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STATE *of* PLAY

SMART CITIES

SMART CITIES WILL SOON BE WORTH $1.2 TRILLION. THIS REPORT CHARTS THE ORIGINS OF SMART CITIES, EXAMINES CURRENT GLOBAL MODELS, AND PREDICTS THE SHIFTS AND LEADERS AMID THE FOURTH INDUSTRIAL REVOLUTION.

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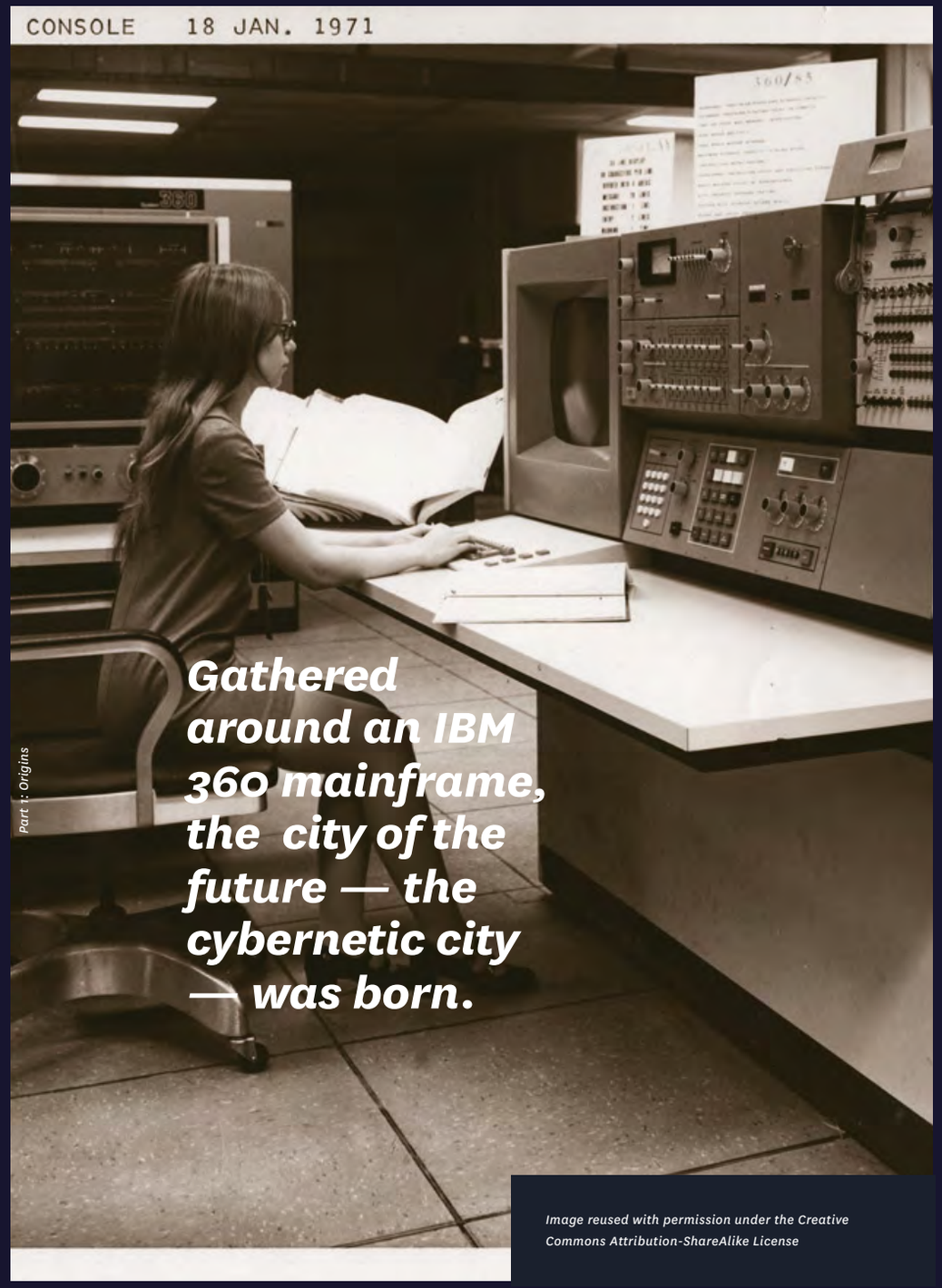

Gathered around an IBM 360 mainframe, the city of the future — the cybernetic city — was born.

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1. SMART CITY ORIGINS

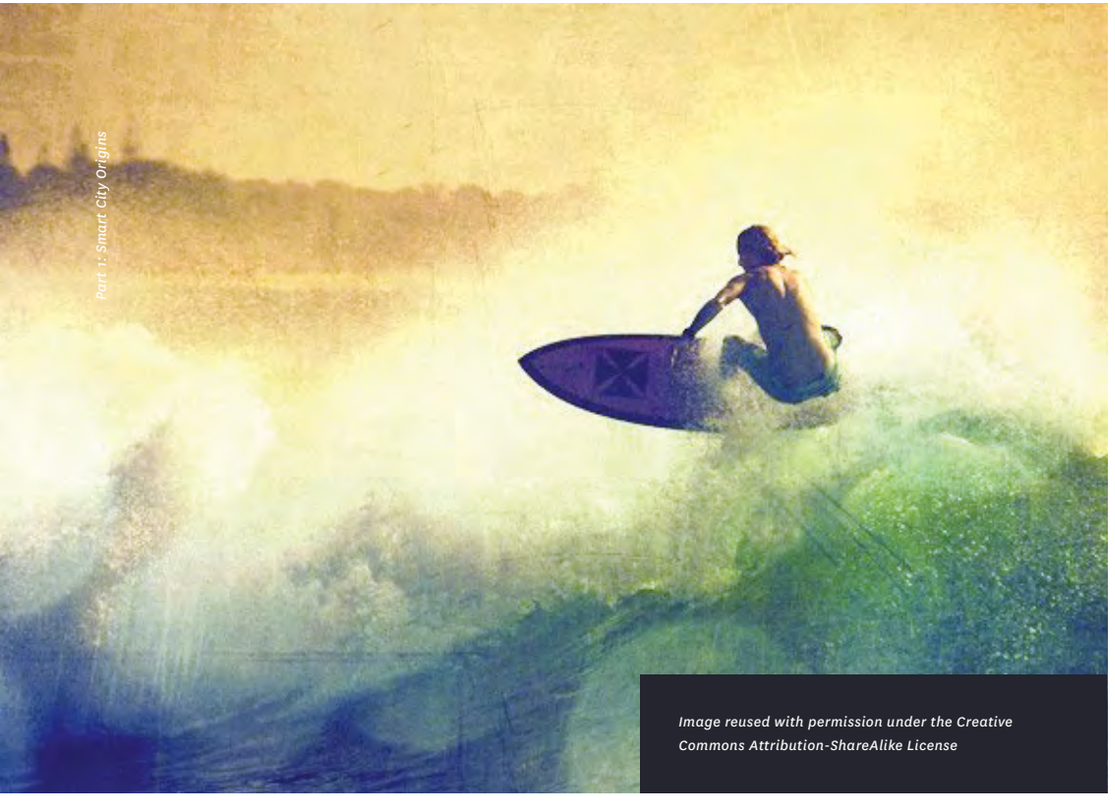
1960s

A team of computer programmers is sorting through reams of recently digitised and centralised data from the US Census Bureau, the Los Angeles Police Department, the LA County Assessor, and other various public and private data sources. So far, they have classified 220 data sets, forming the core of a massive database on the ins and outs of daily life for LA's ever-expanding and diverse population.

The programmers are working against time to solve pressing issues for the booming city: alleviating poverty, stopping blight in its tracks, and effectively directing city resources to urban renewal efforts.

To combat the ever-growing challenge of urban sprawl and decay — the US Census Bureau had thrown the towel in about a decade ago, citing human error for itsinconsistent data — the elite team of programmers, many recruited

Los Angeles "was one of the first non-federal government agencies to use electromechanical and electronic data processing systems in accomplishment of its day-to-day service rendering tasks." [1]



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from the aerospace industry, were experimenting with a radical new solution: using computerised data to uncover the patterns and commonalities between city neighbourhoods that door-to-door surveys have proven incapable of detecting. If successful, this data would become the centrepiece of the city's new approach to planning and budgeting responses to its urban dilemma.

It is the late 1960's in Los Angeles, and Mayor Sam Yorty had just established the Community Analysis Bureau to "launch a community analysis program that would perform 'a comprehensive analysis of the entire city' in order to 'prevent further inroads of a physical, economic, and social nature which contribute to... obsolescence.'" And the city's data would lie at the heart of that mission.

Backed by big data and boundary-breaking technological know-how, the team at the Community Analysis Bureau pioneered a new approach to harnessing insights from city data: deploying a "cluster analysis" that would enable the data to "suggest its own natural grouping." Using the cluster approach, the Bureau identified sixty-six data types that cross-cut traditional geographic parameters, augmenting location data with social data such as ethnicity, education, housing and crime data.

Viewed through a lens of data clusters, the team was able detect common patterns, even among geographically and socio-economically distinct neighbourhoods. Ultimately, the team identified thirty "clusters" that defined life in Los Angeles.

Cluster 2 ... was "The Singles of Los Angeles." It contained "a very young population with an average age of thirty-three, living in high-density new apartment buildings." Seven of the nineteen census tracts in this cluster were located adjacent to one another in West Los Angeles and Brentwood. Other tracts with similar young, single, apartment dwellers were found in Palms, Baldwin Hills, Del Ray Palisades, Hollywood, and Bunker Hill. [1]

Armed with these insights, the team constructed an "Integrated Urban Information System" they like to call the "thermostat" of the city. The thermostat would "sample changes in data and, based on these measurements, make recommendations to operating and staff agencies in the city..."

The first report published by the Bureau including recommendations on "raising family incomes, placing all needy three-to-four-year-olds into preschool, and spurring the construction of 7,000 to 9,000 low-to-moderate income housing units per year, in addition to those already planned."

The data provided by the Community Analysis Bureau secured a number of grants for the city to fund re-development, social services and infrastructure projects in high-poverty neighbourhoods. Over the next five years, insights from the CAB led to the expansion of social services, street maintenance, and building libraries and parks to revitalise low-income areas.

The British travel-writer Jan Morris praised Los Angeles as the "Know-How City," extolling "that... genius for applied logic, for systems, for devices, was inexorably the herald of progress." [1]

The story of the Community Analysis Bureau in the 1960's and 70's could have easily unfurled in modern-day Los Angeles, or any one of hundreds of 'Smart City' projects across the globe today. But in fact, the work carried out by the Bureau represented a trend towards digitisation — the endearingly sixties vision of "Cybernetic Urbanism" — that was sweeping America during the post-war era. Fuelled by the availability of main-frame computers and supported by government grants, social scientists were beginning to turn to machines and data as new tools for bringing about public policy changes. And the Community Analysis Bureau, 5 years in the making, was Los Angeles' contribution.

So what happened to the Community Analysis Bureau — and its promise for social change guided by emerging technology?

The value gained in insights from the city's data became the Bureau's own kryptonite. The CAB was so successful at earning state and federal funding grants that the Mayor's Office began repurposing the Bureau's mission, to focus on gathering data to support grant applications.

Within just a few years, the Bureau, who had pioneered a new approach to utilising city data for public good, had morphed from a transformation engine into a justification machine.

By 1977, just one decade after it was founded, the Community Analysis Bureau was folded into the Community Development Department, as the Community Analysis and Planning Division. Three years later, the "Community Analysis" function was officially retired.

The City of Los Angeles wouldn't pick up its smart city program again until December 2013, more than half a century after it first applied for funding for a citywide databank. [1]

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Part 1: Smart City Origins

Contents

2. RISE OF THE MODERN SMART CITY

2008

Today, you can hardly leaf through the technology section of a newspaper, or read an online magazine, without coming across a new 'Smart City' headline. Where just a few years ago the concept of a smart city still felt more like a thought experiment than an aspect of daily life, today the smart city is closing in on near ubiquity.

The question arises: why now?

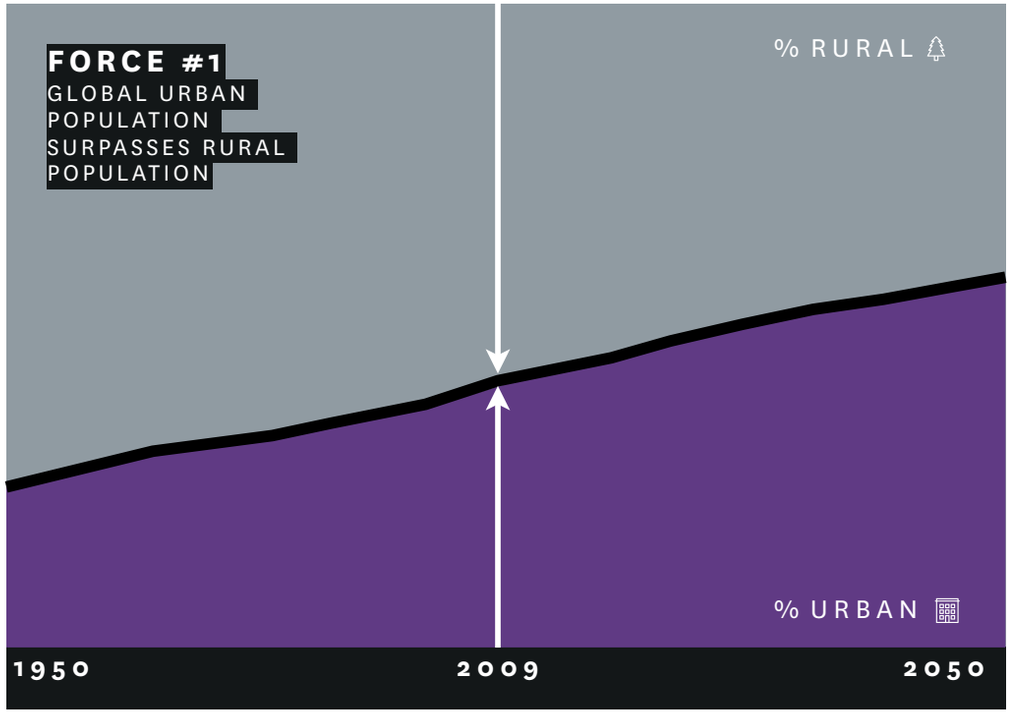
Whispers of the modern smart city movement began as early as 2005, when CISCO accepted a challenge from the Clinton Foundation to apply its technological know-how to make cities more sustainable. Over the next five years, CISCO invested USD $25 million to research the topic, creating the Connected Urban Development Programme and running pilot projects with San Francisco, Amsterdam and Seoul to prove the potential of technology to create positive environmental impact. [4]

But those early whispers became a roar when, in 2008, the forces of society, technology and economy converged to push cities into a profoundly new direction.

FORCE #1 — SOCIETY

For centuries, people have been moving to cities in search of new opportunities, enriched quality of life, deeper connections, increased stability and assured security. That growth has been accelerating: In 1900, just 200 million people lived in cities worldwide. Today, 200 million people live in only the world's twelve most populous cities. And in 2008, the global urbanisation surge reached a tipping point.

In February 2008, UN demographers predicted that, within a year, the total population of city dwellers would match the rural population of the world, for the first time in recorded history. In 2009, the balance irrevocably switched.[6]



As of spring 2009, the balance had irrevocably switched: for the first time in recorded history, more people lived in urban centres than rural areas.

Today, 54.5% of the world's population live in cities. And by 2030, urban areas will be home to 60% of people globally. By 2050, the UN predicts, urban populations will have expanded to nearly 6.5 billion. By 2100, global population could top 10 billion, with cities home to up to 8 billion people.

With urban centres swelling, city planners began looking to new ways to manage and sustain burgeoning populations while continuing to provide the resources, opportunity and security that drew their new citizenry to urban centres in the first place. [6]

For the first time, technology offered a possible solution.

FORCE #2 — TECHNOLOGY

For the first 25 years of the internet, for most people, the freedom of the world wide web could only be experienced while chained by a telephone or ethernet cable. But the rise of cable-free Palm Pilots, Blackberrys and iPhones, connected to the Internet over cellular signals, began slowly tipping the balance until, in 2008, for the first time, the number of Internet users accessing the internet over wireless mobile broadband networks surpassed those accessing the internet over traditional DSL, cable and Fibre Optic lines. [6]

FORCE #2
THE COMING INTERNET OF THINGS

2008: WIFI CONNECTIONS SURPASS LANDLINE FOR THE FIRST TIME

People were accessing the internet on-the-go: posting to social media from the concert venue; writing Yelp reviews as they sat in the restaurant; and sharing photos with their friends as they walked down the street. The simple mobility of the Internet forced everyone to re-think how and when and where city services could be delivered in the newly untethered internet landscape.

But that wasn't the only technology transformation of 2008. While more and more people were detaching themselves from cables, the Internet itself was growing ever more crowded. And not with people — with things. For the first time, in 2008, the number of things connected to the Internet — load sensors, utility meters, taxi cabs, toaster ovens — surpassed the number of people online. By 2013, there were at least 2 things connected to the Internet for every one human's personal device.[6] (Between 2016 and 2020, the number of things connected

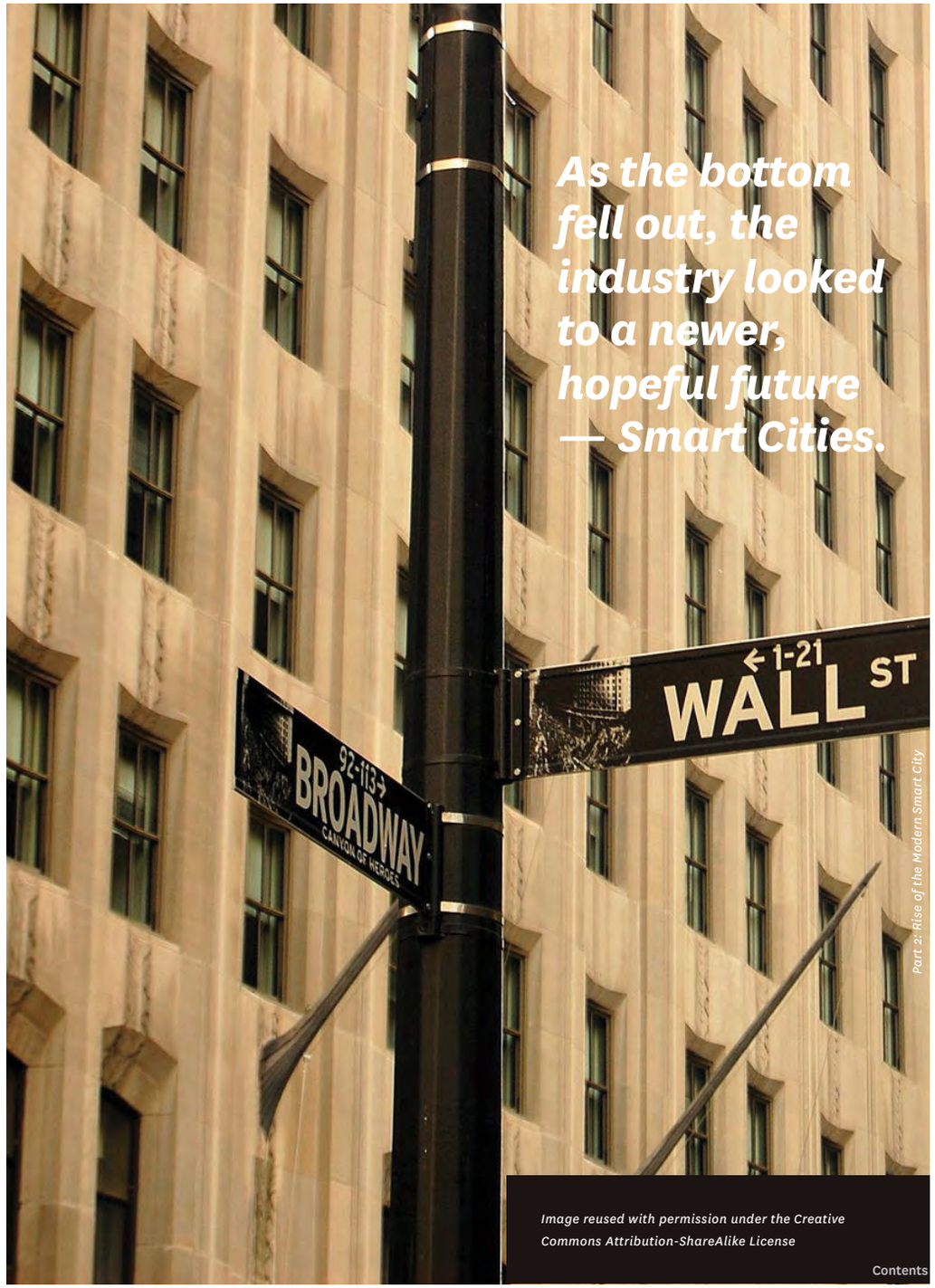
to the Internet is expected to grow more than 200%. [19] Compare that with a stagnating 10% year on year growth-rate for human internet users in 2016.) [18]

Untethered and outnumbered, the Internet of 2008 was fast taking on a whole new role in the city landscape. No longer an "extra channel" or a "nice to have," the Internet began inserting itself in every aspect of city life: social engagement, service delivery and, increasingly, infrastructure management.

The opportunity for city planners was there: but how would they be able to leverage it?

FORCE #3 — ECONOMY

Most people won't remember the social or technological milestones we surpassed in 2008. A different force was wreaking havoc on cities, industries, and in our daily lives: the 2008 financial crisis. With stocks tumbling and credit tightened across the board, multinational corporations slashed budgets and eliminated most non-essential functions. With credit tight or nonexistent, investment in new technology projects dried up. A mentality of "make due with what we've got, and squeeze it to the last drop" pervaded, and sales in the IT industry declined. Intel reported a 20% revenue drop in Q4 2008. By January 2009, IBM announced plans to lay off 4% of its workforce; Microsoft planned to let go of 17% of its employees. [3]



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Part 2: Rise of the Modern Smart City

But even as the major tech giants tightened their belts, a new opportunity emerged. Their customer base, multinational corporations in need of enterprise technology solutions, was falling away. The industry took a bet on a new type of client: cities. [6]

Responding to the 2008 crisis, IBM began re-purposing its sales pitch from multinationals to government clients ready to reinvest their stimulus packages to boost local economies. The same year, IBM launched its Smarter Planet initiative, to investigate the application of connected technologies and intelligence systems — sensors, networks and analytics — to some of the world's most pressing issues. [4]

"Let's seize this opportunity to create more and better jobs, cultivate valuable skills, and not simply repair but prepare our economy for the 21st century."

— SAM PALMISANO. IBM CEO AND CHAIRMAN, 2009 [5]

IBM pioneered its smart city program in Rio de Janeiro, where it set up an experimental emergency response centre that allowed authorities to visualise information collected from a variety of data sources — police, traffic, utilities, weather — and monitor the city in real-time. Using the system, Rio engineers were able to predict landslides as early as 24 hours in advance, and with all emergency service provider data represented on the same platform, plan responses even faster.[4]

Other tech giants — and cities — followed suit. And, driven by social need, technological readiness, and economic stimulus, the modern smart city movement was born.

Part 2: Rise of the Modern Smart City

THE SMART CITY BOOM

The research group IHS identified 21 cities that met their 'Smart City' criteria in 2013, and predict that number will more than quadruple, to 88 smart cities, by 2025.[15] But as cities of all sizes begin adapting smart technologies, more liberal estimates suggest the number of active smart city projects in 2017 approaches 10 times that number. In their 2017 Smart City Tracker report, Navigant Research identifies at least 250 smart city projects in 178 cities worldwide.[8]

The real number of smart city initiatives is likely higher still.

In the United States, 77 mid-sized cities responded to a USD $50,000 Smart City Challenge issued by the Department of Transportation in partnership with Vulcan in February 2016, demonstrating plans to integrate data-driven processes with city infrastructure. The innovation hubs of New York, San Fransisco and Boston routinely rank in the Top 10 of global smart cities. And the Canadian cities of Toronto, Mississauga and Kitchener are also making international smart city headlines. [11] [13]

The smart city movement in Latin America continues to pick up steam. Eight Latin America cities: Santiago, Mexico City, Bogota, Buenos Aires, Rio de Janeiro, Curitiba, Medelin and Montevideo, have advanced smart city projects, according to the Fundacion Pais Digital, a Chilean-based institution for the advancement technology in the areas education, smart cites and digital development. [12]

A study commissioned by the European Union in 2014 to map smart city projects in Europe identified 240 cities from 28 European countries who were implementing or had proposed smart city initiatives.[14] Two years later, in 2016, 36 cities from 12 European countries applied for the 2016 European Capital of Innovation Award, part of Horizon 2020, the EU's research and innovation programme. Amsterdam, Berlin, Eindhoven, Glasgow, Milan, Oxford, Paris, Turin and Vienna were shortlisted — Barcelona won in 2015. European cities have consistently been ranked among the smartest in the world.

Narendra Modi, Prime Minister of India, created a smart city tsunami when, in 2015, he announced the Smart Cities Mission to develop 100 smart cities in India. So far, 60 winning proposals have been selected, impacting a total urban population of 72.2 million people. [17]

Elsewhere in Asia, the Economist Intelligence Unit has identified 18 more Asian, South-east Asian and Asian-Pacific cities actively pursuing smart city projects. [18] And in the Middle East and Africa, research firm Navigant has identified 17 smart city leaders, contenders, challenges and other notable projects from Jordan to Pakistan, Saudi Arabia, the UAE, Qatar, Oman, Kuwait, and Bahrain. [16]

THE SMART CITY BOOM

US & CANADA
83

LATIN AMERICA
8

EUROPE
240

MIDDLE EAST
17

ASIA-PACIFIC
78

ESTIMATES ON THE TOTAL SELF-REPORTED SMART CITY PROJECTS, 2014 - 2016

GLOBAL INCOME FROM SMART TECHNOLOGIES COULD TRIPLE WITHIN THE NEXT 10 YEARS

$27.5BN

POTENTIAL GLOBAL INCOME FROM SMART CITIES

2013
$8.8 BN
GLOBAL SMART CITY INCOME

Source: "Smart Cities: Smart Technologies and Infrastructure for Energy, Water, Mobility, Buildings, and Government: Global Market Analysis and Forecasts," Navigant Research. 2014

ENTICING MARKET POTENTIAL

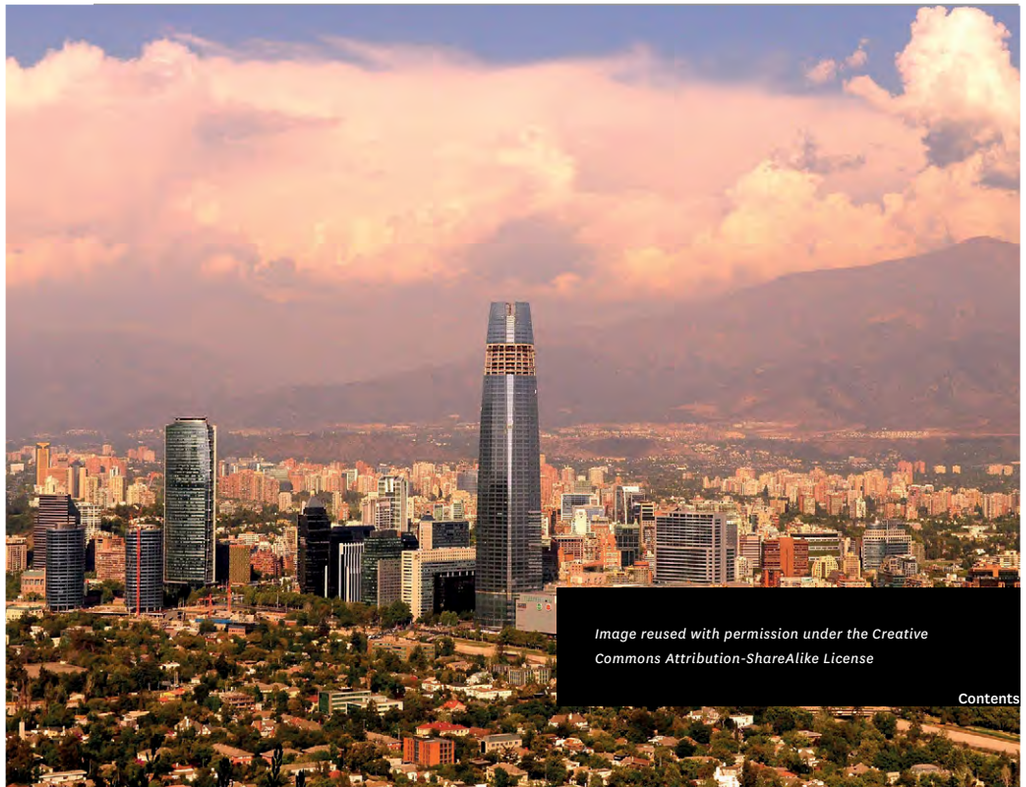
In 2011, in the early days of the boom, the Boulder, Colorado-based firm Pike Research predicted the smart city market would achieve a USD $100 billion value through 2020. Three years later, in 2014, the U.K.government released a its own forecast — for USD $400 billion by 2020.[2]

A June 2015 report from Siemens raised the stakes even higher: the technology giant reported a USD $575 billion market size for smart cities in 2014, and predicted the market could grow as high as USD $1.2 trillion by 2019, with a 19.9% growth rate.[7]

The potential profitability of smart cities is another draw. Navigant research predicts that the global income from smart technologies will triple between 2013 and 2023: growing from USD $8.8 billion to USD $27.5 billion in a ten-year period.[8]

Undoubtably, global cities and the global technology industry are keen to make smart cities a success. But closing in one one decade of smart cities, can anyone say what, exactly, makes a smart city?

"Over the past decade digital technologies have begun to blanket our cities, forming the backbone of a large, intelligent infrastructure. Cities are quickly becoming like computers in open air." —CARLO RATTI. DIRECTOR, MIT SENSEABLE CITY LAB [9]



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3. THE SMART CITY IN 2016

After ten years of investment in smart city programs, there is no global consensus on what defines a smart city, or what a successful smart city would look like. The 2014 European Union report *Mapping Smart Cities in the EU* offers the most complete analysis.

From nine separate definitions by cities, academic institutions, researchers and over government organisations, the authors of the EU study recommended a working definition of a smart city as, "A city seeking to address public issues via ICT-based solutions on the basis of multi-stakeholder, municipally based partnerships."

"A smart city is a city seeking to address public issues via ICT-based solutions on the basis of multi-stakeholder, municipally based partnerships."

DEFINING THE SMART CITY

The same report offered a second definition of the characteristics of a smart city, that "a smart city is quintessentially enabled by the use of technologies (especially ICT) to improve competitiveness and ensure a more sustainable future by symbiotic linkage of networks of people, businesses, technologies, infrastructures, consumption, energy and spaces."

The European Union also identified six axes or dimensions along which a smart city could carry out its mission, "to generate greater and more sustainable economic development and a better quality of life": Smart Economy, Smart Mobility, Smart Environment, Smart People, Smart Living and Smart Governance. [14]

MEASURING THE SMART CITY

The EU's contribution to smart cities is notable, as cities from Singapore to Dubai have adopted the six dimensions as tenants of their own strategy. But, by aligning smart city objectives to the Europe 2020 strategy, the report fell short of offering a globally relevant metric for smart city success.

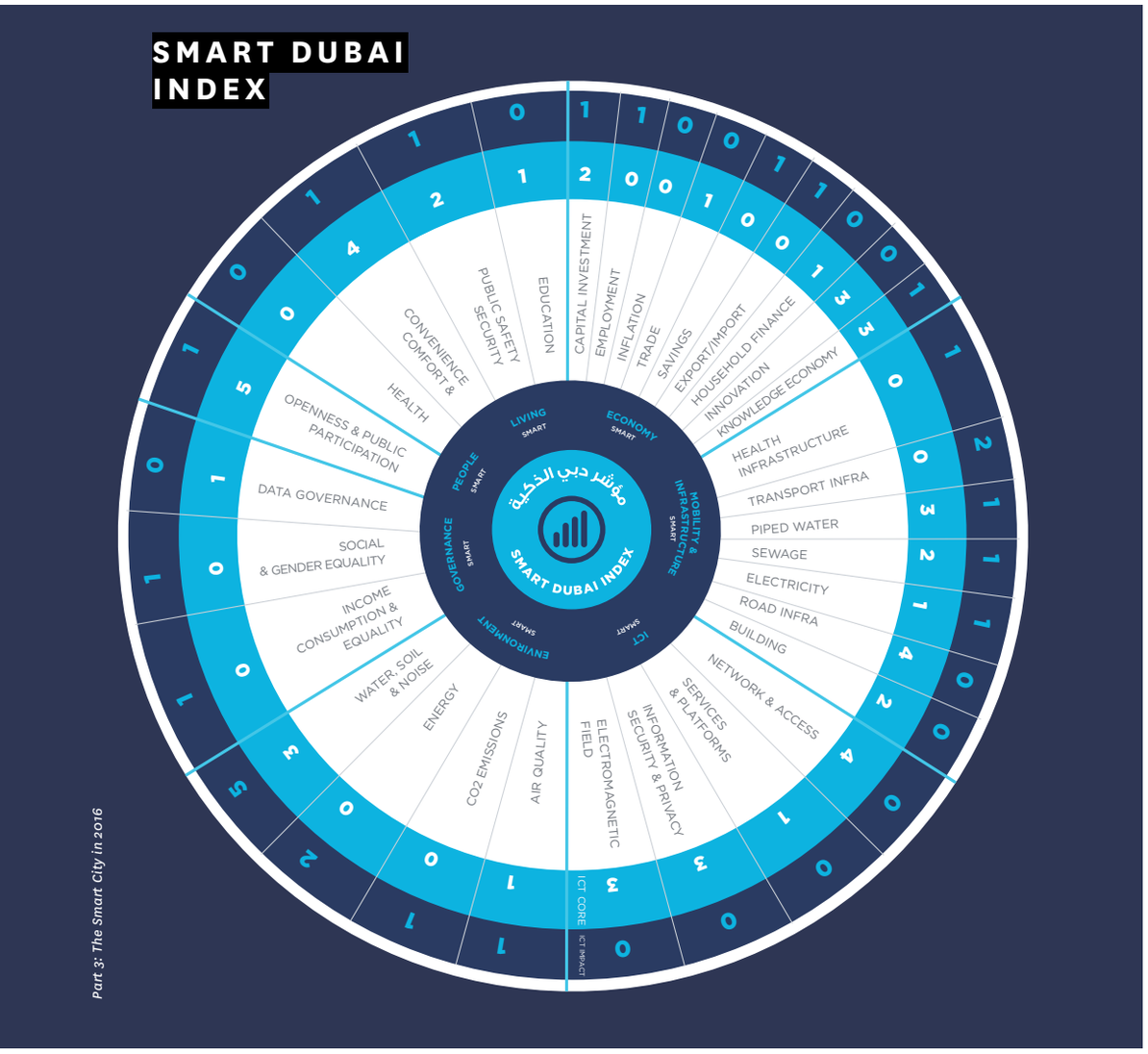
In 2012, urban strategist and author Dr. Boyd Cohen proposed a "wheel" framework to analyse and rank global smart cities against six the six key dimensions defined in the EU mapping report. The mechanism identified 28 indicators for sub-components assigned to each dimension: smart buildings under Smart Environment, online government service availability under Smart Government, creativity under Smart People and so forth. [19] In 2014, Dr. Cohen revised the methodology to include a total of 62 indicators, of which 16 were directly mapped to the ISO sustainable cities standard (ISO 37120).

The Smart City Wheel is popularly accepted, and is the force behind Dr. Cohen's annual "Smartest Cities in the World" report, published by Fast Company.

However, Dr. Cohen himself admits that the methodology, which includes sending an excel sheet to cities and asking them to fill it out, is less than ideal.

But cities and governments have not given up on the ideal of a global smart city standard, and in 2015, Dubai and the International Telecommunications Union (ITU) began work on a new, international smart city index. With Dubai onboard as the first pilot city to evaluate the model — Dubai is unique among smart cities for actively pursuing projects in all six dimensions, and so able to evaluate all indicators — the ITU Focus Group on Smart Sustainable Cities (FG-SSC) and two study groups on "Environment Climate Change and Circular Economy" (ITU-T Study Group 5) and "Internet of Things and Smart Cities and Communities" (ITU-T Study Group 20) completed a set of Key Performance Indicators (KPIs) to assess the impact of the use of ICTs in the sustainability of smart cities. Beginning in May 2015 and continuing through July 2016, Dubai evaluated the effectiveness of the KPIs with the support of 8 government departments actively participating the city's smart initiatives. [20]

Part 3: The Smart City in 2016



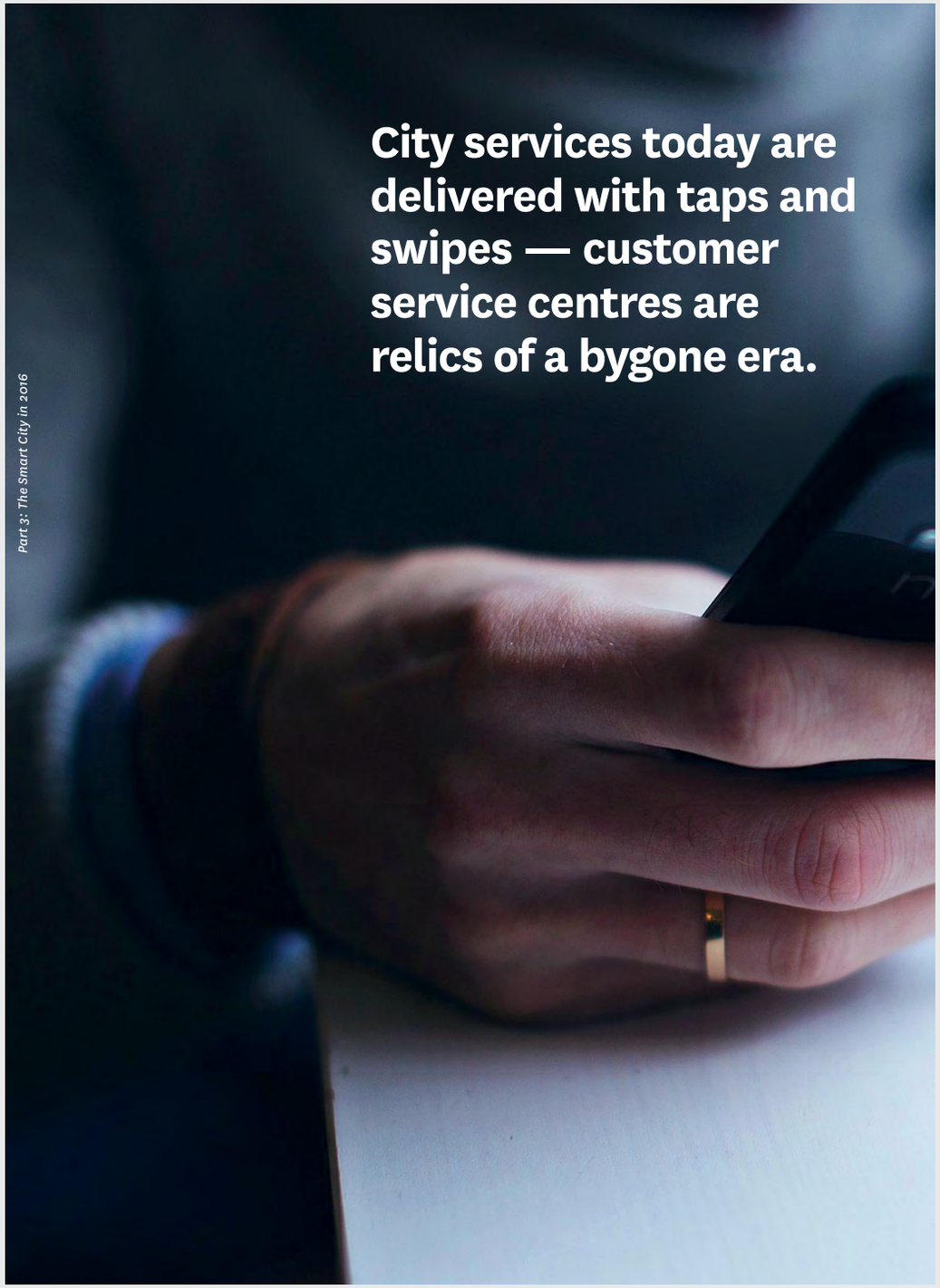
The results of the first year of the pilot program were published in December 2016. The next step of the project will be to refine the KPIs to allow for cities at varying maturity levels to effectively participate in the evaluation. If successful, it will be the first global index to evaluate smart city progress.[20]

PICTURE OF A SMART CITY

In just under a decade of experimentation, a familiar profile of a smart city has developed.

In today's smart city, a new government office has been formed to oversee the smart city program; recruit partnerships; and garner support from city stakeholders and residents. Their closest partners are the local telecommunications regulatory body and local ICT providers. The office is also working closely with the utility, transportation and land departments within the municipality to implement standards for infrastructure interoperability, and to open city data for public access. Where necessary, the office champions new laws and regulations to advance their agenda. The office sets the standards and sometimes defines the requirements for new technology, but installation and commercialisation is overseen by a 3rd party through a public-private partnership model. Although sometimes the management of technology is overseen by an "implementation arm" of the office.

To demonstrate the impact of the smart city and increase public participation, the office also organises or sponsors hackathons and other community-based events to promote innovation with the open data made available by the city.



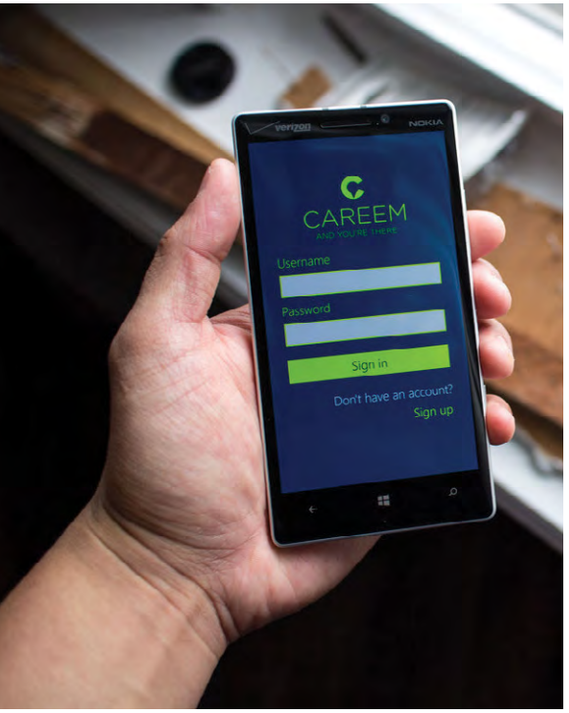
Today's smart city invested early in Internet of Things technology, and is slowly beginning to see benefits. At least one neighbourhood in the city will have smart street lights installed, and studies are underway introduce the lights to more areas of the city. Smart Bins have also been installed in some locations. Emergency responders are now viewing the city through real-time, visual dashboards that are supported by geolocation data. As more shared data sets are made available, their dashboards are becoming more and more powerful. City leaders are excited to see the "City Operating System" taking shape.

City residents have seen an explosion in the number of apps and digital services made available by the government. Most of the larger government departments have released apps for their services, and everything from paying a parking fine to registering a noise complaint can now be done through a smartphone. Slowly, the city is beginning to merge these apps into a single experience, creating a citizen dashboard

Part 3: The Smart City in 2016

powered by the same open data that is pumping value into the visualisation platform for city leaders.

Relationships between the city and the private sector are mixed. Some vendors, mostly the home-grown "entrepreneurship success stories" have been championed by the government, and residents, the business and the city all enjoy the benefits of a fruitful partnership. Other vendors have been left out or blocked from participation by the city. The international technology industry — led by IBM and CISCO — continue to play a significant role in the smart city.



Although the city has been investing heavily in technology, the benefits are not experienced equally. Residents increasingly feel a disconnect when they move from a "smart" experience in the city to a "dumb" one. A resident who has recently moved in the city is able to complete the entire registration process to hook up utility services online, but has to visit a customer service centre to transfer their internet connection. Some sectors are more advanced in the application of smart technology, while others lag behind.

In 2016, stakeholders have moved away from strategy and planning to the implementation, management and operationalisation of the smart city. With the shift in focus comes a shift in strategy, and residents wait to see if, this time, the promise of the smart city will be met.

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Part 3: The Smart City in 2016

4. THE DIGITAL FUTURE

2020

Even as city planners work to operationalise the ICT infrastructure of the past 10 years, the technology that spurred the smart city movement continues to race forward.

THE DAILY 5 MILLION

In 2016, 5.5 million new things are being connected to the Internet every day

INTERNET OF THINGS & CONNECTIVITY

In 2008, the number of things connected to the Internet surpassed the number of people connected through personal devices for the first time. In 2016, 5.5 million new things are being connected to the Internet every day. [21] By 2018, IoT sensors and devices will exceed mobile phones as the largest category of connected devices. [22]

When 50 billion connected devices come online in 2020, they will be transmitting data at speed 1 thousand times faster than today's sensors and devices as 3G networks give way to 4G and LiFi wireless networks.[30]

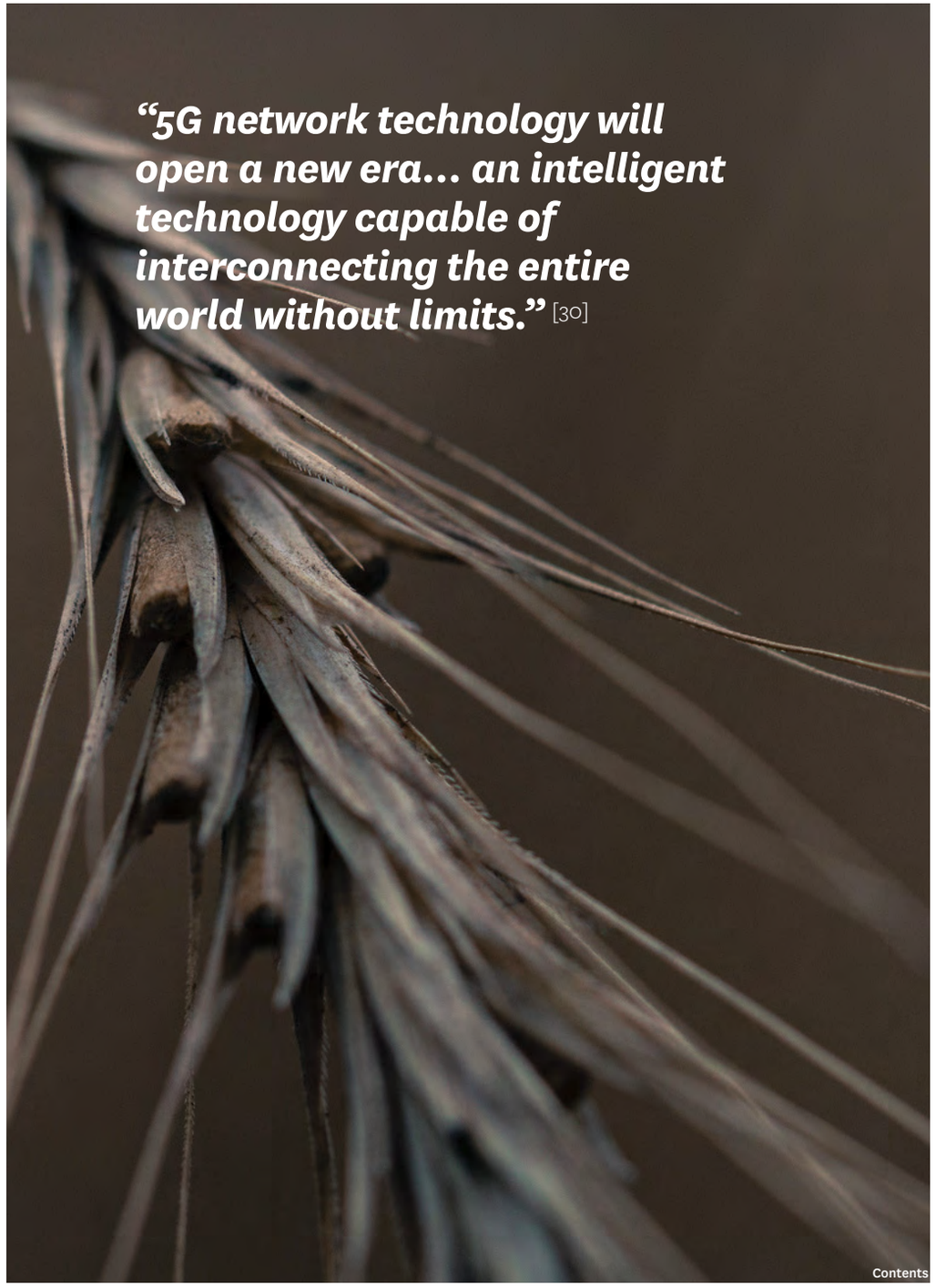
By 2008, the 2G networks that paved the way for early cellphone adoption had been almost entirely replaced by the newer, faster 3G networks. But even as smart cities were busily building apps for the newly-launched App Store, the next generation of wireless communication systems was already taking off.

4G networks were introduced in 2011, and by 2016, 4G signals saw more than 50% availability in 62 of the 70 countries included in Open Signal's annual State of LTE Report. South Korea, the Netherlands and the US enjoy more than 80% 4G availability.[32] With baseline connection speeds of 200 Mbps and speeds reaching 1Gbps, 4G has enabled a significant step forward in Internet-enabled experiences, including IP telephony and HD mobile TV, that are delighting users and facilitating the promise of smart cities.

But there is a new generation of wireless connectivity on the horizon that has the potential to dramatically re-shape how we interact with the Internet.

Reaching by 1 Gbps connection speeds powered by a seamless combination of broadband, LAN, PAN, MAN and WLAN, the 5G networks set to go live in 2020 will be capable of dynamic information access and supporting wearable devices with artificial intelligence capabilities. [30]

If they are ready for it, smart cities will be able to leverage 5G to take the next leap forward towards ubiquitous computing, with simultaneous connections and concurrent data transfers to multiple devices. IOT-connected devices will be able to upload and download information, interact and respond to each other, autonomously.



ARTIFICIAL INTELLIGENCE

5G networks will play an important role in promoting the advancement of the technology that has become a central element to the smart city experience in recent years: Artificial Intelligence.

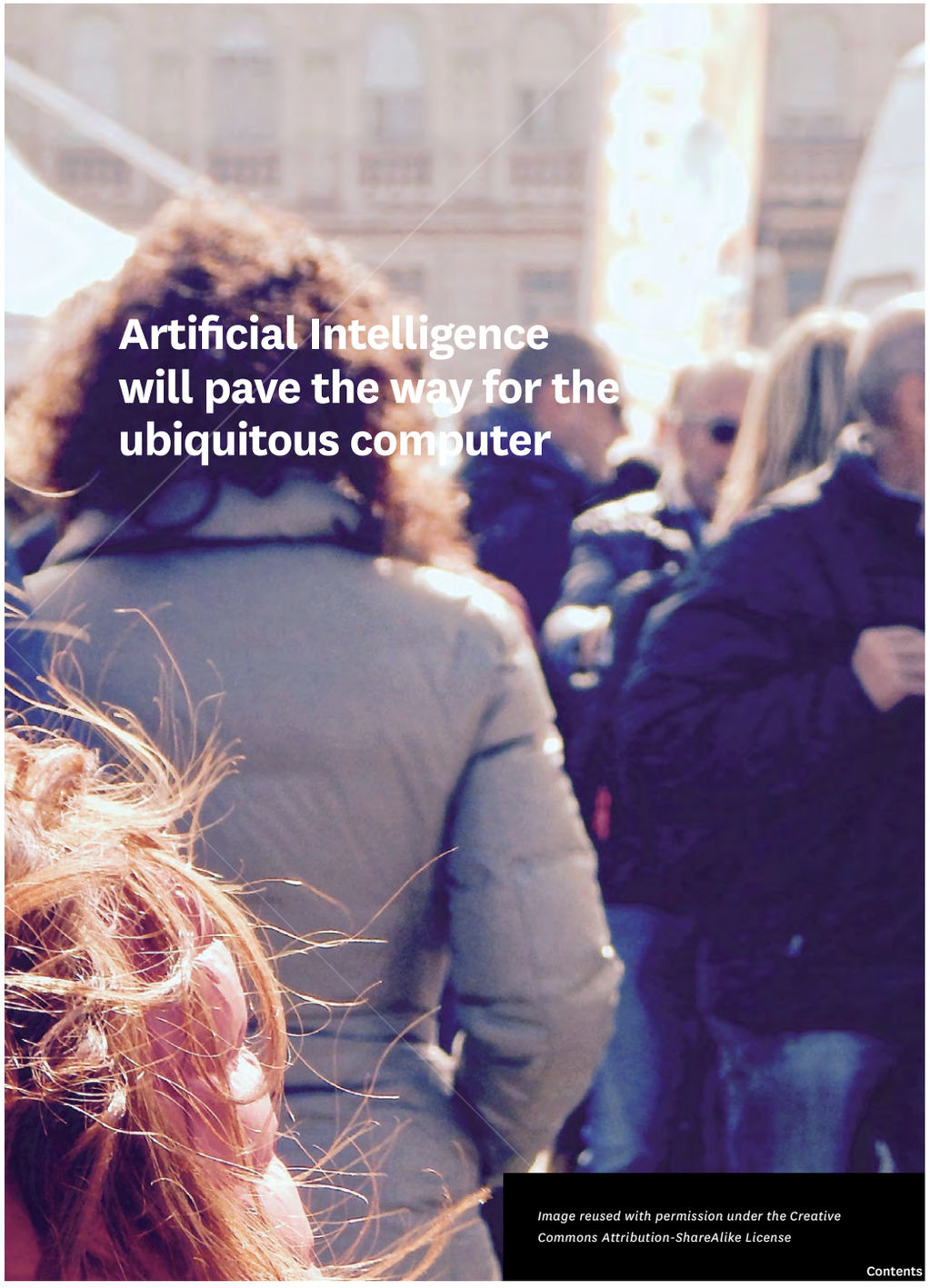
Fuelled by vast volumes of data and faster and faster processing speeds, Artificial Intelligence has accelerated dramatically over the past decade, and interest in machine learning and cognitive computing is peaking.

Annual venture funding for Artificial Intelligence in all sectors exceeded USD $974 million in June of 2016, and is on track reach up to USD $2 billion by the end of the year. Recognising the impact for artificial intelligence for systems and service delivery, cities are joining the funding rush: the AI-based analytics market could reach to USD $70 billion by 2020, a nearly 10-fold increase from USD $8.2 billion in 2013. [33]

Industrial automation and autonomous transportation are huge markets for artificial intelligence, with many smart cities making moves to include autonomous transport in their roadmap. McKinsey reports a potential positive impact to the global economy of USD $1.9 trillion from driverless cars by 2025.[33]

Dubai and Singapore have already announced a strategy to convert a significant percentage of trips to autonomous vehicles in the the next 10 - 15 years. And both cities are actively pursuing Artificial Intelligence projects with impacts in a range of sectors, from city services to healthcare. [23] [24]

As AI enters the mainstream, cities will need to be equipped to confront the technological and social hurdles requiredto make the most of this technology.



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BLOCKCHAIN

Powering these new AI systems will be massive volumes of city data. Robust and secure systems will be needed to facilitate the storage and exchange of data to ensure city systems and process continue to operate smoothly.

Blockchain, the technology behind cryptocurrencies such as Bitcoin, offers a promising new approach to digital transactions that meets city's requirements for a secure, verifiable and indelible record.

Applied to cities, Blockchain technology can be directed to enable the trusted sharing of health records between a patient and his or her doctor. Blockchain can simplify multi-step verification processes, such as the exchange of contracts or title deeds for properties.

Under Dubai's Blockchain Strategy, announced in October 2016, the city aims to move all applicable government transactions onto the blockchain by 2020. His Highness Sheikh Hamdan, the Crown Prince of Dubai, recently declared "in 2021, Dubai government will celebrate its last paper transaction," effectively setting a 5-year deadline for the city to 'go paperless.' The transformation would be powered by the blockchain. [23]

As cities explore new use cases for the technology, legislators will be forced to grapple with the future of Bitcoin as well. On April 1st 2017, Japan enacted the 'Virtual Currency Act,' defining Bitcoin and other cryptocurrencies as a form of payment method, not a legally-recognised currency. Instead, Bitcoin is defined as a taxable asset. Japan's law is among the earliest to formally recognise Bitcoin, and it will be the first of many such new legislations, as cities and countries grapple with new means of transacting digitally, made possible by blockchain. [33]

The move to the digital economy will depend in large part on how flexible cities and countries are in their response to the inevitable disruptions to traditional markets sparked by emerging technologies.

Technology will continue to develop faster than bureaucracy can keep up. The smart cities of today were planned in 2013, or earlier. The smart city ambitions of the early 20-teens are coming online in a vastly different technological landscape.

How can smart cities respond to the changing global technology landscape?

Part 4: The Digital Future

How do today's smart cities adapt to the ever-evolving technology landscape?

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5. THE CITY OF EXPERIENCES

Five out of the 6 major smart city projects we analysed for this report — Dubai, Singapore, New York, Barcelona, London and Vienna — have released revised smart city strategies in the past year.

The updated approaches are not tackling new technology: In fact, to maintain agile and innovative, the smart city elite are moving away from technology. The smart city vision of the next decade is one of experiences.

THE SMART CITY OF THE NEXT DECADE WILL BE DEFINED BY EXPERIENCES.

In Singapore, city leaders are pivoting aware from digital city services — mission complete — and focusing efforts on social services such as healthcare, education and mobility.

To inject innovation and agility into the initiative, Singapore is opening its smart city program to encourage contributions from the general public and the private sector, under the SmartNation's new tagline, "Many smart ideas, one smart nation."

In moving beyond digital city services, Singapore is redefining its vision of a smart city to one where "people are empowered by technology to lead meaningful and fulfilled lives."

New York City, under a new Mayor, is pouring investment into the Internet of Things to create a Smart and Equitable city. Guided by Mayor Bill de Blasio's vision for a "strong and just city," New York's updated smart city strategy will deliver smart initiatives ranging from wireless water meters, to real-time gunshot detection, to snow plow tracking, in an effort to enrich city experiences to all residents and prove "that connected technologies can help improve government services and better the lives of all New Yorkers and communities across the five boroughs."

In 2016, Barcelona announced the next chapter of its digital transformation to "make life better for people."

Absent the pressures of technology proofs, digital blueprints, and initiative roadmaps, a vision that is focused on positive city experiences is giving smart city leaders the flexibility to explore emerging technologies, try and discard new approaches, and change directions when or as needed, towards achieving a goal that everyone in the city can get behind: a better life.

Dubai, who has been steadily investing in developing its knowledge economy since the early 2000's, staked an early claim as a of this new approach to smart cities.

The Smart Dubai initiative, launched by the Ruler of Dubai, His Highness Sheikh Mohammed bin Rashid Al Maktoum, in March of 2014, made a splash in the international smart city arena with a bold new vision: to make Dubai the happiest city on earth.

(Smart city darling Barcelona, in the same period, was operating under a remarkably disconsonant vision, to achieve “many slow cities inside one smart city.”)

Guided for three years now by this unique vision, the Smart Dubai initiative has effectively managed to deliver all the same benefits that most smart city initiatives were promising in the 2013-2014 era: Internet of Things, open data, city platforms, while simultaneously adopting new strategies to deliver emerging technologies well ahead of the curve.

Dubai’s smart city initiative announced a citywide strategy to champion blockchain in October 2016; and in early 2017 announced a similarly comprehensive program to expand artificial intelligence capabilities for services and processes across the city.

Singapore, Barcelona, New York and Dubai represent a new vanguard of smart city programs that have moved beyond ICT technology. For these pioneering cities, the future lies in smarter experiences, not smarter technology.

Part 5: The City of Experiences

THE FUTURE OF SMART CITIES

Half a century ago, at the Community Analysis Bureau in Los Angeles, the first smart city initiative stumbled into obsolesce.

The early promise of the CAB, to harness computational power to uplift standards of living for everyone in city, gave way to bureaucratic accounting, piecemeal demands for new programs and incremental initiatives with little value to show for the effort.

Absent a unifying vision for public good to motivate stakeholders, and left instead with only its technological capabilities, the initiative didn't survive its first decade.

As today's crop of global smart cities confront the 10-year milestone, the route to longevity is clear: to build a resilient smart city, forget about the technology.

Focus on the experience first.

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