Think:Act

navigating complexity

Smart city, smart strategy

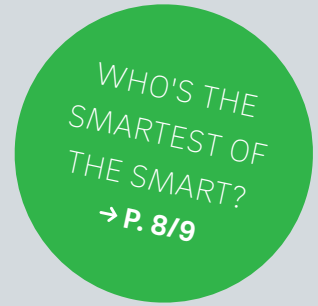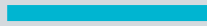Cities around the world are embracing the digital revolution. But how well are they really doing?

Roland Berger

50 years
navigating complexity

THE BIG

3

87

Our groundbreaking Smart City Strategy Index
puts 87 global cities under the spotlight.

Page 4

Top 3

Vienna heads the ranking, with
Chicago and Singapore close behind.

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Key pointers to help cities to get smart.

Page 12

We examined the smart strategies of 87 cities around the globe. The results took us by surprise.

A city with free Wi-Fi in all public spaces. A city where children learn how to program apps in elementary school. Where you can shop online and have your shopping delivered to your home within hours. Where street lighting is provided on demand. A city that uses smart sensors to tell you where to park your vehicle downtown. That knows when your garbage needs to be collected. That has open data access. That uses smart algorithms to coordinate hospital and vaccination capacities. →**A**

A smart city takes action in all of these areas based on a strategic and integrated planning approach and a comprehensive and high quality IT infrastructure. Sounds too good to be true? Different cities already do each of these things today. But no single city exists that ticks all the boxes. For the world's urban centers, a complete set of smart services is not something they currently offer. In many cases it is not even something they are planning to offer in the future.

We know this from our groundbreaking investigation of 87 global cities. This is the first systematic study of cities' smart strategies on such a scale. We took a close look at cities from Europe to Africa, from regional centers of less than half a million to megacities of more than 20 million. We examined their official "smart city strategies" and other strategic policies to discover what they were up to. And we also looked at where they are headed in the coming years and decades.

The results took us by surprise. The "smart city" has been an agenda item for many years now and there is widespread acknowledgment that smart city strategies are of vital importance to the development of urban areas. But the situation on the ground is very patchy. Most cities are simply not taking a broad enough approach: They lack a holistic perspective that covers all parts of society and all relevant facets of urban life.

In this study we look at how cities around the world are embracing the smart revolution – and the multibillion-dollar market it has created. We point out where we believe there is room for improvement and how cities can go about achieving it. Urban centers need to develop an interconnected, integrated approach, one that brings together areas traditionally viewed as separate: energy and mobility, government and health, education and environment, and so on. Their aim must be to forge a holistic smart city strategy that encompasses every area of citizens' lives.

More and more cities are taking a strategic approach to becoming smart. But often they lack connected, end-to-end thinking.

For our Smart City Strategy Index we systematically analyzed 87 urban centers around the globe (see page 14 for details of our approach). In order to capture not just what cities are currently doing on the ground but also what they plan to do in the future, we evaluated their published smart city strategies and other policy papers. We awarded points on the basis of various criteria and calculated an overall score out of 100 for each city – a score of 100 reflecting the utopian city imagined in our introduction.

Of course, we cannot be sure that cities will ultimately realize all of their published plans. Some cities may simply dream bigger than others. But stated policy aims are the best available guide to what cities plan to achieve within a given timeframe. They fairly accurately reflect the extent of their ambition when it comes to making their cities smart. At the same time, importantly, they provide a valuable insight into their approach and mindset.

What did our investigation reveal? First, the good news: More and more cities are taking a strategic ap-
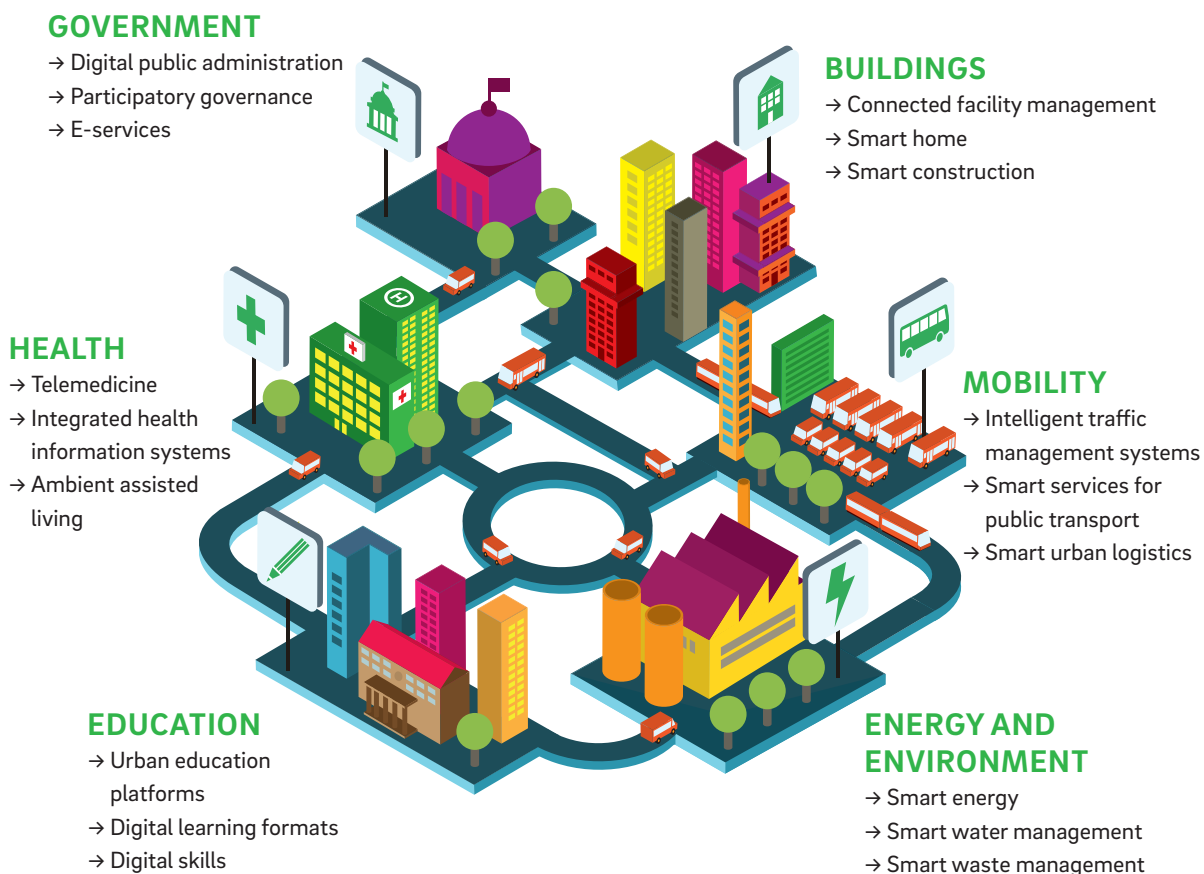
proach to becoming smart – by which we mean an approach based on a properly thought-through program, consisting of integrated actions and carefully planned steps. We identify a strong increase in the number of smart city strategies published each year since 2012. Indeed, more than half of all the smart city strategies publicly available and included in our study were developed since 2014; the average age of their latest version is just under three years. Clearly, cities are waking up to the fact that they need to take action on this front and that citizens want to know what their leaders are doing about the smart revolution.

But equally striking was the patchiness of cities' responses to implementing smart approaches, both digital and non-digital. Our systematic study revealed that most smart city strategies still have room for improvement. The figures speak for themselves: The average score on the Smart City Strategy Index was just 37 out of 100. High performers are thin on the ground, with just 19 of the 87 cities scoring more than 50 out of 100. And a sizeable gap exists between top-performing cit-

A

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THE WHOLE IS GREATER THAN THE SUM OF THE PARTS

An ideal smart city strategy covers six interrelated action fields, comprising a host of subcategories and solutions

GOVERNMENT
→ Digital public administration
→ Participatory governance
→ E-services

BUILDINGS
→ Connected facility management
→ Smart home
→ Smart construction

HEALTH
→ Telemedicine
→ Integrated health
  information systems
→ Ambient assisted
  living

MOBILITY
→ Intelligent traffic
  management systems
→ Smart services for
  public transport
→ Smart urban logistics

EDUCATION
→ Urban education
  platforms
→ Digital learning formats
→ Digital skills

**ENERGY AND
ENVIRONMENT**
→ Smart energy
→ Smart water management
→ Smart waste management

Source: Roland Berger

ies and their peers lower down the ranking, as shown by the sharp fall-off after the top few players.

And that's not all there is to worry about. The quality of cities' published strategies vary not only when taken as a whole but also when we look at each of the three dimensions of the Smart City Strategy Index individually – action fields, strategic planning, and IT infrastructure (see p. 14 for details). Some cities are doing almost nothing in one or other of these areas, and the cities that are doing well in all three areas are few and far between.

When taking a closer look, it becomes obvious that cities' smart strategies are often narrow in scope. They lack a comprehensive approach, tending to emphasize mobility, energy and government topics while neglecting the areas of education, health and buildings.

Of course, digitization is a complex field. Cities need to start somewhere. Digitizing the city transit system, the energy supply and public access to government services is a very good starting point on the road to building a smart city. But cities also need to keep the overall picture in mind. Focusing too heavily on some

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MOST SMART CITY STRATEGIES SHOW ROOM FOR IMPROVEMENT. ONLY 19 CITIES SCORE OVER 50
Results overview: Smart City Strategy Index
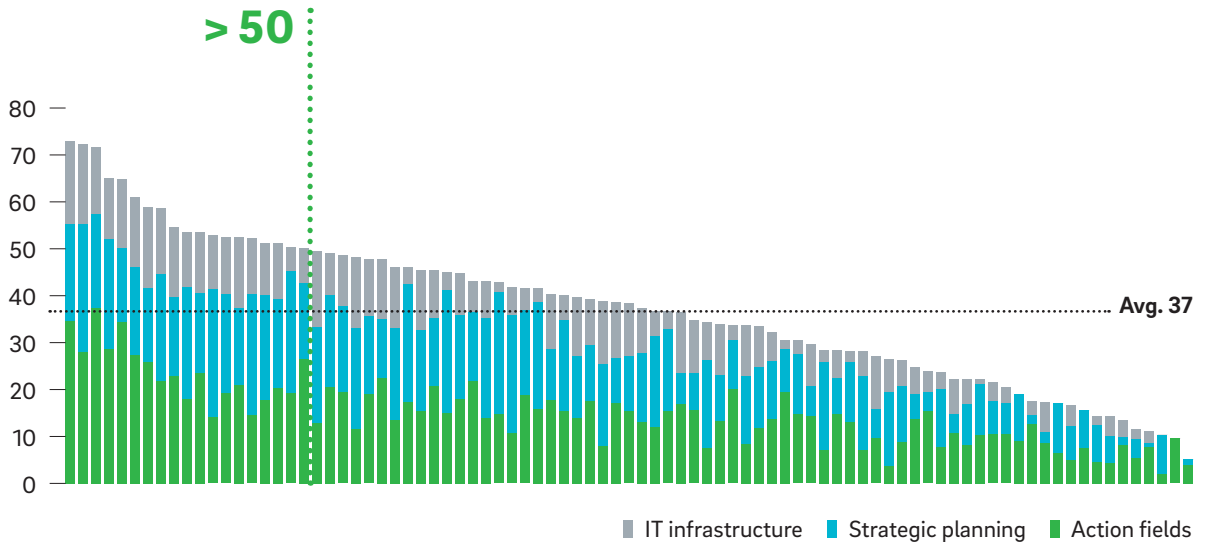
Source: Roland Berger

areas while not addressing others that may be equally or in some cases even more relevant for stakeholders creates an imbalance in the overall strategy. The result is a lopsided approach. →**D**

One key area where cities can improve their smart capabilities is coordination between their different functions. Digitization is a topic that affects all parts of the city administration. Inevitably, this it not easy to coordinate. Our analysis of the smart city strategies published by municipal administrators often revealed a "silo mentality" – a mindset in which the different functions each take their own approach to digitization. For example, a city's energy division will develop a smart approach for its operations, the city transit section its own approach, and so on. The result? A collection of isolated projects.

A solution to this challenge is to set up a central function or office with responsibility for coordinating and cross-linking digitalization activities. Many cities have already appointed a Chief Information Officer or

"CIO" to deal with IT topics. This function needs to be developed into a Chief Digital Officer or "CDO" role – a function that encompasses not only IT issues but also smart city applications, their coordination and deployment. The CIO or CDO should be positioned high up in the hierarchy, close to the mayor.

Our research shows that cities that have appointed a CIO or CDO – Vienna, Amsterdam, and Seoul, for example – reap considerable benefits. Having a central individual or office looking after digitization makes it much easier to coordinate the various smart initiatives in areas such as traffic, health, and education, for instance. Indeed, it is fair to say that the existence of such a function is characteristic of successful smart cities.

In the following section we take a closer look at why some cities are getting it right and others are not. What factors influence their success and what examples of best practice can we identify? On this basis, we then develop a series of key pointers for helping cities develop a comprehensive, end-to-end smart city strategy.

Top-performing cities come in all shapes and sizes. It's not about being big or being rich – it's about being smart.

Which cities are getting it right, and why? Who are the leaders and what can we learn from them? Below, we look at the reasons underlying the widely differing performance of cities in the ranking and try to identify what lies behind their success or otherwise.

Figure C shows the top fifteen cities in the ranking on a world map. For the top three cities, we break down the score further for the three criteria: action fields, strategic planning, and IT infrastructure (rounding to the nearest whole number).

Top of the list is the Austrian capital Vienna, at 73 points out of 100. It is closely followed by Chicago and Singapore, both scoring just one point less, at 72 out of 100. The rankings for the remainder of the top fifteen are given in parentheses on the world map, from London (ranked no. 4),Santander (5), and New York (6), down to Bristol (13), Rio de Janeiro (14), and Seattle (15). **→C**

What is immediately noticeable from the breakdown of points is that high-scoring cities by and large achieve good results for all three criteria. Their strong performance is based on a balanced approach and a clear commitment to all relevant areas. This reflects a degree of end-to-end, holistic thinking behind their strategy.

A closer look at each of the top three cities sheds light on the sort of things that cities are getting right. Vienna, a city of 1.74 million inhabitants, has a well-structured smart city strategy. It also focuses on digitization in other governmental guidelines and directives, such as its strategic land-use plan and its transportation plan. The city lays out clear short-term, medium-term and long-term goals for digitization. Steps include investing in glass fiber and the latest-generation wireless networks while maintaining already highly advanced digital infrastructures. Public services are being comprehensively shifted online and Wi-Fi expanded throughout the city in collaboration with schools, universities, and community colleges. The city actively looks for companies to sponsor smart city activities, with pilot projects run in partnership with ICT companies as showcases for the economy of both the capital and the country as a whole.

Chicago, which comes joint second in the ranking, sets out its vision for the future in *The City of Chicago Technology Plan,* which it describes as "a roadmap to drive Chicago to its aspirations of opportunity, inclusion, engagement, and innovation for all." The 2.7 million-strong city is no stranger to social problems.
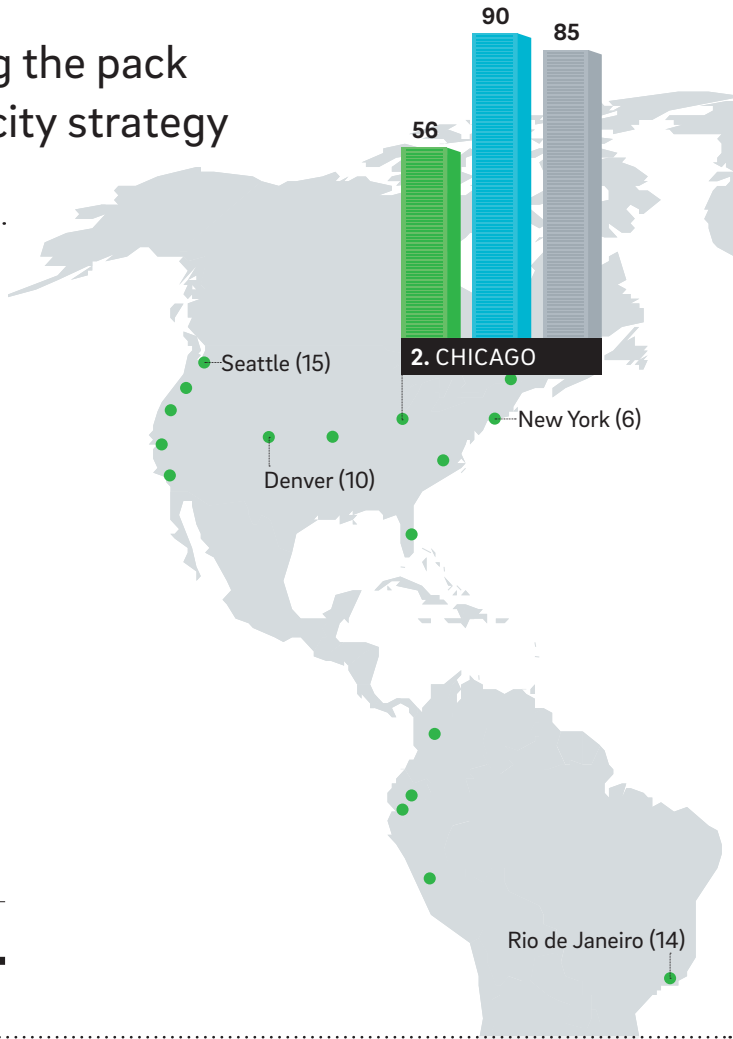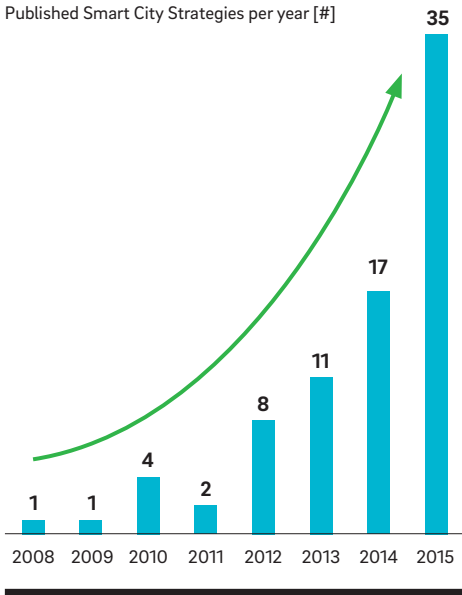
C

THE TOP 3 CITIES ARE ON THREE DIFFERENT CONTINENTS

We show who is leading the pack in terms of their smart city strategy

MORE AND MORE CITIES TAKE A STRATEGIC APPROACH TO BECOMING "SMART" – STRONG DYNAMICS SINCE 2014

Published Smart City Strategies per year [#]

35
17
11
8
4
1   1   2

2008 2009 2010 2011 2012 2013 2014 2015

90
85
56

2. CHICAGO

Seattle (15)
New York (6)
Denver (10)
Rio de Janeiro (14)

TOP 3 BY ACTION FIELD

Cities tend to focus their efforts on one or more areas and rarely excel in all.

GOVERNMENT
Chicago
Cape Town
Stockholm

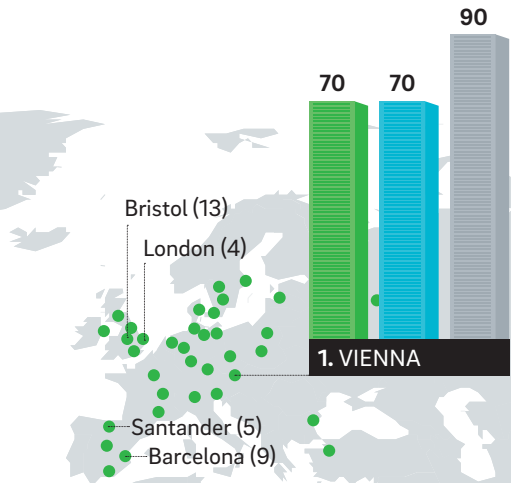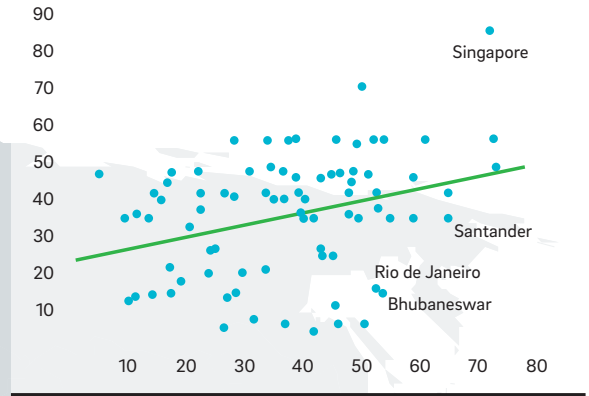**BUILDINGS**
Malmö
Tokyo
Dubai

**IN GENERAL, WEALTHIER CITIES COME UP WITH
BETTER STRATEGIES – BUT EVEN CITIES WITH LOWER
GDP CAN CREATE VERY GOOD STRATEGIES**

Relation of Smart City Strategy Index score to GDP per capita [USD '000]

90

70

70

1. VIENNA

Bristol (13)

London (4)

Santander (5)

Barcelona (9)

in % of maximum
score per category:

🟩 **Action fields**

🟦 **Strategic planning**

⬜ **IT infrastructure**

Singapore

Santander

Rio de Janeiro

Bhubaneswar

Seoul (8)

Tokyo (12)

74

67

70

Hong Kong (11)

3. SINGAPORE

Paramatta (7)

🚌

MOBILITY
Singapore
Lyon
San Francisco

⚡

**ENERGY AND
ENVIRONMENT**
Copenhagen
Santander
Singapore

✏️

EDUCATION
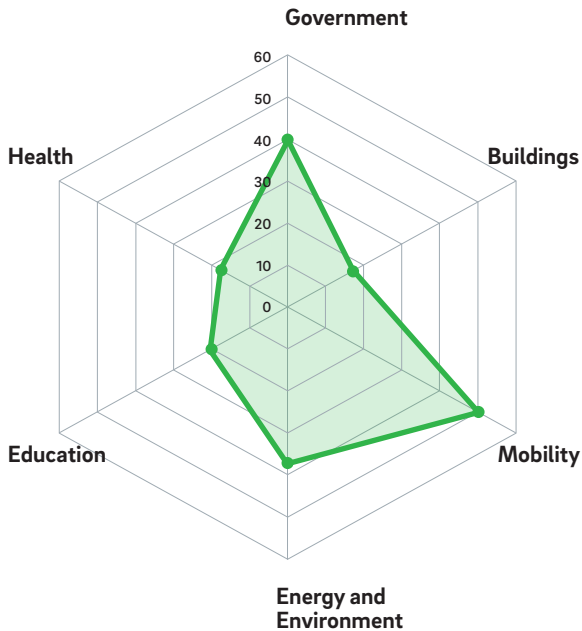Chicago
Vienna
Singapore

➕

HEALTH
Singapore
Vienna
Aarhus

Source: Roland Berger

D

∙∙

FOCUS OF SMART ACTIVITIES
Cities emphasize three areas and neglect three others
[in % of maximum score per category]

Source: Roland Berger

But it boasts a particularly proactive approach to smart education, including improving citizens' digital literacy with training and opportunities for hands-on experience, targeting young people and their use of technology through collaboration with public schools and city colleges, and making educational and creative material available to residents. For example, the city organizes the *Civic Innovation Summer,* a summer jobs program empowering teenagers to "use the latest digital tools to amplify their voices and take positive civic action using open data." Chicago has also established five demonstration sites or neighborhoods to demonstrate digitization in an urban context. Public access to

computers and support is provided by *Connect Chicago,* a network of 250 free-of-charge computer labs and digital skills training centers spread across the city.

Singapore – with 5.4 million inhabitants the largest of the top three cities – shares second place with Chicago. The city is particularly good at forging strong public-public and public-private partnerships in all different action fields. On the public-public side, common platforms bring government bodies together and data is managed by a coordinating arm. A joint laboratory exists with the Land Transport Authority (LTA) to develop a next-generation transportation network, and collaboration with the National Healthcare Group (NHG) is taking place to set up an innovation laboratory for safer treatments. On the public-private side, there is cooperation between government and key stakeholders on every level. For example, joint innovation laboratories have been launched with large corporations, as well as with small and medium-sized enterprises and technology start-ups. Singapore is also working in partnership with top universities around the world, including the Massachusetts Institute of Technology (MIT) and the Swiss Federal Institute of Technology in Zurich, to generate new smart city solutions.

One thing clearly demonstrated by the Index is that top-performing cities come in all shapes and sizes. You don't have to be big to be beautiful – or at least, to be smart. Smaller cities such as Santander (Spain) and Parramatta (Australia) have exemplary, well-balanced strategies despite their size: Both have fewer than 200,000 inhabitants but are in the top ten in the Index. Some of the biggest cities in the index rank in the bottom third of the index.

So, if size doesn't matter, what about money? We made sure that our sample included both wealthy and not so wealthy cities. The results show that, in general, wealthier cities do come up with better strategies: A positive correlation exists between the economic performance of a city and its position in the Index. But being rich is not a prerequisite for success. Some cities with more modest per capita GDPs have also published very good strategies – cities such as Rio de Janeiro in Brazil, and Bhubaneswar, the capital of the state of Odisha in Eastern India.

E

SMART CITY SOLUTIONS – A BLOSSOMING MARKET

Suppliers, too, must avoid the trap of fragmentary thinking

The market for smart city solutions is growing everywhere, driven unstoppably by megatrends such as demographic change, resource scarcity, and climate change. Cities have to make themselves smart to tackle these challenges. It comes as no surprise, then, that the global market for smart city solutions is set to expand by 13% per year over the coming decade, from just under USD 13 billion in 2017 to a forecast USD 28 billion in 2023. Within this overall blossoming of the market, the Asia-Pacific region will see the fastest growth at an average 16% a year, almost quadrupling in size through 2023. Europe will experience more moderate growth at around 13%, while North America and Latin America will see the slowest growth rates at around 11%.
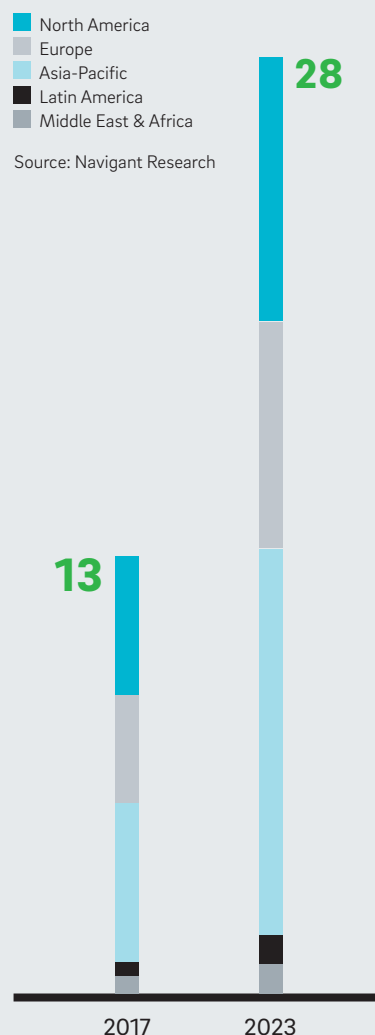
But if companies want to exploit this market potential to the full, they too need to reexamine their strategic approach. Many suppliers are falling into the same trap of fragmentary thinking as cities. Rather than developing comprehensive approaches, they are proposing individual solutions for specific areas of activity based on their existing product portfolios and competencies. What they need instead is to develop a more all-embracing approach, thinking beyond their usual scopes and looking at the interfaces that exist between fields.

Companies of different types have understood that this is an opportunity worth grabbing. The big global players such as Cisco, Siemens, IBM, SAP, and others have launched their own solution packages – the Siemens City Intelligence Platform and IBM's Smarter Cities Program, for example. We are also seeing players from other industries muscling in on the action: energy companies such as innogy (an offshoot of RWE) and EON, real-estate service companies such as CBRE Group and Bilfinger Real Estate, and automotive companies such as Volkswagen, Daimler, and Tesla. A number of innovative start-ups are also helping shape the industry, pouncing on gaps in the product portfolio of larger suppliers to provide solutions to cities – from smart parking and smart urban planning to smart education and digital community solutions.

Government-owned infrastructure and service providers such as local utilities and public transit companies have a special role to play in this context. These players are the ideal operators of smart city solutions as they own the backbone infrastructure within cities. At the same time, they are also the consumers of smart city solutions. Leveraging this dual role, we are currently seeing some players of this type attempting to establish themselves as "smart city platforms" for the communities they serve.

A GREAT OPPORTUNITY FOR SUPPLIERS
Global market size for smart city solutions [USD billion]

- North America
- Europe
- Asia-Pacific
- Latin America
- Middle East & Africa

Source: Navigant Research

28

13

2017   2023

Cities need to develop a comprehensive, end-to-end approach. We identify ten key pointers to help them along the way.

We've seen how cities often take a disjointed approach to smart strategy, focusing heavily on some action areas while neglecting others. But what exactly do we mean when we talk about a comprehensive approach? What would such a strategy entail?

A comprehensive strategy is one that addresses the criteria assessed in the Smart City Strategy Index. For cities, this means looking into all action fields and systematically developing the required underlying IT infrastructure. It also means putting in place a coordinating body and ensuring dedicated budgets. And, critically, it involves exploiting the synergies between action fields by connecting the different services and platforms.

Based on our research, we identify 10 key pointers that can help cities develop a comprehensive, integrated smart city strategy of the type outlined above. These pointers are primarily directed at city officials, that is to say, the individuals drawing up the policies and implementing them. But they are also highly relevant

for city infrastructure operators and the providers of smart city solutions, both big businesses and start-ups. After all, these players need to know and understand the priorities of the marketplace.

1. REEVALUATE THE ROLE OF THE CITY AND ITS ADMINISTRATION

Smart city strategies provide a unique opportunity for reconsidering what exactly the city should offer in terms of services, and what the reach of those services should be. The "city as a service" model is often appropriate – along the lines of "we will contact you when your passport needs renewing" rather than the other way around.

2. INVOLVE CITIZENS AND OTHER STAKEHOLDERS

Before you begin to define your smart city strategy, you must understand the needs of your target group. Getting citizens and other stakeholders from civil society,

NGOs, business, etc. on board right from the start is essential. It enables you to define the added value that your smart city concept should provide to end users.

3. AVOID ISOLATED SOLUTIONS – LOOK BEYOND E-GOVERNMENT AND ACTIVELY APPLY BEST PRACTICES

Many smart city concepts today focus on individual and not integrated solutions. Think about the whole range of action fields in your city and ensure that the interfaces between the different sectors are digital in order to foster cross-sector activities. Actively look for best practices and apply them.

4. ENCOURAGE INITIATIVES, SELF-SUSTAINING BUSINESS MODELS AND OTHER CONTRIBUTIONS FROM THE PRIVATE SECTOR

Businesses increasingly see themselves as both global and local citizens. They are willing to engage in activities that strengthen their local environment and will often invest significantly in them. Draw on this support. Not everything has to be financed from the public pocket – many smart city solutions, such as parking guidance and information (PGI) systems, can be financed by the private sector.

5. CREATE A COMPREHENSIVE DATA STRATEGY AND DATA PLATFORMS

Understand the data you already have, creating data platforms to link existing data structures with each other. Implement an open data policy, proactively making public information available as a basis for a control center and innovative data-based applications.

6. SET UP INNOVATION LABS TO FOSTER AN INSPIRING ECOSYSTEM

Create an ecosystem for innovation and entrepreneurship by providing facilities such as "maker spaces", "living labs", or "business incubators". Importantly, ensure that these facilities have the necessary regulatory room to maneuver. Provide technical and financial support wherever possible.

7. ENSURE DATA SECURITY

Interconnected digital systems come with an increased need for data security. Your smart city strategy should include a cyber-security concept.

8. INVOLVE INFRASTRUCTURE OPERATORS IN DESIGNING, FINANCING AND IMPLEMENTING INITIATIVES

Most major cities own and operate their infrastructure via intermediary companies, such as public utilities, public transit operators, and so on. These players have an important role in designing, financing and implementing smart city concepts. They can also help to develop smart city business models.

9. GAIN POLITICAL BACKING AND INTEGRATE PUBLIC FEEDBACK

Once you have drawn up a smart city strategy, it is important to gain political backing for it. Equally important, however, is inviting citizens and other stakeholders to join in a structured and focused dialog about the strategy to ensure alignment over goals and actions. This could involve the use of participation platforms.

10. ESTABLISH A COORDINATING BODY AND A DEDICATED PLANNING SYSTEM

Put a central authority in place to coordinate the various smart approaches across the city. The job of this body is to plan, monitor, support and evaluate the success of individual initiatives and so avoid a piecemeal approach. Clear, realistic goals, timeframes, and budgets are essential.

To get started along the road to building a comprehensive smart city strategy, we recommend using our free online self-assessment tool (at http://rb.digital/SmartCityStrategyIndex). The tool is simple to use: You enter details about your city and answer a series of questions. The process takes about 30 minutes in total. After completing the self-assessment, you will receive your Smart City Strategy Index score and our team will then provide you with a feedback report outlining a customized smart approach for your city, identifying any possible areas for improvement.

We also offer clients access to our resources in the area of smart city strategies. Working with city planners, infrastructure operators, and providers of solutions gives us a unique perspective. Our clients can also refer to an increasing range of "deep dives" into best-practice solutions from around the world to help them develop or refine their own smart city strategy.

THE SMART CITY STRATEGY INDEX – AT A GLANCE

→ Our investigation covered **87 cities around the globe**, which were selected based on published smart city strategies and other policy papers

→ **Cities were located on all continents**: 39 in Europe, 26 in the Asia-Pacific region, 17 in North, Central and South America, and 5 in the Middle East and Africa

→ **Cities were of all shapes and sizes**: 18 had under half a million inhabitants, 39 had up to 2 million, and 30 had over 2 million

→ We included cities of different **economic strengths**: wealthy cities, e.g. Singapore (GDP per capita of USD 85,209 at purchasing power parity); midfield players, e.g. Barcelona (USD 34,527), Cape Town (USD 13,165), and less wealthy cities, e.g. Bhubaneswar in India (USD 6,020)

→ Evaluation criteria: **action fields** (weighted 50% in final evaluation), **strategic planning** (30%), **IT infrastructure** (20%)

→ **Action fields** refer to the scope of the applications and services that make up the overall smart city strategy. We divided them with equal weighting into six core areas: smart education, smart health, smart government, smart mobility, smart energy, and smart buildings

→ **Strategic planning** refers to the city's ability to execute its smart city strategy. We divided this into implementation plan and schedule (30%), coordination (30%), budget (20%), and target group and stakeholders (20%)

→ **IT infrastructure** refers to the technological basis for the city's smart operations. We looked at the city's IT policy (70%) and Internet connectivity (30%)

→ Each of these criteria consist of a number of **sub-indicators** which are evaluated based on their stated importance in the city strategy, ranging from 1 (not mentioned at all) to 5 (central topic).

→ Using the above weighting, we **calculated a final score out of 100** for each city

→ We then ranked the cities to form the **Smart City Strategy Index**

ABOUT US

Roland Berger, founded in 1967, is the only leading global consultancy of German heritage and European origin. With 2,400 employees working from 34 countries, we have successful operations in all major international markets. Our 50 offices are located in the key global business hubs. The consultancy is an independent partnership owned exclusively by 220 Partners.

FURTHER READING

TREND COMPENDIUM 2030

One of our most popular studies, the Roland Berger Trend Compendium 2030, identifies and analyzes the seven key megatrends that will shape business between now and 2030. Understanding megatrends provides focus and clarity on what's really important in the long run, supporting executives as they seek to cope with future challenges and realize promising business opportunities.

CONNECTED MOBILITY 2025
How tomorrow's passenger transportation will add new value

In the world's 30 biggest megacities, paralyzed traffic flows generate annual costs of more than USD 266 billion. The answer to how to get a grip on the problem of increasing passenger transportation lies with networked mobility. This is the key finding of a study entitled "Connected Mobility 2025" by Roland Berger.

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AND SUGGESTIONS

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