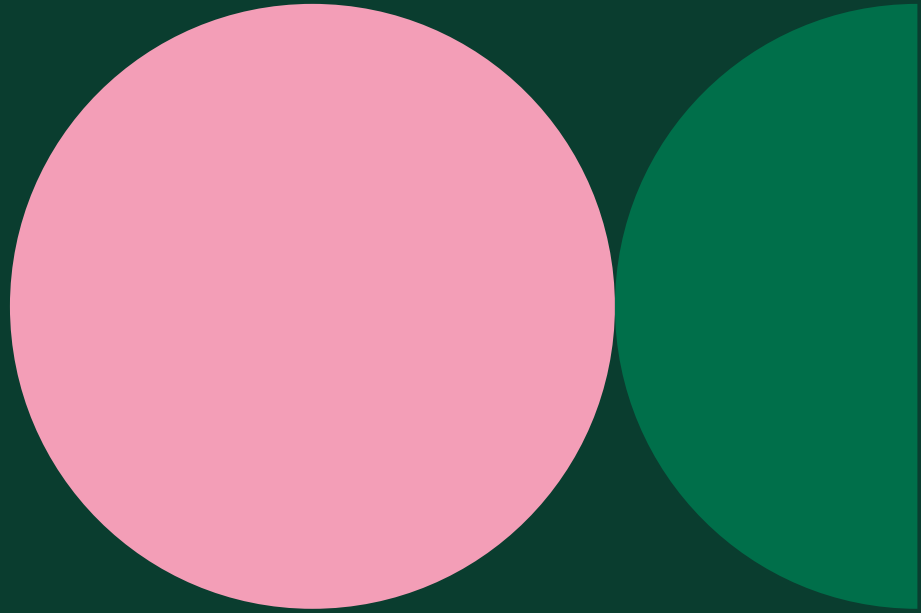




Circular Innovation  
City Challenge



# The city as facilitator of circular digital partnerships

Playbook

# Preface

The circular transition of cities plays a pivotal role for a sustainable future and data and digital solutions hold the potential to accelerate the transition.

Cities around the world have set ambitious climate targets and see the transition to a circular economy as crucial in reaching these targets. More and more cities see the potential in using data and digital solutions as enablers for their transition.

But city administrations are experiencing many obstacles when seeking to explore and implement new data driven, digital and circular solutions as it requires new methods and capabilities as well as new partnerships and collaborations across stakeholders, value chains and city ecosystems.

In the Danish Business Authority, we acknowledge the great potential in data and digital infrastructures as important drivers of innovation for the circular transition. In line with the EU Commission's Green Deal and Circular Action Plan 2020 and legislative proposals such as the Fit for 55 package that set the green and circular transition as a key priority for the EU, the Danish Business Authority urges to utilize the potential of data driven and digital solutions to reinforce circularity for sustainable businesses and societies.

To make it easier for cities to engage with businesses and entrepreneurs around data driven circular solutions we have initiated the development of this playbook. The playbook aims to inspire and guide project managers and leaders in city

administrations to become facilitators of circular digital public-private partnerships and innovation processes. The playbook holds concrete tools, methods and case studies for inspiration.

The playbook has been inspired and based on the learnings and insights from the Circular Innovation City Challenge that the Danish Business Authority initiated in 2021 with the cities of Glasgow, Amsterdam, Copenhagen, Toronto and New York City in collaboration the Danish Design Center, Leaderlab and the Ellen MacArthur Foundation. The city challenge presented great insights into the opportunities in innovative digital circular city solutions and the many obstacles that city administrations face when exploring ways to implement the new solutions in the city.

I am hopeful that the playbook will inspire and encourage cities and businesses to find productive ways to collaborate and engage in new digital circular partnerships paving the way for a sustainable future.



A large, stylized handwritten signature in black ink, reading 'Katrine Winding'.

**Katrine Winding**

*Director General, Danish Business Authority*

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# Purpose of the playbook



## Why this playbook?

Cities are uniquely positioned to accelerate the transition to a circular economy through data-driven innovation. Globally, solutions are emerging, but far too many of the challenges cities encounter are still to be solved for the cities to make the transition and reach their ambitious climate targets. City administrations must acquire new methods and means that support the exploration of partnerships across stakeholder landscapes, value chains, and city ecosystems. In other words, cities need to become facilitators of public-private partnerships in circular, data-driven innovation processes.



## Who is it for?

This playbook is written for project managers and leaders in city administration with a focus on circular transition, in particular data-driven solutions. It is also intended for businesses and entrepreneurs who focus on the circular, data-driven development of cities, and wants to understand how cities can enter into partnerships, as well as the barriers and opportunities currently present for city facilitators.



## How should you use it?

The playbook presents an illustrative transformation journey for cities and city administrators providing: 1) guidance on how to unlock the potential of circular, data-driven public-private partnerships. 2) a set of guidelines, tools and checklists addressing what cities should keep in mind when entering the role as facilitators, and 3) suggestions on where to seek further knowledge and guidance. Examples from frontrunner cities and previous projects are presented throughout the playbook, contributing with key learnings and insights.



## What is it built on?

The playbook is inspired and based on the learnings and insights from the Circular Innovation City Challenge held in 2021 by the partners behind the playbook. Since then interviews of frontrunner cities and relevant organizations within the circular, data-driven transition have been conducted. Additionally, the partners draw on their knowledge from a broad portfolio of projects with city development, public procurement and innovation projects.

**The circular economy transition offers wide ranging benefits to cities and their residents. To realise these benefits in full, cities will need to make bold decisions and imaginative solutions to rethink material and information flows. This report maps out how cities can forge innovative new partnerships to get the data and solutions they need to accelerate their circular economy transitions.**



**Sarah O'Carroll, Cities Lead**  
Ellen MacArthur Foundation

# Cities drive the circular transition

## **Cities play a key role in the transition to a circular economy**

Cities emit over 70% of our total greenhouse gas emissions and produce 50 % of the world's waste. That makes cities a crucial focal point for turning things around through their ability to drive on-the-ground sustainable transformation, involving business, citizens and other public organizations. The city can, as a physical space with far-reaching infrastructure, also be a key driving force in establishing new partnerships and collaborations on new circular, data-driven solutions.

The shift to the circular economy is a complex challenge that demands new ways of working and collaborating across sectors and disciplines. For instance, if a city aims to reuse materials from construction sites for new purposes, or is trying to enable B2C solutions around reusable packaging, the city must consider ways in which it can incite changes that will support new behavior and business models.

## **Data is the driver for circular transformation**

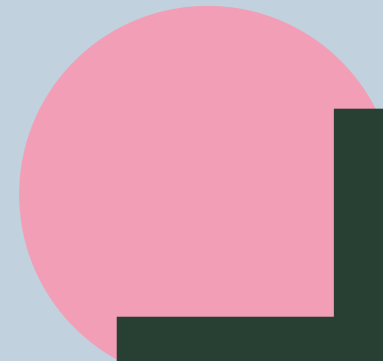
To support collaboration across supply chains and sectors, data is absolutely instrumental.

Data enables collaborators to trace materials and share product information through the value chain as well as to monitor product performance data<sup>1</sup>.

Increasingly, new startups and established businesses are exploiting the value of data-driven development to see how it translates into the circular principles and resilient business models that will future proof their businesses. This is causing them to ultimately rethink their business models and look across sectors - especially towards cities. A better understanding of circular, data-driven solutions is essential for cities to enable and engage companies in building new circular business models for cities.

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<sup>1</sup> Looping on Data, Danish Business Authority, 2021



# Data unlocks new, circular partnerships

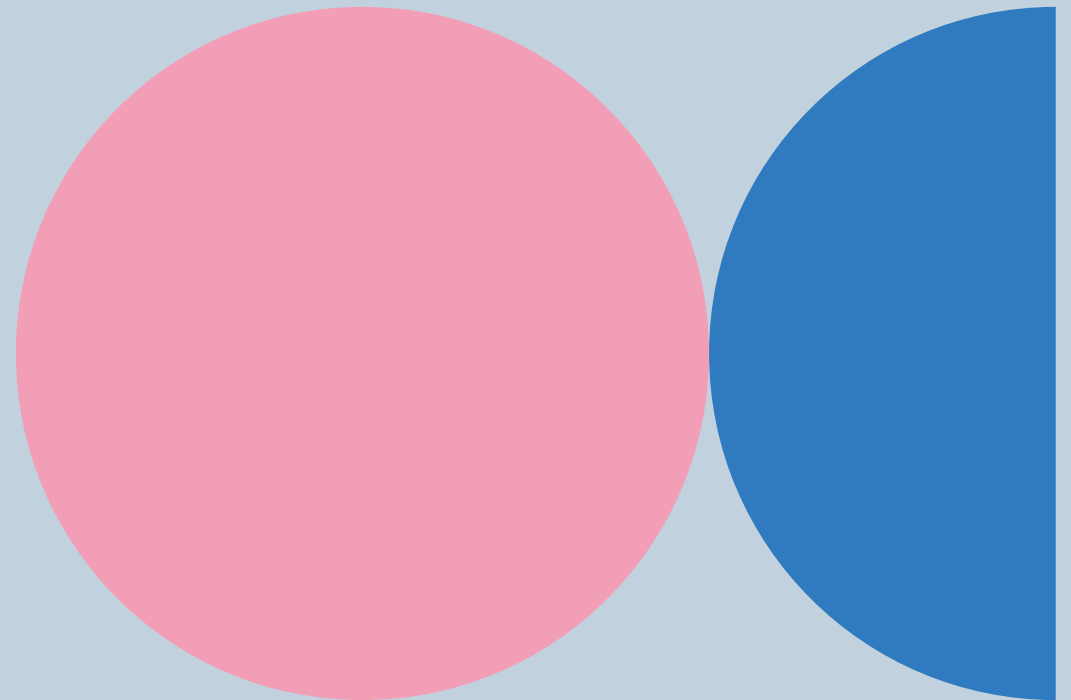
Data-driven solutions have the power to drive a circular transformation within a broad range of domains. From transparency and traceability of materials streams, through product-as-a-service (PaaS) business models, to new ways of engaging citizens in circular, low-emission lifestyles.

The opportunities are many, and the table on the following page, built on Ellen MacArthur Foundation's Interaction Matrix<sup>1</sup>, highlights how city-owned or city-related data can be an enabler within three key circular economy value drivers: 1) extending the use cycle of products and materials, 2) increasing utilization of products and materials 3) looping and cascading products and materials.

The table serves as inspiration for how and where new circular, data-driven solutions can arise in public-private partnerships across businesses and cities, however which use cases to implement for circular impact will differ from city to city. The tools we present in this playbook are relevant for identifying which use case addresses the city's needs.

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<sup>1</sup> 2 Intelligent assets: Unlocking the circular economy potential, Ellen MacArthur Foundation, 2016



# Data unlocks new, circular partnerships

	City-owned or city related data		
Circular Economy Value Drivers	<b>Knowledge of the location of products and materials</b> Useful to determine optimization of logistics, traceability, accessibility, etc.	<b>Knowledge of the condition of products and materials</b> Useful to determine the performance and state of products and materials and their use pattern, etc.	<b>Knowledge of the availability of assets</b> Useful to assess price dynamics, ownership history, quantities, etc.
Data and digital services extending the use cycle length of a product or material	<ul style="list-style-type: none"> <li>— Guided replacement service of broken component to extend asset life cycle</li> <li>— Optimized route planning to avoid vehicle wear</li> </ul>	<ul style="list-style-type: none"> <li>— Predictive maintenance and replacement of failing components prior to asset failure</li> <li>— Changed use pattern to minimize wear</li> </ul>	<ul style="list-style-type: none"> <li>— Improved product design from granular usage information</li> <li>— Optimized sizing, supply, and maintenance in energy systems from detailed use patterns.</li> </ul>
Data and digital services increasing utilization of a product or material	<ul style="list-style-type: none"> <li>— Route planning to reduce driving time and improve utilization rate</li> <li>— Swift localisation of shared assets</li> </ul>	<ul style="list-style-type: none"> <li>— Minimized downtime through predictive maintenance</li> <li>— Precise use of input factors (e.g. fertilizer &amp; pesticides in agriculture)</li> </ul>	<ul style="list-style-type: none"> <li>— Automated connection of available shared asset with next user</li> <li>— Transparency of available space (e.g. parking) to reduce waste (e.g. congestion)</li> </ul>
Data and digital services enabling looping/cascading a product or material through additional use cycles	<ul style="list-style-type: none"> <li>— Enhanced reverse logistics planning</li> <li>— Automated localisation of durable goods and material on secondary markets</li> </ul>	<ul style="list-style-type: none"> <li>— Predictive and effective remanufacturing</li> <li>— Accurate decision-making for future loops (e.g. remain vs. recycle)</li> </ul>	<ul style="list-style-type: none"> <li>— Improved recovery and reuse/repurposing of assets that are no longer in use</li> <li>— Digital marketplace for locally supplied secondary materials</li> </ul>



# Cities set ambitious circular strategies

Many cities are currently working hard to drive the circular transition. This work requires a strong foundation, baselining the city's point of departure as well as establishing strategies for how to reach the goals. Cities such as Glasgow, Toronto and Copenhagen have all in their ways established such baselines and strategies.

## **The Glasgow roadmap**

Glasgow has set an ambitious commitment to become a circular city by 2045. Through the Circular Economy Route Map Glasgow has embarked on a mission to mainstream the guiding principles of circularity within the city. This includes working with themes such as eco-design, sharing, reuse, repair and remanufacture across both public, private and community sectors.

This is an effort that cannot be achieved without data-driven solutions, and includes activities related

to both material stream mapping, community sharing, and consumer behavioral change. Glasgow recognizes the role that the public sector can assume in facilitating and driving the needed innovation and engagement for this to succeed.

## **Baselining for a Circular Toronto**

Toronto aims to be a leading city in attracting and supporting businesses that contribute to the circular economy. With "Baselining for a Circular Toronto", the city has conducted a mapping of how resources like metals, fossil fuels and biomass move

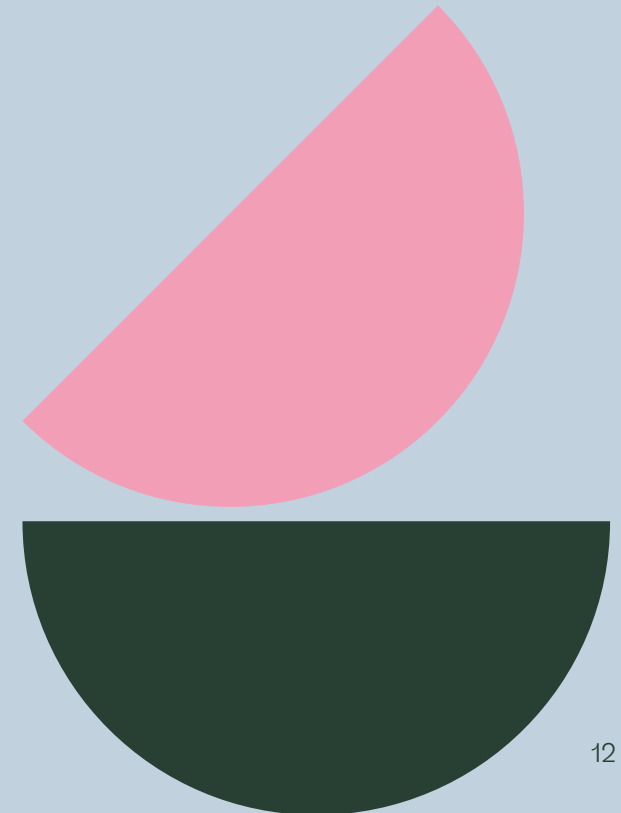
through the city. Through this mapping, Toronto has gained an understanding of the city's current state of circularity and has identified strategic areas of opportunity within key sectors for advancing a circular economy.

The study points to how the technology sector can support more circular resource use and better data management through the development of digital products and data-driven solutions in the city. Toronto highlights that new ways of sharing information and collaborating between the public and private sectors will be necessary to shift from linear thinking to circular opportunity.

## Copenhagen accelerates recycling

With the 'Circular Copenhagen' strategic plan and innovation platform, Copenhagen has set targets to increase the direct reuse of goods by three times, recover 70 % of municipal solid waste for recycling, and reduce CO2 emissions with 59.000 tons by 2024. Digital solutions and technologies are an integral part of Copenhagen's strategic effort and are being explored in partnerships with private and civil society stakeholders.

This includes efforts on how product digitalisation, categorisation, and online marketing can increase the potential for reuse of everyday items by citizens, as well as on using digital watermarks for ensuring higher quality recycling. Copenhagen's strategy not only focuses on handling existing products and materials but holds the ambition to support rethinking and redesigning products and services to fit the circular economy.



**A key finding was that a large amount of the waste generated and resources consumed in our city is outside of our immediate scope of authority. That is a signal that we need to think about how we work with or incentivize private sector actors in our circular transition.. [...]**

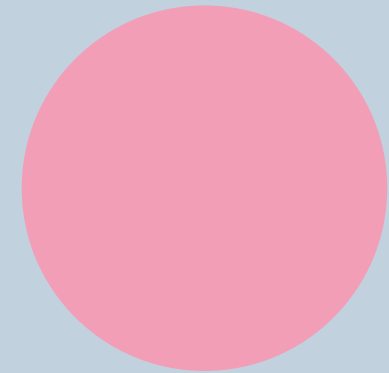


**Meaghan Davis**  
City of Toronto

# The city as facilitator

For a city's administration to succeed in accelerating a circular transformation, innovative data-driven solutions will help iterate new ways of working and partnering across stakeholder landscapes, value chains, and city ecosystems.

These circular, data-driven partnership-based projects require that the city administration initially set aside the traditional public procurement processes, since no existing solutions might be available for procurement, or because the final product or service will not be owned by the city itself. Instead they must opt for a more explorative and collaborative engagement, not only with the private sector but also internally in the city administration. In other words, the city becomes a facilitator of public-private partnerships in circular, data-driven innovation processes.



# Three arguments

There are three key considerations for why city administrations need to take on this new facilitator role.



## **Defining the targets and long-term strategic transformation**

In public-private innovation partnerships it is important that the city administration takes the first step, clearly demonstrating the city's ambitions, inviting stakeholders, exploring common ambitions and facilitating the collaboration within a point of departure in the different leverage points and instruments the city has at its disposal.



## **Leveraging private sector innovation and ecosystem development**

Almost all circular solutions in the context of cities will have a data-driven core or component that is critical to the scalability of the solution. However, ecosystems around circular, data-driven solutions are still fairly new, and consequently city administrations will often find that commercial off-the shelf solutions are not available or ready to scale and that the city administration must play an active role in supporting and maturing these ecosystems to make the necessary solutions available.

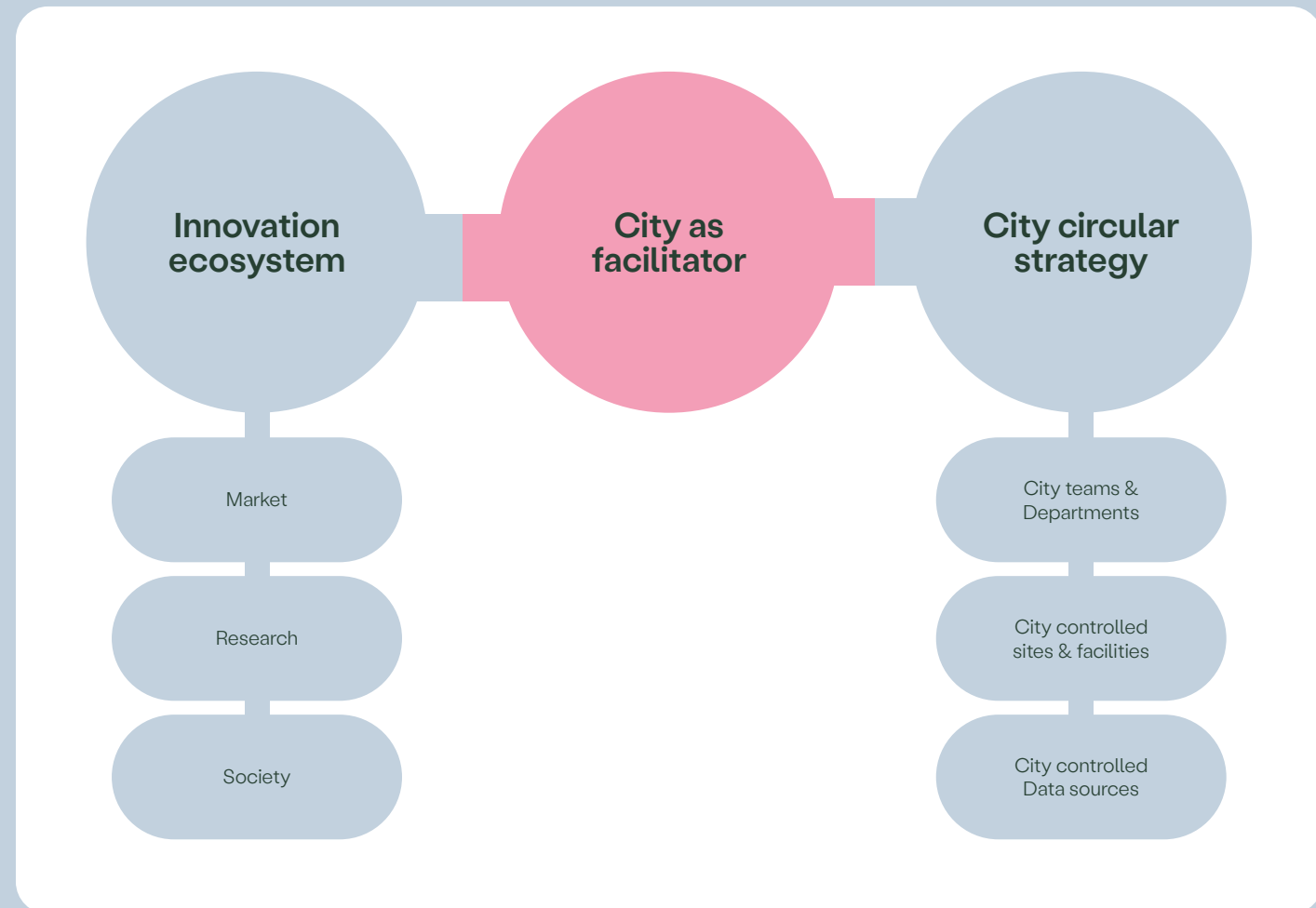


## **Establishing cities as relevant collaboration partners**

Circular, data-driven solutions span city administration departments and roles. In order to succeed it is critical to engage and organize different people with different goals and priorities internally in the city administration.

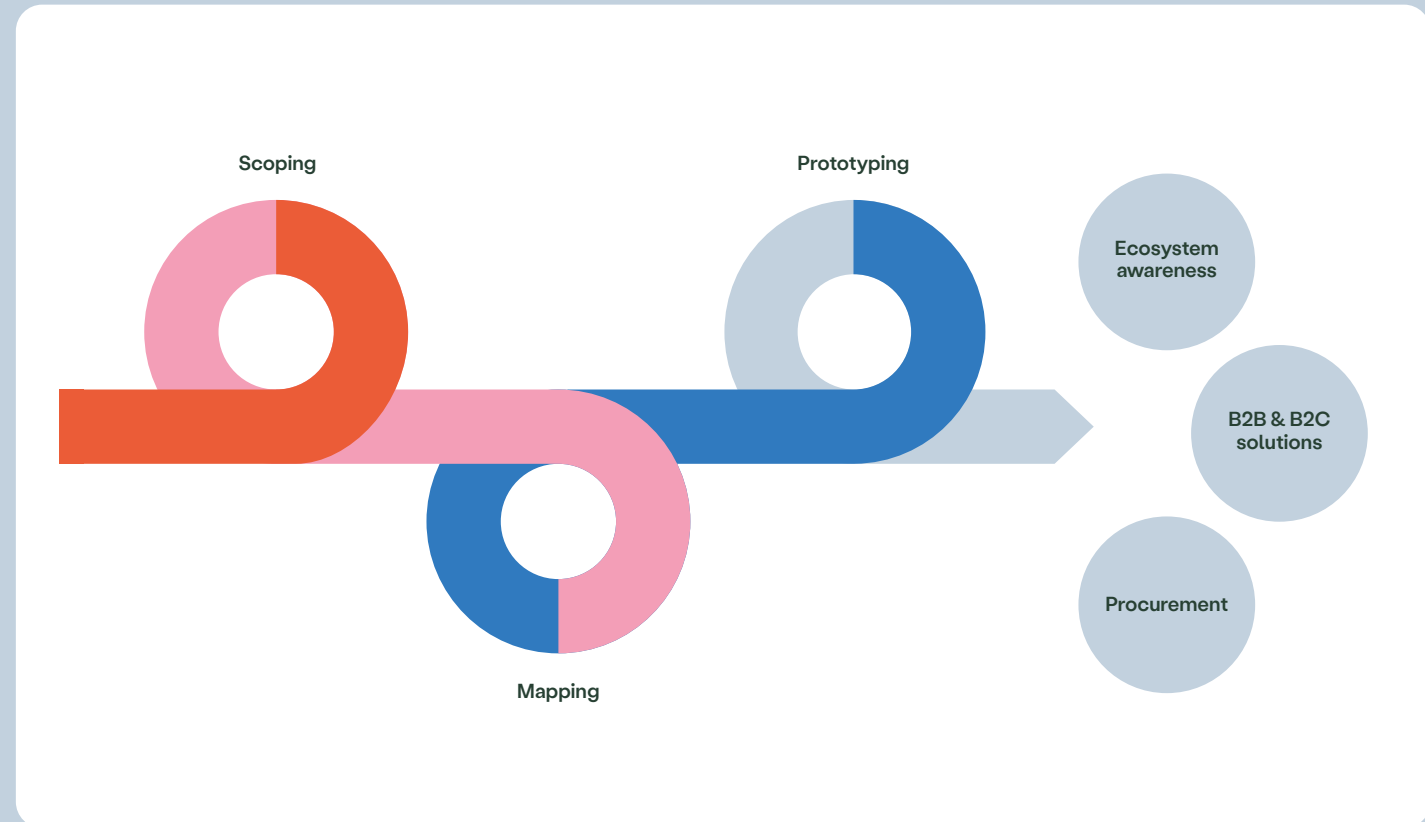
# Collaboration towards a circular transformation

The model shows how city project managers and circular leaders can undertake a facilitator role both internally and externally - facilitating collaboration externally towards the private and civic innovation ecosystem and internally towards city teams, departments, sites, facilities and data sources in order to stimulate new circular, data-driven solutions.



# The journey

The model illustrates the iterative steps in the journey from scoping (p. 19) over mapping (p. 27) to prototyping and testing (p. 36). And finally, the different pathways a project might take when scaling impact (p. 44).



# Approach

When embarking on the journey towards circular, data-driven solutions there are many questions that need to be asked and answered in order to define the best path forward. There are also several methodological ways to approach the innovation process and tools that can help guide the city as a facilitator.

This playbook is based on a design-oriented approach since design processes inherently are concerned with changing existing states into preferred ones, have an action-oriented and iterative methodology, and are often based on participatory practices, which has shown to be effective in transitioning to and innovating within a circular economy.

The playbook presents a generic design journey and suggests where to find more knowledge regarding different methods that can be helpful at each step in the journey. The following is meant as a set of guidelines addressing what cities should be aware of when assuming the role of facilitators. Based on similar processes the playbook introduces four generic steps, that forms the basis of the guide:

- 1. Scoping the digital, circular solution**
- 2. Mapping & engagement**
- 3. Prototyping & testing**
- 4. Choosing the right path for scaling impact**

Depending on the nature of your challenge, cities might find some phases more relevant to their work than others. Note that this is not a linear journey, where city facilitators have to go through all phases sequentially. Facilitators might want to iterate a phase several times or take a different starting point, depending on the particular challenge and context. It is, however, fruitful to understand all four phases and how the city as a facilitator can navigate within and between the different steps/phases.

In each chapter, the playbook describes *why* the step is important, *what* role the city as a facilitator should assume, and also presents examples and links to methods and approaches that are helpful on *how* to proceed with the specific activities. At the end of each subchapter, the playbook offers a brief description of the expected output.

## 1

## Scoping the digital circular solution

Scoping the challenge the city is trying to solve is important to provide direction for everyone involved in the process. In this playbook the challenge field is defined as the circular transition with a specific focus on data-driven solutions. The scope can originate from:

- **An internal, city strategic challenge, e.g. reducing plastic waste across sectors.**
- **A market challenge, e.g. a need for increasing local business and citizen access to sharing platforms or product-as-a-service solutions, e.g. reusable food containers**
- **A specific project need, e.g. a need for access to public data on buildings to predict maintenance issues.**

Regardless of the starting point, the scoping process needs to take all three levels above into account. When solving a circular challenge spanning many administrative groups, drawing on fragmented data sources, the scope needs to be very specific, clarifying the need for access to certain data. An unclear scope makes it harder to provide the case and arguments for involving internal as well as external stakeholders, undermining the process from the outset.



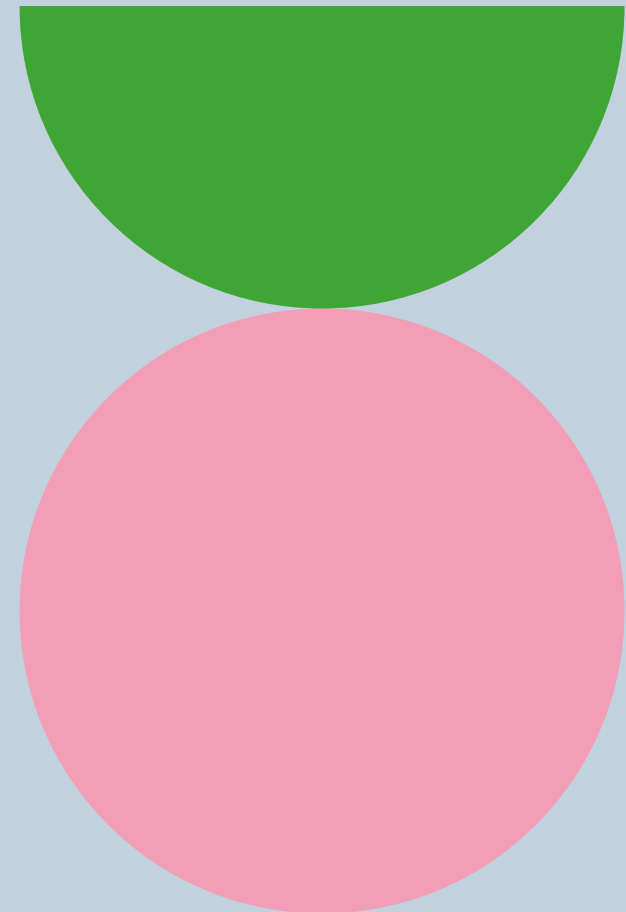
## 1

## Scoping - Settling on outcome and goal

When the city scopes the challenge, it is necessary for the city facilitator to spend some time reflecting on, which outcome of the challenge the city is aiming for and how value can best be created in the city context.

- Is the aim to test and develop new digital and circular solutions for the city to **procure** in the future?
- Is the goal to create better city framework solutions to stimulate new circular, data-driven **B2B** and **B2C** solutions on **market terms**?
- Or is the goal to generate **ecosystem awareness and engagement** to foster new collaboration on circular, data-driven solutions in the innovation ecosystem?

The three outcomes above will affect the nature of the innovation partnership and process. To understand the three pathways towards implementation and scaling, read more in chapter four page 44.





## Spotlight: 'Circular Copenhagen' innovation platform

An innovation platform managed by the City of Copenhagen built for developing circular, data-driven solutions through partnerships.

The City of Copenhagen has set very ambitious goals towards 2024:

- 70 % recycling of MSW in 2024,
- Reuse rate increased by three times in 2024 compared to 2018
- CO2-reduction of 59.000 tonnes.

To tackle these challenges 'Circular Copenhagen' innovation platform was established as a way to apply a challenge-oriented approach to spurring partnerships with industry and academia on themes like; diaper recycling, discarded mattresses and circular food trays<sup>1</sup>.

Challenges as an innovation approach can be a valuable tool for cities to invite in a broader ecosystem nationally as well as internationally to collaborate around solving circular, data-driven challenges and it can serve as a key component to increase the probability of starting ambitious public-private partnerships.

The challenge process also serves as a communication tool for the broader audience, citizens or inspired cities by showcasing their insights, learnings and process along the way.

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<sup>3</sup> 'Circular Copenhagen' innovation platform, 2022  
(<https://circularcph.cphsolutionslab.dk/cc/home>)





## Scoping the digital circular solution

**“Our local politicians are very ambitious when it comes to the circular economy. We can’t meet their goals by just procuring off-the shelf products, so we need to assume a new role and enter into co-creation processes.”**



**Jonas Åbo Mortensen**  
City of Copenhagen

## 1

# Scoping - themes & activities

The scoping process consists of exploring relevant themes & answering questions at each level in close collaboration with both internal and external partners.

## City strategic challenges

The scope must be aligned with internal strategies, policies & politics to succeed.

- First of all, the project must be aligned with a societal need and or political goal, e.g. increasing direct reuse of products and resources, from both citizens and companies, through collection and demand facilitation.
- Second, the project must aim at fulfilling already established strategic goals for the city to get internal support in the long run.
- Make sure that the project has political backing and that the expected results are aligned with the political mandate.
- Describe how this is a data-driven challenge to get the support from relevant internal resources, e.g. IT-department and data owners.

## Market challenges

The scope must address the main market challenges while also acknowledging typical roles in a public-private partnership.

- Be very clear regarding formal and informal rules of engagement when you as a city representative supports commercial development in collaboration with market partners.
- Analyze and define the framework conditions the market partners need to succeed when developing a solution, e.g. city-owned data needs to be made public.
- Analyze and understand the main barriers for industry innovation, e.g. regulatory barriers, financial barriers, lack of knowledge, fragmented value chains etc.
- Make sure that the city and the market partners are fully aligned on which data are critical for the project to succeed.

## Project needs

The scope must address the project needs, including time and budget. And as a city facilitator you need to identify the necessary resources and align expectations across all partners.

- Make sure that all partners involved agree on the success criteria for the project and that these are stated explicitly early in the project.
- Develop a realistic plan and a detailed budget on a task-level in collaboration with all partners.
- Agree on who delivers what and which resources are available to solve each task. Also, define roles and responsibilities for each part of the project and make sure that all partners have allocated the necessary resources.
- Identify and agree on critical data sources, and make sure that all relevant partners have access to the needed data at the right time in the project.

## 1

# Scoping - checklist & issues

Below are checklists to ensure that you as a city facilitator are on track in your scoping process. You can also have a look at the potential issues for each scope area to help guide you in the right direction.



## City strategic challenges

### Checklist

- Is the scope aligned with the city's strategic / political goals?
- Is the scope backed by managers and political leadership?
- Is the scope sufficiently focused on circular, data-driven challenges?

### Issues

- Be aware of any changes in political / organizational goals, which might affect your scope.



## Market challenges

### Checklist

- Is the scope validated and aligned with market actors?
- Have market actors clearly stated their reasons for participating in the partnership?
- Are expectations aligned concerning potential outcomes?

### Issues

- Express the market needs & challenges in general terms to avoid locking the scope to a specific market actor at an early stage.
- Make sure that you are not making any specific promises to individual market actors at this stage.



## Project needs

### Checklist

- Are the project ambitions realistic within the framework defined by time and budget?
- Are the project specific success criteria aligned with internal and external stakeholders?
- Is circular and data-driven a focal point for the project scope?

### Issues

- Avoid locking the scope to a specific solution at this stage of the project.
- Keep the project scope narrow and realistic - do not try to frame entire systemic value chain issues, unless you have the necessary resources.
- When the project scope is finalized, keep it in mind at all times to avoid scope creep.



## Output - Tools & output

Below are some tools to help you in the scoping process and a description of the expected output.



### City strategic challenges

#### Tools

- Literature/desk studies
- Internal workshops & interviews
- Assumption Mapping
- Problem Disc



### Market challenges

#### Tools

- Workshops
- Structured interviews & bilateral meetings with market partners
- Affinity Diagram



### Project challenges

#### Tools

- Workshops with internal/external actors
- How Might We

### Output

The output of the scoping process should be a preliminary design brief stating which specific challenge the project is aiming to solve grounded in the societal, market and specific project needs. The design brief could be anything from a one-pager to a more comprehensive analysis, depending on the complexity of the challenge(s) in question.



## 2

Mapping  
& engagement

**“For the circular economy as a policy field our tools and possibilities are limited, so a lot of what we do as a city is to find the right actors to create solutions together.”**



**Daan Jongejan**  
City of Amsterdam

## 2

## Mapping & engagement

Globally, many private and public actors are engaged with developing solutions and addressing challenges within the circular economy. When initiating new projects, cities run the risk of wasting both public and private resources on scoping challenges, initiating projects and developing solutions, which others have already addressed or solved. That is why a comprehensive mapping of existing projects and solutions is key to developing solutions that will have a real impact.

Additionally, many projects never gain traction simply because the project owners were not sufficiently aware of which actors to involve or because they lacked an understanding of the political and commercial power structures that can either further or hinder the progress of a project.

Equally important, as a city facilitator you need to stay focused on data-related challenges from a city perspective and the key resources needed, e.g. access to existing public/private data sources and availability and readiness of open/closed datasets, which might be necessary to develop specific solutions. You also have to keep other resources in mind, i.e. the financial framework as well as internal/external manpower allocated to the project. Consequently, the mapping process needs to progress at the following levels:

- Mapping existing projects and solutions
- Partner selection internally and externally
- Aligning resources internally and externally

**Mapping existing  
projects & solutions**

**Partner mapping  
& selection**

**Mapping &  
aligning  
resources**

# 2

## Spotlight Circular Innovation City Challenge

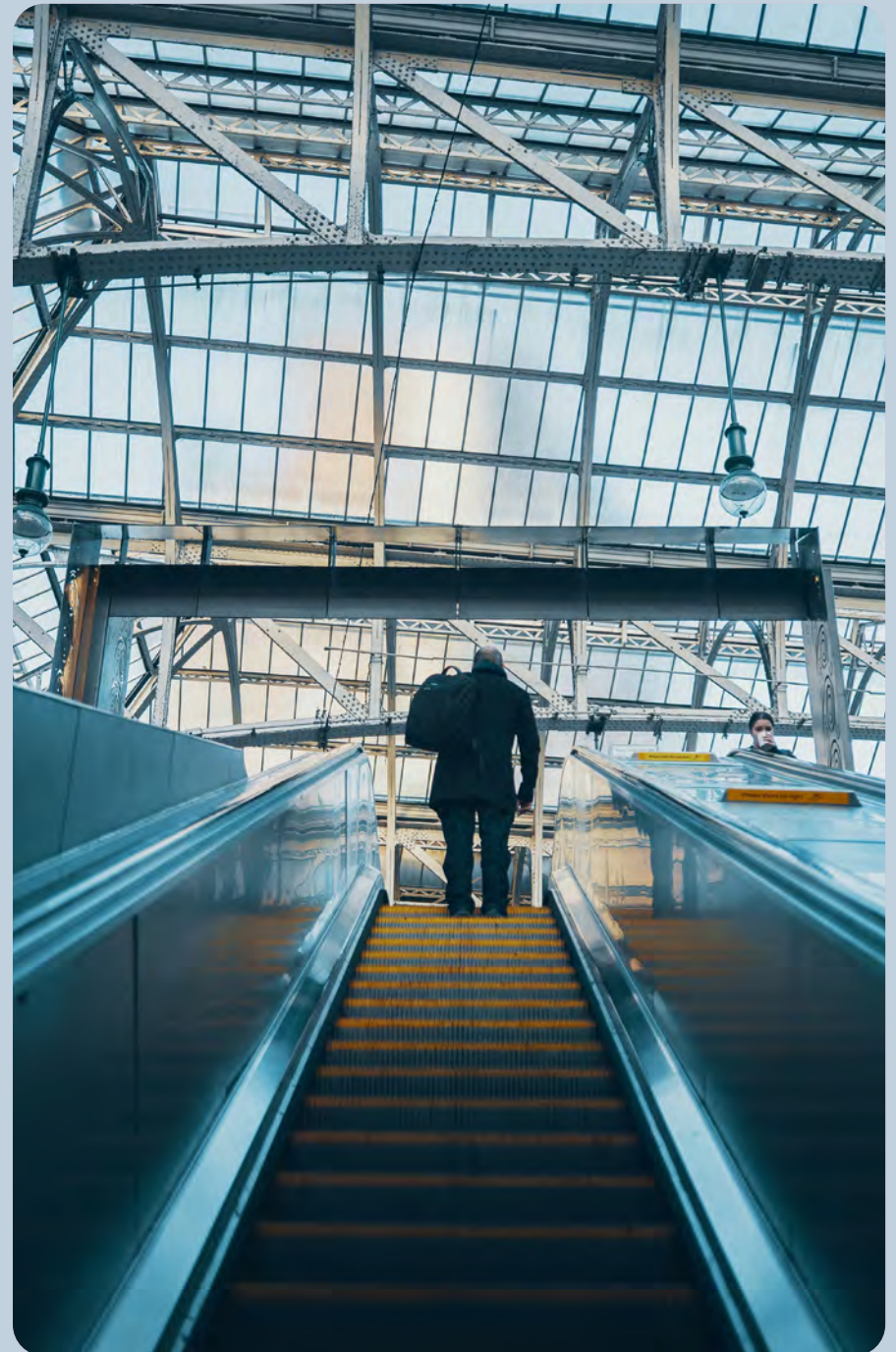
In a joint effort, the cities of New York, Toronto, Amsterdam, Glasgow, and Copenhagen sought innovative digital and data-driven solutions from around the world to create more circular and thriving cities. The Circular Innovation City Challenge (CICC)<sup>4</sup> was a global call to action for innovators and entrepreneurs to submit their solutions, and to engage in collaboration with cities.

CICC was initiated by the Danish Business Authority in 2021, in collaboration with DDC, Leaderlab and The Ellen MacArthur Foundation. The point of departure for CICC was the recognition, among others from a 2019 C40 World Mayors Summit workshop in Copenhagen, that the radical changes needed will not come without better use of data and insights on the materials and products we use, new circular business models, and new ways of engaging city communities.

The challenge uncovered 137 circular, data-driven solutions from 26 countries across six continents. 15 finalists pitched their solutions towards an international jury of city representatives and circular experts, and five winners were selected.

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<sup>4</sup> Circular Innovation City Challenge, 2022  
(<https://www.circularinnovation.city/>)



After the selection, the companies continued the dialogue with the cities to explore further possibilities for collaboration and implementation. Creating a strong awareness both locally and internationally around the opportunities for both cities and innovators in engaging in collaborations and partnerships around circular, data-driven solutions. In particular the CICC resulted in recognition of the potential of circular data-driven solutions:

- To support decentralized and agile solution frameworks suitable for a complex landscape of materials, products, and stakeholders within a city.
- To support knowledge sharing and learning across a wide range of stakeholders within and outside the city.
- In having scaling capabilities across cities and regions.
- In having the ability to provide opportunities and tools for direct engagement of citizens and city communities in circular activities



**“What was really helpful for us in participating in this challenge was identifying so many digital, circular innovators that want to work with the city in some way. We were really surprised by the number of organizations we weren’t aware of or connected with.”**



**Meaghan Davis**  
City of Toronto

## 2

## Mapping & engagement - themes & activities

The mapping process consists of a systematic review of the challenge space and ecosystem as well as aligning resources and exploring relevant themes and questions in collaboration with internal and external partners.



### Mapping existing projects & solutions

- The first step is to find out if the challenge has already been addressed. Globally, many actors are working within the field of circular, data-driven challenges, so chances are that somewhere, someone already is addressing a similar challenge.
- If no solutions can be found on the market, or if existing solutions are at a low maturity level, expand the mapping to include R&D-projects.
- When you have a map of commercial solutions and/or R&D-projects, you can start assessing if and how they can be part of addressing your challenge.



### Partner selection

- The second step is to determine which partners need to be around the table. This covers both external, market actors and equally important, internal city teams and departments. You should have a clear plan for how to involve partners and when their involvement will create the biggest impact. Not everyone has to be involved at all times.
- Create a map of potential, external partners, based on your analysis of projects and solutions already existing in the market, but also beyond those market actors with existing solutions.
- Determine which internal teams and departments are key to the success of the project, either because they will be a future solution owner, are key to accessing data or facilities, or have jurisdiction overlap with the challenge domain.
- Define expectations towards each internal and external partner and use this to align their role and responsibilities concerning time and resources and also in regard to e.g. expectations towards sharing of data.
- Be open and honest about what the expected value and/or return-on-investment is for each partner.



### Aligning resources

- Create a detailed map of the resources available from each partner - from financial to data and manpower, and match those resources with the ambitions of the project.
- If additional resources are needed, e.g. external funding or research partners, make sure to include them in your map and have the responsible partner follow-up continuously.
- In a circular, data-driven project, one of your most important tasks as a city facilitator is to make sure that you have a comprehensive overview of all data needed to succeed, and that all relevant partners have access to the data.
- You also need to map the legal and regulatory framework that might influence the project, to ensure there is a common understanding of the terms of engagement for both internal and external partners.

## 2

## Mapping & engagement - checklist & issues

Below are checklists for ensuring that you are on track in your mapping & engagement process. You can also have a look at the potential issues for each step in the process to help guide you in the right direction.



### Mapping existing projects & solutions

#### Checklist

- Do you have a well-described methodology for your mapping process?
- Have you mapped solutions nationally as well as internationally?
- Do you include both R&D projects, startups/scale-ups and established market solutions?

#### Issues

- Avoid cherry-picking when mapping projects & solutions.
- If you find projects that sound similar, do a deep-dive to ensure that you have a thorough understanding of the scope of the challenges they are trying to solve - you might uncover potential for collaboration.



### Partners selection

#### Checklist

- Is your external and internal partner map sufficiently comprehensive?
- In both public and private sectors there will be actors who are more willing to name competitors as potential collaborators than others, so always try to get a 'second opinion' to make sure the map is comprehensive and unbiased.
- Does your mapping include political and bureaucratic decision makers necessary for the momentum of the project?

#### Issues

- Favoring some partners over others due to e.g. existing collaborations might result in a too narrow focus on specific solutions.
- Large companies and public actors can invest more time in a project without direct financing, while SMEs and startups are more vulnerable - but willing to invest if there is a clear return-on-investment in sight.
- Keep in mind that alignment with internal actors and power structures is key if the project is to succeed.



### Aligning resources

#### Checklist

- Is the time & budget allocated sufficient in regards to the scope of the project?
- Are all partner roles clear and well-defined?
- Are all tasks assigned to a specific partner?
- Do you have access to the data needed to develop the solution?
- Is data owned by and/or available to the project partners?

#### Issues

- During the project you might need to identify and search for additional data sources and/or decide whether to buy or develop new data sets to further the project.
- Make sure that you have room in your budget and timeframe to explore opportunities and handle obstacles that arise during the project.

## 2

## Mapping & engagement - tools & output

Below are some tools to help you in the mapping & engagement process and a description of the expected output.



### Projects & solutions

#### Tools

- Literature/desk studies
- Affinity Diagram



### Partners

#### Tools

- The ecosystem mapping
- Value system mapping



### Project challenges

#### Tools

- Project Gannt
- Budget

## Output

The output of your mapping process could be a project & solution cluster, i.e. a visual/textual overview of relevant projects and solutions trying to solve the same or related challenges as your project.

The output should also include an ecosystem map of internal and external stakeholders and potential partners, which in turn results in a short-list of project partners. The final output should include project milestones and deliverables as well as a comprehensive description of resources including finances, manpower and data, partner group and roles and finally a project plan including tasks assigned to each partner.



## 3

## Prototyping & testing

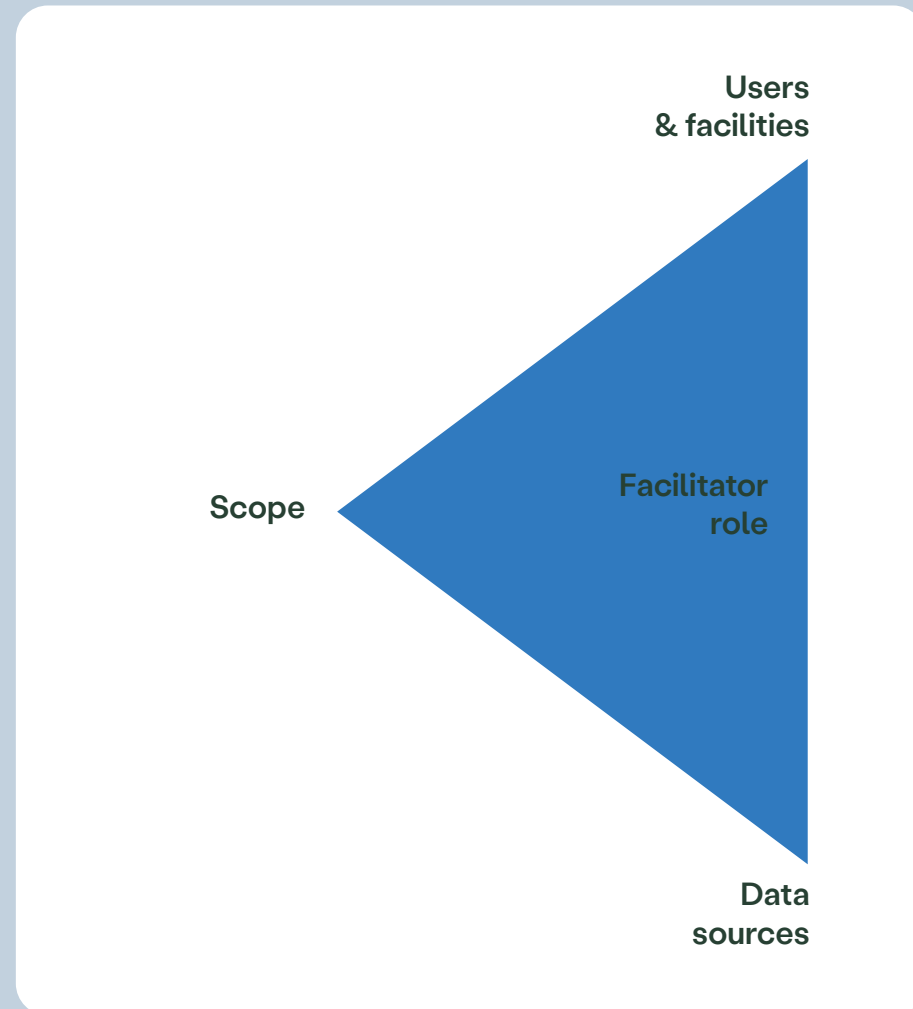
When the project is sufficiently scoped, the originality of the project has been determined and relevant actors and resources identified, the actual development of the solution can begin.

As a city facilitator your role in this part of the process is to ensure that the development of a specific solution stays within scope, budget and time. It is also important that you keep facilitating the process and the collaboration between partners who might have different interests and needs, making sure that everyone is aligned.

Additionally, as a city facilitator you might also represent a very important future user or collaboration partner in the solution space. In this capacity you can play a central role in facilitating user tests and feedback which helps ensure that the solution is relevant for the intended market.

Finally, your role is to make sure that all project partners involved in the prototyping phase have access to critical and relevant data - especially if the data is owned or provided by the city. As a city facilitator you might also be in a position to access privately owned data or engage with external partners by stressing the need for developing solutions with a societal impact. Consequently, your role in the prototyping phase is centered around the following themes and activities:

- Scope - impact, alignment & reframing
- Users & facilities
- Data source access



## 3

## Spotlight: CircuLaw

A platform initiated by the City of Amsterdam and institutional innovation agency Dark Matter Labs, built to show how better use of regulation can contribute to the acceleration of the circular transition.

Navigating laws and regulations around environmental transitions can be a highly complex and frustrating process for policy makers. The team set out to create a tool that would make this process convenient and accessible. Together with a large and diverse partner group, they have created an open and public law-as-a-service platform, which maps out current regulations and laws across different government levels. The tool shows how helpful different regulatory measures can be to achieve circular economy goals and scores them on impact and viability. The idea is firstly to make better use of opportunities within existing laws, and in a later stage also to address barriers and gaps.

The city as facilitator



As part of the EIT Climate-KIC Deep Demonstration Programme, the city of Amsterdam worked together with Dark Matter Labs to make sense of systemic obstacles in achieving the city's ambitious circular economy objectives, and then created initial experimental prototypes. This has turned into a Research and Development collaboration between a coalition of knowledge and funding partners.

The alpha version was launched in September 2022 as a permanent prototype that is continuously added to with the results of legal analysis around different high priority value chains and product groups. In this way, it inspires practical examples and investigations into new themes, and gets enriched every time it is applied - building knowledge from experiences across cities in the Netherlands. In the long term, CircuLaw<sup>1</sup> can be designed so it allows for feedback loops and adaptation to other countries.

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<sup>1</sup> 5 Circulaw, 2022 (<http://circularlaw.nl/>)





## Prototyping & testing solutions

**“Start small, grow it slowly. If you form a coalition of the willing and show that you have a solution that is working, then other parties will join.”**



**Jorren Bosga**  
City of Amsterdam

## 3

## Prototyping & testing - themes & activities

Prototyping & testing is done in close collaboration with internal and external partners. Below are some pointers towards themes and activities which are relevant for you as a city facilitator.



### Scope

- It is important that the prototype demonstrates impact on the challenge scope. It is your role to keep the project within scope and make sure that the project stays aligned with ambitions regarding impact.
- If preliminary tests or findings challenge the scope, it is your role to reframe the design brief and set a new direction.
- Create and maintain an updated design brief, which serves as a guiding tool for all involved stakeholders.



### Users & facilities

- Identify, recruit and engage with the user groups that you and the project team have identified as the most relevant.
- Make sure that external partners have access to relevant actors/users and facilities in your organization.
- Choose a methodology and toolset for keeping track of user input to have consistent data on user feedback.



### Data source access

- In a circular, data-driven project your role as a facilitator is to make sure that project partners have access to critical and relevant data sources before prototyping.
- If preliminary findings point towards the need for new data sources, try to get access quickly to avoid delays.
- Keep an updated map of data sources, including data types, owners, format, and privacy/security issues. Distribute the map to all relevant partners.

## 3

## Prototyping & testing - checklist & issues



### Scope

#### Checklist

- Do results from tests & preliminary findings create the need for a reframing of the project scope?
- Is your design brief consistent with the scope and kept up-to-date?

#### Issues

- Be aware of scope creep, i.e. when the project keeps expanding to solve new challenges not in the original brief.



### Users & facilities

#### Checklist

- Is there a good fit between users recruited and your actual target group for the proposed solution?
- Do you have a consistent method for collecting and reporting user feedback?
- Is user feedback iteratively looped into wireframes/ prototypes and re-tested?

#### Issues

- Erroneous recruiting often leads to unproductive feedback, since the tested solution is not sufficiently relevant to the user.



### Data source access

#### Checklist

- Are critical data sources available and accessible to all relevant partners?
- Is your data map updated and distributed to all partners?
- Are there any security, privacy or governance issues that you need to take into account?

#### Issues

- Data is sometimes seen as more sensitive than they actually are by 'gate-keepers'. To get access it might be necessary to evoke the greater good - or someone higher up the chain of command.

## 3

## Prototyping & testing - tools & output

Below are some tools to help you in the mapping & engagement process and a description of the expected output.

**Scope***Tools*

- Updated design brief

**Users & facilities***Tools*

- Customer journeys
- Storyboard
- Rapid prototyping

**Data source access***Tools*

- Data source map
- API-descriptions

**Output**

The first output should be an updated design brief for the project, including dynamic requirements specifications for the prototype. When involving users, another output is user feedback in structured formats, e.g. customer journeys or use cases and iteratively updated wireframes and functional prototypes on all or parts of the proposed solution.

Additional output is the updated data map, (prototypical) APIs to critical data sources and a general clarification of IT-governance issues related to e.g. data privacy and security. The final output should include project milestones and deliverables as well as a comprehensive description of resources including finances, manpower and data, partner group and roles and finally a project plan including tasks assigned to each partner.





## Next steps: Choosing the right path for scaling impact

Through the explorative journey described in this playbook, the city will have strengthened its ability to achieve strategic circularity goals and targets, by understanding the scope of the challenge, who the critical collaborators and data sources are, and what it takes to implement a solution in practice.

The last, critical step in the journey is to facilitate the transition into subsequent efforts focused on operational implementation and scaling of the solutions to create the necessary impact.

Which path to take for scaling impact is a consideration that should be part of the journey already from the scoping phase, but it is also a consideration that will be informed during the process. The path you end up taking is also influenced by whether the challenge you are addressing:

- Requires that the city host and finance the solution due to e.g. regulatory responsibilities,
- primarily is a private sector or citizen issue that can and should be addressed by market actors,
- is of an emergent nature and requires further R&D to develop market offerings.

Your role as a facilitator in this phase, is to ensure that the insights gained through the previous phases of the journey are brought into the implementation and scaling efforts, whatever the pathway.

Additionally, your role as the facilitator is to ensure that insights are used to inform and further develop the city's capacity for data-driven efforts towards a circular transformation.

**“It is our recommendation that the issue of procurement is considered early in the dialogue between the public and private parties. A collaboration does not always have to end with a tender and/or a procurement, but it is crucial to clarify the matter early in the process. It is a shame to discover that a private company cannot participate in a later tender because they have become ineligible due to participation in a development process. And if the process is to end with an acquisition, it is important to have an early clarification of purchasing power and willingness, as well as to have involved the relevant budget holders.”**



**Rikke Thorlund Haahr**

Center for Public - Private Innovation (CO-PI)



## Next steps: Pathways to implementation and scale

Below are examples of three pathways towards implementing and scaling a project. There are numerous variations for each example, but each represents a fundamentally different approach. For each of these pathways there are specific points the city facilitator should focus on when facilitating the transition:

### City procurement

If the path chosen leads to implementation through city procurement, whether for a finalized product/service or a product to be developed together (public procurement of innovation), your role as a facilitator is to:

- Help clarify internal city governance and ownership around the procured solution based on insights from the mapping phase.
- Make sure insights and results from the prototyping and testing phase are handed over to procurement teams in a form where they can provide guidance for tender requirements.
- Help determine terms of access to city data and facilities, needed for the circular, data-driven solution/service to function.

As an example of this the Metropolitan region of Amsterdam in 2020 published a roadmap for 'Circular Procurement & Commissioning Towards 100%'. The roadmap establishes how a city can develop its strategic capacity to plan, conduct and evaluate concrete circular procurement initiatives. A key aspect of this is understanding the city's own circular readiness, which circular capabilities the market can deliver, what circular procurement data must be collected, and how that data can support a further circular transformation. The journey presented in this handbook can support in answering these questions in support of circular procurement projects.

### Market driven

If implementation is secured through a pure market driven effort either B2B or B2C, your role as a city facilitator is to:

- Help ensure that needed data-sources for the challenge to be addressed, based on scoping and mapping, are accessible to all market actors on equal terms.
- Facilitate connections between product and service providers and off-takers based on insights from mapping.
- Provide access to knowledge and insights from the testing or prototyping phase as reports or best practise supporting overall capacity building in the market.

An example of this approach is Copenhagen who is using its 'Circular Copenhagen' innovation platform to engage the market in partnerships and collaboration around developing market driven circular economy solutions for the challenges identified by the city (cf. case description page 20).



## Next steps: Pathways to implementation and scale

### Open Innovation ecosystem driven:

When implementation is an innovation ecosystem effort, i.e. when the city cannot directly finance a solution through public procurement of innovation, your role as a facilitator is to:

- Help connect startups and emerging market actors with relevant city departments and other market actors, based on mapping insights.
- Provide feedback to further development of emerging products and services based on insights from prototyping and testing.
- Provide sandbox access to data and facilities on more flexible governance terms.

An example of this approach is in Toronto, where the University of Toronto's Rotman School of Management utilized the Circular Innovation City Challenge framework (see page 29) for a student pitch competition as part of the Creativity and Business Innovation course. This presented an opportunity for the City of Toronto to engage with young entrepreneurs and emerging business leaders on circular data-driven innovation.

The students engaged in design-sprints and received feedback from City staff on their innovative solutions to the City's challenges and future of Toronto's circular ecosystem.

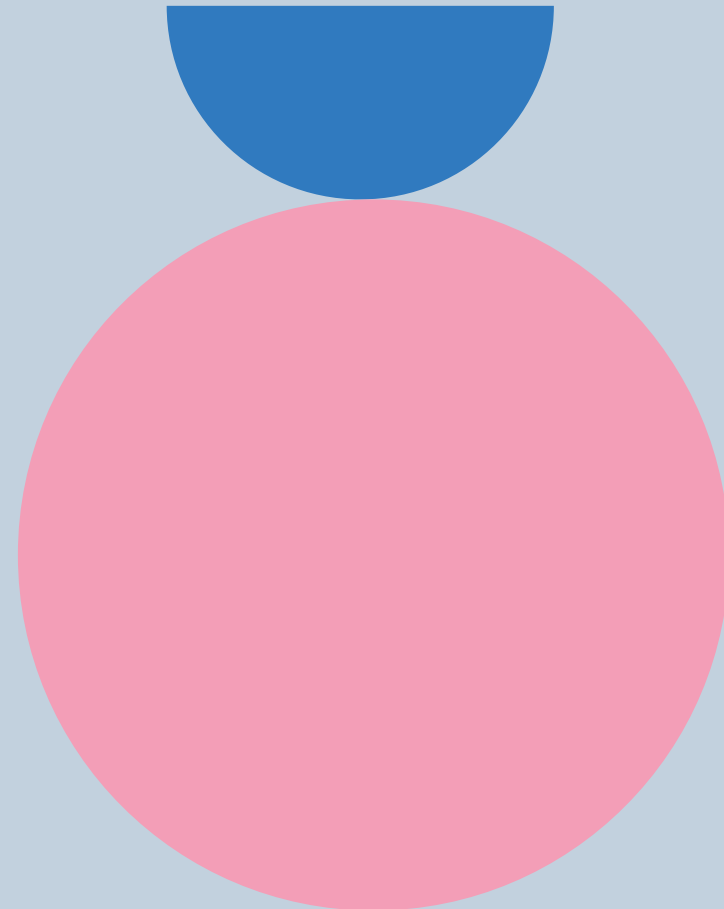


## The city's digital and data capacity

One of the most important take-aways from the journey that you as facilitator must capture is how the city can improve and strengthen its ability to support data-driven circularity efforts.

There are four key issues you need to address when facilitating organizational decision-making, development of governance models, contractual models and city/market dialogue:

- **Access to existing data sources:** Are there existing city data sources that must be made available in the future as open source or on other terms, and what is the governance model underlying that access?
- **Creating new data sources:** Is there a need for new or enriched data sources established either by the city or in collaboration with market actors? And what is the ownership around those enriched data, e.g. created by a market actor gaining access to city facilities?
- **Ensuring open data from procurement:** If a procurement pathway is taken, how do you contractually as a city ensure that the circularity (non-IP) data created become publicly available to support market capacity and city transformation?
- **Ensuring insight into market driven activities:** If the circularity efforts are primarily market driven, how do you as a city ensure continued insights into data gathered by market actors, to support the city's capacity development and future circular goals?





# Outro

## **An open and collaborative city culture**

There are many considerations that impact how your specific journey will unfold in practice. National and city policy, local legal and regulatory frameworks, existing market momentum, access to local innovation clusters etc.

However, what has to be a foundational aspect is the city's willingness to open up, to listen, and to learn. Circular, data-driven solutions cut across sectors and require collaboration across value chains, so organizational boundaries must be bridged, governance models must be redesigned, and roles and responsibilities must be reframed.

This cultural change is fundamental for the city to succeed in the role as facilitator, in the exploratory journey, and ultimately in scaling impactful circular, data-driven solutions. If you are not ready to share

city data sources, do not expect market actors to do so. If you are ready to share city data sources, market actors might be more willing to do the same. If you are ready to share barriers and issues with market actors, it is easier for them to design relevant solutions.

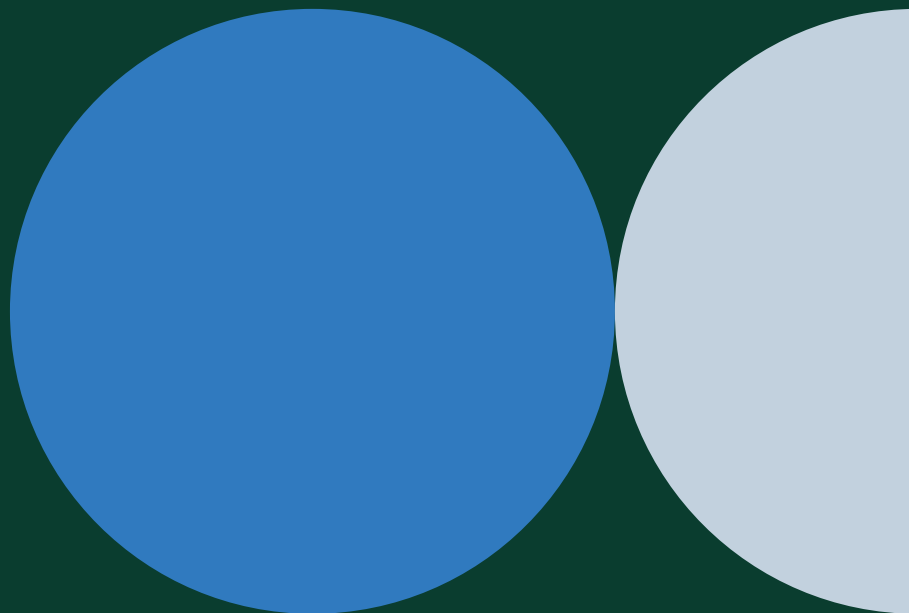
Still, this is a learning process. The input for this handbook has been drawn from cities who are just at the beginning of the circular, data-driven journey as well as cities already experienced in the effort. The facilitator role is common to both, and will grow and develop as your city's capacity evolves.

And every journey, even a circular, data-driven one, starts with taking the first step.

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Circular Innovation  
City Challenge