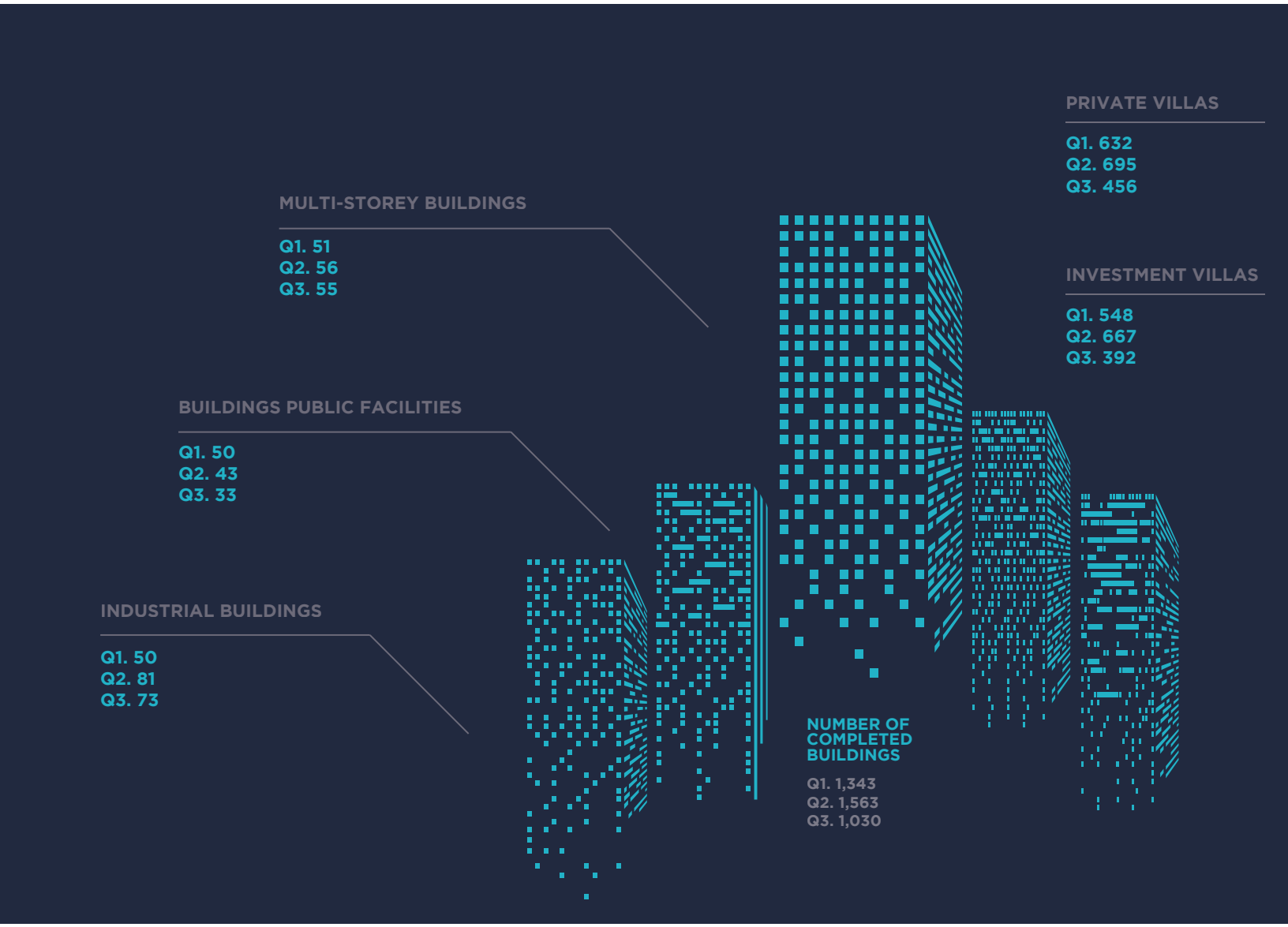
NUMBER OF TAXI TRIPS
106,700,287

NUMBER OF BUS PASSENGERS' TRIPS
127,552,459
- Q1 31, 390,235
- Q2. 32,676,012
- Q3. 31,598,007

NUMBER OF METRO PASSENGERS' TRIPS
173,192,127
- Q1. 44,371,860
- Q2. 43,880,174
- Q3. 41,642,061

NUMBER OF TRAM PASSENGERS' TRIPS
3,720,517
- Q1 943,982
- Q2. 910,073
- Q3. 936,333

Snapshot of Dubai Development: Transport - Data Source: Dubai Statistics Center



Snapshot of Dubai Development: Building and Construction - Data Source: Dubai Statistics Center

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- **Miss. Noora Alsuwaidi,** Project Manager, Smart Dubai Office; Former Project Manager, The Executive Office
- **Mr. Wesam Lootah**, CEO, Dubai Smart Government Est.
- **Mr. Marwan Bin Haidar,** Executive Director of Planning & Development, Dubai Smart Government Est.
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The objectives of the program are aligned with regional governments' objectives towards nurturing a culture of innovation in society, promoting participatory, inclusive and transparent government models; and enabling more responsive and efficient governance through effective adoption of digital technologies. Since its establishment, the projects and initiatives of the Program have spanned the following policy topics, among other 'future of government' areas:

- Digital Governance and 'smart government'
- Open Government Data and the impact on knowledge economy
- Smart city development
- Digital transformations and e-Government policies in the Arab region
- Social Media impact and trends in the Arab World
- Citizen Engagement, inclusion and citizen-government interaction in the digital era
- Innovation policies in Arab public sector
- Whole-of-Government initiatives and Public Sector Collaboration
- Open data, Entrepreneurship and Youth
- ICT for Development

About The Study

The data for this study was collected between October 2015 and February 2016 through a mixed approach of semi-structured interviews with a range of key stakeholders involved with Smart Dubai. The research method in this study also employed analysis of historic traces of developmental processes. Additionally, the analysis is based on textual and qualitative assessment of publicly available—and unpublished—official documents issued between 2013 and 2016. The findings were also informed by secondary research in developmental policy sources, scholarly literature as well as media and social media sources.

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The Mohammed bin Rashid School of Government (MBRSG)

The Mohammed Bin Rashid School of Government (formerly Dubai School of Government) is a research and teaching institution focusing on public policy in the Arab world. Established in 2005 under the patronage of HH Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai, in cooperation with the Harvard Kennedy School, MBRSG aims to promote good governance through enhancing the region's capacity for effective public policy.

Toward this goal, the Mohammed Bin Rashid School of Government also collaborates with regional and global institutions in delivering its research and training programs. In addition, the School organizes policy forums and international conferences to facilitate the exchange of ideas and promote critical debate on public policy in the Arab world.

The School is committed to the creation of knowledge, the dissemination of best practice and the training of policy makers in the Arab world. To achieve this mission, the School is developing strong capabilities to support research and teaching programs, including

- applied research in public policy and management;
- master's degrees in public policy and public administration;
- executive education for senior officials and executives; and,
- knowledge forums for scholars and policy makers.

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