

ROADMAPPING THE TRANSITION TO CLIMATE-NEUTRAL CITIES

Methodology guidelines

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1. Introduction

In July 2019, soon-to-be President of the European Commission Ursula von der Leyen declared she wants Europe to become “the first climate-neutral continent in the world by 2050.”¹ Since then, the European Commission has introduced its Green Deal policy package in December 2019, stating the aim of transitioning to climate-neutrality in 2050 in a socially just way, and reaching a 50 percent reduction of greenhouse gas emissions by 2030, compared to 1990 levels.² While the Commission’s ambitions have been met with praise, the Green Deal has equally been criticised: it has been claimed to be unrealistic, a mere ‘rhetorical commitment’³, and inadequate to realise the targets committed to in the Paris Agreement.⁴ An essential critique concerns how the content of actual, concrete plans for decarbonisation remain opaque, while the Green Deal’s success will depend on how it will be operationalised on national, regional and local levels.

Cities play a pivotal role in fleshing out the implementation of climate neutrality measures. While many cities are engaged in such processes already, for instance by having signed the Covenant of Mayors commitments on becoming low-carbon, climate neutrality efforts are still often characterised by a lack of coherence between long-term aims and short-term actions. A way to bridge this gap might be to develop a local energy transition roadmap. A joint roadmap can be a vehicle for actors across cities to unite and galvanise their efforts. In the EU-funded project TOMORROW, Energy Cities and the Dutch Research Institute for Transitions (DRIFT), together with the pilot cities of Dublin (Ireland), Valencia (Spain), Mouscron (Belgium), Brest (France), Niš (Serbia) and Braşov (Romania), spearhead innovative ways to develop such long-term transition roadmaps.

This document introduces methodological guidelines for developing a transition roadmap for climate neutral cities in 2050. We refer to this as the “transition roadmapping process”: a searching and learning process based on transition governance principles. The objective of these guidelines is to support local authorities to accelerate the transition to climate neutrality by implementing a transition roadmapping process.

Building on insights from transition governance, transition management, as well as existing roadmaps, we propose a new way for roadmapping, co-developed with the pilot cities of TOMORROW. By using Diagnostics tools (“D-tools”), the cities can take stock of transition dynamics in their territories, and identify existing challenges and opportunities. Based on these insights, the cities will continue to implement strategic activities, to learn from as part of the roadmapping process. These activities lead to the development of a transition roadmap and new governance

¹ European Commission (2019)

² Harvey et al. (2019)

³ Adler, D. and Wargan, P. (2019)

⁴ Engelen, E. (2019).

structures.

Section 2 of this document starts with a background on transition studies literature and transition governance. It identifies its main tensions, and discusses how roadmapping might benefit from these insights. In Section 3, we review the state-of-the-art of roadmapping, and argue how this process might be strengthened and improved. Section 4 then presents the methodological guidelines for the transition roadmapping process. This version of the methodological guidelines focuses on the first step of that process: clarifying system needs. The next steps, which include evaluating what activities correspond with the identified system needs, will be elaborated on with the cities and presented in the next version of these guidelines.

The guidelines as published in March 2020 are a draft. They are a “work in progress” and will be tested and co-developed with the pilot cities of TOMORROW over the course of the project. As such, the guidelines will be updated, consolidated and republished in March 2022. Rather than a ready-made blueprint, these guidelines provide ingredients that cities can use to create their own local recipe. This process of adaptation to the local context will also be closely monitored during the TOMORROW project. It is our objective that the guidelines, together with insights on optimising local implementation, will support cities globally to bridge long-term climate-neutrality ambitions with short-term actions.

2. Sustainability Transitions and Transition Governance

The transition roadmapping process that we develop in these guidelines is rooted in the scientific research and insights from the field of sustainability transitions research. This research field emerged at the science-policy interface, in an endeavour to understand and address persistent societal problems. It was developed through experimental co-production between researchers and practitioners, from government, businesses, and civil society.

This Section introduces sustainability transitions studies in more detail by outlining what a transition is (Subsection 2.1) and how these might be governed (Subsection 2.2). It will also outline some of the main tensions in current transition governance, which are important in the light of accelerating energy transitions and achieving climate-neutral cities in 2050 (Subsection 2.3). A concluding paragraph (Subsection 2.4) synthesises how these insights might be taken up in the development of the transition roadmapping process.

2.1 Introducing sustainability transitions

In sustainability transition studies, a sustainability transition is considered a “radical transformation towards a sustainable society, as a response to a number of persistent problems confronting contemporary modern societies”.⁵ Sustainability transitions studies focuses on fundamental change in the ways of doing (practices), thinking (cultures), and organising (structures).⁶

A central feature of transitions is how they deal with complex, persistent problems: these are deeply entrenched in society, difficult to predict, and involve many different actors. Inherently, they are intertwined with other problems and cover multiple scales and sectors.⁷ This means that trying to solve them, for instance with a straightforward technological fix, can lead to reproducing the problem. Sustainability transitions then, in particular, deal with the persistent problem of the emissions of greenhouse gases causing global climate change, and/or the global depletion of natural resources. Specifically, it does not only problematise the resource use in the fossil economy, but also the organisational and power structures that have come to sustain it.

There are several core concepts that are studied in sustainability transition studies to understand the phenomenon of transitions:⁸

- **Non-linearity:** How transitions do not develop gradually, but rather through disruptive shocks.

⁵ Grin et al. (2010)

⁶ Frantzeskaki & de Haan (2009)

⁷ Dirven et al. (2002) in Loorbach & Rotmans (2009)

⁸ Loorbach et al. (2017)

- **Co-evolution:** How rather than searching for linear causal links, transition studies considers how technological, social, economic, ecological, and institutional factors influence each other, and as such “co-evolve”.
- **Emergence:** How new structures emerge out of chaotic and complex processes, rather than from being planned and managed.
- **Variation and selection:** How novelties that accelerate transitions follow from a variety of experimentation.
- **Multi-level dynamics:** How transitions are conceptualised by the interaction of between the “context (landscape), the dominant configuration (regime), and alternatives (niches)”.⁹

A model that can help to explain the issue of multi-level dynamics is the Multi-Level Perspective (MLP). This model visualises the landscape, regime and niches as three distinct levels, which we illustrate below with examples from the energy transition:

- **Landscape:** “Exogenous” factors in the system, influencing both niches and regimes. Examples may include climate change, and resource scarcity.
- **Regime:** Dominant structures, cultures and practices. Examples may include centralised fossil energy systems in the market, government, and consumption.
- **Niches:** Alternative practices, structures and cultures. Examples may include solar energy, wind energy, energy cooperatives, and innovative energy practices.

As demonstrated in Figure 1, out of a multitude of niches, certain alternatives might manage to become increasingly mainstream, up to the point where they can change or replace the dominant socio-technical regime. This is not necessarily always the case: a niche might also backlash.¹⁰

⁹ Kemp et al. (1998) in Loorbach et al. (2017)

¹⁰ Loorbach et al. (2017)

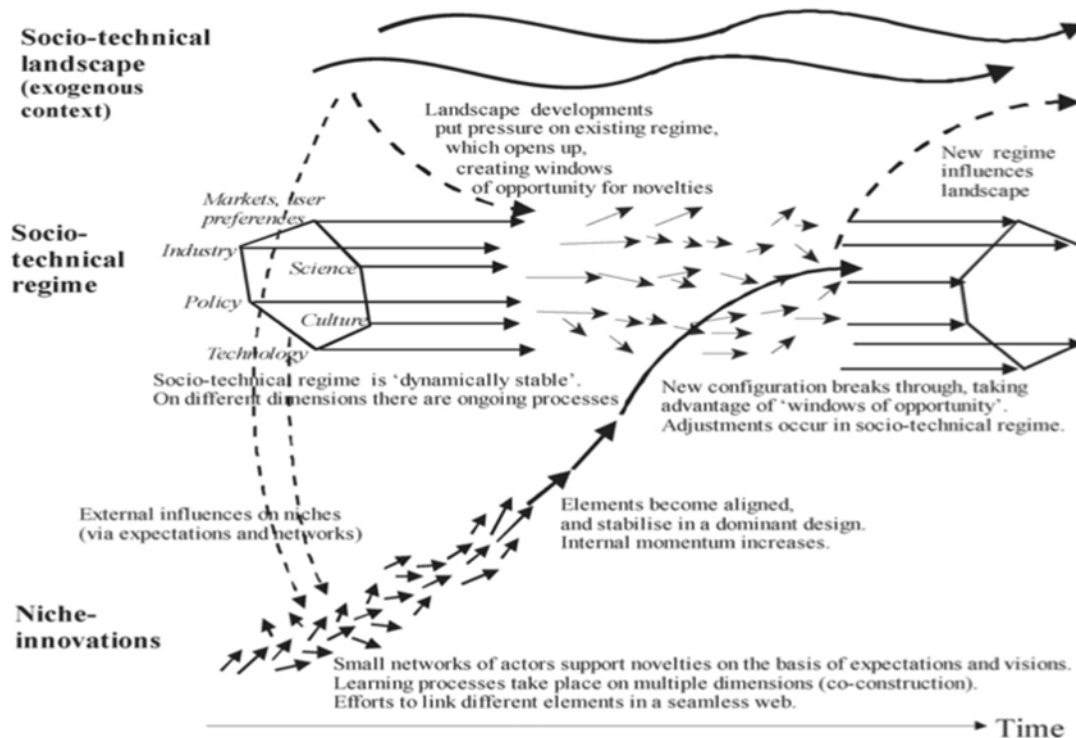


Fig 1. A dynamic multi-level perspective on transitions (Kemp 1994 in Geels 2005).

Another model that helps to conceptualise transitions, is the X-curve model (see Figure 2). The X-curve can be understood as describing “Dynamics of societal transitions as iterative processes of build-up and breakdown over a period of decades.”¹¹ The X-curve features two main lines: one moving up and moving down. The line starting at the top left represents “exnovation” (a process of breaking down and phasing out), while the line starting at the bottom left represents “innovation” (a process of emergence and building up). The interaction between these two patterns takes place within the context of developments in demography, technology, economy and (geo)politics among others. Below we feature succinct descriptions of elements of innovation and exnovation.

Innovation: Build-up of emerging culture, structure, and practices

- **Experimentation** - Radically new ways of doing and thinking;
- **Acceleration** - Alternatives connect, become accessible;
- **Emergence** - New structures become visible;
- **Institutionalisation** - New structures stabilise;
- **Stabilisation** - Optimisation of the new status quo.

¹¹ Loorbach et al. (2017)

Exnovation: Transforming and phasing-out of dominant culture, structure, and practices

- **Optimisation** - Existing structures are improved;
- **Destabilisation** - A fundamental discussion about the direction of society is initiated;
- **Chaos** - Societal structures experience disruptive shocks;
- **Break-down** - Fall out of existing order;
- **Phase-out** - Former dominant institutions and practices become anomalies and eventually disappear.

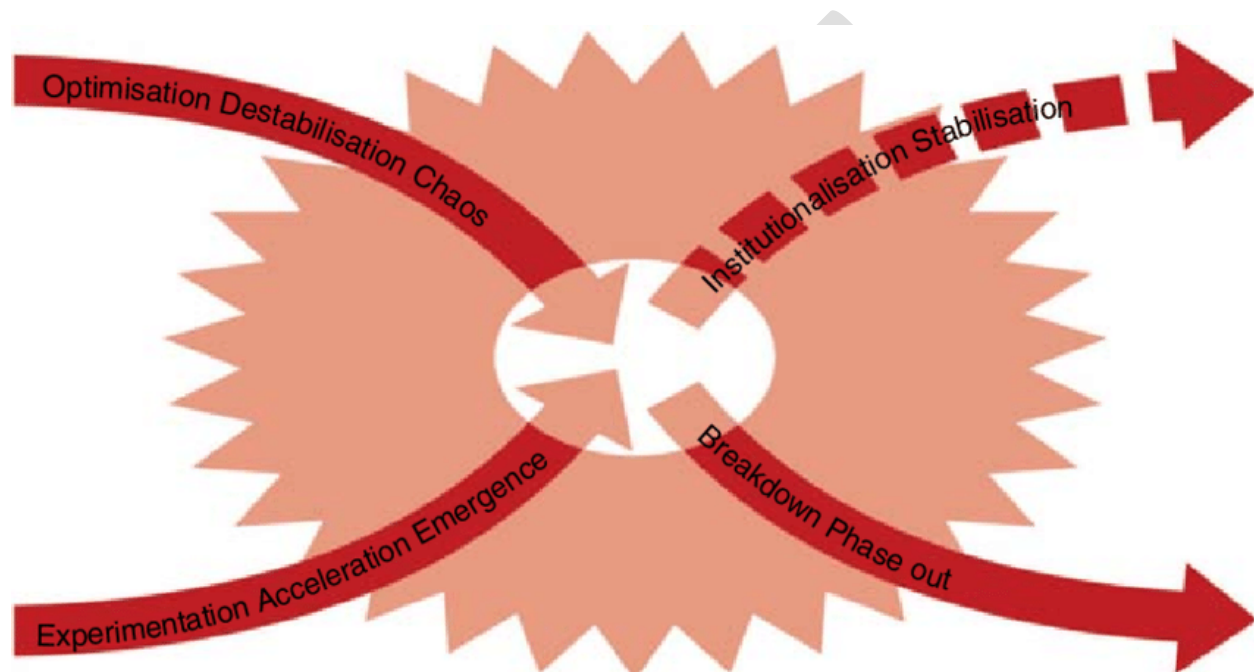


Fig 2. X-curve model (Loorbach 2017)

The mechanisms and patterns described by the X-curve should not be taken as a scientific description of a “state of transition”. Rather, they constitute a starting point for debate about the state of transition. The X-curve offers a common language and perspective to explore the dynamics at play, as well as possible actions and reactions by individuals, organisations and sectors. While transition dynamics that are identified by users in applying the X-curve are subjective, the X-curve’s general characteristics and phases are based on scientific insights of how the nature of complex systems can fundamentally change.¹²

¹² Idem

2.2 Transition Governance and Transition Management

If we acknowledge that transitions deal with complex and persistent problems, how then, might we attempt to accelerate or shape them? Here we introduce the ideas and findings from transition governance and transition management, which describe exactly how we might do that.

One of the starting points for discussing the governance of transitions is that it is not possible to “command and control” them, but that it is possible to support, trigger or accelerate them. This can happen through transition governance: facilitating processes that aim at increasing (social) learning and systems thinking, and through enabling new activities and collaborations relating to visions of a more sustainable future. Transition governance is a long-term process that interacts with existing dynamics. It acknowledges complexity, and does not simply force changes from the top down. Loorbach established nine core principles for transition governance, which are stated below¹³:

1. Process management on its own is not sufficient—insight into how the system works is an essential precondition for effective management.
2. Long-term thinking (at least 25 years) is a framework for shaping short-term policy in the context of persistent societal problems.
3. Objectives should be flexible and adjustable at the system level. (...) While being directed, the structure and order of the system are also changing, and so the set objectives should change too.
4. The timing of the intervention is crucial.
5. Managing a complex, adaptive system means using disequilibria as well as equilibria. Relatively short periods of nonequilibrium offer opportunities to direct the system in a desirable direction (toward a new attractor).
6. Creating space for agents to build up alternative regimes is crucial for innovation.
7. Steering from “outside” a societal system is not effective: Structures, actors, and practices adapt and anticipate in such a manner that these should also be directed from “inside”.
8. A focus on (social) learning about different actor perspectives and a variety of options (which requires a wide playing field) is a necessary precondition for change.
9. Participation from and interaction between stakeholders is a necessary basis for developing support for policies but also to engage actors in reframing problems and solutions through social learning.

A hands-on governance approach based on the insights from transition governance is transition management. Loorbach introduced transition management as “*a new governance framework for addressing persistent societal problems*”.¹⁴ This approach was co-developed in the early 2000s at the

¹³ Loorbach et al. (2017)

¹⁴ Loorbach (2010)

science-policy interface in the Netherlands.¹⁵ Ever since then, the approach has been broadly applied in systems such as energy, healthcare and water, and on the scale of regions, cities and neighbourhoods. Importantly, transition management is a front-runner-driven process: it starts from the premise that pioneers and front-runners play a key role in finding direction for the transition process. Therefore, these actors play a pivotal role in driving and being part of the process. The transition management framework covers four different types of governance: strategic, tactical, operational and reflexive, the characteristics of which are listed below.¹⁶ These four governance types can be used to inform how to organise such searching and learning processes.

- **Strategic:** relating to structuring societal problems and envisioning alternative futures;
- **Tactical:** developing coalitions, images, and transition agendas;
- **Operational:** mobilising actors and implementing projects and experiments;
- **Reflexive:** evaluating, monitoring, and learning throughout the process.

In the Transition Management Guidance Manual, written as part of the EU-funded project MUSIC, the objective of transition management is presented as being three-fold:¹⁷

- **A sense of direction:** proposing a strategic future perspective which addresses the fundamental changes needed to reach a sustainable future;
- **An impulse for local change:** inspiring new and enhancing existing initiatives that contribute to the envisioned future;
- **Collective empowerment:** enabling actors in the city to tackle challenges and seize opportunities for a sustainable city.

The manual breaks down transition management in seven prescriptive steps and four key elements: orienting, agenda-setting, activating and reflecting' (see Figure 3).¹⁸ The orientation phase aims at creating a shared understanding of the respective issue and system (step I, II, and III), as well as to envision what constitutes a desirable future (step IV). As part of transition management, different governance activities and instruments have been developed, which can be used to operationalise these steps. Its most prominent instrument has become the transition arena - a process of problem characterisation, vision development, backcasting and agenda-setting, which can be implemented during the orientation phase.

The agenda setting phase aims at determining actions as well as short-term opportunities to reach the envisioned future (step V), and connect the processes and activities of partners (step VI). The activating phase focuses on organising experiments related to the envisioned desirable future (step

¹⁵ Kemp & Rotmans (2009), Voss et al. (2009)

¹⁶ Loorbach (2010)

¹⁷ Roorda et al. (2014)

¹⁸ Idem

VII). Relating these activities and linking them to the broader context is established as a continued activity throughout all the phases, and is labelled “reflecting”.

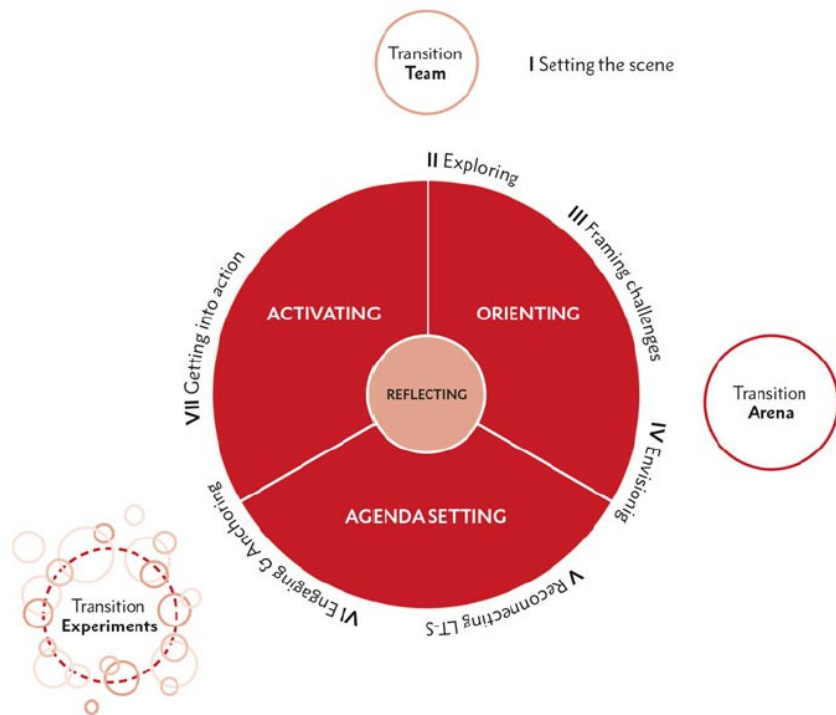


Fig 3. The transition management process structure (Roorda et al. 2014).

Once a sense of direction has been found, and local change and collective empowerment are supported, a next step towards acceleration might be initiated. Reasoned from the perspective of the X-curve (see Figure 2), the acceleration phase follows the experimentation phase in the innovation curve. To expand the role and impact of urban transition niches, the ARTS-project (Accelerating and Rescaling Transitions to Sustainability) designed a theoretical framework for this phase. It identified five acceleration mechanisms for local initiatives to accelerate and contribute to the progress of urban sustainability transitions:¹⁹

1. **Upscaling:** the growth of members, supporters, or users of a single transition initiative to spread new ways of thinking, organising, and practicing;
2. **Replicating:** the take-up of new ways of doing, organising, and thinking of one transition initiative by another transition initiative or different actors to spread these alternative ways;
3. **Partnering:** the pooling and/or complementing of resources, competences, and capacities of local transition initiatives to set up collaborations and synergies supporting the continuity of the new ways of doing, organising, and thinking;

¹⁹ Ehnert et al. (2018)

4. **Instrumentalising**: tapping into and capitalising on opportunities provided by the multi-level governance context to obtain resources;
5. **Embedding**: the alignment of old and new ways of doing, organising, and thinking to integrate them into the existing governance context.

2.3 Tensions in Transition Management

In this Subsection, we discuss main tensions that have surfaced in the implementation of transition management as described above, in order to identify ways in which it may be improved. These tensions are:

1. Between aiming for inclusive participation and focusing on frontrunners - **inclusiveness**;
2. Between being situated within policy and political processes, and being implemented as “shielded” processes focused on consensus - **depoliticisation**;
3. Between transition instruments as a temporary impulse and embedding outcomes by adapting policy structures - **embeddedness**.

Between inclusive participation and focusing on frontrunners

This issue concerns the tension of strategically involving frontrunners as drivers of the transition management process. Inherently, people who do not fit this profile from the initiator’s perspective, are excluded from the process. Consequently, they cannot influence the direction of the envisioned transition. However, as can be seen in Subsection 2.2, the objective of transition management has not been to foster wide public support or input through the transition management process. As was found during the MUSIC project, it might even be counterproductive for groups that are too large to attend sessions for developing a transition strategy: too many diverging opinions make it challenging to come to a common vision. Besides, involving a larger group means leveraging more interests and preferences about how to organise the process.

However, this issue of focusing merely on front-runners may be considered problematic, as democratic values such as deliberation, transparency and participation are paramount in working towards a socially just transition. Not only inherently so, in line with adhering to liberal democratic values, but also because it is key for fostering the necessary public support and action, as well as initiating effective measures. Nevertheless, organising a process for citizen participation in itself does not necessarily mean that the governance process will be opened up to more views: that largely depends on the way a process is designed, who is included, and how much influence the process has on political decisions. This might be further developed as part of transition roadmapping.

Between a political or “shielded” processes

A contentious issue within transition management is the issue of how to relate the process to political developments in a respective city. In some instances, the political context was disregarded for the transition management process. This is rooted in the rationale that transition management is not about creating concrete policy, but rather about creating a collective and shared agenda, and a platform for collaboration. Besides, having the process operate “under the radar” may result in a certain flexibility and accessibility, which can be instrumental in inviting people to envision the future. Also, depoliticising transition management seems to respond to the risk of becoming co-opted by a political party. Such a co-optation would make the process, and its outcomes, more vulnerable to electoral shifts.

Nevertheless, this depoliticisation of the process can also be considered as problematic. Importantly, in the case of MUSIC, there was an underlying ambition for local politics to adopt elements of the result in their political programmes and policies, as this was considered a leverage for change. This underlying objective of transition management needs to be acknowledged and explored further. Unquestionably, transitions affect interests and power relations, and thus political issues. While having its advantages, steering clear from politicising transition management might undermine the impact it may have.

Between a temporary impulse and embedding outcomes

For this tension, the question at hand is how to embed the outcomes of the transition management process in (new) structures, cultures and practices. Connecting to local dynamics, initiatives and policies is difficult, and mapping these activities can indeed be a complex exercise. For instance, some actors might not be open to collaborating with the transition management process, particularly since it seeks to move beyond incremental policy change, and is in favour of radical and transformational change. Not involving these actors may have the advantage of keeping up the pace of the transition management process. Nevertheless, it can prove to be problematic when it results in existing policies and practices being isolated from, or even circumvented by, the transition management process. Arguably, in order for the process to have a lasting impact, it cannot be implemented in isolation of other existing programmes, initiatives or roadmaps.

2.4 Ways forward for the Transition Roadmapping process

When reflecting on the tensions of inclusiveness, depoliticisation and embeddness, it might be argued that these tensions arise from how the objectives of transition management were initially formulated (see Subsection 2.2). As a consequence, the concept and implementation of transition management was designed for systems in which “a sense of direction; an impulse for local change and; and collective empowerment” were lacking. This means that it was developed for contexts in which awareness and action for climate-neutrality was still relatively low.

As mentioned, transitions are complex processes of a fundamental shift in structures, culture and practices. While they cannot be controlled for this reason, existing dynamics can be supported or countered with the ambition to govern the transition. Since sustainability transitions in many contexts have advanced in their development since the time that transition management was initially developed, it only makes sense for the framework of transition management to follow suit. As transitions advance, we hypothesise that other needs emerge to which local authorities have to respond in order to accelerate the dynamics. In this regard, the tensions of inclusiveness, depoliticisation and embeddedness might actually become of greater importance as the objectives of the process change with the dynamics it is responding to.

The way forward for the transition roadmapping process will be characterised by responding to specific context-dependent dynamics of a transition. Once these dynamics have been identified, they will be related accordingly to a range of appropriate instruments, in which inclusiveness, depoliticisation and embeddedness will be of particular importance.

3. Transition roadmapping

This Section aims to elucidate the meaning of transition roadmapping. We first present some definitions of roadmaps, and then continue to highlight characterising elements. These insights are then synthesised and translated to a proposition of how we will experiment with a roadmapping process embedded in transition governance as part of the TOMORROW project. The results are based on the findings from a select number of roadmapping documents and processes, an overview of which is presented in TOMORROW's publication "Factsheets on innovative energy practices in cities".²⁰ In addition, some insights are the results of meetings with stakeholders from the "Grand Débat" roadmapping process in Nantes Métropole in February 2020.

3.1 What are roadmaps?

In its simplest form, a roadmap sets out a path to reach specific objectives or targets within a specified time frame. A roadmap then responds to the following questions:²¹

1. **Objectives:** Where do we want to go?
2. **Status/Challenges:** Where are we now?
3. **Process/Needs:** How can we get there?

As a witness to its origin, much literature on roadmapping is primarily focussed on technology. As such, it is often used for "exploring and communicating the relationships between evolving and

²⁰ Silvestri et al. (2019)

²¹ Jeffrey et al. (2013) in McGrail (2014)

developing markets, products and technologies over time”.²² Roadmapping processes find their origins in technology and business sectors.

Over time, roadmaps have started to become used in the context of cities. In this sense, in many cases the roadmap processes have been linked to the concept of “(sustainable) smart cities”. According to Ibrahim “a smart sustainable city roadmap provides a high-level view of the objectives and goals of the transformation process and identifies the transformation phases and milestones in order to realise the city’s vision for being smart and sustainable”.²³ When focusing on climate change and energy transition, roadmaps can help to operationalise how certain objectives can be reached. For instance, what is needed, and by when, to reach a climate-neutral city in 2050?

3.2 What are the elements of roadmaps and a roadmapping process?

In this Subsection we share some of the insights gained by the analysis of roadmapping processes and their resulting roadmaps, focusing on the scope, focus and process.

In terms of scope, many of that city roadmapping processes mainly focus on actions related to energy, transport and waste management. For instance, the Strategy for a fossil-fuel free Stockholm by 2040²⁴ is divided into three target areas: sustainable energy use, eco-efficient transport and resource-efficient natural cycles. In the case of Copenhagen, the CPH 2025 Climate Plan presents initiatives that ought to be implemented in the field of energy consumption, energy production, green mobility and city administration. Other roadmaps take a broader focus. The city of Leuven for example, aims to be climate-neutral by 2050. To achieve this, their roadmap covers eight ambition areas that calls actors across the city to action:²⁵

1. Climate neutral living;
2. Climate-neutral urban functions (industry, services, and tertiary sector);
3. Climate-neutral mobility;
4. Sustainable consumption;
5. Production of local renewable energy;
6. Urban resilience for climate change;
7. Governance and collaboration for a climate neutral city;
8. Sharing knowledge and innovating together.

²² Phaal et al. (2003)

²³ Ibrahim et al. (2016) in Ibrahim et al. (2018)

²⁴ Stockholm Stad (2016) Strategy for a fossil-fuel free Stockholm by 2040. Retrieved from: <https://international.stockholm.se/globalassets/rappporter/strategy-for-a-fossil-fuel-free-stockholm-by-2040.pdf>

²⁵ De Paep, M., Verachtert, K. & Van Reeth, J. (2019). Roadmap 2025|2035|2050: Naar een klimaatneutraal Leuven. BUUR i.o.v. vzw Leuven 2030. Retrieved from: https://www.leuven2030.be/sites/default/files/attachments/Roadmap_Leuven2030_versie1.0_2019_0.pdf

The majority of the analysed roadmaps focuses on technological actions. They seem to pay less attention to governance approaches, participatory engagement and social innovation processes. An example of a roadmap focussing primarily on technology is the Pathways to a Decarbonized Port²⁶ report by the Wuppertal Institute. Some others, such as New Energy for Rotterdam²⁷ by DRIFT (Dutch only), do also take into account societal processes, changing actor roles, and social innovation.

The geographical scope as well as the process of how to arrive at a roadmap greatly differ. Many choose a geographical scope that consists of the city municipality, while some consider the metropolitan area, which might include other municipalities (e.g. Le Grand Débat in Nantes). In terms of time scale, roadmaps address different time horizons from 2025 (e.g. CPH 2025 Climate Plan²⁸), 2030 (e.g. Leuven 2030), 2040 (e.g. Strategy for a fossil-fuel free Stockholm by 2040), and 2050 (Climate-Neutral Berlin 2050²⁹).

It has been argued that the process of arriving at a roadmap offers possibilities for social learning and for creating an action perspective for participants.³⁰ Roadmapping processes can support building momentum and potentially play a vital role in synergising efforts and new collaborations among different societal actors (e.g. local authorities, civil society, businesses, academia, etc.) towards a particular goal. A roadmapping process might also contribute to the internal organisational innovation of local authorities. For example, by enabling collaborations among different departments, developing a broader understanding of sustainability, and enabling the connection between the local authority and civil society.

3.3 Reflections for the transition roadmapping process

In this Subsection, we leverage critical lessons from the analysis of roadmaps for developing a transition roadmapping process that is rooted in transition governance thinking. Reflecting on what can be learned to develop the transition roadmapping processes, three main issues stand out. Building on transitions principles and the tensions described in Section 2, we argue that there is a need for a roadmapping approach that takes into account the process, rather than just highlighting the roadmap output: it must open up a possibility of different futures, be conscious of what actors are involved and how, and anticipate implementation dynamics.

²⁶ Wuppertal Institute for Climate, Environment and Energy (2016), Infographic Decarbonization Pathways for the Port of Rotterdam Region. Retrieved from: https://wupperinst.org/fa/redaktion/downloads/projects/Decarbonised_Port_Infographic.pdf

²⁷ Van Raak, R., Spork, C. Buchel, S., Loorbach, D., (2018), Nieuwe Energie voor Rotterdam. Retrieved from: https://rotterdam.notubiz.nl/document/6609152/1/s18bb004918_1_30539_tds

²⁸ City of Copenhagen (2012). CPH 2025. Retrieved from: <https://stateofgreen.com/en/partners/city-of-copenhagen/solutions/copenhagen-carbon-neutral-by-2025/>

²⁹ Hirschl, Bernd et al. (2015) Entwurf für ein Berliner Energie- und Klimaschutzprogramm (BEK). Retrieved from https://www.berlin.de/senuvk/klimaschutz/bek_berlin/download/Broschuere_BEK_EN.pdf

³⁰ McGrail (2014)

The first reflection concerns how transition roadmapping ought to acknowledge the possibility of multiple futures, rather than opting for simple solutionist technology focus (i.e. when we implement technology A, result B will be the result). The term roadmap might already distract attention to the idea of a road that ought to be travelled, rather than question underlying changes that are necessary. It might forego questioning system logics, such as who is listened to, and who is not. As such, presenting a roadmap may obscure the importance of political decisions and normative trade-offs. Drawing up a roadmap might falsely give the impression that there is a “singular” future that a society linearly moves toward. Realistically, discussions about the future should acknowledge the multiplicity of futures that might unfold based on circumstantial and societal developments. After all, the direction of transitions is inherently uncertain and contested. Another risk of roadmapping processes is that rather than starting from the ambition of being transformative, roadmaps are designed from the same thought and power structures that created unsustainability in the first place. In this case, the status quo might be reproduced: the focus is likely to be on technological solutionism, rather than transformative actions that foster “new ways of doing, thinking and organising”.

The second issue concerns consciously making a choice of what actors need to be involved for the roadmapping process, and during what moment. This might depend on the transition dynamics that are present in a given city, and consequently the objective of your roadmap (e.g. establishing a sense of direction, or mobilising public support).

The third reflection concerns implementation dynamics. By initiating a roadmapping process, there is a risk of focusing too much on the development of goals and actions. Meanwhile fewer resources might be spent on anticipating the implementation and monitoring of actions over time. This way, the roadmap might state ambitious vision and goals for the future, but fails to implement anything in practice.

In TOMORROW, rather than focusing on the product of a roadmap, we define transition roadmapping as a “[searching and learning process based on transition governance principles](#)”. It is a process that local authorities embark on with citizens, businesses, non-governmental organisations (NGOs), and other actors in the system, with the goal of achieving climate-neutrality in 2050.

Transition roadmapping starts from analysing current system dynamics, and addressing the question: “What does my system actually need right now to accelerate the transition?”. It then formulates strategies, tools and activities to implement and learn from as part of the roadmapping process, dealing with questions such as “How can I experiment with activities to address these needs?”; “How do I build the corresponding capacities needed within myself and organisation?”; “How do I meaningfully engage with citizens?” and “How do I monitor my progress in responding to system demands?”. The process also takes into consideration how to support the continuation of these tools

and activities. Therefore, special attention is given to empowering the participants of the roadmapping processes and other city actors, to maintain the roadmaps actions over time.

The transition roadmapping process leads up to the development of a transition roadmap, as well as a proposition for new governance structures that support the implementation of the roadmap. While the roadmapping process itself is a temporary intervention, the searching and learning process continues with the implementation of the roadmap.

In summary, the objectives for the transition roadmapping process are the following:

- Raise 2030/2050 ambitions towards climate-neutral, resilient and livable cities;
- Create space for innovations and co-creation of knowledge across sectors and societal domains;
- Build capacities of local authorities and experiment with internal organisation;
- Support commitment and co-ownership of transition of citizens;
- Produce a transition roadmap, providing a narrative and agenda, and a tailored governance structure for implementation.

4. TOMORROW: Methodological guidelines

In this Section, we build on the insights of Section 2 on transition governance, as well as Section 3 on improving the concept of roadmaps, to develop a new step-by-step methodological framework for transition roadmapping. The main focus lies on building a foundation in Step 1, by working with Diagnostics tools. These “D-tools” are aimed at fostering an understanding of the system and transition dynamics in cities. Based on the results of the D-tools, cities (i.e. ‘you’) are invited to deepen their understanding of the existing system needs, as well as the activities that would play a role in leveraging change and responding to the respective system needs. Based on the insights provided by the use of the D-tools, you will select specific governance instruments that contribute to accelerating local energy transitions.

4.1 Step 1: Position your city in the transition

The first step of transition roadmapping aims at creating an understanding of the systems you want to influence on the way to becoming climate-neutral. The underlying question it addresses is: “What are the transition dynamics in your city?” Even though it is impossible to pinpoint your city’s exact coordinates on a transition map, becoming aware of local dominant dynamics is a first step towards deciding what actions are required to advance a transition towards a climate-neutral city. At the end of this step, you will be able to understand the dynamics of your city in the transition to climate-neutrality.

As part of Step 1 you will:

- Set up a transition team;
- Define the system you want to focus on (and re-evaluate this throughout the process);
- Conduct an actor analysis;
- Conduct systems analyses.

4.1.1 Transition team

As part of Step 1, each city forms a transition team. This team is in charge of organising and facilitating the transition roadmapping process. Therefore, the transition team will have different roles and responsibilities. In the first phase of the roadmapping process, they will be responsible for conducting a system and actor analysis and choosing which system dynamic to focus on. For the actor analysis, this transition team maps, identifies and engages stakeholders. These are sourced both from across the local administration (connecting different departments) as from other city actors, such as civic initiatives that are working on the transition to climate-neutral futures.

When engaging stakeholders within the local authorities, the transition team initiates processes of change within the organisation by enabling new connections and collaborations among different departments of the local authority and by enabling processes of critical reflection on the existing problems of the local authority in relation to enabling a transition toward a climate-neutral future.

The transition team also links transition roadmapping to ongoing policies, and broadens the process where necessary, by involving other actors. Since the transition team plays a key role in ensuring the success of the transition roadmapping process, it is important for the team to have a diverse range of capacities, skills and availability. Members of the team should include people who have a good overview of the sustainability initiatives and projects in the city, who have facilitation and stakeholder engagement skills, and who are aware of the local ongoing policies and legal frameworks. Ideally, the transition team is diverse in terms of institutional and sectoral domains (e.g. civil society, business, public sector, no-profit sector, academia, etc.) as well as personal backgrounds, including with regard to ethnicity, socio-economic background and gender.

4.1.2 Actor Analysis

The actor analysis aims to identify the most relevant actors or stakeholders in the system, and how they relate to each other. It provides an overview of who plays what role in a particular system, and in the envisaged transition. An actor map will help you understand what actors to involve for which kind of activity.

There are several methods to conduct an actor analysis. Actor analysis can be done from behind a desk, or together with colleagues. However, to truly better understand a system, it is most fruitful to conduct an actor analysis across departments within a local administration and, possibly, beyond that. This might happen by including actors such as civil society, business, academia, and knowledge institutions in a participatory workshop.

Below we include some examples of actor analysis methods that have been adapted and applied in different transition management processes (see Subsection 2.2). These include the Social Network Analysis (SNA), Power-Domain-Mapping and the Multi-Actor perspective (MaP).

Social Network Analysis (SNA)

A social network analysis (SNA) helps practitioners track and understand relationships at a variety of levels. You can use it to better understand the extent and type of social relationships you are operating in (Figure 4).

A social network is made up of actors that are connected by specific types of interdependencies, such as friendship, common interest, financial exchange, common beliefs, knowledge, ethnicity, gender, societal domains, etc.

The mapping and categorisation of these interdependencies gives an overview of actors in a certain system and the (kind of) relation between them. A social network analysis can help you answer questions such as: “Who is the most influential or connected to the most individuals?” and; “Who acts as a bridge between different parts of the system?”. In the blog post “22 Free Social Network Analysis Tools”³¹ on Rank Red, you can read more about online tools for conducting a Social Network Analysis tools.

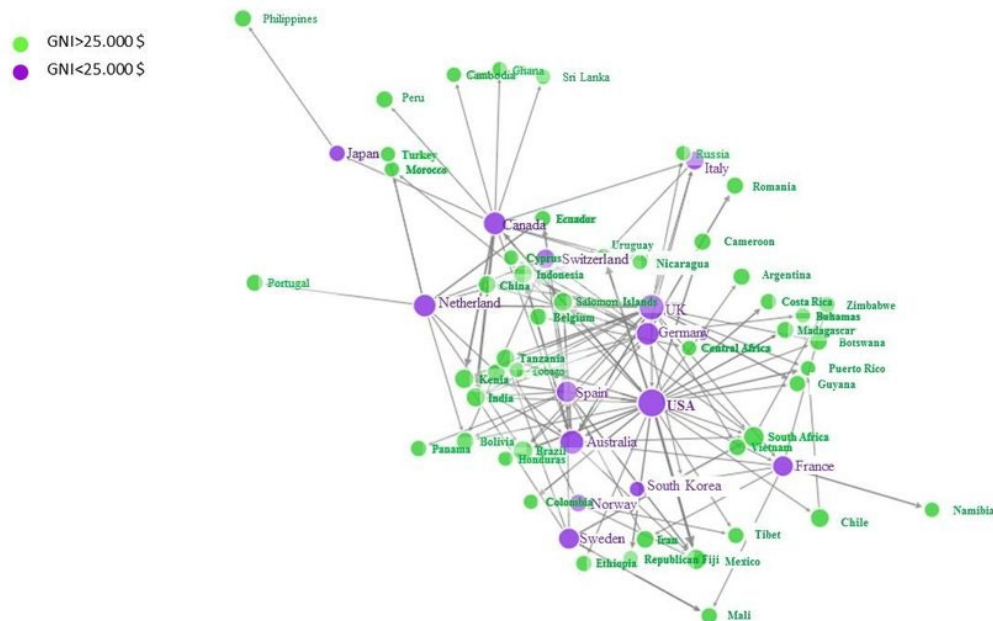


Fig 4. Example of a Social Network Analysis, demonstrating the relationship between the funding country of the research (nodes) and the country where the study area is located (edges) (Herrero-Jáuregui et al., 2018)

Power-Domain-Mapping

Through Power-Domain-Mapping, you map actors according to the domain they are active in (see Figure 5), as well as the kind of power they exercise (see Table 1). This actor analysis combines power-mapping with distinguishing between organisational backgrounds. When using this method, each actor can be represented as a dot. The size of the dot can be varied, to indicate the impact of a given actor. If an actor exercises more types of power at the same time, multiple dots can be connected with a line.

³¹ <https://www.rankred.com/free-social-network-analysis-tools/>

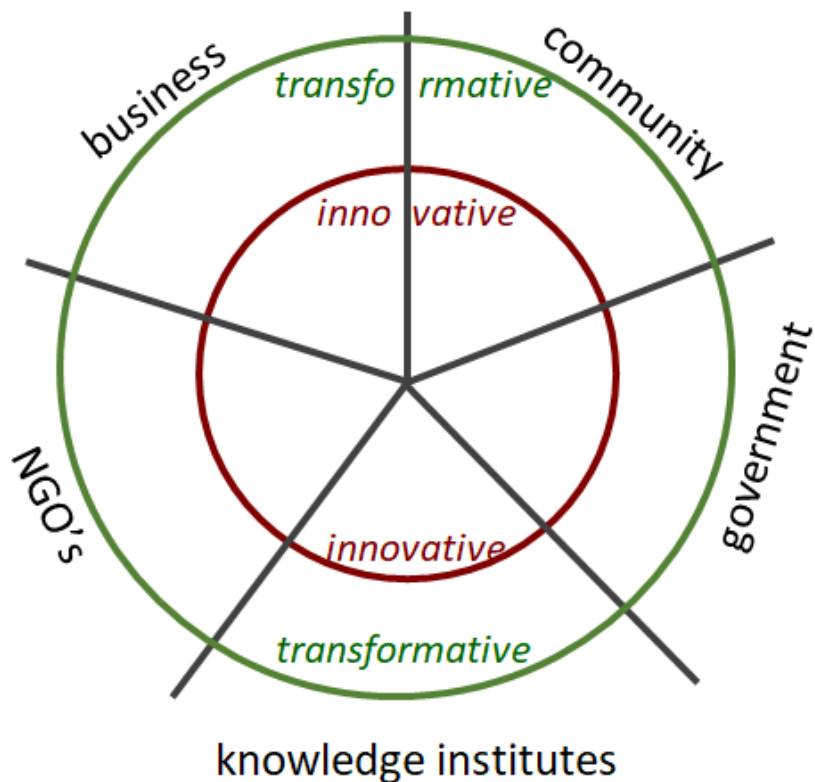


Fig 5. Power-Domain-Mapping (adapted from Wittmayer et al. 2011)

Table 1: Types of power (Avelino, 2011)

Type of Power	Definition	Transition Notions
<i>Innovative</i>	... capacity of actors to invent and create new resources	<i>Niches</i>
<i>Re-inforcive</i>	... capacity of actors to reinforce and reproduce <i>existing</i> institutions and structures	<i>Regimes</i>
<i>Transformative</i>	... capacity of actors to invent and develop <i>new</i> structures and institutions	<i>Niche-regimes</i>
<i>Systemic</i>	... <i>collective</i> capacity of actors to shape (reproduce or challenge) macro-trends	<i>Landscape</i>

Multi-actor Perspective (MaP)

The Multi-actor Perspective (MaP) distinguishes among four sectors: state, market, community, and third sector/not-for-profit. As can be seen in Figure 6 - 8, the MaP can differ between actors at different levels of aggregation: (1) sectors, (2) organisational actors, and (3) individual actors.³² The MaP is based on an existing model from Third Sector studies, which has been elaborated on. The

³² Avelino & Wittmayer (2016)

model emphasises that even though sectors in themselves can and often are framed as “actors”, sectors can also be seen as “institutional contexts” or “discursive fields” in which collective or individual actors operate and interact.³³

You can use the MaP for mapping stakeholders in different sectors, and to reflect on their interactions and interconnections as shown in Figure 7. When conducting this mapping exercise, you should try to be specific and insert the exact names of the organisations and individuals of each sector that are related to the system you have demarcated.

Another use of the MaP is to use it as a way to self-reflect on the role that each individual plays in different sectors in relation to sustainability transitions (Figure 8). For example, in the case of the state, adult individuals are not only citizens, but they are also voters. And market logics are not only formed by companies or producers, but also by individual consumers and clients.

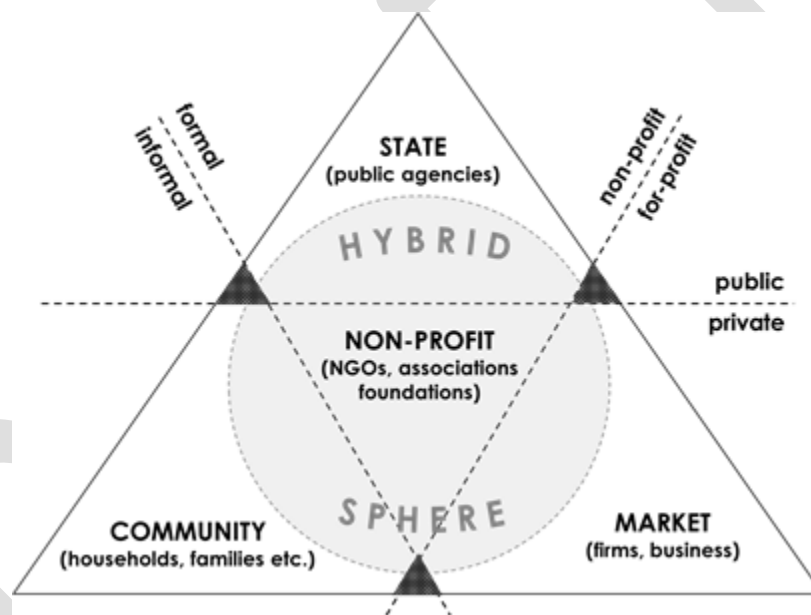


Fig 6. MaP: level of sectors (Avelino & Wittmayer, 2016)

³³ Pesch (2015)

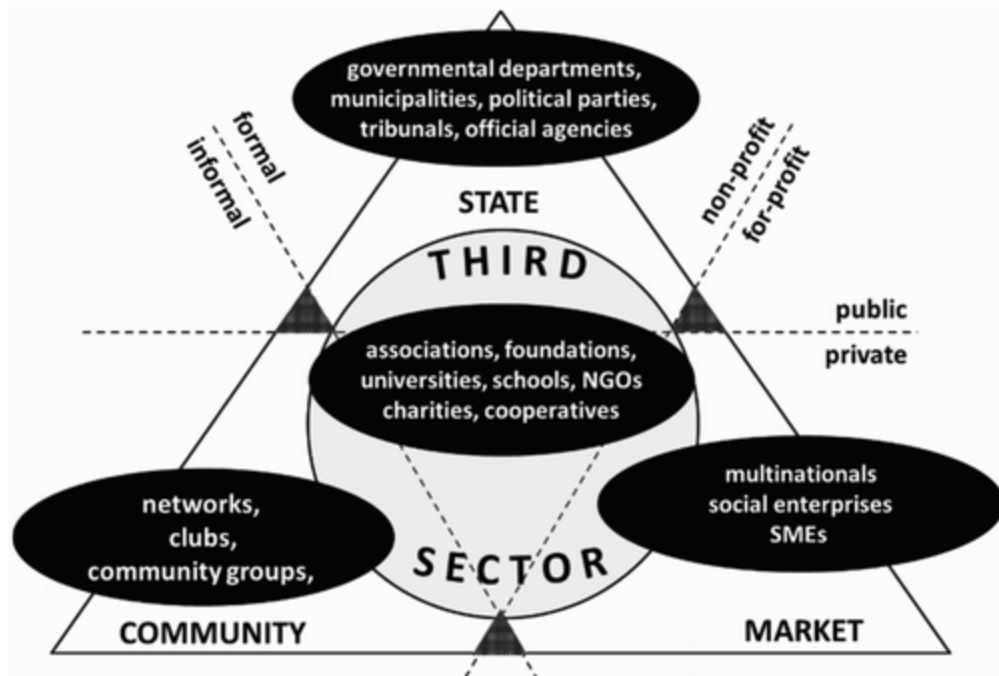


Fig 7. MaP: level of organisations (Avelino & Wittmayer, 2016).



Fig 8. MaP: level of individual actors (Avelino & Wittmayer, 2016).

4.1.3 Systems analysis

A system analysis helps you understand the dynamics, challenges and opportunities of the system you want to target for a transition towards climate-neutrality. It also provides the opportunity to more deeply reflect on the interconnections between (persistent) problems, and their root causes.

The system analysis is conducted by the transition team, and can be performed using desk research, focus groups and formal and informal interviews. Of course, the results from systems analyses depend on who fills them out, and what perspective these actors represent. Therefore, you are invited to conduct the system analyses with people outside of your transition team.

There are different frameworks that can be used to analyse a system. These include:

- Understanding elements of the system: analysing the current structures, cultures and practices;
- Understanding the multi-level dynamics of the system: analysing niche, regime and landscape dynamics using the Multi-Level Perspective (see Subsection 2.1);
- Understanding the innovation and exnovation dynamics of the system using the X-curve (see Subsection 2.1);
- Understanding different governance activities in relation to climate-neutral transitions in the system (see Subsection 2.2).

In the following, we focus on explaining the latter two, which we refer to as Diagnostics tools (“D-tools”). These are tools that help to navigate complexity and uncertainties in a system in transition, by identifying and unpacking dominant dynamics and ongoing processes. In this guideline document, we share D-tool #1 and D-tool #2. Whereas D-tool #1 features a description of innovation and exnovation dynamics and relates them to system needs, D-tool #2 helps to identify what strategic, tactical, operational and reflexive activities are taking place and which ones are still absent from the current system.

Define your system

Before diving into your system analyses, it is important to decide on the boundaries of the system you want to target. A system’s boundary demarcates what processes and components are considered to be “inside” the scope, and which are considered “outside” the scope. Inside of its boundary, the system has a certain integrity: elements work together, which gives the system a degree of autonomy. You demarcate your system by deciding on geographical and sectoral boundaries. Once these demarcations have been decided on (for now), you can start the analyses of your system.

4.1.4 D-tool #1: Understanding the dynamics in your system

D-tool #1 builds on the X-curve model (see Figure 9), as discussed in Subsection 2.1. The tool describes the characteristics of the different dynamics outlined as part of the X-curve (e.g. optimisation, destabilisation, etc.). In doing so, we separate out innovation and exnovation dynamics for structuring the analysis – this allows you to have a discussion on how these dynamics interact when using the tool.

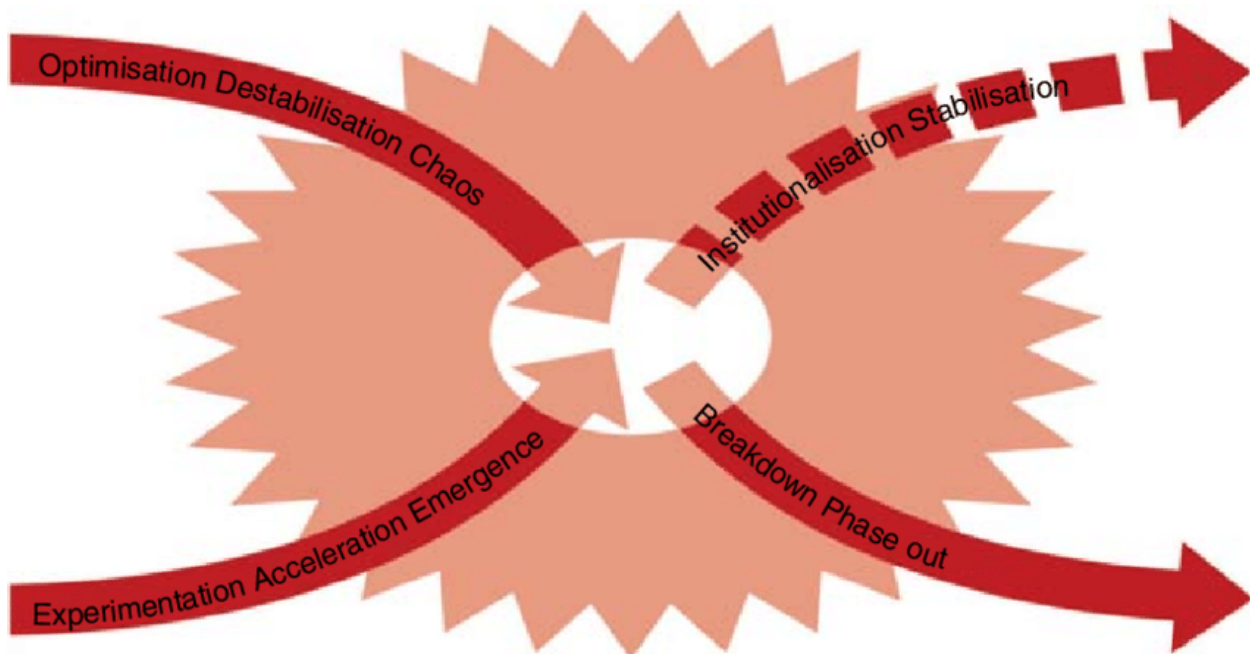


Fig 9: X-curve (Loorbach, 2017)

D-tool #1 consists of two stages. In the first stage, you analyse the extent to which certain dynamics are present and dominant in a system. Having identified this, you move to the second stage of D-tool #1. Based on the system characteristics that have been identified, you can then formulate what those system needs might signal. Understanding the system needs allows you to determine how a roadmap can be of best use: what purpose it can have in your systems' transition. Accordingly, being familiar with what the needs are of your system, allows you and your transition team to make a more informed decision on what transformational activities to initiate to accelerate transition dynamics.

Stage 1: Mapping characteristics

The first stage is thus mapping which characteristics of innovation and exnovation you can identify in your system. This can best be done in a small-group setting, with actors from different backgrounds, who map the identified elements directly on a large version of an X-curve (on a flip chart, floor or similar). The question to map is thus: Do you recognise the characteristic (e.g. dominant practices and actors only pretend to be changing) in your system? You then proceed to write down what/where/who/how.

Tables 2. System Characteristics - Exnovation

<p>Optimisation</p>
<p>1. Dominant practices and actors only pretend to be changing.</p> <p><i>Example: The practice of companies “greenwashing” their brand, while in fact their sustainability performance is not improved.</i></p>
<p>2. Many people consider that society is on the 'right' track: the general public wants to preserve the way of life.</p> <p><i>Example: A general consent on the direction that society is heading towards.</i></p>
<p>3. Many people consider that problems can be fixed through technology and clear cause-solution relations.</p> <p><i>Example: Recycling as the solution to resource scarcity, or replacing fossil fuels with hydrogen throughout society.</i></p>
<p>4. Everyone knows how to act; there is a clear idea of how to get things done.</p> <p><i>Example: People understand how to gain access to electricity.</i></p>
<p>Destabilisation</p>
<p>1. Concrete incidents increase the perceived urgency of a possible transition.</p> <p><i>Examples: The Fukushima nuclear accident in Japan, extreme meteorological events, or decreasing groundwater tables due to droughts.</i></p>
<p>2. New narratives on the need for transition, creates pressure for change in policy. Policy remains contradicting: existing policy and structures are not yet dismantled, while the main narrative starts to shift (e.g. climate-neutral futures).</p> <p><i>Examples: Narratives that can be seen as part of the European Commission's Green Deal, Prosumerism, and smart cities. Contradicting policies may include the subsidising of fossil fuels.</i></p>
<p>3. General public starts demanding alternatives, putting pressure on business and policy. Meanwhile there might be a contradiction between willingness for change and willingness to change behaviour.</p> <p><i>Examples: Global Fridays for Future protests.</i></p>
<p>4. Increasing polarisation regarding causes of the problem and the ways forward - more fundamental discussions across society about possible futures.</p>

<i>Example: Political parties propose radically different approaches towards dealing with the issue.</i>
5. Incumbents are called upon to be accountable for their actions.
<i>Examples: Court rulings start holding city councils and others accountable to their commitments through e.g. being signatory of the Covenant of Mayors.</i>

Break down
1. Policy and legislation are clearer, less ambiguous, and conflicting.
2. Phase-out policy is an explicit part of the policy mix towards climate-neutrality.
<i>Example: Policies address how to deconstruct fossil fuel industries that are no longer relevant, while offering a societal safety-net.</i>
3. More and more people change the way they think about and act on the issue, there is only a small group left that believes in the old ways.
<i>Example: The mainstreaming of (elements of) plant-based diets.</i>
5. It is clear exactly who does not benefit from the new situation.
<i>Example: Some companies are not able to restructure in order to move with the transition and are forced to file for bankruptcy.</i>

Phase out
1. The previous business as usual becomes an ‘unimaginable past’: people can’t imagine anymore that this used to be normal.
<i>Example: The idea of using coal to heat your home in countries that have transitioned to alternative sources for heating.</i>
2. Saying goodbye to former institutions and finding ways of dealing with loss.

Tables 3. System Characteristics - Innovation

Experimentation
1. Discontent with existing structures, cultures and practices finds its expression in some individuals starting experiments on the ground with social and/or technological innovations.

<p><i>Example: Community collectives generating their own energy.</i></p>
<p>2. Societal experiments are starting to get more space; new opportunities are starting to arise. These are mainly driven by visionary agents of change.</p> <p><i>Examples: Societal entrepreneurs or intrapreneurs, civic initiatives, etc.</i></p>
<p>3. The ideas and visions that drive such experiments are identified as 'different from the norm' or 'radical'.</p> <p><i>Example: People who divert from the norm are ridiculed or mocked.</i></p>
<p>4. Experimentation often happens despite rather, than because, of existing policies.</p> <p><i>Example: The development of civic initiatives is curbed due to existing law and policies preventing them from using certain resources. E.g. legislation on the re-purposing of electronics.</i></p>

<p>Acceleration</p>
<p>1. Alternatives to the regime are starting to become more visible and accessible to the general public (e.g. growth in market share, more followers, etc.) Increasingly alternatives become socially accepted.</p> <p><i>Example: Supermarkets and restaurants have more sustainable and vegetarian/vegan options.</i></p>
<p>2. Alternatives to the regime are starting to unite in broader movements, structures and networks for mutual support.</p> <p><i>Examples: Emergence of the European Rescoop network, or the Transition Towns Network.</i></p>
<p>3. There is a clash between policy/legal structures and the initiatives people in society want to develop - and first initiatives by governments to accommodate developments.</p> <p><i>Example: Installation of chargers for electric cars.</i></p>
<p>4. More experiments that have convincingly demonstrated their effectiveness, and a wave of professionalisation ensures.</p> <p><i>Example: Acceleration programmes and challenge prizes support and build capacity with bottom-up innovations.</i></p>
<p>5. Mainstream business is starting to become interested and starts engaging in the movement. This also results in new value creation and business models.</p>

Example: Innovations are developed with new partners, ideas are taken to the market.

Institutionalisation

1. The new normal in thinking and doing is omnipresent.

Examples: Cars are used instead of horse carriages, or mobility becomes based on renewable electricity based instead of fossil-fuel based mobility.

2. There is a new default and standard.

Example: Catering services providing vegan/vegetarian foods as a default option, rather than having to 'opt in'.

3. New structures are becoming established, legal and policy changes incorporate former 'bottom-up' demands.

Example: Renewable Energy Directive of the EU includes a provision for self-consumption and renewable energy communities.

4. New businesses have become established, old businesses have adapted to new market demands.

Example: Sausage companies offering vegetarian/vegan options.

5. Physical infrastructures are designed along new priorities.

Example: Grids cater for decentral energy production, more bike lanes are built.

Stabilisation

1. Former 'niches' and regime have resulted in a new configuration of structures, cultures and practices, a new regime: details become sorted out

2. Optimisation of the regime

Once the mapping of the characteristics is done, the visual representation will provide first clues of where the main dynamics in the system are. What now follows is an interpretation of the analysis. For this, you can use, and discuss, the following questions:

- Where do we see most activity? Why?
- Which dynamics are absent? Why?

- Is a certain actor group over-represented in a certain dynamic? Why? And what are the consequences?
- Where is the system bound by its dependence on outer circumstances (or landscape developments)? (e.g. national legislation when the system demarcates a city);
- What are obvious ideas, activities or material things that are missing from this mapping?
- What would happen to the mapping if we change system boundaries? Would that lead to dramatic changes in the mapping? What does this tell us to how we approached system demarcation?

Stage 2: Defining system needs

In the second stage of D-tool #1, you will define the systems needs based on the characteristics you analysed in stage 1. Table 4 provides a list of system needs that have been discussed in literature related to innovation and exnovation, and that have been consolidated through a transdisciplinary knowledge exchange during the TOMORROW Transition Governance Training in February 2020.³⁴

Tables 4. Description of possible system needs

	System Needs
1.	Create space for experiments/ experiment
2.	Develop shared understanding/ narrative/ strategy
3.	Raise awareness of different stakeholders
4.	Raise political and societal commitment
5.	Create networks/ alliances
6.	Ensure niche embedding
7.	Ensure just transitions
8.	Create / influence legal, administrative and market changes and phase outs (regulations, financial streams, laws)
9.	Establish a new 'business as usual' in people's lives
10.	Break down or repurpose existing physical infrastructures
11.	Have clear strategies to navigate the phasing out of specific sectors/activities
12.	Respond to discrepancies and unforeseen side-effects of institutionalising of new configurations

³⁴ Also see Kivimaa et al. (2019), Roorda et al. (2014) and Lodder et al. (2017).

Based on the identification of system needs, you can discuss how these needs relate to possible interventions that could be employed, and relate this to examples from other contexts. This leads over to Step 2 of the transition roadmapping process (see Subsection 4.2 below).

4.1.5 D-tool #2: Types of governance activities

The goal of D-tool #2 is to help separate the different types of governance activities that are present in the system you are focusing on. By reflecting on what is happening in a given system, you are invited to consider what is needed to move beyond incremental “policy as usual”. The tool helps to diagnose the activities that all actors in your system (including local authorities, citizens, businesses, knowledge institutions and NGOs) engage in, in relation to climate-neutral transitions. This analysis is another step towards choosing what transformative activities to implement.

D-tool #2 builds on the strategic, tactical, operational and reflexive governance activities, a distinction elaborated on in Section 2.2. Filling out D-tool #2 is preferably done in a small-group setting, with actors from different backgrounds, who together map the identified activities directly on a canvas. Thus, the question to map is: Do you recognise activities of the different governance types in your system? Write down what these are and differentiate by which actors they are done.

Table 5. Types of governance activities

Type of governance activity	Definition and examples
Strategic	<p>Focuses on the long term, and relates to structuring problems and envisioning new and different futures. This means all activities that relate to the “culture” of a societal (sub-) system: debates on norms and values, identity, ethics, sustainability, and functional and relative importance for society.</p> <p>Examples of activities :</p> <ul style="list-style-type: none"> ● Support critical reflections on existing problems, their interconnections and causes of persistency; ● Facilitate envisioning processes and development of visions on desired futures; ● Organise strategic discussions related to e.g. formulating long-term (collective) goals; ● Long-term planning;

	<ul style="list-style-type: none"> ● Support actors to collectively discuss and define important norms, values, ethics and understandings of sustainability. <p>Such activities might be documented through or materialise as master plans, visions, etc.</p>
Type of governance activity	Definition and examples
Tactical	<p>Tactical activities have a mid-term horizon and they are targeting the existing structures/ways things are organised and governed; can have has a physical aspect (e.g. changing infrastructures)</p> <p>Examples of activities:</p> <ul style="list-style-type: none"> ● (Co-)create a roadmap; ● Co-develop coalitions, networks or platforms bringing people together around a shared concern or goal; ● Support actors to develop a transition agenda; ● Create financial and institutional regulation <p>Such activities might be documented through or materialise as roadmaps, strategic action plans, covenants, memorandum of understanding, experimentation programmes, etc.</p>
Type of governance activity	Definition and examples
Operational	<p>Involves initiating experiments and actions, mobilising actors, developing projects and activities and giving impulse for action. Operational activities often have a shorter-term horizon and are usually driven by individual ambitions, entrepreneurial skills, or promising innovations. They show that alternatives are already possible today.</p> <p>Examples of activities:</p> <ul style="list-style-type: none"> ● Develop iconic or exemplary projects; ● Create a policy space for experiments; ● Support frontrunner initiatives to connect with each other and other societal actors; ● Support actors (e.g. civil society), to set up pilot projects and activities and to develop organisational administrative, financial capacities.

	Such activities might be documented through or materialise as actual projects, pilot activities, etc.
Type of governance activity	Definition and examples
Reflexive	<p>Relates to monitoring, assessment and evaluation of ongoing societal change processes (e.g. participatory or governance process), policies, activities and projects. These activities include all processes of learning throughout the involvement of a specific process, project or activity.</p> <p>Examples of activities:</p> <ul style="list-style-type: none"> ● Create learning programmes; ● Set up project evaluations; ● Dedicated person organising internal learning; ● Habit of evaluating, reflecting and learning from activities; ● Organise meetings with colleagues to explicate and share insights and learnings. <p>Such activities might be documented through or materialise as learning sessions, learning agendas, 'failing forward nights', evaluation frameworks, etc.</p>

Similarly to D-Tool #1, once the mapping of the ongoing activities is done, the visual representation will provide first clues of where the main activities take place. What now follows is an interpretation of the analysis, using questions such as the following:

- Where do we see most activity? And where least? Why?
- Which actor groups are driving which kinds of activities? Is there a certain pattern? What does this tell us about the system?
- Which of the mapped activities were most successful (and on what accounts) to further the transition towards climate-neutrality?
- What are obvious activities that are missing from this mapping? Why have these not been picked up?
- Are the mapped activities aligned across the type of governance activities? Or are they pulling into different directions? What does this tell us about the system?
- What would happen to the mapping if we change system boundaries? Would that lead to dramatic changes in the mapping? What does this tell us to how we approached system demarcation?

Based on the understanding of existing governance activities, you can discuss how these relate to possible interventions that can be employed, by including examples. This leads over to Step 2 of the transition roadmapping process (see Subsection 4.2 below).

4.2 Next steps in the Transition Roadmapping process

Understanding your system, the actors involved in it as well as building a team to work with is just the first step in the overall transition roadmapping process. An overview of all steps is provided in Table 7, and Step 2 is shortly outlined below. The next versions of these guidelines will further detail each of the steps as part of the transdisciplinary and peer-learning process of TOMORROW.

Step 2: Determine your activities

Once cities have determined the system needs and have a good overview of existing governance activities, they continue by determining the intervention that has the biggest transformative potential in relation to their systems state, and the desired climate-neutral transition. Important here is the question of who is driving the transition roadmapping process – in TOMORROW these are local authorities – they will have access to a different repertoire of interventions than other actors and might thus be more inclined towards certain kinds of interventions. In deciding on relevant activities, they design new, or adapt existing, interventions based on transition governance principles. This means considering the tensions of inclusiveness, depoliticisation and embeddedness as discussed in Subsection 2.3.

The roadmapping activities that are decided on are likely to be a process, rather than a one-off activity. They include two streams: a) one focused on a broader process including different societal actors, and b) one focused on internal organisational structures at the local authority. As part of Step 2, you will also set up a dynamic learning agenda for that you will update throughout the process.

Table 7. Overview of transition roadmapping process steps

Step 1	Position your city in the transition to climate-neutrality. Activities in this phase include: <ul style="list-style-type: none">● Set up a transition team;● Define your system (and reconsider them throughout the process);● Conduct an actor analysis;● Conduct systems analyses;● Determine the system needs.
Step 2	Determine the “how”: choosing relevant activities and setting up a reflexive monitoring framework. This includes strategies for citizen engagement and

	<p>organisational change.</p> <p>Activities in this phase include:</p> <ul style="list-style-type: none"> ● Determine the goal, target group and scope of the transition roadmapping activities/intervention; ● Decide what kind of intervention to focus on; ● Design the intervention including both an internal and external focus; ● Collect options for possible self-sustaining governance strategies; ● Design your reflexive monitoring framework/dynamic learning agenda.
Step 3	<p>Implement transition roadmapping activities, including an innovative engagement process.</p> <p>Activities in this phase include:</p> <ul style="list-style-type: none"> ● Implement the activity; ● Monitor your process and adapt it where necessary; ● Implement any actions necessary to ensure official endorsement of outcomes (transition roadmap and self-sustaining governance structures).
Step 4	<p>Translate insights into a transition roadmap document and obtain official endorsement of the transition roadmap.</p> <p>Activities in this phase include:</p> <ul style="list-style-type: none"> ● Develop a transition roadmap based on inputs from the intervention/activities; ● Obtain official endorsement for the roadmap; ● Prepare to initiate self-sustaining governance structures.
Step 5	<p>Implement self-sustaining governance structures.</p> <ul style="list-style-type: none"> ● Build capacity with actors involved to sustain governance structures; ● Monitor and adapt governance structures continuously.

5. Acknowledgements

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TOMORROW

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Tomorrow is a Horizon 2020 funded project, aiming at empowering local authorities to lead the transition towards low-carbon, resilient and more liveable cities. In the framework of the project, six cities will develop 2050 transition roadmaps together with citizens and other local stakeholders and serve as pilot for the transition of European territories.

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