



THE SMART COOKBOOK

for midsized cities



*A Guide on Creating and Improving
Open Innovation Using Data*

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Editorial

The world is changing at an unprecedented speed. Fuelled by rapid population growth and the need to have all amenities close by, cities are growing like never before. By now around 80 percent of Europeans live in an urban area. Technology is changing even faster. What is revolutionary today might already be obsolete tomorrow. If we want to keep up we need to be able to adapt and shift gears frequently. Data is also more important than ever, but we have to stay wary that safeguarding people's privacy remains key.

This poses a major challenge for most cities since they are usually not known for their agility. There are often constraints that can hinder innovation, such as slow decision making processes, procurement rules, hierarchy and politics.

But when there's a challenge, there's also an opportunity, which is exactly what brought this partnership together. The last few years the cities of Bruges, Delft, Mechelen and Saint-Quentin, together with Agoria, Cambridge Cleantech, DIH Faubourg Numérique and the University of Southampton, have been experimenting to see how we can enable and accelerate innovation in midsized cities by using data and new technologies.

Before we dive into our kitchen and show you the dishes we've created I can already tell you that we have made quite a mess. After all, you can't make an omelette without breaking a few eggs. People came and went, pilots failed, equipment malfunctioned, even anticipated problems had unforeseen side effects, and then the pandemic still had to hit us. But we still managed to create some incredible dishes. And that's simultaneously the most beautiful and most terrifying thing about innovation: you never know for sure what's coming next.

Fortunately, this cookbook will provide you with the utensils to be prepared for pretty much anything that can come your way. We've written down not just our recipes for success, but also for disaster, so you can be the smart chef your city needs you to be.

Good luck!

Jan Vanbockrijck
Project manager, city of Mechelen



Do You Want to Bake Smart City Projects?

Congratulations! You have come to the right place: The Interreg-project SCIFI. In this cookbook, you will find recipes, handy ingredient lists, and tips & tricks to produce the finest recipes, a.k.a. smart city projects. Of course, tastes differ, and no two cities are the same. But our real-life examples, taken from the SCIFI pilot projects, showcase the flexibility of the smart city concept. The tools and approaches within this project are meant to inspire you and help you in accelerating innovation in a sustainable way.

Throughout this cookbook, we offer advice on how to start projects, avoid pitfalls, and work towards a better result as quickly and efficiently as possible.

At this point, **you probably have a lot of questions**. You do not know where to start, or, perhaps, you do not know what a smart city is or what advantages it brings.

Before you start to cook, you should answer questions such as these:

- » *How do you translate end users' needs into suitable technical requirements?*
- » *How do you collect, store, and manage access to the data that fuels smart city solutions?*
- » *How do you ensure interoperability between different data types and systems?*
- » *How do you manage a variety of IoT devices?*
- » *How do you engage the market with a procurement policy that defines clearly, both in terms of actor coordination (responsibility sharing between providers) and technical coordination (standards, interoperability, etc.), your smart city ambitions?*

Throughout this cookbook, **these questions and more will be answered**. Reading **this book will help you take the first step towards your city's future**.



What Is SCIFI?

SCIFI is about creating a new, better, and smarter future. Here, it does not stand for “science-fiction” but for: **“Smart Cities Innovation Framework Implementation”**. These five words perfectly sum up this learning project’s goal of providing a set of recommendations on how to approach a smart city project. Through the smart use of (open) data, we aim to:

- » Accelerate innovation to create more sustainable and inclusive cities.
- » Provide better services for our stakeholders (citizens, companies, city departments, etc.).

Four medium sized cities from three European countries lie at the heart of this project:

Bruges (BE), Delft (NL), Mechelen (BE), and Saint-Quentin (FR). And just as their larger counterparts, these cities also face today’s typical urban issues such as pollution, growing populations, mobility, etc. However, the Amsterdams, New Yorks, and Parises of this world have considerably more resources to work with.

The SCIFI cities quickly recognised that becoming “smarter” was the way of the future. But how would we go about this? As it turns out, there was not yet a reliable methodology to become a smart city, especially not without a large budget or infrastructure, internal experts, knowledge about data, transversal and multi-level cooperation, relations with stakeholders, etc.

We partnered up to become smart cities and recorded our process. Our partners at Agoria (BE), Cambridge Cleantech (UK), DIH Faubourg Numérique (FR), and the University of Southampton (UK) helped us connect with industry partners, start-ups, and data experts. Together, **we developed and refined our approach in an agile, trial-and-error kind of way, and put it in practice.** This helped us create bigger playing fields and economies of scale, exchange knowledge and expertise, and speed up pilot development. This methodology also ensured that our experience could serve as



an example. SCIFI was co-funded by **Interreg 2 Seas**. This cooperation programme’s goal is to turn the 2 Seas area (which consists of parts of Belgium, France, the Netherlands, and the UK) into a sustainable, innovative, and cohesive place where natural resources are protected and green economy is promoted. Because of its international nature, all Interreg projects need to bring together partners from different countries. This cross-border cooperation was beneficial for SCIFI as different contexts had to be considered while developing our methodology, making it more widely usable.

Website: smartcityinnovation.eu

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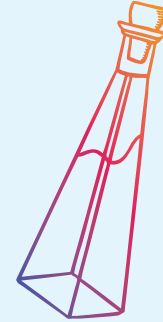




Photo Credits: Shutterstock

Why This Cookbook?

We want to share our learnings because we believe that other cities face similar challenges regarding innovation, sustainability and inclusion. We chose to present the results of this project in the form of a cookbook because **our approach has a lot in common with a recipe.** In both cases, you first decide what you want to achieve, you then collect the required ingredients, you process those, and then you try it out. It is through this process that you learn where adjustments need to be



made, but also **how to make the recipe your own.** For example, if you prefer to eat a mild chilli con carne, you might replace the spicier ingredients with cinnamon. Maybe you discover that your stove is not as good as the one used in the recipe, which means you have to adjust your cooking time. And the same goes for any solutions you might procure to become a smart city. Any plans or tools that worked for someone else might not work for you. In other words, **this book is a guide**, but the exact method you use is up to you.



Partner Cities



This medium-sized Belgian city is famous for its historic inner city, which is UNESCO protected.

However, in order to keep Bruges vibrant and liveable, the city administration is in search of smart solutions to the urban issues of today.

By doing so, this Venice of the North will be able to continuously adapt to the modern world while maintaining its medieval, fairy-tale-like beauty.

brugge.be



It is no wonder that this Dutch city, with its reputable technical university, its world-famous porcelain and its many historical sites, quickly rose in popularity.

Faced with an ever-growing (student) population, Delft joined the SCIFI project to find ways to preventively combat societal issues related to an increasing populace.

This way, the city will be able to maintain its reputation even if it grows far beyond its current 100 000+ residents.

delft.nl



This medium-sized Belgian city, which lies at the center of the country's Flemish region, has gained a reputation of being inclusive, innovative, and investor friendly in recent years.

The city wants to use this positive momentum to increase their population sustainably. One way in which Mechelen hopes to achieve this goal is through a data-driven improvement of their public services.

That is why this municipality became the project's lead partner.

mechelen.be



Saint-Quentin is the main city of a French urban community of 80 000 inhabitants. This territory of human dimension aims to protect and develop the environment and pursue a local approach. Youth, sport, and culture are promoted in Saint-Quentin. Robonumerics is an industrial revolution that started at Saint-Quentin in factories that have been integrating more and more sophisticated robots over time. Digital technologies that associate artificial intelligence to robotics are spreading in various activities such as agriculture, home care services, and internet of things. These robo numeric technologies generate growth, competitiveness, and jobs creation in all areas.

Saint-Quentin is dedicated to achieving its aims and figures as a frontrunner territory in digital transformation.

saint-quentin.fr

Professional Partners



This research-intensive university with a leading role in the fields of Web Data and Linked Data was invaluable to the SCIFI project. This Global Top 100 University provided the project with training materials and documentation. They also helped with designing the approach, defining the challenges, evaluating the solutions, and the co-creation of processes.

southampton.ac.uk



Although they are not an official partner, SCIFI was assisted by Bax & Company. This leading innovation consultancy has offices in Spain, England and the Netherlands. It is their belief that humanity needs to innovate at an ever-increasing rate in order to make the planet a more sustainable, liveable, and prosperous place for future generations. Bax & Company makes innovation happen by connecting people, being challenge-driven, and collaborating efficiently.

baxcompany.com



As Belgium's sectoral employer's organisation for technology-driven companies, Agoria's goal is to improve the planet and its inhabitants, societies, and industries through technology. With more than 1800 member companies, that total an impressive 300 thousand+ employees, Agoria facilitates the dialogue between government and privately owned companies

agoria.be



Cambridge Cleantech connects innovators, corporates, academics, SMEs and investors for a smarter, more sustainable future. As a leading membership organisation, we are a powerful catalyst in the cleantech sector responding to global sustainability challenges. With its 300+ member companies and strong connections with smart city innovators across Europe, Cambridge Cleantech was the ideal partner to handle SCIFI's communication needs. Their expertise in dealing with firms specialised in innovative technologies was also invaluable to SCIFI.

cambridgecleantech.org.uk



DIH Faubourg Numérique (FbN) is a not-for-profit association of SMEs and innovative entrepreneurs. Located in Northern France, FbN acts as a Digital Innovation Hub and is a core member of the EDIH candidate Sumity.eu. DIH FbN has initiated the Open & Agile Smart Cities (OASC) chapter in France in order to support cities and territories - especially mid-sized, small or rural ones - in their digital and sustainable transformations, to achieve concrete local impact, leveraging deliverables from global initiatives (like Living-in.eu) an open source standard and software and communities (like FIWARE.org).

faubourgnumerique.com



What Is a Smart City?

A short question with a long answer. An academic response could look like this: *A smart city is a city that, through the use of **data** and **modern technology**, continuously adapts the services it provides to the needs and wants of its citizens and other stakeholders in an effort to be **more sustainable** and to ready itself for **future challenges**.* However, as is often the case, such a definition raises more questions than it answers. What are the wants and needs of a city's inhabitants? And how does a smart city adapt itself to them? How can you define your stakeholders? Where does the data come from? How is a smart city better prepared for the future? And so on and so on.

This guide will not only answer all of these questions, it will also provide a practical and comprehensive guide for becoming a city of the future. But for now, it is important to remember that neither technology nor

data are a smart city's end goals. They are merely tools through which a city becomes smart. In other words, smart cities are not about technology for technology's sake. They are about improving their citizens' quality of life and the city's capability to adapt to change.

As the world's urban population is on the rise, we need to consider the challenges cities face both today and tomorrow. Some of the most common issues cities face include **climate change**, **mobility problems**, and **mass energy consumption**. Fortunately, both large and small cities are increasingly using data and modern technology to combat these problems. Will your city be next?

If your city does become the world's next smart city, it will be joining an **ever-growing list** that includes major metropolises like London, Copenhagen,

Tokyo, New York, and Hong Kong. But smaller, more medium-sized cities like Bruges, Delft, Mechelen, and Saint-Quentin also become smarter each day. These cities regularly launch projects to improve themselves using data. However, smaller cities often lack resources and expertise. But being a smaller city does have the advantage of being flexible without the added complexities of a larger city's often enormous scale. SCIFI's approach to smart cities consists of enhancing mid-sized cities' capacity to (re)use data in order to unleash their potential for innovation and local problem solving.

So, what exactly is a smart city? Simply put, **it is the evolution of urban life as we know it.**



Ingredients to Become a Smart City



Just as Rome before it, a smart city is not built in a day. It takes time, effort, reflection, and resources. However, this investment will ultimately result in **a wide array of positive effects** such as cleaner streets, fewer accidents, less pollution, better economies, etc. On this page, we list some of the most important ingredients you need in order to start your smart city journey.

Clearly Articulated Needs

This is where it all begins. Before becoming a smart city, you should have a clear understanding of both your context and your local needs. What do you want to use smart city technology for? What will help your community to better manage your data, solutions, sensors, etc.? What level of flexibility do you need to adapt to changing needs?

In order to attract the right kind of solution providers, you need to be very specific when describing your issue and make sure you do not describe a solution. Also, be open to innovative solutions that you might not have thought of before.

A Clear and Human-centric Strategy

Technology's potential to change the world lies in the way we use it. On its own, it is merely a tool. This is why we believe that a smart city strategy should focus on a clear and human-centric approach to innovation. This will help to combine actions, align people, and facilitate the uptake within the community.

Well-managed Data Publication

We recommend you list both available and unavailable data. Most cities already have an (enormous) amount of data. It is often just a matter of making it **"as open as possible, as closed as necessary"**. If there are any gaps in the data you have, your partnering solution provider may help you with that.

Always publish data with purpose: Deciding in advance what data to use is often not as useful as opening up data under the guidance of a partnering solution provider or citizen group. Do make sure not to violate your citizens' privacy.

Stakeholder Support

If your innovative approach is supported by your citizens, entrepreneurs, educational institutions and other stakeholders, its results will improve, and its success becomes more likely. We recommend being as transparent as possible in your communication towards all your stakeholders.

Creative Funding



This is especially important for medium-sized cities with modest budgets. You might not have the budget to procure the solution you want, but you might be able to find the financial aid you need by working together with similar cities on the same challenge or by using national or EU funding. Perhaps funding can come from multiple city departments.

For example, the **Smart Cycling pilot** of Mechelen and Bruges was beneficial for schools and transportation and could be funded with money from both budgets.



Photo Credits: City of Bruges

Interoperability and Interdisciplinary Collaboration

Many smart city projects require interdisciplinary collaboration. However, a city's infrastructure often consists of multiple (mostly) independent silos. If you want your city to become truly smart, you either need to break down these silos or build bridges between them. This will optimise the management and use of heterogeneous systems, solutions, and data sources within the city.

Implementing an interoperable digital platform based on open standards is key to managing a city's data, assets, and processes across silos.

To avoid being locked in by one particular vendor, we recommend you implement this platform independently from any solution providers or proprietary technologies. And in order to address interoperability and integration challenges, such as data availability and ownership, you need to structure your public procurement policy using clear technical references.



Photo Credits: City of Mechelen

Cooperation with other Cities

Even though each city is unique, they often face similar issues. As such, reaching out to other municipalities will only benefit you. If they have already solved the issue, they could provide expertise. If they face the same issue, you can partner up to create a more interesting business opportunity that attracts more solution providers.

We have bundled the experiences and tips & tricks from the SCIFI cities and partners into this handy cookbook.



Ecosystem

The Best Ingredients
for a Successful Dish!



Ingredients

to Build Your Digital Innovation Ecosystem

1. Your municipality's enthusiasm
2. Partnerships with other municipalities
3. Collaborations with companies
4. A helping hand from knowledge & research institutions
5. A good understanding of your stakeholders' needs



Better ingredients yield better outputs!

A smart city is a complex ecosystem of people, processes, policies, technology, and other enablers working together to deliver a set of outcomes. As such, making your city smart requires the involvement of various stakeholders. Including stakeholders guarantees increased sustainability, more inclusivity, faster implementation, and a more correct uptake of solutions.

It is also unlikely that your city organisation can provide all the necessary know-how, technology, and data. In other words, you have to develop and maintain your own network/ecosystem and/or join an already existing one in order to secure these smart city ingredients. And that is exactly what this first chapter is about.

Within these pages, you will learn more about how to convince and involve your municipality, technology partners, companies, citizens, and other stakeholders. But you will also read about how to cooperate with other cities, the importance of interoperability, and so forth.

Ingredient 1. Your Municipality's Enthusiasm



🟡 **In order to become a smart city, you need to convince political leaders, board members, advisors, (executive) sponsorship**, and anyone else involved in your city's policy-making process. While doing so, always focus on how your approach solves problems. Only implement new technologies or use (open) data and/or smart applications when needed. Your strategic approach should have an impact on present and/or future projects!

🟡 **Make clear how open data and smart applications might improve your city.** Do your research, be critical, and accept that there are still a lot of uncertainties in this area. Becoming a smart city should not be about innovation for innovation's sake, nor should it be about chasing trends. **Only do this if you genuinely believe it will help your city.** Remember that your city council is more likely to support projects that are in line with their policies or contribute to their realisation.

Food for Thought: When talking to stakeholders, use the learnings and use cases in this cookbook as examples. This will improve the strength of your arguments.

🟡 You also need to **define what city department the project belongs to**. Smart city projects tend to need input from multiple departments. For example, who owns/funds a smart project aimed at decreasing traffic congestion in an industrial area? The mobility department, your smart city experts, or the economy department? The exact answers to such questions will differ based upon your circumstances. For example, **Saint-Quentin's** smart city experts say it will be easier to convince your operational departments if you can provide them with a fully financed project.

On the other hand, if an operational department is not involved from the start, the project might lack the necessary support during the development and implementation phases. This is why **Delft's** smart city experts chose to put a lot of time and effort into explaining the pilots to their colleagues from other departments. This helped them to convince these people to deliver the required input.

🟡 The SCIFI cities all agree that in order to become a smart city, **it is necessary to have a person or department with a citywide view** on all issues, discussions, and policies. This will allow

the different pillars of your city's governmental structure to communicate with one another, which in turn will break down barriers between your city's various departments.

Food for Thought:
Collecting stakeholder feedback

- » **Bruges** collected ideas and opinions of their citizens through consultation rounds and stakeholder events. They then put these into a database and linked them to various themes (sustainability, tourism, culture and events, etc.).
- » **Delft** had sent out a questionnaire prior to the project because of new legislation. But they found that this was also useful feedback for their smart city ambitions. This allowed them to quickly establish an internal project.
- » **Mechelen** found that gamification works well as an influencing tactic when working with children and young adults.
- » **Saint-Quentin** consulted its citizens, city staff, and other stakeholders over the course of four design-thinking workshops to better understand their concerns.

Ingredient 2. Partnership with Other Municipalities



When trying to procure a smart solution, your medium-sized city's sales market could prove to be your biggest challenge. For many companies, it might simply not be economically feasible to provide you with their solution. One reason for this is that they will have to invest a lot of time in the tendering process. One way to mitigate this is by cooperating with other cities, either in your region or with a similar profile, in tackling similar challenges. By doing so, potential (commercial) partners will be incentivised to present themselves as **you create both larger economies of scale and a larger network**. The latter is important because for many firms this is a primary motivation to work with municipalities.

A **synergy in communication** has additional benefits. E.g.

- » Sharing costs and multiplying communication channels.
- » More intensive communication can result in more applicants.
- » Synergies in describing the solution can result in a larger number of buyers.

Food for Thought: Working together with other cities might help you convince your city council. They often want to cooperate with other municipalities so that they can share their experiences and learn from one another.

What are some of the pitfalls of working with other cities in the field of innovative solutions?

Well, **it matters with whom you collaborate. We recommend working together with one or more similar municipalities in your region** as a large geographical distance might negate the advantages of your partnership. The solution of your technology partner might simply not scale to it. You will also not have to deal with the added complexities (and costs) that come with an international partnership. In case of innovative procurement, collaborating with foreign cities is often less of a problem.

We also recommend to **find like-minded partner cities that want to solve the same issue(s) as you do**. If you do, it will be easier to collaborate on the initial business case, the creation of a contract template, the negotiations with the technology providers, etc.

Our final recommendation here is that you **develop a uniform methodology within your partnership**.

This will help you prevent the creation of two different solutions to one issue.

Food for Thought: If you are interested in partnering up with other cities, you may want to look into some of these **networks**:

- » **Open & Agile Smart Cities (OASC)** (Global)
- » **Living-in.eu** (Europe)
- » **Future City Foundation** (The Netherlands)
- » **G40** (The Netherlands)
- » **Key Cities** (UK)
- » **Les Interconnectés** (France)
- » **Smart Flanders** (Flanders, Belgium)
- » **VLOCA** (Flanders, Belgium)
- » **VVSG** (Flanders, Belgium)

Ingredient 3. Collaborations with Companies



Do you know how you, as a city, can keep track of new developments? Do you know what companies are active in your area? **Working with the right companies can get you ahead quickly.**

Reaching out to companies can be done through governmental networks or matchmaking organisations. More on this in the “How to expand your network”-segment.

Do not forget to define milestones for the implementation of the solution together with the stakeholders. This will help you build stronger guarantees that the project will run timely and correctly. You will also more quickly detect impending delays and potential problems. Of course, you can set milestones at the start of the project, but do not forget that if both parties agree you can always change them during the project as well.

It is crucial to own and manage the cities’ digitised assets (sensors, roads, buildings, flora, etc.) and processes independently from any vendors or proprietary technologies. This way, you avoid being tied to one vendor.

The use of standard data models ensures the interoperability and replicability of solutions. This will also help you prevent being locked in by a vendor. Interoperability is also in the best interest of the solution provider since it facilitates the rollout to other cities with a minimum of rework.

Asking for a solution based on a standardised and widespread technology will lower the amount of time and money the provider has to invest in adapting to your local context.

Keep in mind that this is more than just a supplier-buyer relationship. Cities could (or should) also give the technology providers a better insight in how a city operates.

Food for Thought: Working with Start-ups

Working with start-ups is similar to working with other companies. However, there are additional complexities to consider. For example, **start-ups often do not have the same resources or experience as their larger counterparts.** This means that you might have to provide more support when compared to working with a larger company. A good way to do so is by asking them what kind of infrastructure they expect you to

have. The start-up might require support on any number of topics like data visualisation, web development, the internet of things, etc. Due to their smaller scale, it is rare to find a start-up that can address all of these issues. In fact, most start-ups specialise in only one field of expertise. It is possible that this lack of skills or expertise is no problem for a pilot, but if you want a more permanent project, you will need both.

Also, keep in mind that **start-ups might have more difficulties scaling their products.** To help them, you should try to **make the data you collect as interoperable as possible** by, for example, using an open-source platform to store and release (parts of) the data. This focus on interoperable data will also help you if you want (or need) another partner to turn your pilot into a long-term project.

Innovative projects require, almost by definition, flexibility and working with a start-up will only amplify this. **Make sure you understand how they plan to implement their solution.** Once you do, you need to cooperate on the actual implementation. Always keep an open mind when solving issues.

Because of their smaller size however, start-ups are usually **more agile and can adapt faster** to unforeseen situations or changed needs.

Lastly, **start-ups have a higher risk of going bankrupt.** They often use their starting capital as opposed to any profits they might have. Because of this, their bookkeeping does not necessarily provide you with a clear picture of the start-up’s finances.

Ingredient 4. A Helping Hand of Knowledge and Research Institutions



Universities and educational institutions have a lot of expertise and knowledge to share. They are also usually well connected and can help you build/improve your network. **If you want to turn your city into a smart city, these institutions should be among the first you contact.**

One way in which you can entice these institutions is through a quid pro quo exchange of knowledge. This may come in the form of your aid for a student project or a research project. This approach has led to a successful cooperation between the city of Delft and TU Delft.

The SCIFI cities worked together with these knowledge and research institutions: Cambridge Cleantech (UK), DIH Faubourg Numérique (France), University of Southampton (UK), technology federation Agoria (Belgium), TU Delft (The Netherlands), and Bax & Company (UK).



Photo Credits: City of Delft

Ingredient 5. A Good Understanding of Citizens' Needs


Photo Credits: City of Mechelen / Bruges



Case: Workshops to involve the Citizens

The cities of Mechelen and Bruges ran a **safe cycling pilot**. Their goal was to use gamification to determine the safest biking routes within their cities. In order for this project to become a success, it was necessary to talk to the end-users of the app. Through **workshops** both the city and the technology provider were able to explain the project's end goal, the collection of data, and how to use the app.

The fact that this project involved children, parents, and schools made it even more important to be transparent.

 **When working together with citizens, it is fundamental to communicate openly and clearly!** Do not create any unreasonable expectations and be respectful of everyone's privacy. The two most important questions you need to answer are: "What are you going to change/improve?" and "What are you going to do with the data?" These questions go hand in hand with a point we made earlier: *Do not innovate for innovation's sake*. Your citizens will want to know how the collection of (their) data improves their lives. Keep them informed on a regular basis on the progress, this will augment the sense of inclusion and can help detect issues.

Case: Use Already Collected Input from Citizens to Define Your Project

In the case of **Smart Waste**, the city of Delft already had a well-defined case by using the existing instrument for reporting waste problems by citizens as a source of input. Therefore, the city decided not to actively involve the residents during the pilot.



Photo Credits: City of Delft

Food for Thought: How Do You Involve Your Citizens Throughout the Solution-building Process?

Communicating openly with citizens should be done throughout the process. This allows for a bottom-up approach to solution building. Keep in mind that you should also collect feedback once the solution has been implemented. The following is a non-exhaustive list of ways to engage or update your citizens:

- » Workshops
- » Questionnaires
- » Design-thinking sessions
- » Newsletters
- » Your municipality's website

But what should you do if your project does not involve collecting data from the people in your city? Should you still reach out to them? Well, simply put, **all of your stakeholders, which includes your citizens, deserve to know what is happening**. Of course, not every project you launch will easily translate into something that can be understood by most people. In other words, it is up to you to determine what and how much information you make public.

How Do You Expand Your Network?



Throughout this chapter, we have assumed you have a network of some kind. But what if you do not? Or what if you want to expand your network in order to facilitate innovation in your city? How would you do this?

Your first step could be to research the networks your local or federal government provides or funds. Many governments across the world actively support the development of smart cities. The networks they create can help you find technological partners, knowledge partners, and potential partner cities.

If you have no access to government-sponsored networks, **you can always partner up with organisations such as Cambridge Cleantech, DIH Faubourg Numérique, Start-up in Residence, F6S or Unknown Group.** Their mission is focused on innovation, peer to peer interaction and networking. Working with such organisations has two main advantages: they have strong networks and they are trusted by their partners, making it easier for you to find a suitable technology provider.



Photo Credits: City of Bruges

Case: "toekomstmakers/creators of the future"

There used to be a local business platform called De toekomstmakers / 'creators of the future'. Each trimester, this platform gathered the decision-makers of local businesses and institutions, e.g. high schools, so that they could talk about and listen to interesting ideas and innovations. These were great events to learn about new opportunities and to network.

Food for Thought: Define clearly what you want to get from the stakeholders you are looking for. When you identify these stakeholders or networks, get in touch with them regularly in a way that works best for all. Usually, a personal approach works the best.



Challenges & Business Cases

The Best Recipes for Tasty Challenges and Business Cases

By now, you have a network of partner cities, technology associates, citizens, knowledge institutions, and other stakeholders. But what good is a network when you have nothing to ask them? **Now you need to explore the city's needs and write a challenge**, which you then spread throughout your ecosystem.



1. How to Start



If there is only one thing you take away from this chapter, let it be this: **describe a need, not a solution**. Describing a solution stifles creativity and will limit the kinds of responses you receive. However, the distinction between a solution and a need is not always clear. In order to deal with this, we recommend you also define the desired outcome.

Why? The outcome defines what you want to achieve, a solution also defines how you want to achieve it. By describing both a need and the desired outcome you future-proof your procurement process.

“We **start with the identification of problems**, then define a **need** and finally we find a **solution**. Problems often arise in evaluating policy execution or feedback from citizens and other stakeholders. But we also use innovation in the development of new policies where we would like to test new approaches.”

Fons van der Ham, Delft



The former serves as a description of the issue, the latter as a goal for the solution providers. This way, any sudden changes to the market's current state of affairs will not catch you off-guard.

Easier said than done though. How do you put a need into words? A solution is usually quite concrete, while a need is often rather abstract.

Define a Scope that Suits Your Challenge.

Generally speaking, a wide scope will lead to issues such as misunderstandings about your goal, offering of wrong kinds of solutions, acceptance of lesser solutions, etc. On the other hand, make sure your scope does not become too narrow.

We recommend (temporarily) dedicating a multidisciplinary team, with at least one data specialist, to cooking the following recipe, the goal of which is to ensure that your team has all the necessary know-how to turn your scope into a smart city challenge.

Photo Credits: City of Delft



Recipe

a. Investigate what goes on in your city/area.

Are there any movements among your citizens? Do you experience any personal issues within the city? What solutions do other cities implement? What feedback do your citizens give your municipality? Answering questions like these is your preliminary research.

b. Engage your stakeholders.

These include, perhaps among others, citizens, city representatives, city staff, and local businesses. Create a questionnaire and let a large and diverse group of people fill it out. You can also organise workshops and design-thinking activities on a regular basis. Do make sure these are well moderated in order to maintain focus. Use your network well here!

c. Make use of what you have!

If you are unsure about how to reach your stakeholders, do not worry. You probably already have a lot of ways of reaching out. You can use social media, newsletter(s), local newspapers, public events, your already existing advisory boards, discussion groups with local stakeholders, etc. Do not forget to use these same platforms together with any relevant networks you are part of, to spread your challenges.



Photo Credits: Shutterstock

Case: Pedestrian Flow Measurement in Saint-Quentin

Saint-Quentin's pedestrian flow pilot was very valuable to a lot of different stakeholders as the data could be reused in many ways.

Various parties involved in the project, such as retailers, were interested in the possible commercial applications of this data. The specifics of the project such as the area covered by the measurement system, the statistics that were useful to them, as well as any additional feedback of these parties about the visualisation tools were discussed.

Both the Tourism office and the Department of Culture were part of the pilot. They were able to make good use of the data to organise their activities. Their feedback on the statistics, ergonomics, and data visualisation tools was particularly important.

d. Check the data you have!

Make sure you have a technical solution to release your data. You need at least a basic amount of data to start. More on this later.

Food for Thought: Additional Questions to Ask when Starting out

- » What is the current situation?
- » What caused the current situation?
- » Who are the beneficiaries?
- » Which stakeholders are affected?

e. Make a selection based on your city's policies, priorities, and capabilities.

f. Always keep the end in mind!

From the very beginning, ask yourself: "What if this project is successful? How would we bridge the valley of death after turning it into a long-running project?" This will help you in the long run (more on this in the chapter on the "Long Term"). The requirements needed to survive the valley of death usually relate to budget, executive sponsorship, infrastructure, etc.

Food for Thought: What is the valley of death?

The valley of death, also known as the death valley curve, is a term commonly used by venture capitalists to describe the period in a start-up's life in which it depends solely on its initial capital contribution. In other words, it does not yet generate enough revenue to be self-sufficient. The longer this valley lasts, the more likely the venture will go bankrupt prematurely.



2. Turn Your Scope into a Challenge



Now that you have both a scope and an idea of what you want to do, it is time to write the challenge. **The list of ingredients is a checklist of what all smart city challenges need:**

Ingredients

- » A well-articulated need
- » Your desired outcome.
- » Your data requirements. What (open source) technologies or platforms do you (want companies to) use?
- » All of the projects, departments, and/or technologies that the solution needs to interact or be interoperable with.
- » The initial run's length.
- » Your budget.
- » All legal obligations and restrictions
- » The project's (indirect) beneficiaries.
- » How interested parties can submit their propositions.
- » A deadline.

Recipe for the Application Process

- » A clear and complete application guide helps to align project partners and facilitates the application process.

- » Click [here](#) to see the SCIFI application guide
- » The effort that solution providers need to put into your application procedure must be in line with the (financial) benefits they get out of it.

- » Only ask for information your reviewers need. Everything else is redundant. If you do need more information, you can always organise an interview with the most interesting applicants.

- » Make sure your application procedure allows for technology providers that might want to tackle more than one challenge using either one or multiple solutions.

- » It is useful to follow up on the status of both open and closed application forms. You might have to adapt your communication strategy midway through.

- » Make it easy for solution providers to fill out the entire application form. They will also appreciate it if they can reach you directly.

- » You need to be able to contact the interested technology providers.

- » In our experience around 70% of applicants close their applications about 24 to 48 hours before the deadline. In other words, do not worry if you do not have a lot of submissions a few days before then.

Recipe for Reaching Solution Providers

- » Use a large network when reaching out to solution providers.
- » Spread the word via relevant existing networks (OASC, FIWARE).
- » Scouting services can be a big help in reaching specific target groups.
- » Choose a personal approach. Show who is behind the challenge and be reachable for additional questions. It will help increase the response rate.
- » The more specific your use case is, the narrower the target group of solution providers will be, and the clearer your communication needs to be.



3. Select a Solution



After publishing your challenge, you will have to select a proposal. It is possible that no company came forward or that none of the offered solutions suit your needs. This is fine because innovation cannot be forced. You can always launch a second challenge. **It is better to have no project than one that will only partially solve the problem.**



Photo Credits: City of Saint-Quentin

But assuming you have a decent selection of offers, these are some of the things you need to consider when making your choice:

- » Is the solution scalable/interoperable with the data (platform) and technology already present in your city? Or do they offer a solution that will become interoperable in the future? This is crucial, as you do not want to restrict yourself to one provider
- » How innovative is the solution they offer?
- » What reputation does the company have?
- » Keep in mind that start-ups do not yet have a reputation. Do not hold this against them. If you do, you run the risk of only working with established solutions, which is not a good way to foster innovation.
- » How willing are they to work with you in the long run?
- » Where is the company located? International partners bring added complexity.

Food for Thought:

Click **this link** for an overview of the review criteria the SCIFI cities used for their projects' applicants.



Photo Credits: City of Saint-Quentin

Case:

For its **watering project**, the city of Saint-Quentin identified the list of technical requirements during the testing phase. The cooperation with the local start-up Element IO allowed the city to specify the required technical features and user ergonomics during the procurement phase.

The city also signed an agreement with two technical partners, *DIH Faubourg Numérique* and *Orange*, to specify the required digital infrastructure as well as to support the integration and interconnection of the project's solution with the rest of the city's infrastructure (e.g. incumbent irrigation systems, lawn mowers, and other IT systems). Together, they created a pilot that allowed the city to leverage their technical and organisational learnings and transfer them to the implementation plan of the City-as-a-Platform concept.

Source: Digitalization in Saint-Quentin's stadiums: City-as-a-Platform Concept. FIWARE, https://www.fiware.org/wp-content/uploads/FF_ImpactStories_SaintQuentin.pdf



4. Check Interoperability



As explained in the introductory chapters, interoperability does not necessarily mean the breaking down of your city's infrastructure. Instead, it can be about connecting the different silos on a technological, organisational and procedural level. Using a pilot to experiment will help both you and your ecosystem get a better understanding of the workings of your city, which in turn facilitates cooperation.



Photo Credits: SCIFI



Photo Credits: City of Bruges

Food for Thought on Interoperability:

The minimal requirements for solutions providers when adopting an innovative digital solution in a city should be the use of (open source) standard APIs, and the use of standard architecture and harmonised data models from cross-domain communities. E.g. Watering pilot Saint Quentin. Fiware architecture: interoperability and interconnection in data and systems. (More information: https://www.fiware.org/wp-content/uploads/FF_ImpactStories_SaintQuentin.pdf)

It is best if your partner agrees that they will publish the project's data in a format and on a platform of your choice before you start working together.

You can also ask them to share the data model they use to process their data. That way you can work together to harmonise your models.

Working with different solution providers that use the same data helps to better understand the interoperability of solutions.

It takes time to set up a general smart city strategy, and it takes even longer to set up a clear plan for the technical implementation.

Smaller projects are a great way to build your city's digital strategy. They help you gain experience and knowledge, and you may also learn some best practices.



5. Contract and Financing: Use Milestones!



Case: The SCIFI project

The pilots executed by the solution providers in the SCIFI project were all financed with funding up to 10,000 euros. On top of that, the equipment used in the pilots was funded or bought by the cities.

In the contract between the SCIFI cities and the solution providers, two milestones and three estimations of payment intervals were defined:

- » Payment 1: 50% of the total financing of the pilot (based on contract and milestones) upfront.
- » Payment 2: 30% of the pilot's total financing if the first milestone was met.
- » Payment 3: 20% of the pilot's total financing at the end of the pilot if the second milestone was met.

Milestones give both you and your partner a clear picture of what needs to be done in order to finalise the pilot in such a way that it satisfies everyone involved. We suggest you define these together with the solution provider and make them a contractual obligation.

In other words, if your partner regularly fails to meet the agreed deadlines, you should be able to cancel the contract. By doing this, you avoid a gold rush towards the end of the project, while at the same time communicating clearly what you expect from your partner. It will also help both of you deal with any unforeseen circumstances. Alternatively, you can tie your payments to these milestones.

You should also introduce SLAs (Service Level Agreements) in your contract. They serve a similar purpose as the milestones. If you work with a more mature and established technology partner, ask for their standard service level agreements. Also ask how fast they can provide services if, for example, repairs are needed.

A start-up, on the other hand, may not have any standard SLAs. In that case, you should discuss them with your partners and write them into your contract. Ask them how they propose to solve challenges. Make sure you can end the partnership in the case of a complete failure.



Photo Credits: SCIFI

Recipe for Contracting and Financing:

🕒 **Install a pre-payment at the beginning of the pilot.** It will help start-ups pre-finance their expenses and allow them to work faster.

🕒 **Identify and track** expectations of both the city and the solution providers during the pilot. Milestones give a clear indication of the necessary steps to finalise the pilot. It also prevents any misinterpretations or false expectations.

🕒 **Define milestones.** They are important to track the pilot's progress and to stimulate creative problem solving if unforeseen problems arise. They can also be linked to payments. In other words, if your partner fails to deliver results within the agreed timeframe, you can withhold payments or even cancel the project.

The path to innovation is not written in stone. Failure happens, and it is often necessary to pivot during the pilot. Midterm milestones help to highlight problems. They can also serve as a motivation to try again or to reach out for help when no solutions are available. Fail fast, learn faster.



Photo Credits: Shutterstock

Case: Failure Is not the Only Reason to Pivot

Saint-Quentin's smart parking pilot showed how fickle innovative projects can be. During this project, a target for the second milestone was not met. However, another target, originally set for the third stage, was. As such, the city administration ruled that the second milestone had been met. In other words, the municipality focused on the project's overall progress.

The major take-away from this experience is that every milestone should trigger a review of the following stage(s). After all, any number of variables might have changed since you last decided upon your targets. If everything goes incredibly well, you might even make progress faster than expected. In cases like these, it might also be necessary to pivot.

Food for Thought:

Changing the set milestones should always be done in an open dialogue with your partner(s). Once both/all parties agree upon the change, add it as an addendum to the contract. Transparency is key!

Case: How to Introduce Digital Technologies in a New Sector

Saint-Quentin saw in their watering optimisation project a chance to reorganise the digital transformation of public services.

They split this process into three distinct stages:

1. An eight-month testing phase
2. A public procurement phase to scale up using insights from the testing phase
3. The deployment phase at an industrial scale with the providers selected during the tender

Source: Digitalization in Saint-Quentin's stadiums: City-as-a-Platform Concept. FIWARE, https://www.fiware.org/wp-content/uploads/FF_ImpactStories_SaintQuentin.pdf



Photo Credits: City of Saint-Quentin



6. Skills and Trainings



In order to get everyone on the same page, you can exchange information through, for example, webinars and remote exchange sessions. For solution providers, the possibility to communicate directly with the city concerned is the single most important thing.

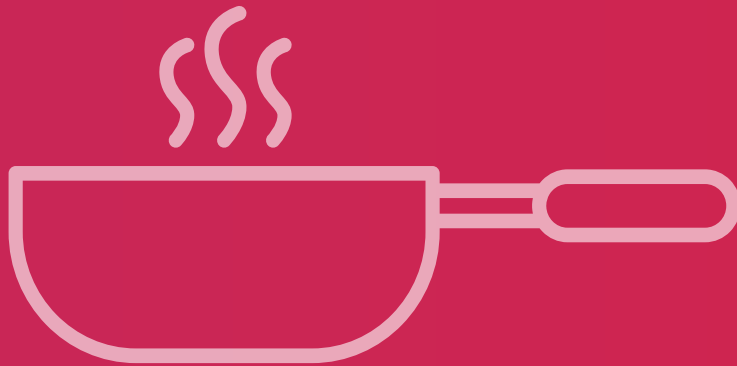
Learnings on Trainings:

Make sure you have the capacity to provide your partner with the support they require.

Make an inventory of all the departments/colleagues that need to provide you with input, feedback, and/or cooperation.



Photo Credits: SCIFI



Open Data

Building a smart city is like cooking with ingredients. Most smart city applications simply require data to function. They often also produce data.

In some cases, smart city projects are developed as a tool to gather useful information in order to improve city services. **The Air Quality Challenge**, in which sensory boxes gathered data, would be an example of such a project.

In other cases, existing datasets are used, shared and/or combined to create better solutions. Such was the case for **Delft's de-icing project**. This application combined historical data with weather forecast data to predict when and where ice would form.

The most interesting smart city applications combine the two. Saint-Quentin's **Element_io pilot** is a great example of this. Not only did the French municipality combine already existing datasets, they also installed new sensors. This led to an improved watering of the city's sports fields.

The purpose of this chapter is to provide an introduction on open data and its advantages. If you require a more in-depth explanation, we suggest reading our **Guide to Valuing Data** and our **Guidance Package for Cities**.



Photo Credits: City of Delft



What Are the Real Life Advantages of Opening Up Your Data?



- 1. Service Improvement:** The ultimate goal of opening up your data is to improve the services you provide. When you open up your data, the amount of data accessible to you will typically increase very quickly. This could lead to new insights about how the service in question operates. It could also lead to more accurate services.
- 2. Citizen Participation:** When you have an open set of data, you can allow your citizens to add their own data. This could prove useful if you want to crowdsource a large amount of data in a short amount of time. Research has shown that engaged people enjoy having an impact on their municipality's policies. At the same time, discontented citizens had a more positive attitude when they could contribute in this way. A successful example of this is Bruges and Mechelen's **smart cycling pilot**. The main goal of this project was to gather citizen input on what they experience as dangerous traffic situations. Moreover, the only way that this project could be GDPR-compliant was by engaging citizens and gaining their consent.
- 3. Data Quality Improvement:** By releasing your data, more people will look at what you have. This allows them to give you feedback on the quality of your data. That way, you will know if it is incomplete, unreliable or inaccurate. Take for example Delft and their **de-icing pilot**. At the start of this project, their partner discovered structural issues with the city's geographical data. Because of this, the municipality decided to check the entirety of their data collection process. As a result, they were able to find both the reasons for these issues and ways to improve their data. Service or use case designer to coordinate all parties and make a link between the needs of the city and the technical specifics.
- 4. Increased Transparency:** Open data makes your city more transparent. This facilitates a higher interlinking with your surroundings. But simply releasing your data into the wild might have an adverse effect. That is why we recommend you publishing your data with purpose. In other words, prioritise opening datasets that will aid you in developing robust policies (alongside your stakeholders).
- 5. Improved Findability:** By publishing all of your data on a central portal, it will be easier for your city's staff to find the data they need. This is especially true if they need data created/ managed by another department. Once again, Delft's **de-icing pilot** can serve as an example. The Dutch municipality discovered that their data was only available to a small number of people in a single department. It was not being stored in a reliable manner. This showcases, from an internal workings point of view, how having a central portal facilitates cross-department cooperation.
- 6. Economic Benefits:** By opening up your data, you could experience both direct and indirect economic benefits. The direct results (such as new companies coming to your city, new products developed based upon your data, and the cost reduction of your improved services) are usually long term. Indirect benefits, on the other hand, can be difficult to pinpoint. They could include benefits such as an increase in productivity through decreased journey times, fewer people calling in sick as a result of bad air quality, and less time spent on repairing roads.



Cooking Up an Open Data Organisation



Now that you know what the benefits of opening up your data are, you need to learn how to publish it and how to organise your organisation around it.

There are different ways to open up your data, but there are a few things to aim for if you want to maximise the return on investment of your publishing efforts and to avoid vendor lock-in.

From a technical point of view, **it should be easy for vendors and other applications to connect to the datasets**. Both the structure of the dataset and the meaning of the attributes should be logical and, whenever possible, standardised to (international) standards. This will help you achieve interoperability, but you will learn more about this in the next chapter.

From an organisational point of view, **you need to make sure the data you publish is correct, up-to-date, and its publication should be as effortless as possible**.

Good data governance is key to achieving this. This means that from the moment that internal processes create the data, you need to pay attention to data ownership, data quality, and the use of commonly used data models/ standards. This has consequences for all internal departments that generate data, not just the IT department.

Ensure the following is in place when buying data or new software tools for your organisation:

- a. The city needs to own the data it buys or produces.
- b. The city needs access to the data from the application as structured data (e.g. through an API, as daily csv-dumps, ...),
- c. The city has the right to further distribute and publish the data.

When publishing your data, there are four steps to go through:

1. **Select** the data you want to publish.
2. **Prepare** the data:
 1. ensure quality
 2. ensure ownership
 3. provide context and explanation
 4. optimise it for the data platform of your choice
3. **Publish** the data. If you executed the previous steps well, this should be relatively painless.
4. **(Re)use** the data. Reach out to different stakeholders for this step, both within your organisation and external partners.



Open Data, Privacy, and the GDPR



This is not an overview of the GDPR. Other resources, such as [this article by the European Commission](#), already provide sufficient information on this piece of legislation. Instead, this segment lists the lessons learned by the four SCIFI - cities with regards to citizens' privacy and the GDPR. If you want more information, we recommend [our webinar on data protection](#).

SCIFI's learnings:

- » **Immediately and continuously check if your data is GDPR compliant!** Discuss with your Data Protection Officer (DPO) whether or not a DPIA (Data Protection Impact Assessment) needs to be done. Do this as soon as possible within the process, but also during development and rollout.
- » Depending on your project, **written consent might not be enough.**
- » Users of your application need to be able to delete their data themselves.
- » GDPR compliance should be a part of your contractual obligations.
- » **Make sure your non-personal data does not become personal** by, for example, saving payment details.

Food for Thought:

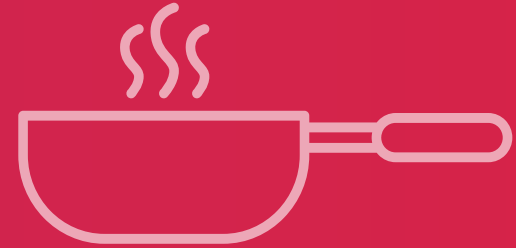
Do you truly want to become a smart city? We recommend hiring a data specialist. This is a worthwhile investment because they will help you get the most out of your data.

- » **If possible, save the data on your own servers and/or platform.** This will make it easier for you to check it.
- » **The GDPR implies a minimalist approach to data.**
- » **Do not assume that the data sets you already have are GDPR compliant.**
- » If your solution provider suggests using encryption to protect your data, research the encryption method they want to use. **Not all encryption techniques are created equal.**

Photo Credits: City of Saint-Quentin



An Interoperable Platform



Simply publishing your data is not enough. You also need to host and manage it. This means that you need to continuously update and monitor your data.

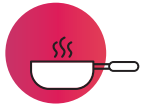
To avoid being locked in by a vendor, the SCIFI team recommends that a city implements its own interoperable platform.

This chapter *marinates* on three central questions:

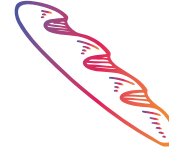
1. Why is interoperability important?
2. How do you facilitate interoperability?
3. Does SCIFI have an example with regards to interoperability?

While reading this chapter, keep in mind that interoperability and open data are closely related to one another. This means that opening up your data brings many advantages, while a focus on making your platform interoperable will maximize (most of) those benefits.

If you want to learn more about this topic, please read **our article on interoperability** or **our Guidance Package for Cities**.



The Importance of Interoperability



The currently available technology, when used correctly, can assist a city in its (daily) operations. However, due to the rise of heterogeneous, yet interdependent, systems and data sources, **technical complexity is incredibly high**. This makes it increasingly hard for municipalities to:

- » deliver information necessary for transparent and understandable decision making
- » (significantly) impact fair and open business development

Food for Thought:

We recommend to start small and to experiment with very concrete use cases, new or existing IT systems, IoT devices, 3rd party services, and/or datasets. What are the most relevant challenges faced by city services/citizens? How can combining various information sources and heterogeneous systems improve the current situation?

With this in mind, it becomes easy to understand **the importance of interoperable digital platforms** based on open standards. Through such a platform, it becomes possible to build up and share the virtual representations of a city's assets.

Collecting and (visually) representing this data leads to digital commons known as "digital twins". Any public administration with a high level of interoperability will be able to:

- » Own and manage its digitised assets and processes independently from any vendors or proprietary technology (which helps you avoid being tied to one vendor).
- » Structure the public procurement policy better, through clear technical references that address interoperability and integration challenges, such as data availability and ownership.

All this talk about digital twins might sound impressive, expensive and complicated. However, **you can start small** by building a platform that only contains the data necessary for your first smart city project. If you do decide to launch a second project, **the platform will, because of its interoperable nature, be easy to add data(sets) to**.

Digital twins are the most direct and concrete path to a city's technological sovereignty, more transparency and efficiency, and the completion of their digital transformation processes. Luckily, public investments into open source building blocks, open standards, test bed environments, etc. have increased significantly in the last decade. Because of this, **there now exist many freely available interoperable digital platforms**. This lowers the technical threshold and allows mid-sized cities (and even rural areas) to make use of them.



Facilitating Interoperability



Now that you have a better understanding of the importance of interoperability, you need to learn how to organise your organisation around this concept.

If you are thinking of implementing an interoperable platform, we recommend taking a look at [the deliverables](#) proposed by **OASC** (Open & Agile Smart Cities), known as **MIMs** (Minimum Interoperable Mechanisms). For your first recipe, a.k.a. your first smart city project, we suggest taking a look at:

- » **MIM 1: Context Information Management**
- » **MIM 2: Data models**

(Alternative resource: [Smart Data Models](#))

Implementing these two MIMs will allow you to **rapidly deploy an operational and scalable test platform** for your first experimental use cases. This will allow you, your team, your stakeholders, and your ecosystem to quickly start working on/with concrete projects.

Also, as with everything else in this cookbook:

If you fail, fail fast. That way, you can learn from your mistakes without losing too much time or money. It also allows you to potentially start again more quickly with a new and improved approach, better tools, and better suited partners.

Once you have whetted your appetite, it might be time to **look at ways to complement your interoperable digital platform**. Depending on your exact situation, we recommend looking at the following MIMs:

- » **MIM 3: Ecosystems Transactions Management**
- » **MIM 4: Personal Data Management**
- » **MIM 6: Security Management**
- » **MIM 7: Geospatial Information Management**

Food for Thought:

Here are some additional resources for you to look at:

- » The world bank's [list of technology options](#).
- » **The Connecting Europe Facility** (CEF) provides access to a wide range of digital tools in Europe.
- » **EDIHs** (European Digital Innovation Hubs) are one stop shops that help companies respond to the challenges posed by an increasingly digital world. Keep in mind that the public sector is not what these hubs focus on. Nonetheless, they can provide you with useful information.
- » **Living-In.EU** wants to build the European way of the digital transformation
- » The UN initiative titled **U4SSC**.



A SCIFI Example



We have already mentioned it in the introductory chapters: **A city's infrastructure often consists of a series of (mostly) independent silos.**

Such a fractured structure is not a good basis for smart projects, as those often require interdisciplinary and interdepartmental collaboration. In other words, to maximize your city's interoperability, you not only need to look at the technology you use, but also at how you

can build organisational and procedural bridges between different departments.

Saint-Quentin's smart watering pilot is a great example of how to apply interoperability to your city's data and infrastructure. The project's goal was to save water by automating the watering process of the city's sports fields and making it as efficient as possible. This meant, for example, that the sprinklers were not supposed to start working if it was expected to rain later that day,

even if the soil was dry. For this pilot to be a success, it was necessary to coordinate many time consuming tasks and different data sources. These included the field reservation calendar, the mowing schedule, and the weather forecast.

Instead of developing a stand-alone application to manage all this data, the French municipality decided to implement an interoperable platform. This allowed them not only to collect and distribute open data, but also to digitise all of the city's assets and their possible interactions. In other words, they created a digital twin.

interoperability take off: specialised systems in silos are turned into powerful engines for global efficiency

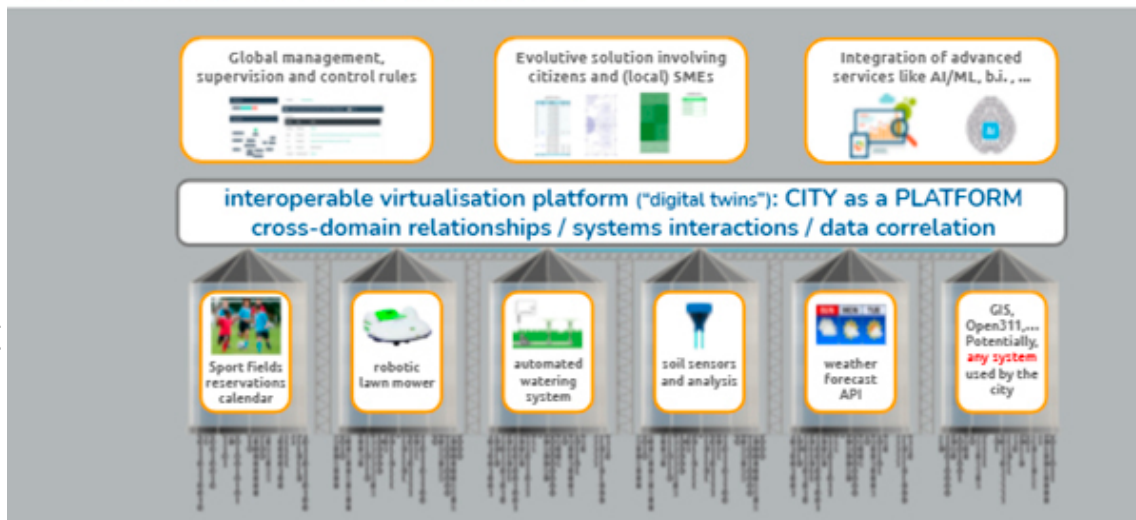


Photo Credits: SCIFI, City of Saint-Quentin

Thanks to this "City as a Platform" approach, Saint-Quentin now has:

- » Harmonised tools and procedures for the supervision of the virtualized infrastructures
- » A single entry point to interact with the city's infrastructure, which makes it easier and faster to deploy innovative services
- » A smooth integration of advanced data treatments

The image to the left is a visualization of how Saint-Quentin's numerous data sources are connected through a singular platform.



Innovative Procurement

This chapter serves as a companion piece to the chapter on “Challenges and Business Cases”. In that chapter, we laid out the six steps of the smart pilot process as a whole:

1. How to start.
2. Turn your scope into a challenge.
3. Select a solution.
4. Check interoperability.
5. Contract and financing.
6. Skills and training.

The title of this chapter, “Innovative Procurement”, mostly refers to steps 3, 4 and 5. These are crucial steps in this process and deserve to be looked at in more detail. We do this here using the examples, learnings and experiences from the SCIFI-cities.

If you need more information on this topic, please read our **Guide on Public Procurement of Innovative Data-driven Innovation**.



What Is Innovative Procurement?



We list the most relevant ones from the four SCIFI countries here:

When is the procurement of a solution considered innovative? Simply put, **procurement is innovative when a contracting authority acts as an early adopter of inventive goods and services** not yet available on a large scale (commercial) basis. Using existing technology in interesting and groundbreaking ways is also a form of innovation. We recommend keeping this in mind when selecting a solution (step 3).

Of course, an innovative proposal might not be the right one for your municipality. **There is no point in reinventing the wheel.**

Throughout this cookbook we have always worked on the assumption that innovation was right for you.

Procuring innovative goods or services does not automatically necessitate an innovative procurement. However, innovation usually requires special attention which traditional procurement strategies are often not equipped for.

Innovative Procurement Initiatives

There are national, regional and local initiatives throughout the world for municipalities interested in procuring smart solutions.

Belgium

- » [Nido - Innovatielab voor de overheid / Nido - Le labo d'innovation du service public](#)
- » [The Flemish Programme for Innovation Procurement](#)

France

- » [Plate-forme des achats d'innovation de l'État et de ses Établissements publics](#)

The Netherlands

- » [SBIR](#) (Small Business Innovation Research)

The UK

- » [SBIR](#) (Small Business Innovation Research Initiative)



Photo Credits: Shutterstock, City of Bruges



What Did the SCIFI Procurement Process Look Like?



The four SCIFI - cities came together and created a (mostly) uniform procurement strategy.

Numerous debates, some trial & error and a little bit of creativity ultimately resulted in the following six steps:

- 1. Eligibility Checks:** Check if the proposal in question is actually eligible according to the requirements set by your organisation and/or a relevant piece of legislation. For example: Does the supplier have a valid VAT-number?
- 2. Review:** Each proposal was evaluated by at least two reviewers against the call's criteria. We suggest that at least one of your reviewers has enough of a technical background to check if the project is feasible. Also, do make sure that interested parties can check what your criteria are before they send in their proposition. For an applicant to be considered for an interview within the context of SCIFI, they had to receive at least 60 out of a 100 points. Both the idea and its potential to have an impact could each receive a maximum of 30 points. The team and budget, on the other hand, were each graded on a 20-point scale. The proposals' finale scores were an internal tool to rank and select which ones would be shortlisted. This is also a great time to check how interoperable the solution(s) would be with your municipality's technology and policies. In other words, the smart pilot process' fourth step begins here.
- 3. Remote Interview:** Invite the top-scoring candidates for a 30-minute interview. The first five minutes are dedicated to a short presentation by the company or organisation that sent in the proposal. The remaining time is used for a Q&A. The interviewers may ask the candidates to provide documents prior to the interview. Once the interview is over, the municipality decides whether or not to accept the proposal. In any case, structured feedback should be given to all applicants who made it this far, regardless of whether they made the cut or not.
- 4. Negotiation:** Invite successful applicants to negotiate the terms of your contract. This is where step five in the larger smart pilot process begins. The SCIFI – cities have divided this roughly into two parts:
 - a. Due diligence checks: Check the company's status and (financial) information. If the applicant fails here, you reserve the right to reject them. Make sure that all potential candidates are aware of this before they send in their application.
 - b. Work plan agreement: This is where you agree on milestones, success criteria, and the dissemination plan.
- 5. Accelerator:** Applicants who reach this stage of the application process are formally accepted into the accelerator programme. Throughout the programme, meetings will be held at (key) milestones.
- 6. Full Implementation:** If the accelerator was a success, a procurement process may be initiated to turn it into a (more) permanent solution. For legal reasons, this process needs to be an entirely new and independent one. See also the chapter on the "Long Term".

SCIFI's learnings:

- » **A standardised procurement process should guarantee that all relevant legal safeguards are in place.** This means including a moment to discuss the Service Level Agreements (SLAs), a clause that allows for the termination of a project, and, conversely, a clause that allows for an extension of the project. You should also include regular milestone reviews as part of your partner's contractual obligations.
- » **Do extensive research on both the topic of your challenge and the relevant industries before launching a call.** This will help you define a narrower scope, which in turn will attract only those stakeholders that are actually capable of providing a specialised solution.

Food for Thought:

The SCIFI-cities required applicants who had reached the accelerator stage to attend both a kick-off meeting and a final matchmaking event.

- » **Both parties should strive to learn from each other.** Not only during the pilot/accelerator programme, but also before and after. The municipalities in particular could implement activities to support the further commercialisation of the solution developed during the piloting phase.
- » **Municipalities are not obligated to buy the solution,** even if the pilot was successful. It is perfectly acceptable to give a company a chance to promote themselves through the pilot.

Photo Credits: SCIFI





Execution

Up to this point, you have read a lot about smart cities, ecosystems, business cases, and much more. However, we know how difficult it can be to get an overview of the different steps you have to take in order to launch a successful smart pilot. That is why we dedicate this chapter to a nifty to-do list of all the things you need to pay attention to throughout your first smart project.

Good luck!



Recipe (To-Do List)

1. Identify and scope your need(s)

- » Stakeholders: citizens, politicians
- » Examples: SCIFI's YouTube webinars on challenges, challenge pages on your website, questionnaires

Resources:

- » [Citizen-centric Services for Smarter Cities](#)
- » [SCIFI's YouTube channel](#)

2. Identify and scope your data

- » Examples: data-list on the SCIFI challenge pages, cities' open data portals

Resources:

- » [Best Practices on City Dashboards \(webinar\)](#)
- » [Case Study in Bruges on Gamification & Open Data \(webinar\)](#)
- » [Guide on Public Procurement of Open Data-driven Innovation](#)
- » [Open Data Guidance Package](#)
- » [Use of an Interoperable Platform for Cities and Enterprises \(webinar\)](#)

3. Establish how you will measure if the project was a success

- » Keep the end in mind!
- » Examples: expected impact on the challenge pages on the website, milestones in pilot contracts

4. Identify how you will put citizens at the centre of your pilots

- » Stakeholders: citizens

Resources:

- » [Citizen-centric Services for Smarter Cities](#)
- » [Gamification Nation](#)
- » [Project AllRide](#)

5. Finalise your business case

- » Stakeholders: citizens, city staff
- » This step usually results in an internal document that answers questions like “What is in it for us?” and “Who are our end users?”.
- » DO NOT write a solution.
- » Focus on your needs.
- » Examples: business case documents

Resources: » [Template document](#)

6. Assemble your team

- » You may already have the necessary knowhow in-house.
- » If your initial budget allows it, you can also hire external people
- » The most important roles:
 - » Service or use case designer
 - » Data manager
 - » IT specialist
 - » Legal specialist
- » Remember, one person can fulfil multiple roles.

7. Write your challenge

- » This is a shortened, adapted version of the business case for external use.

Resources:

- » [List of SCIFI's 2018 challenges](#)
- » [List of SCIFI's 2019 challenges](#)

8. Publish and promote your challenge

- » You probably have many ways of reaching out to (local) stakeholders. You can use social media, newsletters, local newspapers, public events, already existing advisory boards, etc.

9. Devise your application process

- » Make sure that the complexity of the administrative process is proportional to the project's estimated value.

Resources: » [Guide for Applicants](#)

10. Select (a) partner(s)

- » Does their solution embrace privacy by design?
- » How interoperable is their solution?
- » How innovative is their proposition?
- » What is their reputation?
- » Are they willing to work with you on a long-term basis?
- » Where are they located?

Resources: » [Guide for Applicants](#)

11. Define your contracts

- » Stakeholders: lawyers, city staff, suppliers
- » Your contracts need to include:
 - » An exit clause
 - » An extension clause
 - » Well-defined SLAs
 - » Milestones that clearly define mutual expectations

- » You are developing an innovative solution. This means that you need to be agile and expect the unexpected. Your contract needs to reflect this and should allow for mutually agreed upon changes to the scope and goal of your project.

12. Get started

13. Regularly meet up with your partner(s) and end users to discuss the project's progress

- » Remain flexible and pivot when necessary
- » Does your partner regularly fail to meet the set milestones? Use your exit clause!

14. Continuously check if your data is GDPR-compliant

- » Define who is responsible for GDPR-compliance.

15. Review if the project has been a success and whether or not you want to implement it.

- » Stakeholders: citizens, politicians
- » If you want to make the solution more permanent, you will have to issue another procurement. Even if you would like to continue with the same partner, you need to provide all applicants with the same amount of information. This is a prerequisite for a fair and objective selection process. Not doing so might result in legal action being taken against you.



Long term

This Tastes Like More... A Full Menu ?

Successfully making one tasty dish does not make you a chef. But it might give you the courage to take on a full menu. With that in mind, it is time to look to the future. What do you do after a successful pilot? How do you future-proof your city's policies? What about further cooperation between yourself and other medium-sized cities?



1. From One Dish to a Full Menu



From pilot to long running project. So, you have run a successful pilot and want to turn it into a long-term project. What now? If you followed the smart city recipe laid out in this cookbook, you have already done most of the work. However, there are still some noteworthy challenges.

Challenges to Serving a Full Menu:

Challenge 1: Do you have the capacity to turn the pilot into a long running project? Turning a pilot into a sustainable project requires a certain know-how, possibly a different infrastructure, as well as people who permanently work on the project/technology. Luckily, a pilot and its prototyping phase can serve as a test to see how your project and its associated technology will scale to different (technical) conditions. Keep this in mind while procuring pilots.

Case: The city of Saint-Quentin has decided to continue with two of their pilots:

- » A **smart parking pilot** that aims to increase the attractiveness of the city centre (with the same partner).
- » Their **pilot** with a focus on increasing the efficiency of the city's water usage (with a new partner).

Challenge 2: Make sure your procurement for the long-term implementation meets the requirements for fair market competition. This means **all parties should have the outcome and all relevant information from the pilot.**

Challenge 3: We have already mentioned it a few times, but **do not lose track of the project's interoperability.** This should always be at the forefront when discussing new terms and contracts. In fact, it might not even be worth it to continue a successful pilot into a long-running project if it's not interoperable with the rest of your city's infrastructure.

Challenge 4: With this in mind, **changes to the project are not necessarily a bad thing.** Many, if not most, digital projects are iterative in nature. But you should always keep an eye on

Case: The city of Saint-Quentin decided to continue **their water efficiency pilot.** They also decided to work with new partners to help them deploy the overall architecture and solution to nine stadiums. Additionally, the city wants to reuse the framework of watering challenges in order to manage other city domains. This will allow Saint-Quentin to scale up horizontally.

Food for Thought:

Turning a successful pilot into a long-running project might not be the best option for you. Another way to continue your smart city story is to increase the number of projects you work on. This is a useful course of action when, for example, you want to test the scalability of a data platform.

If you want to continue your project, you can cooperate with either the same partner or with another. But always integrate the knowledge gained during the pilot into the new project!

what you set out to do while taking into account the lessons learned during the pilot. The pilot phase serves to define the technical conditions needed to fulfil your initial goal and is a first test to see whether the solution contributes toward the expected outcome. This may mean your second procurement will differ (significantly) from the first (and thus might lead to a different contractor). **But the initial goal must be conserved.** For example, Saint-Quentin did not ask for a data platform for their **watering pilot**, but they learned they needed one to fulfil their initial aim. So, the project is functionally different but the initial goal, as expressed by the stakeholders, remains unchanged.



2. You Can't Make an Omelette without Breaking a Few Eggs



How do you cope with failure? What if you do not want to continue your pilot? You could decide to discontinue a project for any number of reasons. Perhaps there is no more budget. Maybe the responsible department does not want to buy the solution. Or perhaps the results are unsatisfying.

No matter what your reasoning is, dealing with the (perceived) failure of a project is not always easy. But remember: **the scope of a pilot is to learn!** And failure is a part of the learning process. We recommend keeping a logbook. That way, you can share your learnings.

Case:

The data collected in **Saint-Quentin's watering project** served as information on when to activate the sprinklers and on how much water would be used. Comparing the digital project's water consumption to that of a completely analogue scenario was an easy way to evaluate the project's return on investment.

Food for Thought: Start Small and Fail Fast!

By organising a smaller-scale pilot, you can build up experience in innovative projects without investing a lot of time and money.

Such a pilot will teach you about the procurement of these kinds of undertakings, your (technical) infrastructure, the usage of data, cooperation with both internal and external partners, etc.

Also, since you are looking for innovative solutions, success is anything but guaranteed. By starting out small, you minimise the (financial) risk you take. If, for some reason, something goes wrong, you can stop the project without having invested too much.



Photo Credits: City of Saint-Quentin



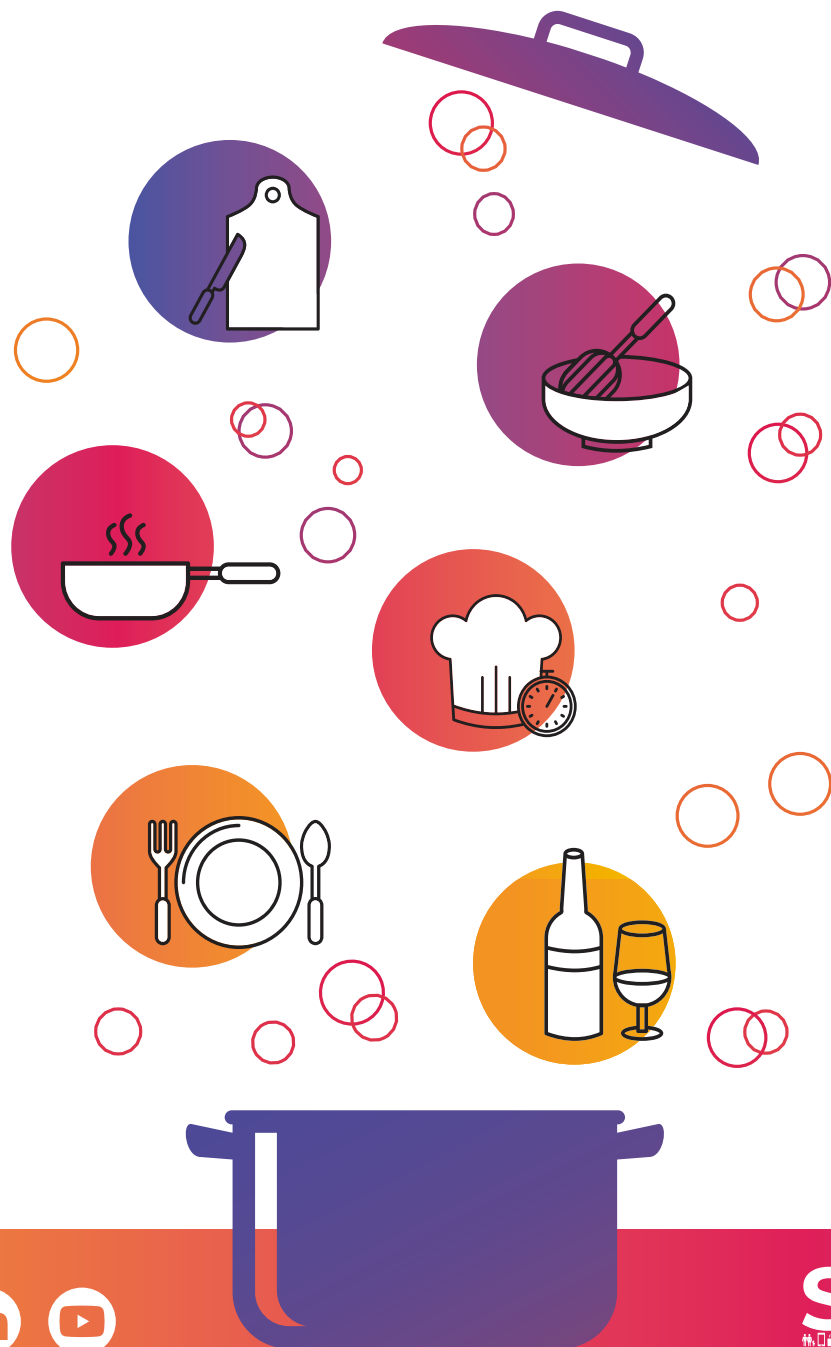


3. Experimenting, Failing, and Learning are Part of a Chef's DNA

Of course, becoming a smart city requires more than a few long-running smart projects. You also need to **make innovation a part of your city's policies** and perhaps even identity.

10 tips to do so:

1. The best way to learn is by **doing it**.
2. There needs to be **room for experimentation** within both your policies and your budget. In other words: be prepared to invest time and money in experiments that yield little to no results. This will help you in the long run as you minimise and mitigate potential risks.
3. The more smart city projects you start, the better your track record will be, and the easier it will be to attract potential partners.
4. The previous point also applies to potential partner cities as they will want to learn from your experience.
5. **Dedicating a multidisciplinary team** will help you spot opportunities to become even smarter. The most important roles within this team are:
 - » Service or use case designer to coordinate all parties and make a link between the needs of the city and the technical specifics.
 - » Data manager
 - » IT specialist (with knowledge of APIs and/or IoT)
 - » Legal specialist (Data Protection Officer)*Remember that all of these roles can be fulfilled by the same person.*
6. **Your level of engagement is a key factor** in determining whether or not a pilot becomes a success. The same goes for your stakeholders' level of engagement.
7. Not every smart city is the same. **Your procurement policy should reflect your smart city ambitions**. How do you handle the ownership of data? What are the minimum technical requirements for each of your smart city projects? What data model will you use? Defining these requirements is an iterative process, where every new pilot provides more insights.
8. **Your procurement process might become too rigid over time**. This is counterproductive within the world of innovation. Make sure to combat this by regularly updating your administrative process. It should reflect the latest changes and trends in the governmental procurement of smart city solutions. For example, if you are in the Netherlands, **PIANOo** can serve as a source to stay up to date.
9. Keep in mind that **the administrative process needs to be proportional** to the budget each successful candidate will receive.
10. It is also important to evaluate the return on investment of your project. Generally speaking, digital projects are developed to fulfil a purpose. If possible, you will have to compare the project's output to its initial goal. Part of the evaluation process of digital public services is to try and quantify their output and compare it to a situation without digital solutions. To do this, you need guaranteed access to the data generated by the digital service.



THE SMART COOKBOOK

for midsized cities



*A Guide on Creating and Improving
Open Innovation using Data*



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Smart City Innovation

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