Smart City

Six Steps to Successfully Transform Your City

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Content

Foreword

Armed with the knowledge that city leaders lack a framework to help them drive successful Smart City initiatives, two years ago IMD and Swisscom teamed up to develop the Smart City Piano, as described in our report, "Smart City: Essentials for City Leaders." Since then, we have had the opportunity to discuss and apply the Piano to many projects at different geographical scales, from cities to regions. The experience we gained from these engagements has convinced us to go one step further and produce a second report providing practical advice to city leaders and other stakeholders on how to define, select and implement the most promising Smart City projects. This second report provides a strategic six-step methodology that we have developed based on interviews with city and business leaders, and refined with concrete client projects. In addition, the report offers advice on how to practically apply the Smart City Piano.

Swisscom's mission is to lead the Swiss economy into the digital future, and with it public sector administration. Providing know-how on digital transformation to public sector entities was one of the key motivations behind Swisscom's decision to partner with IMD and embark on the research collaboration that has led to this second report. Considering the growing awareness of city officials, municipal workers, citizens, businesses, etc. with respect to the topic of Smart Cities, the time seems right to share this report.

In 2015 IMD set up the Global Center for Digital Business Transformation in collaboration with Cisco. Since then, it has talked to thousands of executives and mapped out the digital business transformation journeys of hundreds of companies across a wide range of industries. Yet, when it comes to public sector transformation, and in particular the development of Smart Cities and regions, many of the normal private sector rules do not apply. Joining forces with Swisscom has enabled IMD to gain a deeper understanding of the specific dynamics of digital transformation in these contexts.

This second report builds on, and extends, our original work. We have drawn on extensive practical insights to provide broader recommendations to city leaders and other stakeholders currently struggling to transform their cities and regions.

Executive summary

This paper presents research on the transformative and technological urban initiatives referred to as Smart City projects and is targeted at city leaders across the globe who aspire to make their cities "smart."

In the report, we introduce a six-step approach to becoming "smart," including practical examples and valuable insights from city and business leaders who are already active in the Smart City field. We reintroduce the Smart City Piano, first mentioned in "Smart City: Essentials for City Leaders," and incorporate additional success factors for each key of the Piano. Finally, we introduce the Smart City Project Selection Matrix; a decision-making tool to assist city leaders in selecting the Smart City projects with the highest chance of implementation success and the highest potential impact.

Introduction

In our previous report, we provided a concise definition of the term "Smart City" (see sidebar) and identified the four main motivations for cities to engage in projects of this type:

In addition, we presented the Smart City Piano, which defines seven keys that represent the most critical success factors. A city may use the Piano to assess the likelihood of a particular Smart City project's implementation success.[1] In addition to the six-step approach to becoming a Smart City, this report includes an analysis of a city's starting point as well as its ambitions in terms of becoming smart.

Efficiency Benefits

Environmental Objectives

Social Inclusiveness

Increasing a City's Attractiveness

What is a Smart City?
A Smart City is an urban area that has become more efficient and/or more environmentally friendly and/or more socially inclusive through the use of digital technologies. The goal of a Smart City is to improve its attractiveness to citizens and/or businesses by enhancing or adding city services.

Methodology

The six-step approach was developed following 25 one-hour interviews with city leaders across different departments, as well as Smart City product and service suppliers. Our focus was on small and medium-sized cities that were in the midst of Smart City transformation projects.

In addition, we have included insights and drawn conclusions from our extensive experience within the Smart City ecosystem, working with cities, startups, big companies and research entities that are active in the field.
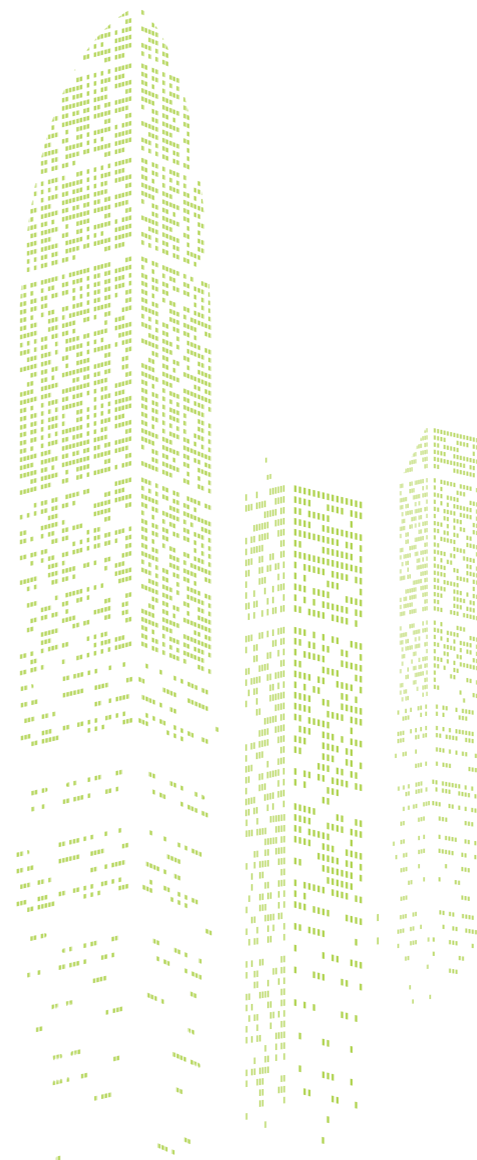
The 25 interviewed cities and enterprises are:

Cities:
Baar
Copenhagen
Louisville (KY)
Lyon
Nice
Pittsburgh (PA)
Singapore
South Bend (IN)
Vevey
Vienna
Zurich

SMEs:
BH Technologies
Breezometer
Gfeller Informatik Ltd
Libelium
Novaccess
Plair SA
Sensity
Siradel
Tvilight

MNEs:
Cisco
IBM
Philips Lighting
Schneider Electric

Six steps to become a Smart City

Our research has unveiled a widespread lack of understanding among stakeholders as to how cities can transform themselves into Smart Cities. Discussions with city leaders, department officials and companies providing Smart City products and services show that there is no shared understanding of how to embark on a Smart City journey. Thus, this report seeks to provide an approach that city leaders can use to effectively make their city "smart." The six necessary steps we have identified are:

Determine your starting point
Develop a clear and objective understanding of the current situation across multiple relevant parameters.

Identify your objectives
Critically identify the objectives behind your decision to embark on a Smart City journey.

Define a set of projects
Identify potential Smart City projects for each objective.

Assess the likelihood of each project's implementation success
For each project identified, assess the success factors for implementation using the Smart City Piano.

Assess the impact of each project
Assess the impact of each Smart City project based on the identified objectives.

Select the most promising projects
Select the most promising projects according to the Smart City Project Selection Matrix.

Determine
your starting point

A city should begin by considering its starting point for becoming a Smart City. In this context, it may be useful to determine a Smart City definition to be used during the process. This will ensure that everyone has the same understanding of the term and that potential projects and initiatives can be classified or identified as such. A city can either choose to use a pre-existing Smart City definition such as the one presented in the introduction, or define their own. Regardless of the option chosen, the definition should be as specific as possible to ensure a broad understanding of the concept.

Once a city has chosen its Smart City definition, it should review initiatives already being undertaken that can be considered "smart." This is important, since it allows a city to build on existing initiatives and capitalize on lessons learned and best practices already established. The importance of determining the appropriate starting point has been reinforced by a number of our respondents.

According to Peter Gfeller, CEO of Gfeller Informatik Ltd., a city should perform a state analysis of what has already been done and assess the level of digitization in each department. Thereafter, the city should look at what other cities have done in the field and how that corresponds with their own initiatives.

Wladimir Boric, Director of Higher Education, Research and New Sectors at Métropole Nice Côte d'Azur, believes that a city must first assess its level of digitization:

"We realized that some of our departments were digitized differently, e.g. the building department was ultra-digitized and was already beginning to develop a centralized control system of energy in buildings. The first thing is to do an analysis of the level of digitization of the territory carried out by specialists, and from there you can set priorities, where you want to develop your city."

Thomas Madreiter, Director of Urban Planning for the City of Vienna, also suggested that the city should consider activities that have already been implemented in the Smart City area, but may not have been identified as "smart." In his words:

"I cannot imagine one Central European city that is not already doing different modules, but has just not considered it under the Smart City label. Based on such an analysis, you can then go for the next steps."

Once a city has developed an inventory of existing smart initiatives, it might be appropriate to benchmark its efforts against other cities to understand where it is in the transformative phase. For instance, it is useful for a city to know where it stands with regard to Smart City readiness compared to its biggest competitors in terms of taxpayers. Simon Kuhn, Head of Networks & Operation at ewz Telecom, explained why the City of Zurich commissioned a Smart City benchmarking study:

"It was important for us to see where we stand today as the benchmark to establish a vision and to motivate other people in the environment."

In addition, cities can take a look at their future Smart City ecosystem to identify key future stakeholders, such as department officials, product and service suppliers, citizen groups and educational institutions. Due to their transformative and innovative nature, cities often have to work with several stakeholders in order to successfully implement a Smart City project. Simon Kuhn feels that it is important to invite a panel of stakeholders at the beginning of the journey to discuss the subject:

"You can feel the pulse of the city. It's not just about listening to city departments, but also to universities or external partners, neighborhood associations, citizen associations, etc."

Identify
your objectives

Once a city knows where it stands in terms of its Smart City maturity, it has to determine where it wants to go by identifying Smart City objectives. According to Alicia Asìn, CEO of Libelium, cities must define the end objectives behind their aspiration to become "smart." Similarly, Jeff Cassis, SVP Global Lighting Systems at Philips Lighting, argues that an important challenge is to reflect on and understand a city's strategy and vision, and then design clear goals and objectives for becoming a Smart City. Jérôme Degryse, CEO of BH Technologies, cited an incident in which city workers were not aligned with the priorities of the politicians, creating major problems during implementation. Wladimir Boric argued that Smart City projects should never be launched without a clear vision of the end goal, since they are often long-term, expensive projects; if the goals are not clear from the onset, the project usually ends badly.

Smart City objectives can be identified by looking at three distinct categories of drivers:

City or departmental strategy

Challenges and problems of a City

City administration, citizen and business needs or experience

City or departmental strategy

Cities can identify Smart City objectives based on pre-existing city or departmental strategies. Indeed, many cities already have specific strategic guidelines in place. The City of Zurich, for example, has a long-term aim to become a "2,000 Watt society," which could be identified as a Smart City objective.[2] Similarly, more specific strategies can be translated into Smart City objectives, such as becoming more environmentally friendly or reducing road traffic. The basis of this approach is to examine current city/departmental strategies and legislation programs and explore their importance for a city. The strategies that are deemed to carry the most weight could be the ones translated into Smart City objectives. Søren Kvist, Chief Advisor, Greater Copenhagen Smart City Solutions, believes that cities should look at the strategies they pursue and topics that are high on the political agenda, and that Smart City objectives should support the overall strategies in place. Simon Kuhn from the City of Zurich agrees that there should be a link between Smart City projects and the strategies and objectives of the city or the respective departments.

Challenges and problems of a City

Another way of identifying Smart City objectives is to take a look at the challenges and problems a city faces. Singapore, for instance, has limited land and a growing population, which creates mobility issues. Such pressing issues can be mitigated through Smart City projects, which is exactly what Singapore has done. For example, it used data analytics to improve the bus riding experience, despite a year-on-year increase in average daily bus ridership, and to reduce average waiting time on popular services.[3][4] Wladimir Boric explained that it is important to be able to analyze a city's weak points, which can then be mitigated or resolved through Smart City projects. Scott Ford, former Executive Director, Department of Community Investment in the City of South Bend, affirmed that the goal of becoming a Smart City is about repositioning your community as a resource for problem solving, looking at the city itself as a laboratory where innovative policy solutions can be piloted to address the most urgent problems.

City administration, citizen and business needs or experience

Finally, a city should look at the needs and experiences of its city administration, citizens and businesses to identify Smart City objectives, since their perceptions may be entirely different than those of the city leaders. For instance, the City of Nice in France engages on a regular basis with its citizens in workshops to better understand and register needs, experiences and feedback on planned projects. Interviews with key citizens or businesses, or the issuing of questionnaires to interested citizens should also be considered as a means of gathering feedback.

Research within the city or polling for favorites from a candidate project list will not only help identify needs among the population but also increase citizen engagement. Debra Lam, former Chief Innovation & Performance Officer in the City of Pittsburgh, believes that cities need to do some homework on what has already been done and communicate with stakeholders about what needs there actually are.

By using these approaches, a city should be able to identify a set of Smart City objectives to underpin their rationale for engagement in particular projects.
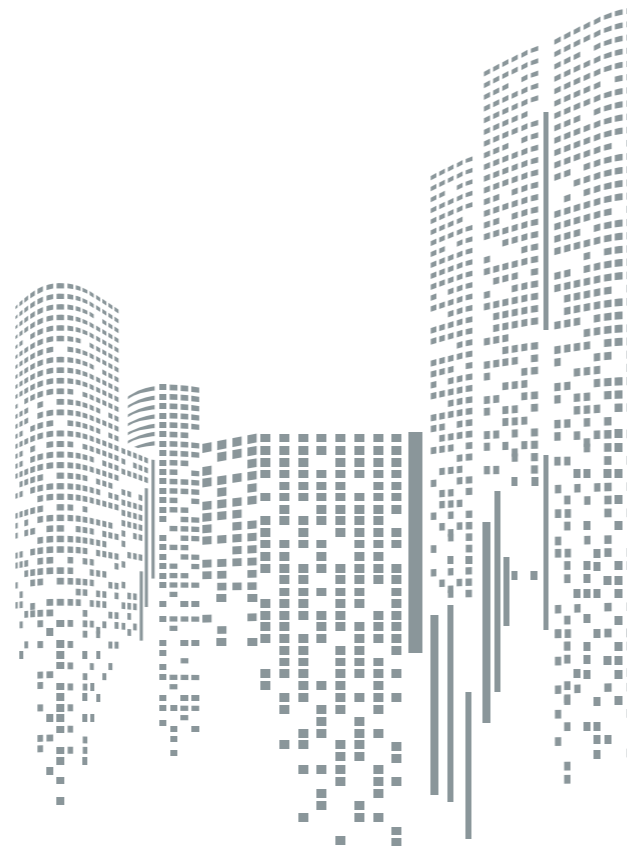
Example:
City of Vienna

The City of Vienna's "Smart City Vienna Framework Strategy" has identified three key objectives that it seeks to achieve by the year 2050:

1. Radical resource preservation

2. Development and productive use of innovations/new technologies

3. High and socially balanced quality of living.

For each key objective, the City has pinpointed a number of sub-objectives within each specific area. For instance, for "radical resource preservation," the following sub-objectives have been identified in the "Energy" area:

- Increase energy efficiency and decrease final energy consumption per capita in Vienna by 40% by 2050 (compared to 2005).

- Simultaneous reduction of the per-capita primary energy input from 3,000 watt to 2,000 watt.

- In 2030, over 20%, and in 2050, 50% of Vienna's gross energy consumption will originate from renewable sources.[5]

Define
a set of projects

Once a city has identified a set of Smart City objectives, it should develop project briefs that target one or more of the objectives. This can be done through an in-depth exploration of how it can achieve each objective. In terms of defining Smart City projects, the key question is how they can achieve a specific objective. For instance, if "reduce total electricity consumption by 10% by 2030" has been defined as a Smart City objective, the city must identify electricity consumption sources and patterns. Once an in-depth analysis has been completed, the city can consider what projects can be implemented to reduce that consumption. Another example could be to "reduce total yearly traffic congestion time" by a specific number of hours. The city would have to analyze what the causes of traffic congestion are, and how they might be mitigated or resolved. Identifying Smart City projects that reduce traffic congestion would be the end result. The idea is that for each general objective, there should be an analysis of which digital technologies are most suitable. Each technological solution will then be a Smart City project on its own.

If the objectives are fairly broad, not all candidate projects will necessarily be "smart," since the presented framework can be used for assessing both "smart" and "non-smart" projects. For example, a project to build new roads might be proposed in response to "reduce traffic congestion," which is a suitable solution, but not necessarily a "smart" solution.

In order to "reduce traffic congestion," the city in the example could thus identify smart traffic management, smart parking and car sharing as possible projects.

Identifying viable candidate projects is not easy, especially given that the implementation of Smart City projects is a relatively new concept. Nevertheless, inspiration for projects can be found externally by:

- Investigating what peer cities are doing in the field. Chances are high that other cities are facing similar problems and some may already have started Smart City projects to resolve them.
- Engaging with Smart City forums and conferences, which are growing in number around the world. Nice, Barcelona and Vienna, for instance, all host Smart City events.
- Cooperating with local universities and other research institutions on the forefront of Smart City research.
- Seeking input from companies already engaged in the field, many of which have dedicated Smart City teams that can offer advice and consultancy as well as design, specification, and implementation partnerships.

In addition to external inspiration for Smart City projects, cities can also encourage input from within, either from departments or citizens. Workshops can be organized to take advantage of the creativity and ingenuity of key stakeholders to come up with new "smart" solutions to old problems.

Identifying viable Smart City projects:

External sources:
> **Investigate what peer cities are doing**
> **Engage with Smart City forums and conferences**
> **Cooperate with local universities and other research institutions**
> **Seek input from companies already engaged in the field**

Internal resources:
> **Encourage input from within the city, either from departments or citizens**
> **Host workshops with key stakeholders**

Assess the likelihood of a project's implementation success

Once a set of candidate projects that target a city's Smart objectives has been identified, the next step is to formally assess the likelihood of successful implementation using the Smart City Piano presented in the paper "Smart City: Essentials for City Leaders."

The Smart City Piano

To help cities implement Smart City projects, we have developed the Smart City Piano, which defines seven keys that structure what a city needs to do to implement a Smart City project. For each of the seven keys, we have identified a number of different factors that will impact the implementation success of a potential Smart City project. Because many of the Piano keys are closely interrelated and chronologically dependent, the seven keys are grouped into three different categories that logically follow each other in sequence, so that they can be played as "chords."

The goal of a Smart City project implementation success assessment is to evaluate different projects with the help of the Smart City Piano and rank them in terms of a success score. The projects with the highest success score are the ones for which implementation is most likely to succeed.

ASSESSING THE POTENTIAL

PREPARING THE GROUNDWORK

MANAGING THE EXECUTION

TECHNOLOGY/ INFRASTRUCTURE

BUSINESS CASE

POLITICS

REGULATIONS

GOVERNANCE/ ORGANIZATIONAL STRUCTURE

PEOPLE SKILLS

SOFT/CULTURAL FACTORS

The implementation success assessment requires two steps:

1. **Identify the success factors for each Smart City Piano key**

2. **Assess each project and calculate its implementation success score.**

Identify the success factors for each Smart City Piano key

A city has to first identify the success factors that apply to its specific situation and context for each Smart City Piano key. In our previous paper, we defined success factors as those "that will impact the implementation success of a potential Smart City project." City leaders therefore need to examine which success factors have a real influence on the implementation success of Smart projects in their cities.

We present a representative list of success factors in the Appendix. This list is not exhaustive. Individual cities may identify crucial success factors that are not on the list, since every city has a different starting point and different success criteria. However, interviews conducted with specialists who are active in the field lead us to conclude that these success factors are highly relevant when assessing the implementation success of Smart City projects.

Assess each project and evaluate its implementation success score

In a second step, the city has to assess each project according to the previously identified success factors by analyzing how each success factor influences the implementation success of the project. Once all the success factors have been assessed for a project, the results should be aggregated for each Smart City Piano key. This will give the city an indication of how each key contributes to the overall implementation success of the project in question. Finally, the city can evaluate the likelihood of successful implementation for the project by aggregating all the success factors. The total score should be compared to that of other Smart City projects to identify the project with the highest chance of successful implementation.

It may be useful to involve all relevant stakeholders in workshops to jointly identify and agree on these success factors. This will ensure that all relevant viewpoints are taken into consideration.

Example:
Smart City Project "Mobility Observatory" in Pully, Switzerland

Challenged by the amount of traffic flowing through its town center, the town of Pully decided to work with Swisscom to create the "Mobility Observatory" project. This project uses aggregated and anonymized mobile phone data to analyze mobility patterns within the town, seeking to optimize traffic flows and better plan future infrastructure investments. To assess the implementation success of this project, the success factors for each Smart City Piano key were identified and selected. In this case, all the success factors listed in the Appendix were selected for assessment. Each success factor was analyzed in relation to the way it affected the implementation success of the specific project. For instance, the "Technology/infrastructure testing" success factor affected the implementation success positively, because the technology used could easily be tested within the municipality since the project was mainly software based. Once all the success factors had been evaluated, they were aggregated across the Piano, which provided a total project implementation success assessment score.

Smart City Piano:
Pully's "Mobility Observatory" project
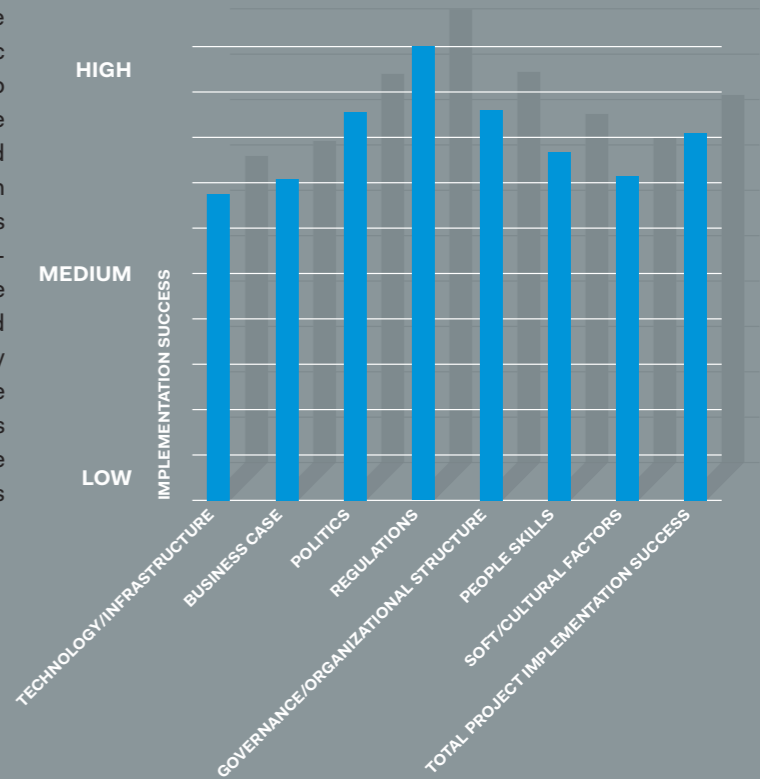
Assess
the impact
of each project

Once the implementation success of individual projects has been evaluated, the next step is to identify the impact that the projects will have on the Smart City objectives. The projects with the highest impact are the ones that are most attractive for implementation.

The impact assessment is a two-step process:

1. **Prioritize the Smart City objectives**

2. **Assess each project and calculate its total impact.**

Prioritize the Smart City objectives

First, a city has to prioritize the identified Smart City objectives by allocating a weight to each objective depending on its relative importance for the city.

## Assess each project and calculate its impact

Second, key city stakeholders must assess the impact of each project on each objective. Once this has been done, cities can compute the total impact a project has on the Smart City objectives.

Example continued:
Smart City Project "Mobility Observatory" in Pully, Switzerland

In its municipal legislature program for the 2011-2016 period, Pully identified two main priority objectives: "increase city center attractiveness" and "housing policy."[6] Based on the first objective, the municipality launched the "Mobility Observatory" project in conjunction with Swisscom. The graph below shows an impact assessment of the project on the two objectives, the weighting of each objective and the total project impact.

Impact assessment:
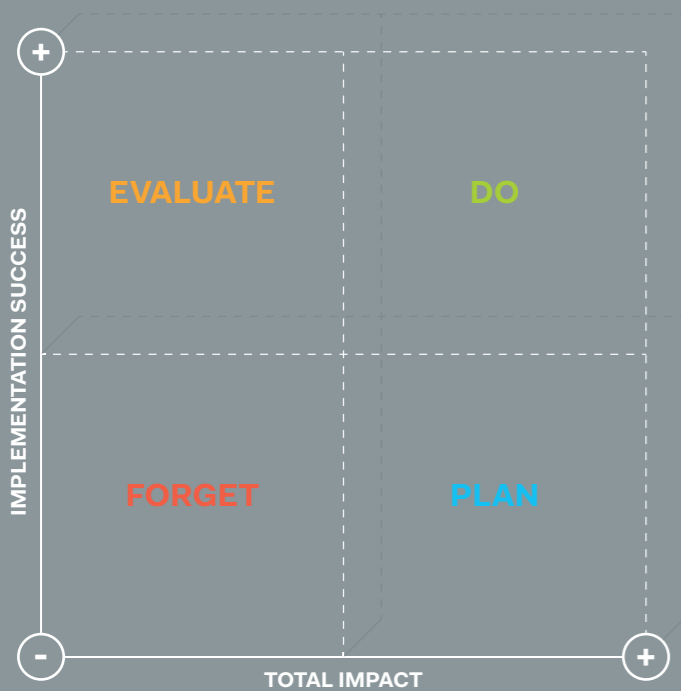**Pully's "Mobility Observatory" project**
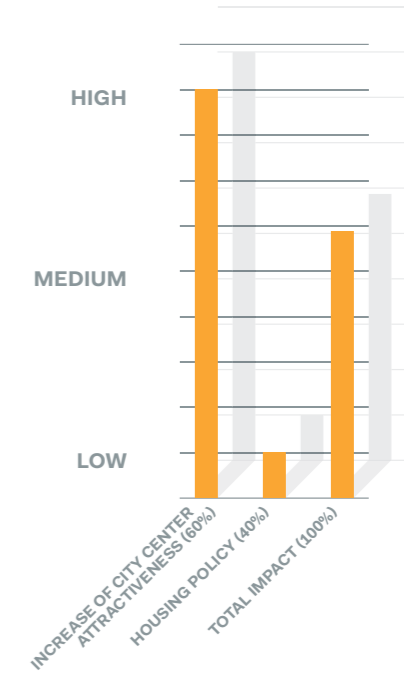
Select the most promising projects

Once a city has determined the likely implementation success and impact of its Smart City projects, it is ready to select the most promising projects for implementation. To help cities select Smart City projects, we have developed a tool called the "Smart City Project Selection Matrix":

The Smart City Project Selection Matrix combines the implementation success with the impact evaluation of Smart City projects and serves as a decision-making tool to facilitate the selection of projects that a city wants to implement. Projects are placed in the matrix according to the implementation success and impact assessments already conducted. Those that are most attractive for implementation are located in the top right "do" quadrant. These projects have the highest chance of implementation success and the highest total impact for a city and should, therefore, be chosen for implementation. Although projects in the "evaluate" quadrant have a high chance of implementation success, their total impact is low. City leaders need to evaluate which of these projects have a high enough impact and are therefore worth implementing. Conversely, projects in the "plan" quadrant have a high project impact, but their implementation success is low. These projects should not be implemented until their chance of success is sufficiently high. This could happen as a result of technological innovation or any change relating to the other six Smart City Piano keys that renders the projects more feasible. Projects in the "forget" quadrant have a low implementation success chance and a low project impact and should not therefore be implemented.

Example continued:
Smart City Project "Mobility Observatory" in Pully, Switzerland

By combining the implementation success and impact assessment of Pully's "Mobility Observatory" project and depicting the results on the Smart City Project Selection Matrix, the project is obviously located in the "do" quadrant and should, therefore, be considered for implementation:

Once projects are selected for implementation, start small: Our research shows that starting small with a proof of concept, followed by prototyping and piloting is more beneficial than immediately rolling out a project citywide. By making small steps, a city is able to test elements such as whether the new technology works with old technologies, etc. Hervé Dedieu, CEO of Novaccess, feels that cities need to understand what happens with the old technology and how to integrate new technologies, which is why the proof of concept is so important. Likewise, Chintan Shah, CEO of Tvilight, mentioned that cities could start with a pilot or learn from the neighbouring cities that have already implemented the solution, because it offers opportunity to become familiar with new technologies. Additionally, a prototype can be used to validate the assumptions made in the implementation success and impact assessment.

Interviewees repeatedly stated that Smart City projects must be closely monitored. Thomas Madreiter from the City of Vienna argues that monitoring is essential from the beginning, because what you cannot measure you cannot control. For that purpose, the city of Vienna uses a set of core indicators that include status, target and policy indicators. The International Telecom Union (ITU), which is an agency of the United Nations and assists in the development of worldwide technical standards, has created a set of key performance indicators (KPIs) for smart and sustainable cities in collaboration with the United Nations Economic Commission for Europe. Cities can use ITU's KPIs to assess how well they have accomplished their Smart City objectives by setting up Smart City projects, and to steer and control the projects that are currently being introduced.[7][8] The City of Dubai, which aims to become the happiest and smartest city in the world, is currently piloting ITU's KPIs for smart and sustainable cities to assess city progress and inform about urban development policies.[9][10]

Conclusion

Our research has shown that cities lack the practical know-how to turn themselves into Smart Cities. In this paper, we have presented a strategic six-step methodology to identify and select Smart City projects to improve the odds of successful implementation and start the journey to become "smart."

With the help of this methodology, cities can transform themselves by identifying and selecting the Smart City projects that have the highest chance of implementation success and the highest impact. This procedure ensures that cities can focus their resources on the most promising projects, reducing possible project failure and keeping their opportunity costs as low as possible.

The Smart City Piano and the Smart City Project Selection Matrix play a key role in our six-step approach to becoming a Smart City. The Smart City Piano helps cities structure the success factors that influence the implementation success of a Smart City project. Meanwhile, the Smart City Project Selection Matrix assists city leaders in selecting the projects that have the highest chance of implementation success and the highest impact.

While the process may appear challenging, consider the words of Ted Smith of the City of Louisville: "Resources – time, money, people, etc. – are precious in a city. You can't ever get them back. You have to minimize your possible losses by selecting the right projects for implementation. That stage is really, really important. Not all projects can be implemented with success."

Appendix

City	Name of interviewee	Interviewee position
Baar, Switzerland	Paul Langenegger	Vice-Mayor, Director of Construction at the City of Baar
Copenhagen, Denmark	Søren Kvist	Chief Advisor, Greater Copenhagen Smart City Solutions
Louisville (KY), US	Ted Smith	Chief Innovation Officer at the City of Louisville and Executive Director at the Institute for Healthy Air, Water, and Soil
Lyon, France	Diana Diziain	Director at AFILOG; former Freight & Logistics Project Manager at Lyon Metropolis
Nice, France	Wladimir Boric	Director of Higher Education, Research and New Sectors at Métropole Nice Côte d'Azur
Pittsburgh (PA), US	Debra Lam	Managing Director, Smart Cities and Inclusive Innovation at Georgia Institute of Technology; former Chief Innovation & Performance Officer at the City of Pittsburgh
Singapore	Robert De Souza	Executive Director / CEO at The Logistics Institute – Asia Pacific
South Bend (IN), US	Scott Ford	Executive Vice President, Operations & Finance at Bradley Company; former Executive Director, Department of Community Investment at the City of South Bend
Vevey, Switzerland	Daniel Gnerre	Head of Geographic Information System at the City of Vevey, Vice President of ASIT VD
Vienna, Austria	Thomas Madreiter	Director of Planning at the City of Vienna
Zurich, Switzerland	Simon Kuhn	Head of Networks & Operation at ewz Telecom

SME	Name of interviewee	Interviewee position
BH Technologies	Jérôme Degryse	Chief Executive Officer
Breezometer	Ziv Lautman	Co-Founder & Chief Marketing Officer
Gfeller Informatik Inc.	Peter Gfeller	Owner & Chief Executive Officer
Libelium	Alicia Asin	Co-Founder & Chief Executive Officer
Novacess	Hervé Dedieu	Chief Executive Officer
Plair SA	Svetlana Afonina	Co-Founder & Chief Marketing Officer
Sensity Systems (a Verizon company)	Sean Harrington	Vice President, City Solutions at Verizon
Siradel	Yves Lostanlen	Chief Executive Officer of SIRADEL North America
Tvilight	Chintan Shah	Chief Executive Officer

MNE	Name of interviewee	Interviewee position
Cisco	Robert Pepper	Global Connectivity and Technology Policy at Facebook; former Vice President, Global Technology Policy
IBM	Alexey Ershov	Vice President at IBM Watson Internet of Things; former Vice President, Smarter Cities Europe
IBM	Nicola Villa	Executive Partner and European Leader, Internet of Things
Philips Lighting	Jeff Cassis	SVP Global Lighting Systems
Schneider Electric	Mike Hughes	Executive Vice President. Segments and Strategic Customers

Smart City Piano: Success Factors

Technology/Infrastructure

- Maturity of the technology/infrastructure used in the project. Is it mature and tested or immature and under development?
- Compatibility of the new technology/infrastructure with existing technology/infrastructure.
- Ease of testing the new technology/infrastructure on a small scale, for instance with a pilot.
- Importance of technology/infrastructure/data security in a project for the city.
- Ability to use existing technology/infrastructure for the project.
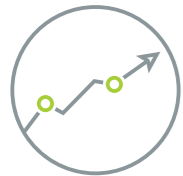
Business Case

- Net present value or internal rate of return of a project.
- Likelihood of being able to finance the project.
- Ability to allocate the costs of a project proportionally according to the benefits to the respective entities.
- Ability to share costs across different projects for use of the same technology/infrastructure.

Politics

- Scope of political support or resistance for the project.
- Scope of support for or resistance to the project from other city departments and their leaders.
- Likelihood that the project is perceived negatively in terms of technology/infrastructure security and data privacy.

Regulations

- Probability that local, regional or national regulations (or even their absence) might halt the project.
- Probability of mitigation of regulatory issues (e.g. through regulation circumvention, alteration or creation of new regulations).

Governance/Organizational Structure

- Previous experience working across departments and/or with external parties, such as universities, etc.
- Total number of departments involved in the project.
- Ease of access to all relevant persons involved with the project.
- Clarity of project responsibility for the project members.
- Clarity of project roles and tasks for the project members.
- Synergies – the number of similar projects the team is working on in addition to the project in question.

People Skills

- Having people with the right skill set and competencies within a city to implement the project.
- Possibility of training or hiring (internally or externally) to reduce a competency gap.
- Synergies – the number of people in the project team who are working on similar projects.

Soft/Cultural Factors

- Likelihood that resistance from individuals within a city's administration will stop the project.
- Likelihood that external resistance from the population, businesses, etc. will stop the project.
- Likelihood that the city administration's culture supports the successful implementation of the project.
- Ease of communicating/interacting with citizens.
- Number of other ongoing similar projects, where synergies can be achieved in the communications area.
- Number of third-party stakeholders who are involved and who are engaged in other similar projects, such as citizen groups.

Author biographies

Michel Peter Pfaeffli

Michel Peter Pfaeffli is a Smart City Expert and Management Consultant at Swisscom and the lead researcher of this paper. He has been working as an External Research Associate at IMD Business School since September 2015, where he was first author on "Smart City: Essentials for City Leaders," published by IMD and Swisscom in May 2016. Before joining Swisscom, Michel obtained a master's degree in management with specialization in strategy from HEC Lausanne and a bachelor's degree in business administration from the University of Bern. He has worked and studied in three countries and currently lives in Switzerland.

Raphael Rollier

Raphael Rollier currently leads the Smart City Program at Swisscom, creating innovative solutions for public goods based on the Internet of Things and Big Data. He has also developed a mentoring program for startups at EPFL and is a jury member at Venture Kick and a Venture Associate at Swisscom. Previously, Raphael offered consulting services to help companies with their digital strategy, such as the connected car in the insurance sector. Raphael has worked for Nokia and has 13 years of international marketing & sales and general management experience. He holds a master's degree in micro-engineering from EPFL.

Blaise Vonlanthen

Blaise Vonlanthen leads technology and management consulting teams at Swisscom. He assists and advises enterprise customers in the implementation of their digital strategies. Previously, he led multiple international consulting mandates, mainly within finance, broadcasting and sports industries. Blaise has 14 years of international technology projects and general management experience. He holds an engineering degree in telecommunication and an Executive MBA degree from the International Institute of Management in Technologies of the University of Fribourg.

Michael Wade

Michael Wade is the Cisco Chair in Digital Business Transformation and Professor of Innovation and Strategy at IMD, a Swiss-based business school focusing on executive education. He is the Director of the Global Center for Digital Business Transformation, an IMD and Cisco initiative. Michael has more than 50 articles and presentations to his credit in leading academic journals and conferences and has written 7 books and more than 20 case studies based on his experience working with organizations. His latest book is Digital Vortex: How Today's Market Leaders Can Beat Disruptive Competitors at Their Own Game. He co-directs IMD's Leading Digital Business Transformation executive program, and has designed several customized programs for companies such as Credit Suisse, Vodafone, Maersk, Zurich Financial, PSA Peugeot Citroen, and Cartier. He was named one of the top ten digital thought leaders in Switzerland by Bilanz magazine in October, 2016. Michael obtained Honours BA, MBA and PhD degrees from the Richard Ivey School of Business, University of Western Ontario, Canada. He has lived and worked in seven countries and currently resides with his family in Switzerland.

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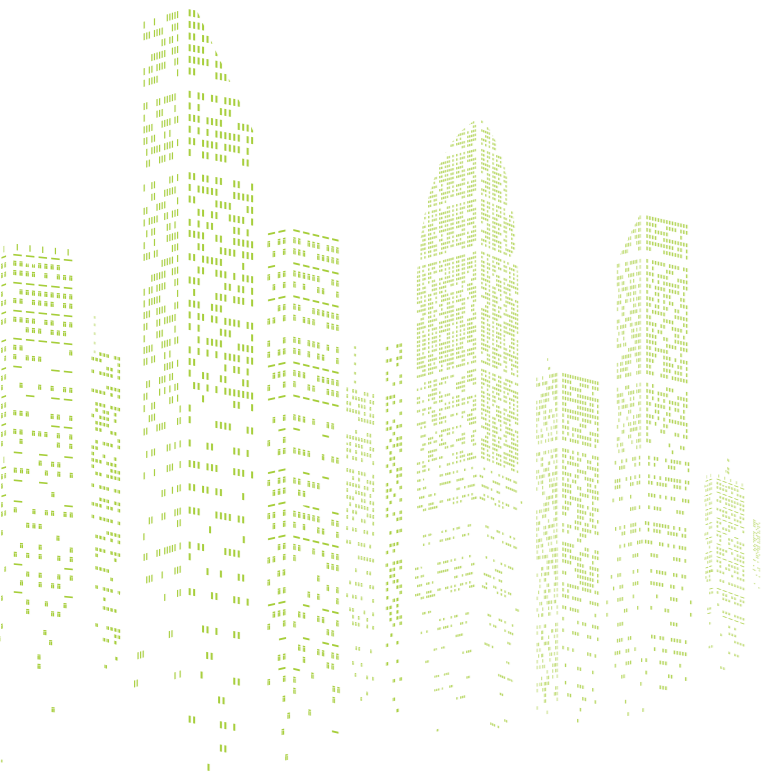
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