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Designing radical transitions: a plea for a new governance culture to empower deep transformative change

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Abstract

This explorative paper introduces the idea of radical transitions as a necessary starting point for policy and governance. The urgency to achieve transformative change facing climate change and biodiversity loss is now broadly shared, but the dominant policy and market logics of innovation, optimization and risk management persist. In for example the urban mobility transition, we do see a technological shift towards electric mobility but not automatically a deeper cultural, spatial and behavioral shift towards cities in which as less vehicles and space are used to provide as much and as affordable mobility to all. We see a similar pattern in the built environment and food systems: the logics of policy and markets dictate optimization through (technological) innovation, while already for decades more radical alternatives have been developing and maturing locally worldwide. In this paper we explore how the basic principles and approach of transition management can be enriched with insights and methods from design to help institutionalize and mainstream the more radical alternatives.

Keywords: Transition management, Design, Radical transition, Urban mobility

Introduction

Twenty years after transition management was introduced, it seems that there is no argument anymore: to deal with persistent sustainability challenges we need transformative change (Guterres 2021; Masson-Delmotte et al. 2018) and strategies to accelerate this. Climate change, biodiversity loss and all sort of socio-economic inequalities related to these are becoming an existential threat and 2021 marked the first time the global community reached a 100% consensus that these problems are man-made (Masson-Delmotte et al. 2021). The European Green Deal seeks to build upon this consensus and formulates an integrated ambition to not only tackle climate change but also transform land-use and resources consumption to transform towards a climate neutral and circular economy.

Cities are also stepping up their effort to push transformative change. They have already been at the forefront of sustainability (for example through the covenant of mayors, the C40 and local agenda 21), but many cities used the COVID crisis to accelerate the transformation of public space allowing for more green spaces, cycling or walking (Griffiths et al. 2021; Newman 2020). Similarly, city governments develop urban food strategies to stimulate diet change and regionalize food production. Or they work on the shift in electricity and heat moving away from fossil fuels to increasingly sustainable sources. To support such urban sustainability transitions (Frantzeskaki et al. 2016), often large policy programs have been developed, new departments established, and all sorts of new financial and policy instruments developed.

It is for long argued that cities are at the forefront of sustainable development as they are the first being confronted with the negative impacts of climate change and biodiversity loss, and they are hotbeds of (social) innovation that supports sustainability transitions. Yet at

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the same time it is clear that over-all, progress is far too slow: emissions globally are still increasing rather than in a steep decline, biodiversity loss hasn't slowed down in spite of global agreements and resource consumption is still increasing in spite of efficiency gains. Efforts invested in achieving sustainable development are countered by ever continuing growth in unsustainable production and consumption as has been clear for decades (Daly 1996). A clear example of this pattern is in urban mobility. While policies and investments in innovation have made cars more fuel efficient and cleaner, the size and amount of cars keeps increasing as do the problems associated with it.

In this paper we explore the argument that it is not the lack of technological or social innovation that is leading to this persistent pattern of unsustainable development, but it is the way in which we institutionally pursue solutions to deal with the great societal challenges. The dominant discourse in policy and management is so fixated on risk and control, that all efforts end up making marginal and manageable improvements of the existing, rather than that they open-up new development pathways. The risk-paradigm combined with a continuing drive for (cost-)efficiency and optimization has created a mental and institutional lock-in: we seem to only be able to move forwards in small, incremental steps avoiding any negative impacts upon existing interests.

As it is increasingly evident that this pathway of gradual improvement will not be enough to achieve the climate and biodiversity targets set (Díaz et al. 2019; UNEP 2021), we are inevitably heading for disruption and increasing social and institutional instability. Taking a transition perspective, this is also a phase in which space opens up for much more radical, accelerated and fundamental shifts. The inability of societal systems to proactively move 'out-of-equilibrium' leads to increasing pressures that inevitably create the instabilities that force that system into a non-linear and transformative shift towards a new equilibrium (Loorbach et al. 2017). It is thus no surprise that policy and business are unable to move our economic development out of its path-dependency, we need to anticipate transition space opening up and ask how we can seize this momentum to accelerate societal transition towards futures that are truly just and sustainable.

In this paper we argue that we need to be able to imagine and communicate alternative futures, but we also need to inspire and mobilize people on a large scale to embrace the transformative journey ahead. In transitions, we cannot predict nor control outcomes: it is a collective process of 'learning-by-doing' and 'doing-by-learning'. By combining the latest insights from transition management research with design thinking and methods,

we here formulate a new logic of 'designing transitions': making the potential of radical transitions visible through a transition management and design approach is an effective way to accelerate these transitions and lock society out of a pathway of incremental improvement.

We first introduce the transition management approach that has developed to empower and support transformative social innovation. We then use the case of urban mobility transition to illustrate the concept of path-dependency, lock-in and unsustainability. We then unpack how the dominant institutional logics of policy and markets reinforce this path-dependency and are unable to proactively seize the momentum of disruptive and transformative changes. We then argue that we need to enrich transition management with insights from design to support radical transitions. We end our paper reflecting upon the implications for urban transitions and the role of culture and design: to capitalize on the potential of radical transitions requires research and cultural organization to work together in an action-oriented way to support radical transformative changes.

Transition management

The concept of transition management was introduced in 2001 (Rotmans et al. 2001) in science and policy as a new governance theory for sustainability transitions (Grin et al. 2010). Building on core concepts of societal regimes, path-dependency and lock-in, transition management assumes that actors from within a regime context (incumbents) are most likely seeking to try to improve and optimize their position and thus reinforce an existing regime. As government and established markets are defined as incumbents, transition management formulated a governance theory that fundamentally challenges and ultimately seeks to replace established (government and market) institutions, structures, cultures and practices that now support unsustainable societal regimes (Loorbach 2010).

The core concept relating to this notion of 'societal regimes' as the dominant structures, cultures and practices within a societal system, is *path-dependency*. By developing routines, establishing institutions, investing in technology and infrastructure and developing established positions, it is increasingly harder for actors to change fundamentally. What is generally referred to as 'markets' or 'government' is inherently regime: these concepts refer to the institutionalized economic and governance practices. Within these contexts, incremental and path-dependent development is the norm: either through policy or innovation. As path-dependency also comes with an interest to sustain the status-quo (through adaptation and improvement), incumbent actors in general have a negative interest in transitions:

they will seek to maintain stability and, at least until it is inevitable, work against transformative change (Feola 2020).

So rather than to take the existing governance and market contexts as a given, transition management starts from the premise that over time inevitably the more disruptive, shock-wise and non-linear dynamics will occur that push societal regimes out of equilibrium. Transition management is therefore about anticipating transitions as a process *away from* and unsustainable regime for which inevitably alternatives emerge in niches. But also as inherently uncertain, ambiguous and contested processes as they are future transitions in-the-making that challenge vested interests, established norms and routines, and undermine investments, powers and cultures. Transition management is about trying to challenge, alter and replace existing unsustainable regimes and exploring in a more experimental way potential and desirable possible future transitions.

To this end, transition management has formulated governance principles (long-term systemic, backcasting, selective participation, learning-by-doing and doing-by-learning, reflexivity) that form the basis for practical governance tools and instruments such as the transition arena (a small-scale social learning process to empower change agents with a shared transition narrative and agenda), transition experiments, scenarios or reflexive monitoring (Loorbach 2010). These tools developed in a societal context in which the dominant societal regimes were quite stable and alternatives very experimental (costly, alternative, fragmented, poorly developed, or resourced, local). The operationalization of transition management in this context was based on a dichotomy between niche and regime and produced a lot of experimental action research producing tangible impact empowering niches, developing transformative narratives and creating space for transformative innovation (TM 1.0).

From around 2010, actors within societal regimes started to experience destabilization and alternatives started to accelerate. Transition management evolved and tools and methods were developed that sought to facilitate the translocal diffusion of transformative innovation and opening up transition space at the level of societal regimes (Köhler et al. 2019; Loorbach et al. 2020). The core governance idea is that of the 'transition governance mix' in which the direction of a *desired* transition is more or less clear, but the focus shifts to activities that support the *build-up*, *transformation* and *phase-out* of the existing regime cultures, structures and practices. The 'X-curve' provides a template for this transition governance mix and was developed in co-creation with a large variety of public and private actors that are

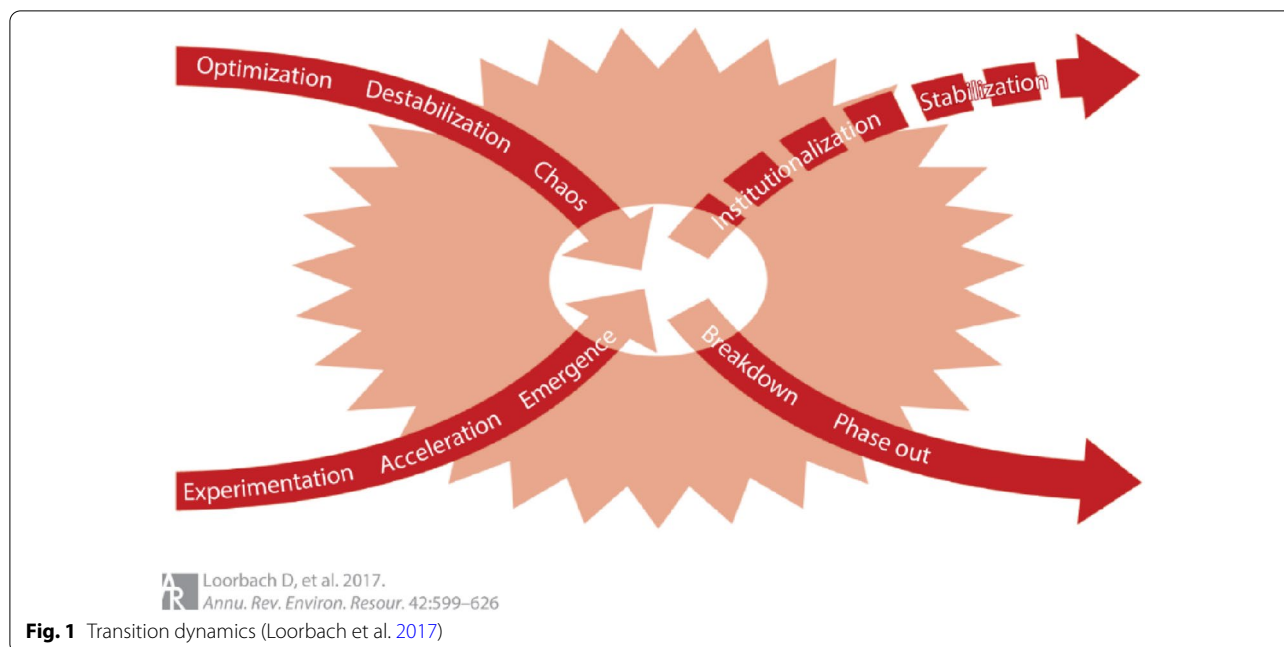
increasingly open to challenge and destabilize their own (regime) context (Hebinck et al. 2022).

Transition management provides a basis for anticipating desired and possible future transitions in a context of slowly destabilizing unsustainable (fossil and linear) societal regimes. But we can argue that by now we see all the signs of early breakdown and actual chaotic, non-linear change as the climate and biodiversity crises are escalating while regime responses to the COVID-crises focus on saving incumbent regimes rather than using public investments to truly accelerate sustainability transitions (Hepburn et al. 2020). This in itself will only lead to more fundamental future disruption: resistance against change as well as pressures for change exponentially grow, also exponentially accelerating the diffusion of transformative innovations. Taking the accumulated knowledge and insight on transitions seriously it seems inevitable that we are heading for a decade of truly transformative change: collapse and chaos will coincide with emergence and institutionalization. These interacting dynamics of build-up and break-down underlying the shift of a societal regime from one dynamic equilibrium to another is captured in Fig. 1.

Our argument is that many societal regimes are moving towards this phase of non-linear, unmanageable and unpredictable change, because of factors that prevent a more proactive dealing with the persistent problems that over time arise in these regimes. This so-called path dependency includes the economic, infrastructural, regulatory and behavioural lock-ins, and makes people seek for ways to mitigate problems by improving or optimizing the existing. While transition management sought to develop an alternative, reality is that it did not develop and diffuse in a way that it helped prevent the increasing destabilisation and emerging chaos without a clear and shared strategy for desired transition. In the next section we use the urban mobility regime to illustrate the mechanisms that cause path-dependency and how it slows down transitions.

The Urban mobility regime and path-dependencies

An evident example of a much-needed transition is in mobility and transport as mobility contributes significantly to climate change and resource use. But at a local scale it additionally leads to air pollution, loss of space and a range of negative social impacts such as transport poverty, safety issues and spatial segregation. In this section we take the transition perspective to describe presently dominant 'urban mobility regimes' and how they have historically evolved. We then also describe how existing policies intervene in support of sustainable development but, even when these efforts were accelerated through the COVID crisis, fail to put us on a more



fundamental trajectory of ‘radical transition’ towards just and truly sustainable mobility futures.

Urban mobility systems in developed countries are based on a mix of modalities that include public and individual/private transport options. Most major cities have elaborated, and well-used public transport systems (e.g. metro, bus, tram), decent infrastructures for walking and, sometimes, dedicated cycling infrastructure. However, individual car use is typically the most dominant modality in terms of physical presence with problems caused ranging from safety issues and parking to congestion and (air) pollution (Geels et al. 2011). As concerns over negative environmental and social impacts of current urban mobility systems mount and spatial pressures increase, more and more cities are seeking to facilitate a transition to sustainable mobility.

A ‘societal regime’ is defined as the dominant ‘culture, structure and practice’ in a societal domain. The urban mobility regime thus includes all modalities, the institutions, and infrastructure that have co-evolved around these, as well as our cultures and practices related to how mobility is understood, organized, governed, and studied. In these regimes, the (individual) car has historically clearly become dominant through interacting historical transitions that coincided with rapid urbanization in the twentieth century (Geels et al. 2011). These transitions have drastically changed how we live, consume, and move around. A core characteristic of this process of modernization has been the spatial segregation of production and consumption, facilitated by large-scale infrastructures (Graham and Marvin 2002). Examples include industrial

production systems; road, rail, waterway, and pipeline networks; and electricity and natural gas grids. Together with modern (auto)mobility regimes these infrastructural developments have enabled the spatial separation of living and working, contributing to suburbanization and urban sprawl.

The shift to individual mass use of cars has been extensively studied and described in mobilities scholarship. Authors such as Urry (2006) have pointed out the multiple socio-economic and spatial effects of this shift and the related path-dependencies that emerged with the transition from automobiles as luxury items to individual mass automobility after the Second World War. A new automobility regime emerged with supporting institutions and structures such as highways, fueling stations, parking facilities, taxation schemes, a service industry and institutions, and regulations aimed at safety, congestion reduction, environmental improvement, and accessibility. Along with this transition came a consumer culture and societal discourse in which freedom of choice and movement were considered a basic right leading to expectations of accessible and affordable automobility and a high degree of car ownership.

Over the past decades the growth of car use and ownership may have slowed down, and in some cases even reversed, particularly in cities and among the young in the Western world (Boyce and Williams 2015). Nonetheless, that does not automatically mean that automobility is in decline on the national (or global) level. For example, for the Netherlands, in 2016 the number of cars surpassed 8 million on a population of roughly 17 million people.

Across the western world, transport policy has historically been concerned with the growth of mobility and economic growth, and since the 1970–90 s (depending on the country) managing and mitigating transport's negative effects or externalities. It is in this context where the broader public has come to accept the presence of cars everywhere in the public space and has developed routines and lifestyles in which the private car cannot be missed. It has also created a policy logic around technological innovation and market facilitation. This fails to address the deeply politicized nature of transport planning and transport infrastructure development as a means to encourage economic development, which mean that transport policies—often unintentionally—keep reinforcing the current (auto-)mobility regime in ways that subordinate other modes of transport such as public transport, cycling, and walking.

In transition research these 'regimes' (Berkhout et al. 2004) are an explanation for path-dependency: investments in infrastructures, vested interests, built-up routines and developed regulations create a context from which it is hard to escape. The role of policy and management in this context is ambiguous at best: they support innovation but at the same time do so from an established position within such regimes. Government and business derive income from mobility through taxes on fuel, parking and congestion, sales of vehicles or rides. Their interest is, in a way, to increase these, while simultaneously mitigating negative impacts to allow for more growth. In other words: existing policy- and market-actors are embedded within these regimes and thereby have an established interest in sustaining it.

This interdependence of policy and markets upon existing societal regimes is visible beyond mobility. Energy, food, healthcare, resources, housing or education: such societal systems have developed through government policies that supported the creation of markets providing these basic needs. But in all cases the underlying design is based upon facilitating demographic and consumption growth as a basis for increasing government and market income as a way to create space for investments in efficiency and optimization. This model has certainly generated welfare increases and societal progress, but already in the 1970's science started to warn that this dominant economic development model was unsustainable. In spite of all the evidence and growing choir of voices challenging the dominant economic development discourse, it persists until now.

From a policy and management to a designing transition logic

This inability to change course is often linked to deliberate resistance against more profound change by vested interest of the complex and inert nature of the

institutions we develop. Much less attention has been given to the nature of *how* we organize change in society. The argument put forward in transition management is that the way policy and markets work is by definition supporting stabilization and gradual change. In other words: policy and business seek stability and to prevent disruptive change. Perhaps also because policy and incumbent business has established interests in the status quo, they have developed and incremental innovation logic that seeks to maximize control and minimize risks.

The multi-actor perspective (Avelino and Wittmayer 2015) distinguishes these three logics: policy, markets and community. The first two have been dominating the past decades, often at the expense of the community logic. The policy and market logics are in some ways quite different, but also share a number of core characteristics, such as their focus on risk-reduction, on implementing solutions, on predictability and control, on (technological) innovation and on improvement. This development logic certainly has strong advantages in that it facilitates societal stability and continuing progress. That is, until it becomes increasingly difficult and costly to make any further progress of efficiency gains while external pressures for change keep increasing. Such was also the experience of car manufacturers like Volkswagen in delaying a shift to electric mobility until the external pressures forced them into a very disruptive and chaotic transition.

From a transition governance perspective, this dominant logic in policy and markets creates a number of problems that stand in the way of a more proactive approach to future transitions (Feola 2020; Thomann et al. 2016; Wittmayer et al. 2021):

- **Implementation illusion** especially in policy, a lot of effort is invested in the policy-making process to generate legitimate outcomes. As society become more complex and policy more and more scrutinized by public and media, policy-making itself is often a complicated process to develop plans that need to be accountable, legitimate and precise in identifying solutions to solve specific problems. It creates the illusion for participants that something is changing in the real world and that somewhere someone in the future will actually implement these plans. However in the context of transitions, the pace of societal change often makes policy plans come after the fact and 'solutions' that are found outdated or generating new problems.
- **Risk paradox** the focus on risk management through target setting, monitoring and assessment often obscures the more systemic and structurally uncertain risks. Over time numerous strategies and approaches have been developed and are imple-

mented with support of consultants to identify risks that threaten business as usual and ways to mitigate these. But structural uncertainties that cannot be identified or predicted at all such as the risk that a whole market or business as usual is disrupted, are ignored or remain unaddressed. Typical examples are from industries that did not see disruptive change coming (from car industry to photography) or political changes such as Brexit.

- **Innovation trap** linked to the first two is a focus on innovation and solutions for identified problems, often of a technological nature. Policy has developed innovation policies along with accompanying instruments. Business has established R&D departments, investment strategies and incubators. This leads to continuous innovation but in practice always added to existing systems: hardly ever are things removed, phased-out or scaled down deliberately. This leads to the pattern in which for example cars get smarter, more efficient, are built from high-tech materials but also become heavier, bigger and more expensive.
- **Imagination deficit** in many ways historical examples of transitions illustrate that incumbent actors did not see it coming. It is perhaps a result of having grown so accustomed to the status quo and how things are, but it is also human to expect the next day to be more or less similar to the present. Exponential growth is in general hard to understand or anticipate (as also the policy responses to COVID have shown). Combined with the historical stability a regime context provided it seems that many leaders in policy and business are unable to see the present as an historical coincidence and the future as inherently uncertain.

Now that pressures to accelerate transformative change rapidly increase due to inaction (and during COVID even massive public investments in saving or supporting unsustainable economic activities), these problems of the dominant policy and market logic will only become more and more apparent. The interesting paradox here is that the more policy and markets are unable to proactively explore desired futures beyond a transition but in doing so actually increase the chances that such a transition will occur and with more negative impacts because of the sudden, non-linear and disruptive character.

Transition management is one of the approaches that has sought to offer an alternative development logic. As explained, it assumes future transitions and their structural uncertainties as a starting point based on the premise that existing approaches are inadequate in dealing with the persistent (unsustainability) problems inherent to existing regimes. Based on that, it also assumes that

people are also creative, entrepreneurial, engaged and inventive: in a context where existing systems and structures do not work they will start to explore alternatives. This 'transformative social innovation' (Loorbach et al. 2020, Avelino and Wittmayer 2017) encompasses new ways of thinking, doing and organizing that 'challenge, alter or replace' existing regime cultures, structures and practices.

It builds upon the multi-actor model (Avelino and Wittmayer 2015) which suggests that the traditional dichotomies created between 'government,' 'market' and 'community' is flawed. It posits that individuals by definition have multiple identities and are part of all logics, depending on their actions (as consumer, voter or neighbor for example). This would also mean that individuals and/or groups of individuals can use different identities to influence the direction and speed of social development. The evidence is there: cooperatives (community), social entrepreneurship (market) or court cases (public) are examples of ways through which individuals are influencing transitions. However, the highly institutionalized nature of a specific policy and market logic as well as the public-private collaboration model is still far more dominant and crowds out alternatives.

So far the focus of transition management and governance therefore has been towards empowerment of niches and support for change-makers to contribute to regime-destabilisation. But now that we are arguably moving towards the actual phase of institutional shifts and chaotic emergence of alternatives, we can see the urgency and need for transformative change being acknowledged within policies and markets (Guterres 2021). As highlighted in the introduction: transitions are mainstreaming in the sense that existing institutions and business are adopting 'transformative change' and seemingly feel the sense of urgency to move to a more proactive strategy. But from our perspective of a locked-in development logic, it is most likely that the new sense of urgency will lead to policy and business strategies that primarily seek to accelerate improvement through technological innovation. To continue to push for more efficiency and growth to generate funds to invest in making this growth green. Such a strategy will crowd out existing niches that have developed but is also likely to extend the lifetimes of industries and societal regimes that are at least partially unsustainable on the longer term.

Transition management on the other hand embraces transformative change as the context within which alternatives that have developed and matured in niches (external or inside incumbent regimes) can become mainstream and institutionalize. To capitalize on this transformative momentum implies that transition management researchers much more directly and less

reflexively engage with incumbent actors willing to support transitions to help institutionalize the emergent and potential just, sustainable futures. To, for example, work with the transitions in the food system to make sure it will be about switching to plant-based diets, regenerative production, and community supported models. To work with the possible transition in the built environment to ensure it supports a shift towards nature-positive and community based. To work with the emerging transition to electric mobility to guide it towards social, sustainable and healthy mobility prioritizing walking, cycling and sharing in urban contexts.

Inevitably this requires a strategy referred to as a 'policy mix' (Griffiths et al. 2021; Kern et al. 2019; Rogge and Reichardt 2016) but then dedicated to achieve transformational change. To do so implies combining strategies to support the emergence of radically new systems, the transformation of elements of existing systems that can be adapted and a proactive phase-out of unsustainable and undesirable elements. Where policy and business often prioritize innovation that supports and improves the existing, the starting point for a transition governance mix is the potential of a desired transition and hence prioritizes transformative innovation and a deliberate strategy destabilize existing and unsustainable patterns of production and consumption. Where such a strategy can be developed and who or what institution can support it however is unclear: transition management is often implemented by action researchers, entrepreneurial policy makers or social entrepreneurs and it is not (yet) and institutional strategy.

Transition management from the start has been an action-oriented type of transformation research (Hölscher et al. 2021) that is science-based (on evidence of unsustainability and transition analysis) and methodological (experimental, transparent, reflexive and systematic). In the described context of large-scale destabilization combined with the chaotic emergence of alternatives that opens up a period of power, conflict and disruption, the experimental agenda of transition management is on how to 'institutionalise emergence': finding strategies, tools and methods that make the radical alternatives that developed in niches the norm. Strategies that help change (economic, financial, political, cultural and regulatory) institutions to make the *possible* and *desirable* transitions a reality and an object of study for future historians. To help undermine and disempower established unsustainable cultures, structures and practices and help diffuse, mainstream and institutionalize truly sustainable alternatives.

Designing radical transitions

To that end, the approach of transition management itself needs to be reinvented. While the underlying principles remain, it should much more directly seek to deal with power and resistance from incumbent actors and the dominant development logic described in the previous section. To counter this, transition management in this phase should be able to mobilize and inspire large groups of people and help develop and support transformative alternatives at scale. To combine the critical stance towards business as usual and the drive for systemic, transformative change, with the ability to show people what is desirable and possible. That, rather than an improved version of the present, it is possible to pursue and explore an alternative future that is inherently more just and sustainable (Pereira et al. 2015).

The starting point for this would be to explore futures in which as many of our economic activities as possible have a positive impact on people and nature, in which as few resources as possible are used, in which collective capital and system formation are maximized as much as possible, close to practice, in which there is room for practice diversity and continuous adaptation, and in which historical patterns and of colonization, equity, and extraction are incorporated. It means, basically, a process of development that combines technological and social innovation that matured in niches, to reinvent our society and economy. In a way this has been what millions of people have been doing worldwide for decades: to take initiative to start a journey to locally find alternatives to an economy based on fossil fuels, extraction, and linear production-consumption systems.

One of the main challenges in this is that such transformative alternatives are hardly visible to the broader public: they are often locally rooted and seem small (but globally connected and part of broad movements) but also are often about prevention and *not* doing something rather than doing something with a negative external impact. To make it concrete: people that deliberate choose to walk and cycle do not cause traffic jams or other car-related problems and hence are less visible and a problem to be solved. This means that they get less attention from policy, are not interesting for business and for the average citizens that is car-dependent are at best a nuisance. The basic hypothesis underlying the idea of designing radical transitions is thus that there are potential and desirable transitions that do not mainstream because they are not visible or organized in a powerful way.

We can give three examples of such possible and desirable transitions that have been developing in the niches and are now not automatically mainstreaming because

they would imply a deeper cultural, institutional, and behavioral change across society:

- **Radical food transition** our food system needs to shift towards one that is largely plant-based, community supported and regenerative (Anderson and Rivera-Ferre 2021; Hebinck et al. 2021). Regenerative farming is an umbrella term under which all sorts of practices have developed over the past decades that combine food production with restoring soils and biodiversity. Farming without toxics and fertilizers and in harmony with nature: it is often less productive in a narrow sense but creates much more value in a broad sense. It is for long argued by science that we need to cut down on meat production and consumption and change from monocultures to regenerative practices but the global food industry and its importance in the global economy will not by itself give way. Similarly, our (urban) environment offers cheap and fast food everywhere and our supermarkets are full of processed foods. While there are clear trends amongst some producers and consumers to make the shift themselves, government and business have developed vested interests in the existing and unsustainable food system and focus on making that more sustainable. What if we instead try to imagine a shift towards (urban) food systems based on healthy and sustainable diets, regional food networks, fair prices and regenerative production?
- **Radical building transition** our built environment needs to shift towards healthy, circular and energy-positive (Dobbelsteen 2021). This would mean that at least all new buildings are developed in that way, but also that renovation and retrofit would develop in a way that it can transform the existing housing and office stock. The dominant practice however is that regulations gradually increase the standards and requirements but that still the vast majority of the buildings that are developed are not truly sustainable. Instead of mandating the use of wood and biomass to store carbon, to build in a way that more power is generated than the buildings use or ensure that material can be reused, the existing policies and building sector at large continues a process focusing on increasing efficiency and performance but within the existing model. The finance system is interlinked with the dominant practices, using buildings as way to store and generate capital and consumers are mostly that, consumers. It is however already for decades possible to build in a truly healthy, sustainable and circular way as numerous examples and icon projects show. It is also clear that community engagement and collaborative or cooperative forms of living enhance

social cohesion and can also help lower prices and increase democratic ownership and control. What if we imagine a complete shift towards a future built environment that supports communities, is nature positive and in which buildings actually contribute to mitigating climate change, offering nature-based solutions and restoring biodiversity?

- **Radical mobility transition** we need a shift towards environmentally sustainable and socially inclusive mobility that minimizes ecological impact and resource use, while maximizing the production of social, ecological, and economic value (Griffiths et al. 2021; Loorbach et al. 2021). This implies high levels of circularity, low levels of energy use and no fossil fuel use, and a high density, enabling short(er) distances between facilities and a reduction of transport movement. The current pathway however is one in which there is a technological push towards more diverse mobility systems adding new types of vehicles for comfort (from Uber to scooters and mopeds for example) and a shift towards electrical mobility replacing fossil fuel cars. It is obvious that for market actors this fits their need to sell rides or vehicles for a profit, for governments it is less obvious. They have become dependent upon income related to mobility (parking, taxes) and have developed institutions and interdependencies with the current mobility regimes, but also are supposed to care for air quality, public space and sustainability. The general public is largely accustomed to the existing mobility systems and changes to especially car-infrastructures can count on resistance. But what if we imagine a radical transition away from private car use towards a collective mobility system that prioritizes walking, cycling, public transport, and additionally offers shared mobility services for all in an efficient and affordable way. This could radically reduce the numbers of cars needed, free up public space and support healthy and safe urban environments that could benefit all citizens.

To support these radical transitions requires strategies that can fundamentally challenge business-as-usual: in terms of what consumers and citizens are used to, what businesses won't let go of and profits from, and what policy automatically seeks to stabilize and manage. It requires strategies that help make such possible and desirable transitions visible and powerful. It is here that the role of culture and design comes in as it can help to engage a wider audience and open up our collective imagination to actually start believing that such transitions are possible. To inspire large groups of people to start taking steps into this direction in a creative,

entrepreneurial and step-wise manner. To help make visible where the dominant development logic fails in delivering sustainability and justice for people and what alternatives are already available.

To this end transition management seeks to combine the urgency and analytical basis behind transitions research with the power and creativity of design disciplines. Already for longer there has been a movement in design research towards systemic and transition design. In this, designers challenge the origins of design as an approach from industry to improve products and services in order to sell more and achieve more impact. Rather it is argued that designers should take a more proactive role in supporting transformative change and bring their methods and skills to contribute to desired societal outcomes rather than to answer the need for innovation and improvement from within existing systems (Gaziulusoy and Erdoğan Öztekin 2019). Design in the broadest sense is a process that triggers imagination, can reframe and challenge existing logics and questions and create new artefacts, images and products out of nowhere. Yet it also often lacks strategies to deal with issues of power and politics, it lacks tools to make deeper analysis of path-dependencies and is often 'design-centric' as the focus is on the output of the process rather than the impact of the process itself, leading to attempts to broaden the approach (Dorst 2019).

Marrying the transition logic with a design logic seems to be a way to create a 'development-by-design' logic: processes in which existing transition practices and transformative innovations that have developed in niches are empowered and made visible in ways that inspire and mobilise and can become mainstream. This development-by-design logic formulates how society in general and policy more specifically could work with transitions, as it would include the following elements:

- A non-negotiable sense of urgency: we need to move away from dependencies upon fossil resources, extraction and linear production and consumption as soon as possible
- A non-negotiable commitment to radical transition: a nature positive, inclusive, just and circular future is the starting point for any process
- A dedication to existing transition practices: the people, entrepreneurs, policy-makers, activists, change-makers etc. that have for long been exploring radical transitions
- A transition-based framing: using system analysis, actor mapping, envisioning and back-casting to create a social learning process and shared discourse

- A design-based approach: bringing in design methods, approaches and competences to articulate, imagine, design and materialize radical transitions
- A cultural strategy: engaging wider public through dialogue, exhibition, experience, intervention and inspiration to make them part of radical transitions

Breaking out of the pathways of unsustainable development led by policy and incumbent business requires a combination of mobilizing and inspiring power that can challenge the existing *and* help build the new. While there are ample examples of civil servants, policy initiatives and entrepreneurs that do facilitate transformative change, their institutional environment will always slow down or limit the effects of their efforts. To support the described processes therefore requires other types of actors that can create a context in which science and creativity are combined. The most likely candidates could be universities working together with creative and cultural organisations that could combine strengths and work together with transition practices to make visible the radical transitions in their contexts. Approaching these as objects of action research or 'research-by-design' could be a way to help legitimate, underpin, illustrate and translate transformative changes.

There are signs that universities are moving in this direction seeking to transform their campuses, as well as how they work and collaborate with stakeholders to make the university into a 'Living lab' (Evans et al. 2015; Lambrechts et al. 2019). Yet it is also clear that to become effective actors in designing radical transitions, more is needed: a shift towards inter- and transdisciplinarity and a rethink of what good research is in the age of transitions. Especially in the social sciences this implies a move from descriptive and analytical to more explorative and engaged research, which will require new organizational structures and capacities.

Discussion

This paper set out to explore the role of culture and design in urban sustainability transitions. Our main argument in this paper is that the dominant way in which urban sustainability transitions are approached, is through policy and market strategies that prioritize improvement and optimization over transformative change. This is in part because of vested interests and the institutional logics that rule policy and markets, but it is also a lack of imagination and creativity in being unable to imagine more radical alternatives to ever become mainstream. From a transition perspective however, it is impossible not to see that over longer periods of time transformative change is inevitable: the urgency around climate change and biodiversity loss will only increase with our inability to

transform, accelerating the development and diffusion of technological and social innovations.

This creates the momentum for rapid systemic change, away from the pathways of unsustainable or gradual development. But not necessarily with the best possible ecological and social outcomes: as we illustrated with the mobility example it could well lead to transitions dictated by incumbents and policy logics that lead to 'less bad' futures. The focus on solving problems and implementing (technological) solutions reinforces path-dependencies, instead of opening up alternative pathways of 'radical transitions'. We provided brief illustrations in the domains of food, housing and mobility of how such radical transitions are different from the dominant pathway of optimization: they would imply a much more profound cultural, economic and institutional shift.

The building blocks for these radical transitions are existing transformative innovations that by definition are locally rooted and not very visible as they are often not institutionally organized or represented, do not cause major problems or (negative) impacts and do not represent substantial economic interests. We argued that they challenge and threaten the dominant logic of policy and markets and for the wider public are not really seen as alternative. This in practice means that advancing these radical transitions is left to social entrepreneurs, activists, idealists, entrepreneurial civil servants and engaged citizens. That have to work against the existing institutional policy logics and economic conditions to develop cooperative energy, regional and regenerative food, cycling, public green space or nature positive housing.

To help support radical transitions, we started to formulate a designing transition logic. It is based upon combining the strengths of transition management and design approaches: the urgency and analytical strength to challenge existing powers of transitions with the creative and mobilizing power of design. Research and design can help support and underpin the need and potential of radical transitions and make these visible and accessible to a wider public, thereby also helping to growth the support and hence the power-base of these. Universities and cultural organisations are in a position to take leadership in this by proactively engaging with radical transition practices in their urban or regional environment through action research and research-by-design.

There are examples of how universities take up such roles but in most cases, universities are organized around scientific disciplines and types of knowledge production that are empirical, qualitative or descriptive, rather than transdisciplinary, transformative and design oriented. A transformative university that helps to create transition arenas and facilitate processes of experimentation, envisioning, network building for radical transitions, thus

also implies transitions in and of the university. There are examples of universities that are taking on this shift (see for example <https://www.eur.nl/en/about-eur/strategy-2024/strategy-practice/dit-platform>) or even reorganizing themselves to address societal challenges (such as Leuphana University in Germany). This is however only an emerging movement and examples that go beyond traditional partnerships and traditional research-policy models are scarce and a broader institutional strategy to support a radical transition in academia is still pending.

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Author contributions

The author read and approved the final manuscript.

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