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From my perspective

A proposed theoretical framework for actors in transformative change

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A B S T R A C T

In this opinion piece we suggest a number of theoretical innovations related to the representation and conceptualisation of actors and agency in transitions studies. The research field has gained significant academic and policy popularity and reached a degree of maturity that belies its youth. Despite the ongoing advances and sophistications however, we argue that major lacunae remain regarding actors and agency. Because transitions are reaching advanced stages with more prominent roles for actors, addressing this issue is a prerequisite for progress in transition research – something which is widely acknowledged in the field.

Rather than the archetypical way of conceptualising a transition as some kind of systemic fight between alternative systems (niches) and dominant systems (the regime), we present a transition as a fluid unfolding of network activities by diverse actors aligned with a particular stream, resulting in a transformed system. We emphasize that our framework is a proposition – to stimulate debate and suggest avenues of further research. The ideas in this framework have yet to prove themselves, empirically and theoretically as regards their merits for transitions research, but at least they provide a different conceptualisation of transitions with a central role for actors and agency.

1. Introduction

Over the last two decades a vast amount of knowledge on transitions and transformative change has been amassed.[1] This emerging scholarship – under the moniker of sustainability transitions – has gained significant popularity, both in academic and in policy circles. To a substantial degree, this has been made possible by the availability and further development of theoretical frameworks that were originally intended to study innovation and technological transitions. Consequently, the present body of transitions knowledge – its scholarly success and policy appeal notwithstanding – has inherited some biases.

One such a bias is an emphasis on systems and technologies while actors are typically poorly represented. Despite the ongoing sophistication of transitions frameworks, the archetypical way of conceptualising a transition is still as some kind of 'systemic fight', where one or more alternative systems (niches) emerge within or alongside the existing, dominant system (the regime), which is considered to be under pressure, either from outside influences (e.g. resource constraints) or from the inside (new, competitive solutions) and an emerging system replaces or transforms the dominant one leading to an overall better adapted system.

The systemic fight picture is no doubt a caricature, but it serves to illustrate that the actions of people are somewhat of an afterthought in the explanations we are used to in the field – at least from our perspective. Therefore we propose a conceptualisation of transitions wherein societal and socio-technical systems change is *explicitly* the consequence of strategic actions of people. We do not, however, aim to discard or replace the existing transitions frameworks, but rather to achieve a balance. We feel it is now tipped to the side of systems and technologies and to correct this we would like to give the explanatory primacy to agency.

We are by no means the first or only ones to point out this explanatory disbalance. In fact, the main transitions frameworks seem to have been attracting ongoing criticism for their inadequate representation and implementation of agents and agency. By 2012, authors like Farla et al. (2012) and Markard et al. (2012) are clearly putting the actor issue on the research agenda, with Farla et al. observing that systemic framings 'might have come at the expense of a more actor-oriented and agency-sensitive analysis' and Markard et al. noting that 'understanding of the agency of different actor groups' appears be a promising realm for further research, respectively.

Such critique applies to virtually all the transition concepts, such as the Multi-Level Perspective (MLP, Geels, 2002; Rip and Kemp, 1998), Transition Management (TM, Loorbach, 2010, 2007; Rotmans et al.,

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2001), Strategic Niche Management (SNM, Kemp et al., 1998), Technological Innovation Systems (TIS, Hekkert et al., 2007) and the Multi-Pattern Approach (MPA, de Haan and Rotmans, 2011). In some of these, actors are represented in an overly simplified way, as regime versus niche players, in others there is a focus on a particular type of actor, such as frontrunners and yet others have no explicit conceptualisation of actors at all.

Obviously, these frameworks do have a rationale of how actors somehow underlie the systemic change.[2] Singling out the MLP, for example, we read Geels (2011) saying that it 'is shot through with agency' and that MLP concepts are 'enacted by actors in concrete activities', and the assumed forms of agency (bounded rationality and interpretive activities) are outlined also. Moreover, the MLP has been employed to investigate actor-related dynamics in many case studies. For example, learning processes and network building (Kemp et al., 1998), empowering (Smith and Raven, 2012), strategies of actors (Geels et al., 2016). Also, various roles and types of actors have been analysed in MLP studies, social movements (van de Poel, 2000), activists and communities (Seyfang and Smith, 2007), intermediary actors (Hargreaves et al., 2013; Kivimaa, 2014), strategic and political activities of niche and regime actors (Geels, 2014; Smink et al., 2015) and recently Schot et al. (2016) investigated the role of users as actors in transitions within an MLP framing.

But our point is not to argue that actors and matters of agency are not being addressed by, or with, the canonical transitions frameworks. Our point is that actors are not explicitly represented and often poorly conceptualised. With all the above-mentioned frameworks, it is possible to provide an account of a transition without referring to actors – as illustrated by the systemic fight caricature. Agency can be added in a case narrative as desired, or drawn from external theories if deemed useful, but the frameworks do not *rely* on agency for their explanations of transformative change. In other words, the explanatory primacy is not on agency. This situation we would like to shift. We are not saying that the systemic perspective is wrong – and it is in fact compatible with our proposed framework – but we suggest that employing agency may provide richer explanations and a basis for progressing transitions governance.

In summary, we observe a specific lacuna in transitions research with regards to the representation and conceptualisation of actors. This is in fact broadly acknowledged in the transitions literature. Avelino and Wittmayer (2015) note that 'most contributions in transition studies which refer to actors are troubled by conceptual ambiguity—do they refer to specific individuals or individual organizations, to more generalized categories of actors or to roles of actors?' and propose their multi-actor perspective with an aim to better understand potentially changing power relations in transitions. Fischer and Newig (2016) recently surveyed the sustainability transitions literature on the importance of actors and agency, going back as far as 1995. The 'conclude that actors in transitions can be part of several different categories, which can change over the course of time'. They furthermore cite Loorbach's (2014) work, who observes that new technologies 'enable individuals to shift between networks, communities and governance contexts almost freely' and say this 'suggests that a comprehensive actor typology for transitions will need to consider these dynamics'.

To address this lacuna, we propose a theoretical framework that intrinsically and explicitly explains systemic change in terms of the actions of actors in different roles. The framework consists of

1. a conceptualisation of agency combined with a typology of individual actor roles and a typology of actor alliances (such as networks),

2. a reinterpretation of systems which integrates most of the familiar transitions concepts and terminology, and
3. a new concept – streams – to explain how the value-based motivations of individual actors can connect to shared societal value sets and thus enable them to join forces.

We do not consider actors as bound to, or part of, particular systems, but rather as affiliated to potentially several systems or individual technical or social solutions. Transitions, from our perspective, are the consequences of myriad actions and interactions of actors and the alliances they form in their pursuit of systemic changes.

Without claiming to present empirical validation at this stage, we do illustrate our actor framework with a preliminary case study of transformative dynamics in energy supply. The case is set in the Netherlands which we consider a representative context for similar dynamics across North-Western European countries. Within this context we show how the key concepts of actors, streams and systems and the actor typology can be employed in an explanatory narrative. We argue that our theoretical framework is able to explain dynamics which appear paradoxical from a pure systems change perspective using only the traditional transitions concepts.

2. Our proposition – the framework

Before we elaborate our framework in more detail, let us first provide an overview and some positioning of its main characteristics.

The central aim is to explain transformative systems change as the consequence of actions and interventions of actors and alliances. We consider transformative change the consequence of deliberate, or even strategic actions of specific types of *value*-driven actors. The values that drive these actors are those that are part of *streams*: sets of values that could be upheld on a societal level by the available solutions and organisational possibilities. Because of this, streams are in a sense *societal* value sets rather than personal values. Streams represent those sets of values that are, or could be, embodied – as it were – in systems. Values cut across specific needs and solutions to meet them, and we therefore think that the stream concept provides a key to understanding how very similar transformative change is pursued and occurring in very different societal systems.

Connecting to streams allows individual actors to form *alliances*, aligning their actions and finding strength in numbers. In fact, the formation of alliances of various kinds amongst actors is considered crucial in achieving transformative systems change. Alliances include organisations, corporations, networks, movements. Actors and alliances can have different, sometimes concurrent, affiliations to systems. The cumulative actions of actors and alliances aligned to a stream, if successful, bring about change aligning the relevant system or systems with that stream.

From the above it is clear that the key elements of our framework are *actors*, *streams* and *systems* – in no particular order as all of them are crucial in explaining transformative change. We call the bundle of actors, streams and systems the *stage* – as it is where actors play their roles. We speak of a *transformative* stage if the actors, streams and systems on it are in such positions relative to each other that transformative change is possible. In other words, if it provides the necessary conditions for a transition. In summary:

- Actors are strategic and interpretive, operating individually or as part of alliances. Their strategic actions are aimed at making certain solutions available to society, or at phasing certain solutions out. These actions, if successful, would change systems. Actors *connect* to streams and *affiliate* with solutions, possibly several of either.
- Streams are value sets enabled by the state of knowledge (science, technology or otherwise) and the available organising principles (e.g. economical, infrastructural) with which that knowledge could be harnessed to meet societal needs. When actors *connect* to streams,

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[2] The Multi-Pattern Approach however is explicitly agnostic about how actors may bring about the systemic change described by the framework. It of course does acknowledge that systems and systems change are produced by people's actions.

the stream can be thought to direct their strategic actions.

- Systems are sets of solutions with which societies meet societal needs. To this end, solutions may involve the employment of technologies, practices, organisations and arrangements. The solution set of a system is institutionally coherent and organised to meet specific needs, e.g. public transport and car-based mobility would typically represent distinct systems.

Consequently, our conceptualisation of transformative change, and by extension of transitions, is that of a fluid unfolding of network activities aligned with a particular stream, resulting in a transformed system. This conceptualisation is – as mentioned – compatible with systems change narratives, like those from the Multi-Level Perspective in terms of niches and regimes, or in terms of constellations and patterns like in the Multi-Pattern Approach. In fact, we see this framework as an example of a complex systems theory and a continuation of our earlier work on this, particularly de Haan and Rotmans (2011).

To be more specific about this compatibility, and also to point out where our concepts do deviate from the traditional ones, we will consider systems and streams in some more detail here.

Both the MLP and the MPA employ a notion of system. In the MLP regimes and niches are either socio-technical systems themselves or their constituents though in earlier work (e.g. Geels, 2002) the term socio-technical 'configuration' is used which appears to be synonymous. The MPA (de Haan and Rotmans, 2011) is more explicit and speaks of 'constellations' which are societal systems in their own right but several constellations may compose a larger societal system (e.g. transport systems can be decomposed into several constellations around different modes of transport). The MPA subsumes niches and regimes as specific ideal types of constellations. Our notion of 'system' in this article is synonymous with the MPA's 'constellation' concept.

In the MLP the 'landscape' is roughly equivalent to the socio-technical system's environment[3] and its main import for the framework is that it is considered to put 'pressure' on the regime which then opens a 'window of opportunity' allowing niche innovations to break through (cf. Geels and Schot, 2007, Fig. 1). Our concept of 'stream' is not to be confused or equated with the MLP landscape. Streams are value sets enabled by the state of knowledge. Values are in the heads of actors – though they can be shared, which in fact is central to our framework – and provide them with an 'action perspective'. We also do not speculate about the pace of stream changes while the landscape is considered to be glacial, moving on the time scales of decades. We will now treat the three key concepts: actors, streams and systems in detail, beginning with streams.

2.1. The stage – streams

Not all values are considered to be drivers of transformative agency. We think that the values guiding the actions leading to transformative change are, as it were, facilitated by the available knowledge and organising principles (e.g. as per the state of technology and legal or economic possibilities) – in other words, those sets of values for which the conditions can be created in which they can be upheld. These are the value sets we refer to as *streams*. Streams are *societal* value sets, though not in the mystical sense that society personified holds certain values. The values that are part of streams are held and articulated by individuals. Streams are societal value sets in two senses: (1) they are considered good or right for *society* rather than just for the individual holding them, and (2) they are, or can be, shared as societal *goals*.

The conception of values we have is in line with that of Schwartz

(2012) characterisation, particularly the notion that values are beliefs – i.e. one thinks it is *true* that pursuing the value is good, more on this when we discuss actors below – and that values refer to desirable goals that motivate action. However, for the purposes of our framework and its applications, the actual values one encounters will typically be more specific than Schwartz' list of basic personal values. The values on Schwartz' list can perhaps be thought of as classes, and examples of values in the context of our framework are then specific instances of those values.

It is possible that at a given time in a given society, multiple distinct, incompatible or even conflicting streams are present. In a situation like that, different (groups of) actors would pursue transformative change in line with each separate stream. Also, streams may emerge, or, as we will say, *rise* and they may disappear or become unimportant, in which case we will be speaking of a stream *drying up*.

When a stream has not (yet) risen or when a stream has dried up, its values may nevertheless be held in that society. There is also no reason to assume transformative change agents would not be holding such values, though they would not be the imperatives of their transformative actions – at least not yet, or not any more. Though lone actors – voices in the wilderness – may of course be pursuing transformative change in name of such, perhaps deeply and commendably held, values. They would be the exceptions, unlikely to achieve the societal change they desire.

Because streams are value sets, they are not directly related to any specific solution an actor might propose. As streams are facilitated by the state of knowledge and organising principles, they much rather correspond to some abstraction or ideal, a right way of doing things, of solving societal issues and meeting societal needs. This abstraction or idealisation has two important consequences for our theoretical framework:

(1) Streams allow actors to form alliances on the basis of a shared, though necessarily somewhat vague, notion of what needs to be done. Potentially several, though likely similar, solutions may be part of a portfolio of options advocated by that group of actors, and different actors may collaborate whilst contributing something personal and specific to 'the cause'. It is much easier for people to join forces for an ideal or idea than for a specific solution, or piece of work to be done.[4]

(2) As streams suggest a way of doing things rather than specific solutions, they can guide transformative change across very dissimilar systems or sectors. This can be seen, for example, in many systems – often emerging roughly around the same time – where uniform and universal provision of basic resources or services has been a leading principle, ranging from drinking water supply to sanitation, health care and education up to a certain level. These systems typically have a hierarchical governance structure and centralised infrastructure for the actual service provision.

2.2. The stage – systems

Systems – in our conception – are the ways in which societies organise the meeting of human needs. We consider systems to be *institutionally coherent sets of solutions* – where solutions provide the specific approaches to the meeting of needs. Though this way of looking at systems may strike one as overly functionalist it should not be mistaken for a position that reifies systems and attributes agency *to* structures. Rather, it should be seen as a convention in line with common discourse that speaks of energy systems, health care systems and so on. Our

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[3] Though early work by Rip and Kemp (1998) presents the landscape more as a metaphorical device than a systemic category. Moreover, the MLP is supposed to be a 'nested' hierarchy which suggests that at least part of the landscape is contained within the system's boundaries. These issues are usually not discussed or made precise.

[4] This seems to be true in a very general sense. Whenever people voluntarily unite to accomplish something that is not blatantly in their self-interests, it is in name of some ideal or idea, such as 'social justice' or 'literacy', rather than a concrete task. Even when it concerns something down-to-earth, an ideal or idea will be raised upon the shield: 'be part of our clean neighbourhood' is more mobilising than 'clean your doorstep'.

conceptualisation of systems is a continuation of our earlier work on the Multi-Pattern Approach (de Haan, 2010; de Haan and Rotmans, 2011). The conceptualisation of systems and subsystems (constellations) as sets of institutionalised solutions can be found in (de Haan and Rogers, 2014) and the concept of 'societal needs' as human needs met on societal scales was developed in (de Haan et al., 2014).

Solutions are specific ways to meet human needs that can – at least in principle – be implemented by, or for, several people. In other words, a solution is not a coincidental way to meet needs, not peculiar to a particular person or context. Solutions may involve the use of technology, organisations, arrangements or they may rely solely on human (inter)actions. For solutions to meet needs at societal scales they need to be institutionalised – which turns them into systems. By institutionalising we mean the establishment of institutions relating to the solution and its functioning, also with respect to other solutions.

Our conception of institutions is essentially Scott's (1995) and covers a spectrum ranging from awareness to norms and guidelines to rules and regulations. Institutions not only enable solutions to perform their functions in systems, they also provide the *coherence* that turns them into systems. For different solutions related to grid-distributed electricity generation to systematically function together, such institutions are essential – to ensure engineering compliance and safety, but also in order to operate in a market context. Similarly, for the different medical specialties to provide health care systematically, institutions are required. More clearly put: the hospital is an institution bringing together several solutions involving specialist forms of health care practice, while other institutions connect these solutions to the general practitioner (another solution) making sure patients get to see the right specialist for their ailments.[5]

Though institutions, as per our conception above, in a sense *encode* the functioning of the system, they do not produce it. Actors, making use of solutions in the ways the institutions describe, produce the functioning of the system. Conversely, though they produce the functioning, actors do not need to be considered part of the systems – in much the same way a language is produced by its speakers, while few people would argue that its speakers are somehow contained within it. This framework chooses to clearly separate the descriptions of actors and systems. Actors relate to systems not as 'parts of' but through *affiliation* – and we expressly allow the possibility of actors having multiple affiliations.

If actors, guided by institutions, produce and reproduce the functioning of the system, then, one can ask, how do these institutions emerge and – importantly for our framework – how do they change? Importantly, for if institutions change, the systems change. Once established, the continuing, institutionally guided, use of the solutions by actors affirms or reproduces the institutions. This is of course structuration dynamics à la Giddens (1984, 1979). The kind of change allowed by structuration is of an evolutionary kind – though perhaps not strictly Darwinian.[6] Established institutions would have some margin to use the existing solutions in a slightly different manner, giving rise to optimisation dynamics for example. Similarly, new solutions can be integrated in the incumbent set by expanding the established institutions, which accommodates the use of the new solutions in a manner that complements or improves the incumbent set (see e.g. Rogers et al., 2015). This kind of change, incremental and evolutionary, within the frame of structuration, yields path dependency. Here, at last, we arrive at an opportunity to give a more technical characterisation of transformative change, as the kind of change that breaks this path dependency. Clearly, transformative change is extraordinary.

2.3. The stage – actors

Our conception of systems enabled us to make a more technical distinction between the normal, path-dependent way they evolve and transformative change. The actors involved in the former are guided in their actions by institutions from which they have little power to deviate. Milgram (1974) might have said these actors are in the *agentic* state. We will however focus on the actors involved in transformative change. We have been, and will be, using 'actor' and 'transformative change agent' interchangeably. However, since the latter term, though perhaps more accurate, is slightly cumbersome we will mostly use 'actor'. The term 'actor' also allows us to use its other meaning of someone playing a *role*, which is instrumental when we will be considering how actors can play different, even contrary roles. An example of this is the possibility of someone playing a role of an institutional actor whilst seeking to change those institutions as part of another, more transformative role.

We understand agency as the ability to act with intention – as opposed to just reacting, like a flower turning towards the sun. This emphasis on intentionality is common and non-controversial in the philosophy of action, going back, in modern analytic philosophy,[7] to Anscombe (1957) and Davidson (1963). Our conception is also informed by Bratman's (1999, 1987) work and we will draw on Dennett's (1971) 'Intentional Stance'. An agent, then, is an entity with agency, that can have beliefs (e.g. about what is going on around it, or about other agents) and desires (e.g. it wants to go somewhere, or do something) – or, an entity that can meaningfully *be thought to have* beliefs, desires and agency. Beliefs and desires are the basis for an agent's intentional actions – the actions that manifest its agency.[8]

The actors – transformative change agents – of our framework are value driven, as opposed to, for example, acting out of economic self-interest or functional, problem-solving motivations. Their intention is to do the *right* thing, not so much the best – that is, they can be considered *moral* agents. By value driven we mean that the actions and strategies of these actors to achieve systems change are guided by values. It is because they would like to see those systems more in line with their values that they want to see them changed. The solutions they propose, they deem the *right* ones, considerations of costs and benefits or performance are not primary – though they quite possibly consider their solutions superior in those respects also.

One of the key problems actors encounter when trying to achieve transformative change is that either existing structures have to be broken down to adopt different solutions or completely new structures have to be built up to support them, and often combinations of both. In either case the initial activities on the path to transformative change will have negative pay off, it may be more expensive or performance may suffer. Despite this, transformative change *does* occur, and as we believe it occurs intentionally, produced by actors, it seems to follow that *other* motivations drive the actors involved – motivations that are able to persist while the initial changes yield their poor results, motivations that will keep them convinced they did the right thing. We think they are value driven.

We discussed earlier that actors are not so much driven by 'their' values, but by value sets that have the potential to be upheld on a societal scale, given the state of knowledge and organisational possibilities. This was the basis of the concept of 'stream'. We say that an actor *connects* to a stream and this would obviously be because that stream is in line with the values personally held by that actor.

Schwartz (2012) points out that values are a kind of belief, and that they 'refer to desirable goals that motivate action'. Sayre-McCord and

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[5] Though this way of organising these aspects of health care is not the only way possible, it is common to several OECD-type countries.

[6] This would be an example of an adaptation process as described by Holland (1975), a broader conception of evolutionary dynamics that includes Darwinian evolutions as a special case. In the Multi-Pattern Approach (de Haan and Rotmans, 2011) this kind of change is part of a pattern called 'Adaptation'.

[7] See also the entry on 'agency' in The Stanford Encyclopedia of Philosophy (Schlosser, 2015).

[8] This is what Bratman (1987) calls the desire-belief model of intention. How intentions are formed, and the status of intentions with respect to beliefs and desires we leave aside in this article.

Smith (2014) say that the valuing of an agent consists in believing that whatever is valued is desirable or good. They also allude to the enduring quality of valuing something. This seems implicit in Schwartz though he does explicitly refer to values transcending specific actions and situations. These considerations lead us to say that the particular values that connect an agent to a stream, consist of the belief that the desire to achieve the valued outcomes is worthwhile of a long-term commitment. We can then continue to conceptualise *strategies* as special intentions formed by the agent on the basis of beliefs concerning the right solutions given the value set of the stream connected to. The agent combines these beliefs with others concerning capacities, influence and opportunities to ally with other agents connected to the same stream. Actors are normative, strategic and social, transformative change agents.

Although beliefs, desires and intentions are the kind of mental states normally attributed to humans, it is common practice and often very useful to attribute 'agent-hood' to things, animals or other non-humans, this is what Dennett (1971) calls the 'Intentional stance'. Examples of the Intentional stance in the societal context are statements like 'the government decided to …' or 'this is what the system does to people'. It is in that sense that we may attribute agency to our alliances, the collectives and organisations of actors – not in the reifying sense that suggests social structures actually have beliefs, desires and act with intention.[9] It is the joint connection to a stream that provides an alliance with the unity that justifies the Intentional stance in our case.

Our conception of a system was that of an institutionally coherent set of solutions to meet societal needs. With our notion of transformative change as breaking the path dependence induced by the institutionally guided use of solutions, we are left to investigate how actors relate to solutions and how they change institutions.

We say that an actor *affiliates* with a certain solution, or possibly several. This means that given the needs in question, actors hold that solution to be in line with the stream they connect to – they believe it to be the *right* solution. Actors being transformative change agents, this belief will lead them to form an intention, a strategy to get that solution implemented to benefit society. If the solution they affiliate with is already part of a system – emergent or established – they may direct their efforts to further institutionalise it with the aim of making it more widely available in society. The exception to this is when the system's organising principles, encoded in its institutions, are not in line with the stream the actor is connected to, for example an actor who would affiliate with a solution offering vocational education but not if it were part of a system demanding competitive fees. In such a case, the actor would strive for system reform or the establishment of a different system.

Breaking path dependency involves changing the very institutions that bring it about, and not every actor is in a position to do this. Suitable positions would obviously include the top, but also specific places within influential actor networks or places where rare abilities can accomplish rare feats. Another suitable position may be 'outside' the system, by establishing a new one or creating a protected environment[10] – effectively avoiding the path dependence. The ability to change institutions is an ability to influence people's actions, we therefore say the actors in these positions have *power* – a perspective we think is in line with Avelino's conceptualisation of power in transitions (e.g. Avelino, 2011, 2017; Avelino and Rotmans, 2011, 2009). These individual or collective powers can of course be greatly amplified, or at least be more effectively used, when actors are able to form alliances and act in concert.

3. Transformative dynamics

This section will outline how transformative change is explained within our framework. As per our own decree, the actions of transformative change agents – actors – will be at the core of these explanations. Nevertheless, as also mentioned before, the entire stage, featuring actors, streams and systems is involved in transformative change. Moreover, it is through alliances that actors compound and increase their transformative potential. In the following, therefore, we will elaborate on the value-driven dynamics of actors and streams, on the alliances that actors can form and on the systemic manifestations of their actions. Before we do this, we will present a small number of fundamental roles of transformative change agents. These are the roles we deem essential in transformative dynamics – roles can be enacted by different actors at different times and an actor may simultaneously enact multiple roles.

3.1. Typology of transformative actor roles

For our typology of transformative actors we distinguish four different types of actors: frontrunners, connectors, topplers and supporters. These actors can be affiliated to emerging systems or incumbent systems, or to both types simultaneously. This means there is no bias in our model of transformative change towards 'niche actors' or 'bottom up' dynamics. Moreover, the idea that actors can have multiple affiliations (with different systems) and several roles (employing different kinds of strategies) enables the treatment of boundary spanning actors within our framework (see e.g. Brodnik and Brown, 2017; Smink et al., 2015 for discussions of boundary spanning in transitions). Our typology complements those in the recent literature (see the brief overview in the Introduction) by focussing on the actors' strategies and potential systemic consequences.

Frontrunners – are already known from the Transition Management literature (Loorbach and Rotmans, 2006). The frontrunner role is geared towards making alternative solutions known and available early on – they are solution driven. Frontrunners act upon their own, personal values and do not necessarily align with any stream – as far as they are concerned. Becoming part of an alliance may however explicitly connect and align them and their endeavours to a stream.

The alternatives presented by frontrunners provide systems with *diversity*.

Connectors – connect in two respects: (1) they connect solutions to systems – be they emerging or incumbent – by embedding or anchoring them in an institutional context. They institutionalise solutions, making them established options to society. And, (2) by connecting actors with other actors on the basis of their shared value sets, aligning them with a stream. The connector role is therefore crucial in the formation of alliances.

Connectors provide *connectivity* amongst actors and between solutions and systems.

Topplers – are mobilising and system-oriented in their actions (as opposed to the solution-driven frontrunners). Actors in a toppler role introduce, change and phase out institutions to make way for alternative solutions. Topplers may affiliate across different systems, for example emerging and incumbent, in order to achieve their transformative goals. Topplers are able to articulate the values that connect their alliances to a rising stream and make them explicit. By *externalising* values they are able to attract *supporters* (followers).

Topplers provide *coherence* to the alliances and nascent or changed systems.

Supporters – are not themselves to be considered transformative, though their support is an important factor in the institutionalisation process of transformative change. Their adoption and endorsement provides the legitimisation, and expresses the societal need for the new solutions and changed systems.

As the title of this subsection suggests, these are actor roles involved

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[9] Whether that ever is a justifiable suggestion – that is, more than a stance – we leave open for discussion.

[10] This is what is elaborated in the literature on the Multi-Level Perspective (Geels, 2002; Rip and Kemp, 1998) and Strategic Niche Management (Kemp et al., 1998).

in transformative change only. A more complete treatment would also include several types of institutional actors. In particular actors whose role it is to counter or slow down change. Treatment of such actors is however outside the scope of this article.

Gladwell (2000), in his book *The Tipping Point*, discusses types of actors, who in some respects resemble ours – or the other way around. This should not be completely surprising, as Gladwell is interested in social contagion-like phenomena, which can be considered a part of, or similar to, the dynamics of transformative change – e.g. when the adoption of innovations is a key aspect of it. He distinguishes *connectors*, *mavens* and *salesmen*. His connectors certainly resemble ours in their capacity to be social links but it is important to note that our connectors also connect solutions to systems. Characteristics of Gladwell's Mavens – people who have access to important information and are keen to share it – can likely be found in all our transformative actors but are most prominent in frontrunners (pioneering and entrepreneurial after all) and topplers (especially in their ability to externalise values). All our transformative actors have characteristics of Gladwell's salesmen.

3.2. Actor dynamics and the formation of alliances

The actors in the roles we just presented all aim – in one way or another – to effect transformative change. In order to do this, they can either directly try to implement an alternative solution themselves or they can work together with other actors on the basis of a shared aim and values. Either way, one measure of success would be the support received. Consequently, even the most straightforward strategy to achieve transformative change will involve some *alliance* between one or more transformative actors and one or more supporters. We will now discuss the kinds of alliances we consider crucial, the actor dynamics behind their emergence and some of their potential systemic consequences.

3.2.1. Initiatives

The most straightforward type of actor dynamics is that of one or several actors forming an *initiative*. Initiatives are the organised endeavours of actors with the aim of making alternative solutions known or available. As can be expected, initiatives are typically the work of frontrunners, though connectors or topplers may also be involved and of course initiatives may have supporters.

Initiatives often have an entrepreneurial character – in the broadest interpretation of the word – and may take the form of start-ups, businesses, NGOs, coops or similar forms of organisation. This, however, may give the impression that initiatives are necessarily small, or at least grow 'from the bottom up', which need not be the case at all. Initiatives may also be large, or even 'mega' projects such as infrastructure roll outs or thorough-going legislative reform in a particular sector. Conversely, just as not every start up is an initiative in the transformative sense in which we use the word, not every large-scale infrastructure project should be considered one. What sets initiatives apart from other organised endeavours is that they aim to provide new or alternative solutions to what is offered by the incumbent systems.

Two more things need to be said about initiatives, one about how they relate to streams and one about their systemic manifestations. As regards the former, we indicated that initiatives are typically instigated by frontrunners. As a consequence, initiatives usually only accidentally align with a particular stream. Regarding the latter, the systemic consequence of a successful initiative is the establishment of what we shall call a *single-solution system*. A measure of success would be that the initiative attracts supporters. The involvement of connectors in initiatives can lead to further institutionalisation of the nascent single-solution systems, either as such or by connecting them to existing systems.

3.2.2. Networks

In a similar way as initiatives are related to frontrunners, so *networks* are related to connectors. Networks form under influence of connectors who bring together several actors and possibly their initiatives on the basis of shared values. Where it was possible for a frontrunner and consequentially an initiative to be only accidentally aligned with a stream, becoming part of a network makes such alignment an explicit necessity. It is part of the role of connectors to bring this alignment about.

Networks may be loose affiliations amongst like-minded transformative agents but they may just as well be formalised organisations with restrictive policies about membership. Knowledge networks and unions are typical examples, as are user communities (be they virtual or in 'real' life), advocacy groups, trade associations and so on. As with initiatives, it is their transformative agenda that sets networks – in our sense of the word – apart from the other networks around.

Amongst the systemic consequences of networks are the alignment of potentially several single-solution systems. For example, connectors align actors in the network along the same stream which in turn leads the single-solution systems of these actors to acquire some institutional alignment also, through interactions, knowledge exchange and agreements. Connectors, as in the case of initiatives, further institutionalise the single-solution systems related to the network, both amongst each other – forming, as it were, a networked system of single solutions – and with respect to existing systems. Successful networks align various initiatives and connect actors with shared value sets.

3.2.3. Movements

Movements are closely related to, and typically the consequence of, the actions of topplers. It is a key characteristic of the toppler role to articulate and advocate the value sets that would connect actors to a rising stream. It is by virtue of this externalising of a shared value set that a transformative movement can emerge and amass supporters. Movements need not consist of topplers and supporters exclusively, frontrunners, connectors and, consequentially, initiatives and networks often also form part of movements. What sets movements apart from networks is that most supporters do not have, or need, a direct connection to the transformative actors in the alliance, but rather connect to value sets embodied by the movement on a more abstract level.

Movements are often associated with some common moniker, e.g. the 'Open Source', 'Socialism' and 'Transition' movements. Such labels are indicative of the specific value set that unites the movement – and often become synonymous with it. Within a movement, a portfolio of solutions may be considered the appropriate instrumentarium to put the value set in practice. Indeed, when some of those solutions have already reached a level of institutionalisation, such as in a single-solution system, they may become identified with the cause of the movement. Think in this respect for example about the role of communist parties in 19th and 20th century Socialism, or the Transition Town model for the present day transition movement.

The systemic consequences of the dynamics of movements are the taking shape of alternative systems. This can be in the form of single-solution systems growing and further institutionalising, several small systems merging to form a larger system or such aligned new solutions becoming institutionalised parts of incumbent systems. When we said topplers provide coherence, it was in this system-shaping sense as much as in the sense of articulating and advocating of shared values amongst actors.

As we have been focussing on the motivations and actions of actors and their alliances to pursue transformative change, we have not treated in much detail the important question of under what kind of circumstances actors would be more inclined to do so, and, moreover, under what kind of circumstances are their efforts more likely to be successful. We have discussed the systemic conditions for transformative change in some detail in de Haan and Rotmans (2011). There we distinguish *tensions* (with the environment of the system), *stress*

(inconsistencies within the system) and *pressure* (in competition with other systems). As our framework considers all transformative change the consequence of the actions of actors and alliances, it is crucial for them to *perceive* these as conditions for change. Crises are often mentioned as drivers of transformative change,[11] but in this sense it is even more important that an issue is perceived as a crisis for actors to act upon, and form alliances around.

3.3. Actor dynamics and transformative systemic change

The above treatment of actors, their alliances and potential systemic consequences may give rise to three misunderstandings: (1) that alliance formation is somehow necessarily sequential, (2) that transformative change is always about building up, and (3) that we forgot about actors who aim at maintaining the status quo and impede change.

The first can easily be clarified: A movement may emerge in the absence of prior networks or initiatives and, moreover, movements may give rise to new initiatives and networks 'within' them.[12] In other words, though there is the apparent suggestion of a natural progression from initiative to network to movement, such a progression is not necessary for, and perhaps not even common in, transformative change. Regarding the third potential misunderstanding, we perhaps should reiterate that we did not forget them but choose to focus on transformative actors in this article. We identified institutional actors as the ones who maintain the structures of systems (which is close to tautological), but have not at all attempted typologising them or their potential strategies, if any. We will come back to this in the discussion. The second potential misunderstanding is a more subtle matter to clarify and it is central to understanding how the threads of actor dynamics described thus far can come to form a transitions tapestry.

Transformation is as much about breaking down as it is about building up. However, arguably, most transformative actors consider their goals to be positive ends – they would consider their actions constructive rather than destructive. The issue is that transformative change is about changing systems, sometimes by adding something new to the existing offerings but typically by providing alternatives and these will either compete with or replace incumbent solutions. From this the picture emerges that transformative dynamics produced by the actions of actors, in the sense of their various endeavours to institutionalise alternative solutions, can have constructive or destructive consequences, *depending on the degree of institutionalisation of the systems in question*. Roughly speaking, the initiative of a frontrunner can be constructive if leading to the emergence of a single-solution system and destructive if the initiative is to implement the alternative in an incumbent system, where the institutional setting will need to be adjusted and where it competes with other solutions.[13] Obviously some transformative change will be both, and some neither. We will elaborate this a little bit more.

We said that frontrunners, through their alternatives, provided systems with *diversity*. Connectors were considered to provide *connectivity* – for obvious reasons. And, topplers, through their system shaping, articulation and advocacy of shared values, provided *coherence*. Each of these can have disruptive outcomes as much as reinforcing, depending on the system in question. Diversity of non-aligned alternatives may be important in the building of new structures,

but in established systems it may be at odds with stability and efficiency. Similarly for connectivity, where connecting alternatives into an existing system may be disruptive, but connecting several alternatives into a network or nascent system may be reinforcing. Finally, coherence was related to the system shaping work of topplers, which entails establishing alternative sets of solutions as much as it can mean phasing out of incumbent solutions.

In an ongoing transition, the transformative actions of actors relate to incumbent and emerging systems alike. Not all actors are affiliated to both, but many necessarily have to be. In order to start an initiative, for example, a frontrunner may need access to funding or at least permission to do whatever the initiative is about and this may very well come from the systems the frontrunner provides an alternative for. Networks, in likewise manner, may be initiated by connectors affiliated to an incumbent system whereas their actions may lead to the development of an emerging system in direct competition with the incumbent, or to the displacement of certain solutions within the incumbent system. Toppler action would almost always rely on simultaneous affiliations to incumbent and emerging systems either because the transformative potential of movements requires supporters in institutional roles or because their system-shaping activities involve negotiations and establishing agreements across systems.

From the above one sees again the virtue in refraining from viewing actors as part of, or exclusively belonging to, specific systems. Actor dynamics lives in an 'actor space', where actors interact and form alliances on the basis of shared values that connect them to streams that live in their own 'stream space' as it were. The consequences of the (inter)actions of actors and alliances are felt in the 'system space' and the transformative dynamics at large requires taking into account the actors, streams and systems, that is, the entire transformative *stage*.

By now we can construct two pictures of transition dynamics based on actors, streams and systems. At the core is the actor dynamics, where actors affiliate with alternative solutions and existing systems as they deem opportune. They connect to a rising stream and initiatives, networks and movements form with increasing numbers of supporters. In the systems space there can be several outcomes of course but we will for now consider only two complementary scenarios of 'successful'[14] transformative change.

Fig. 1 depicts the simple decline of the incumbent system at the expense of the success of the emerging system.[15] Paired with this is the drying up of the stream representing the values embodied in the incumbent system and the rise of the stream of the emerging one. During the course of this transition the two systems exist as almost mutually exclusive ways to meet the same societal needs. Fig. 2 depicts a transition where the emerging system grows in co-evolution with the declining incumbent. Doubly affiliated actors facilitate constant exchange and mutual adoption of solutions and institutions. Midway through the depicted time line the two systems are at the verge of merging while both have changed significantly and their streams have come together, that is, both their value sets have adapted to each other.

Such bird's-eye views as presented in Figs. 1 and 2 may wrongly convey a sense of inevitability, of necessity about the transitional trajectories. We stress that these are simplified stylisations of highly idealised ways transitions can unfold – with as main aim to show the roles actors may play in them. They serve to illustrate and allow us to clarify certain issues:

First, the figures show a seeming succession of involvement of frontrunners, connectors and topplers respectively. While it is true that frontrunners – per definition – first introduce alternative solutions, connectors and topplers can be active at any stage in a transition. Connectors and topplers have more systemic roles than frontrunners,

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[11] The sense of urgency that sometimes accompanies (perceived) crises can however also lead to the rapid implementation of a relatively 'conservative' measure that is 'certain to work'. See e.g. Rogers et al. (2015) for an example of this where a status-quo reinforcing infrastructure was commissioned in Melbourne, Australia when drought conditions reached a point where running out of (drinking) water became a realistic prospect.

[12] Or think for example of how a global movement, possibly grown out of a local initiative, may inspire local initiatives and networks in a different region or context.

[13] *Nota bene*, we do not mean that it depends on one's viewpoint whether these consequences are constructive or destructive. The constructive consequences of transformative change (building up of an alternative) and the destructive consequences (phasing out of obsolete solutions) are both real.

[14] 'Successful' also not intended in any relative sense, but simply to mean that transformative change has indeed occurred – whether in a desired direction or not.

[15] Loorbach (2014) presents similar 'X-curves' in his inaugural address (p. 46–47).
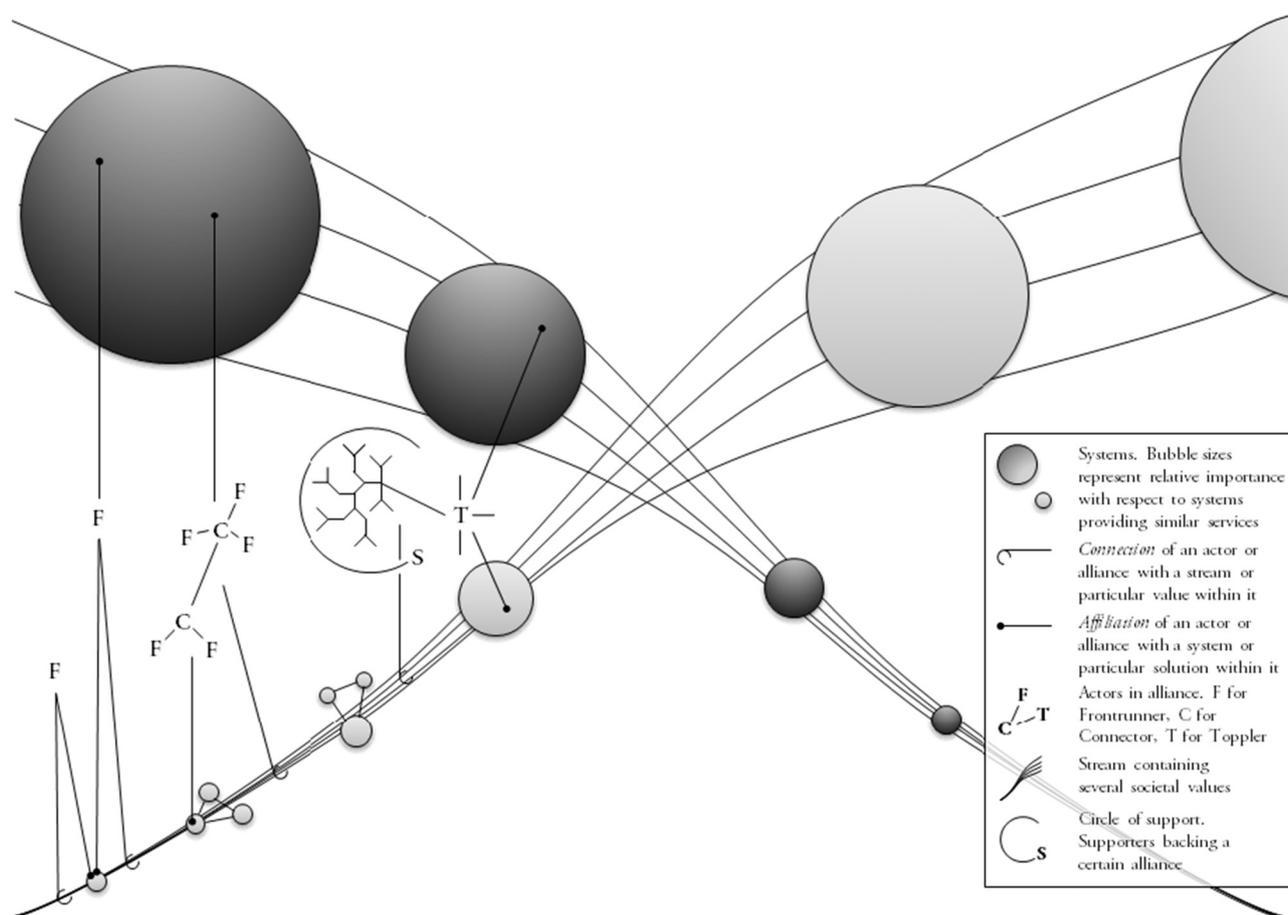
Fig. 1. Dynamics on a transformative stage, with an incumbent system being replaced by an emerging system. Actors, streams and systems as well as connections, affiliations and alliances are shown.

which is why in the figures they appear when the alternative system becomes more competitive with, or begins to merge with, the incumbent one. Other, more complicated trajectories are certainly possible, so the seeming sequence is an artefact of the particular stylised trajectories in Figs. 1 and 2.

Second, the figures only depict actors, streams and systems. As the actors are the agents of change, whom we consider to be value driven, one may get the impression that values are the only or major determinants in shaping the transitional trajectory. This is far from what we mean. We consider values to be the main motivators of the actors in their pursuit of transformative change. How their value-driven actions work out in practice, and what means they have at their disposal, also depends on many other factors – amongst which of course the usual economic and technological constraints.

Third, both figures begin and end in a situation where one system prevails, and accordingly where one stream remains. Other scenarios are very well possible. For instance, a scenario where two streams continue to coexist, each embodied in a system meeting the associated needs in different ways. This is commonplace in many transport systems, where a car-based system and public transport coexist meeting roughly the same needs in different ways, based on different values (like individualist versus egalitarian). Also, it is not the case that when a system becomes dominant all actors gradually choose its side. It is rather the other way around, if a system has become dominant it is because enough transformative actors have over time affiliated with it, leading to the adoption and institutionalisation of its solutions. In practice, actors would often remain connected to more than one stream and perhaps affiliated to more than one system – including the possibility of being affiliated to a system incompatible with the values of the stream that actor connects to.

We can now briefly revisit the idea that the constructive or destructive consequences of transformative change depend on the degree of institutionalisation of the system in question.[16] Assuming it carries some truth, and with the framework as it now stands, we can draw some conclusions. Firstly, if we consider a transition starting with a well-established incumbent system then all transformative change is initially going to contribute to its decline, however small these effects may be at the outset. Conversely, transformative change, for nascent systems, is more likely to have a constructive effect – until, of course, the emerging system reaches a degree of institutionalisation at which transformative change will become detrimental to it. Thus we arrive at the conclusion that if the degree of institutionalisation determines the constructive or destructive systemic manifestations of transformative actions, then there is a degree of institutionalisation at which it is unclear whether the effects of transformative change will be constructive or destructive.

This would correspond to the middle stages of Figs. 1 and 2 or the acceleration phase – the steep part of the S-shaped curve – of the Multi-Phase picture of transitions (Rotmans et al., 2001), when a period of pre-developmental transformative change has brought down the degree of institutionalisation of some, and increased that of other systems. Since in such a period more 'directions' of systems change are possible,

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[16] The idea of 'degree of institutionalisation' is admittedly not very well defined at all, but it can be thought of as a kind of systemic maturity. It is in that sense similar to the notion of 'structuration of activities in local practices' as employed in some incarnations of the MLP (e.g. Geels and Schot, 2007) to distinguish between niches and regimes—the former obviously having less structuration than the latter. See Coenen et al. (2012) for an interpretation of the MLP levels as a measure of systemic maturity ('[…] they are conceptually related to the maturity of the socio-technological system').
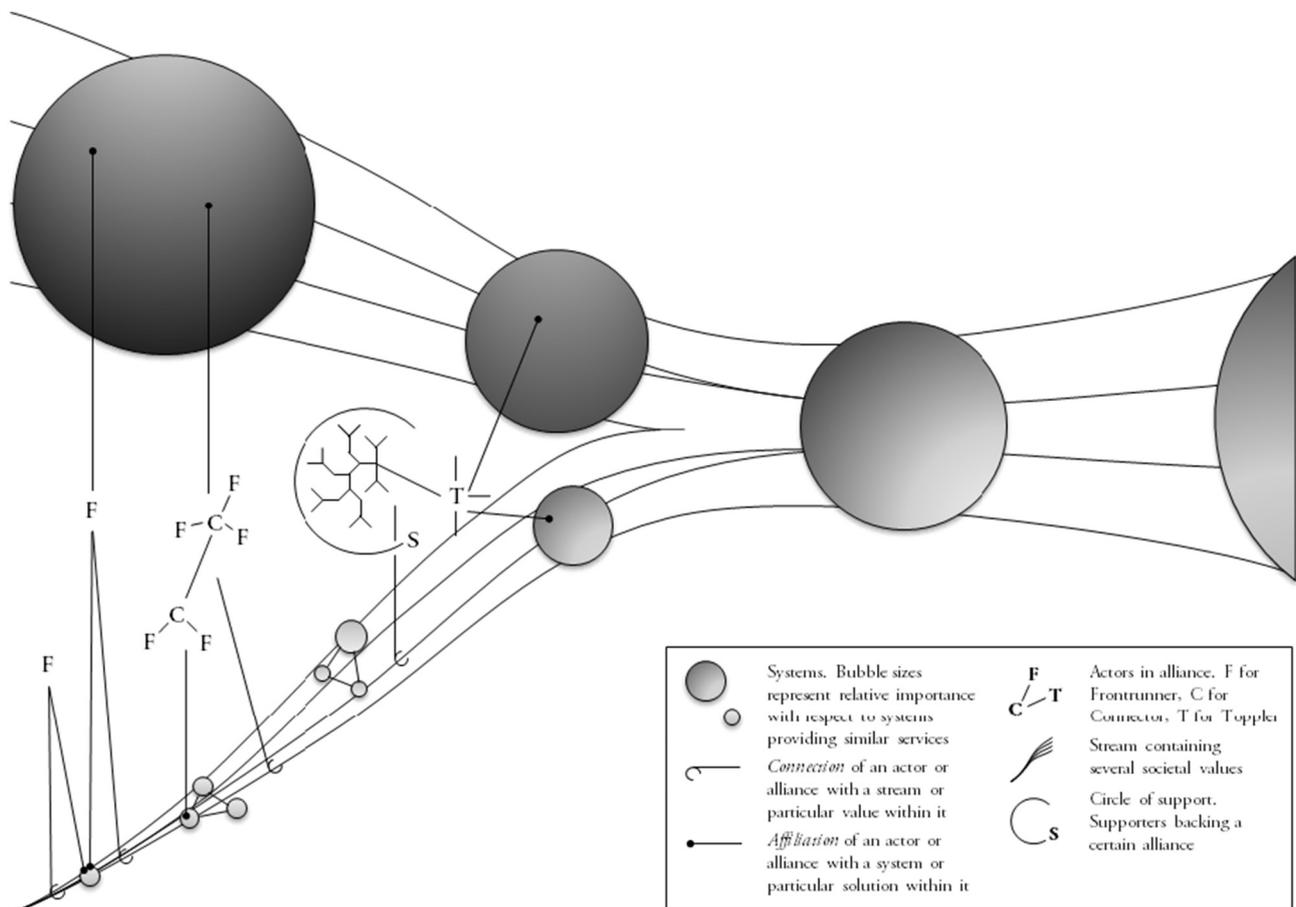
Fig. 2. Dynamics on a transformative stage, with an incumbent system merging with an emerging system. Actors, streams and systems as well as connections, affiliations and alliances are shown.

the strategic actions of relatively few actors may be highly effective, which is an important observation to make if one is interested in steering or managing transitions. Surely, these are the periods of dis-equilibrium that Rotmans and Loorbach (2009) view as opportunities to direct systems in desirable directions.

4. Illustration by case example

We will now illustrate our framework with a case example. As mentioned in the introduction, we do not claim to provide empirical validation with this illustration. The aim is to show how the key concepts can be applied to analyse a case. We first present a brief narrative description of the case. Given our aims, this is more a sketch of the developments than an exhaustive detailing of the relevant events. We then analyse the case using some of the key concepts of our framework. While we do this, we will draw attention to how the analysis would differ from one carried out with a systems-only or otherwise traditional transitions-theoretical framework such as the MPA (as e.g. per de Haan and Rotmans, 2011) or the MLP (as e.g. per Geels, 2002). Finally, we will compare the dynamics of this case with the ideal-typical dynamics discussed in the previous section and summarised in Figs. 1 and 2.

4.1. Case narrative

The Dutch energy system once was ahead of its time. That is, the energy transition has been around in the Netherlands for some 25 years already. The Netherlands were a frontrunner in the late 80s of the previous century with the first integrated environmental policy plan, including tax reforms to push the energy supply system in a more sustainable direction. However, there appeared to be a big gap between

the policy plans and their implementation in an unruly practice. An official energy transition project was started in 2001 which lasted for about 10 years. It has been extensively documented and investigated (see e.g. Kemp et al., 2007; Kemp and Rotmans, 2009; Loorbach, 2007; Smith and Kern, 2009; van der Loo and Loorbach, 2012). The project was a success in terms of agenda setting, experimenting and social learning but a failure in policy implementation terms. Perhaps the greatest achievement was an indirect impact some years after, namely the broad energy agreement amongst 40 Dutch parties and an im-plementation plan for 2015–2050.

Nevertheless, the implementation results over the last 25 years have been dramatic. The Netherlands ranks second to last amongst the European 28 according to share of renewables in gross inland energy consumption (Eurostat, 2017). The incumbent, fossil-fuel based system is very powerful and over 150 years old, starting with coal exploitation, later shifting to oil and, after the 1958 discovery of enormous reserves in the north of the country, to natural gas. The influence of multi-nationals, particularly Shell, is considerable, also on government min-istries and administrations.

The transformative potential seems to have been low. Dutch in-novation policy has been inconsistent, for example by stimulating al-ternative solutions too briefly. In the context of biomass digestion Negro et al. (2007) observe that there 'has been no continuity and stability in government regulations longer than a few years' (p. 933). Apart from this instability there has also been a lack of political lea-dership, no single leader in Dutch parliament or cabinet was able to play a distinguishing role as a toppler in accelerating the energy tran-sition. In the meanwhile, Germany's *Energiewende*, became a success story, commonly attributed to consistent government policy.

The Dutch government is certainly not in climate-denial. It

acknowledges, with the European Union and other industrialised countries that between 25–40% reductions would be required to prevent dangerous climate change. However, the targets set by the EU and member states are not accordingly. The EU has committed to a 20% emission reduction target for the entire union by 2020 with respect to 1990 levels. This entails a Dutch national target of 16% reduction. In other words, by far not enough.[17]

This was the background of a law suit filed by Urgenda,[18] a Non-Governmental Organisation founded in 2008 promoting and implementing sustainability in practical ways. Urgenda started legal proceedings against the Dutch government to court in November 2013, supported by hundreds of citizens representing the Dutch energy and climate movement. The legal case[19] was that the Netherlands apparently understood and acknowledged the threat of climate change and therefore had a duty of care. The Government's non-action was to be considered harmful negligence. Contrary to the expectations of many, on 25 June 2015 the court ruled in favour of Urgenda, effectively ordering the Dutch Government to cut emissions by at least 25% by 2020. The case is unique for it being the first time a state has been legally required to take action against climate change. The case provides a legal precedent for the global energy and climate movement, and in several countries similar cases are being considered.

4.2. Case analysis

We begin with translating the elements of the narrative in terms of the concepts of our framework. The narrative discusses a transition of an energy provision system, refusing to take off. The incumbent system referred to employs solutions based on energy generation with fossil fuels and the historically accumulated institutions around them. This system embodies the *stream* of values such as universal access and affordability, enabled by e.g. centralised governance and grid distribution. Such an incumbent system would be called the 'regime' in the MLP or the 'dominant constellation' in the MPA. Thus far no issues or major discrepancies.

MPA or MLP respectively would like to identify an 'alternative constellation' or 'niche' respectively. This is more difficult in this case. The alternative solutions, though present, have yet to consolidate in a system – whether that be called a constellation or a niche. The MLP would allow a more loose interpretation of 'niche activities' and also does not seem to require these to be confined to the specific geographic context.[20] Our framework would avoid these difficulties by acknowledging the lack of an alternative system and by focussing instead on the transformative *actors* who aim to either establish such an alternative or changing the incumbent system.

Those actors – in part in response to failing energy and climate policy – connect to a new *stream* of values like sustainability and autonomy, enabled by renewable, often distributed technologies and self-organising modes of governance. Although there were many *frontrunners* there were few *connectors* within the Dutch political arena and no *toppler* to anchor the many initiatives and networks into a competitive emerging system like in Germany. The 'hindrance power' exercised by institutional actors affiliated to the incumbent, fossil-fuel based system, that slowed down the energy transition, frustrated many sustainability pioneers, but at the same time has spurred dedicated and motivated action by entrepreneurial citizens.

The result is a growing 'undercurrent' of *networks* and *initiatives* driven by *frontrunners* and *connectors*.[21] Though these initiatives and networks operate in relative isolation, with little cooperation amongst them, the actors involved do connect to the same emerging *stream*, characterised by distributed and decentralised solutions and a self-organising mode of operation. These initiatives and networks have grown into a loosely organised *movement*, which is obviously not limited to the Netherlands and in fact part of a larger, international energy and climate movement. Paradoxically, due to all the hindrance power of the incumbent energy system, the Netherlands has a considerable energy and climate *movement*.

The presence of this movement, these networks and initiatives is hard to appreciate in the conceptual frameworks of the MLP or MPA. Representing them as part of an emerging constellation or niche would not do justice to their individual agency or the structure of their organisation (the particular networks and initiatives). Discussing them as a social movement or otherwise 'collective actor' as for example suggested in Geels (2014) is not only ad hoc but connotes more coherence than they seem to have.

The Urgenda climate court case also does not fit comfortably in the MPA or MLP frameworks. It is at the time of writing too early to assess its systemic consequences, if any. But if they are considerable, then a transitions analysis should be able to trace those consequences back to the actions of a particular *actor* – namely, the director of Urgenda, a *toppler*. In our terms, Urgenda is one of the key *alliances* to arise out of the aforementioned Dutch energy and climate movement. More specifically, Urgenda is an *initiative* founded by two *topplers* and run by one.

In the MLP template, a transition is precipitated by a 'landscape pressure' from outside the system 'beyond the direct influence of niche and regime actors (macro-economics, deep cultural patterns, macro-political developments). Changes at the landscape level usually take place slowly (decades)' (Geels and Schot, 2007).[22] This explicitly precludes individual actions as a cause of transformative change and, again, it would therefore have to be included ad hoc. The MPA does allow the condition for transformative change to come from within a system but this is always in the form of a systemic condition 'stress' as the framework sees actors as 'implicit', as not 'an explicit part of the conceptual language' (de Haan and Rotmans, 2011).

4.3. Comparison with ideal-typical dynamics

In reference to Figs. 1 and 2, the dynamics of this case is all still on the left side of the diagrams. Though a movement has formed, an alternative system – or perhaps better: alternative systems – are only beginning to take shape. In principle, this means both trajectories could still result – and therefore also all intermediate cases, as the two figures represented extreme ends of a spectrum of possibilities. We can interpret the figures, then, as scenarios for this case.

Fig. 1 is the scenario where a wholly new system emerges around the stream of sustainability and autonomy values. This system implements renewable, distributed technologies to meet energy provision needs and it would be characterised by decentralised forms of organisation, e.g. self-organisation. The ascent of this new system implies the decline of the incumbent system which is essentially made obsolete.

Fig. 2 is the scenario where a new system gradually merges with the incumbent system. As in Fig. 1, the new system embodies sustainability and autonomy values and embraces decentralised governance and self-organisation. The solutions the new system implements are again renewable, distributed technologies. Merging of this system with the incumbent system means nothing more than that the incumbent system

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[17] The data in this paragraph are drawn directly from the Summons in the Case: Urgenda Foundation (2014) v. Kingdom of the Netherlands (1.1.21, 8.1 and 8.2) – the law suit discussed in the following paragraph.

[18] See http://www.urgenda.nl/ and in particular http://www.urgenda.nl/en/climate-case/, where also the previously cited Summons can be found.

[19] See http://blog.oup.com/2015/07/urgenda-netherlands-climate-change/ for a brief overview of the legal aspects.

[20] Whether this is or is not allowed is often unclear. See the work by Geels and Raven (2006) and Raven et al. (2012) for a discussion of matters of place in an MLP context. See de Haan (2017) for an analytical discussion of place and related issues in transitions studies.

[21] Rotmans et al. (2014) estimate that there are some 500 local, decentralised renewable energy initiatives to be found in the Netherlands, at the time of their writing.

[22] In a recent sophistication of the MLP (Geels et al., 2016) this template is more nuanced, with emphasis on the enactment of transition pathways.

adopts solutions and institutions (e.g. the modes of organisation) of the emerging system while possibly phasing out some existing ones that are becoming obsolete or were undesired. This merging effectively results in a new system embodying a hybrid value set, the confluence of the two streams.

In the case discussed here, the solutions are all quite technological. This is not at all a necessary or even typical. In our (2016) working paper, we discuss two hypothetical cases corresponding to Figs. 1 and 2 in this article. The second case study was a hypothetical transition in the practice of health care, in which the relevant solutions were practices, not technologies.

5. Discussion and conclusion

We will be brief in concluding this article. We believe that the most pressing issues to discuss about this theoretical framework have been discussed as early in the article as possible, often straight after introducing new concepts. There are however, two things we would like to address here. The first is what we think are important things we have not addressed and the second is some remarks about the status of our proposed framework.

In this article we proposed a theoretical framework that explains transformative change as the consequence of the intentional actions of actors and networks of actors – in other words we gave the explanatory primacy to agency. As we consider this agency to reside with actors we presented a typology of actor roles – ideal types of transformative change agents with different strategies and abilities. We considered actors to be value driven and we introduced the concept of streams to describe how actors can join forces based on shared values. Systems are still of central importance – after all the ultimate manifestation of transformative change is systemic change – and we elaborated a refined conception of earlier work on this. We presented our hypotheses about the interactions and dynamics amongst actors, streams and systems, referring to all of this together as the transformative stage. We would like to reiterate that we have not discarded the canonical frameworks of transitions studies but rather that we have attempted to fill an explanatory lacuna which we think is due to a lack of explicit conceptualisation and representation of actors.

We fully realise that our theoretical framework leaves many things unaddressed or underappreciated. We have not yet underpinned our concepts with empirical research, relying instead on insights from various literatures and theoretical conjecture. Conceptually also, there are many things left to be done, one aspect in particular stands out and that is the actors we did not discuss in much detail. They are the actors who want to maintain or improve the status quo – the institutional actors as we have called them – and they are of crucial importance as well. The 'total dynamics' would involve the interplay between the efforts of institutional actors to keep change at bay and the transformative endeavours of the actors we discussed. Moreover, we suspect there is an interesting part to play for boundary spanning actors with multiple roles – institutional roles as well as transformative. We emphasize again that our framework is a proposition – to stimulate debate and suggest avenues of further research. Our work on it continues.

References

Anscombe, G.E.M., 1957. Intention. Harvard University Press, Cambridge, Massachusetts.
Avelino, F., 2011. Power in Transition: Empowering Discourses on Sustainability Transitions.
Avelino, F., 2017. Power in sustainability transitions: analysing power and (dis)empowerment in transformative change towards sustainability. Env. Pol. Gov. http://dx.doi.org/10.1002/eet.1777.
Avelino, F., Rotmans, J., 2009. Power in transition: an interdisciplinary framework to study power in relation to structural change. Eur. J. Soc. Theory 12, 543–569. http://dx.doi.org/10.1177/1368431009349830.
Avelino, F., Rotmans, J., 2011. A dynamic conceptualization of power for sustainability research. J. Clean. Prod. 19, 796–804. http://dx.doi.org/10.1016/j.jclepro.2010.11.012.

Avelino, F., Wittmayer, J.M., 2015. Shifting power relations in sustainability transitions: a multi-actor perspective. J. Environ. Policy Plan. 1–22.
Bratman, M.E., 1987. Intention, Plans, and Practical Reason. Harvard University Press, Cambridge, Massachusetts and London, England.
Bratman, M.E., 1999. Faces of Intention: Selected Essays on Intention and Agency. Cambridge University Press, Cambridge, UK.
Brodnik, C., Brown, R., 2017. The co-evolution of institutional logics and boundary spanning in sustainability transitions: the case of urban stormwater management in Melbourne, Australia. Environ. Nat. Resour. Res. 7, 36–50.
Coenen, L., Benneworth, P., Truffer, B., 2012. Toward a spatial perspective on sustainability transitions. Res. Policy 41, 968–979. http://dx.doi.org/10.1016/j.respol.2012.02.014.
Davidson, D., 1963. Actions, reasons, and causes. J. Philos. 60, 685–700.
Dennett, D.C., 1971. Intentional systems. J. Philos. 68, 87–106.
Eurostat, 2017. Renewable Energy Statistics (2015). (Europe in figures - Eurostat yearbook).
Farla, J., Markard, J., Raven, R., Coenen, L., 2012. Sustainability transitions in the making: a closer look at actors, strategies and resources. Technol. Forecast. Soc. Chang. 79, 991–998. http://dx.doi.org/10.1016/j.techfore.2012.02.001.
Fischer, L.-B., Newig, J., 2016. Importance of actors and agency in sustainability transitions: a systematic exploration of the literature. Sustainability 8. http://dx.doi.org/10.3390/su8050476.
Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. Res. Policy 31, 1257–1274. http://dx.doi.org/10.1016/s0048-7333(02)00062-8.
Geels, F.W., 2011. The multi-level perspective on sustainability transitions: responses to seven criticisms. Environ. Innov. Soc. Transit. 1, 24–40. http://dx.doi.org/10.1016/j.eist.2011.02.002.
Geels, F.W., 2014. Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective. Theory Cult. Soc. 31, 21–40. http://dx.doi.org/10.1177/0263276414531627.
Geels, F., Raven, R., 2006. Non-linearity and expectations in niche-development trajectories: ups and downs in Dutch biogas development (1973–2003). Tech. Anal. Strat. Manag. 18, 375–392. http://dx.doi.org/10.1080/09537320600777143.
Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. Res. Policy 36, 399–417.
Geels, F.W., Kern, F., Fuchs, G., Hinderer, N., Kungl, G., Mylan, J., Neukirch, M., Wassermann, S., 2016. The enactment of socio-technical transition pathways: a reformulated typology and a comparative multi-level analysis of the German and UK low-carbon electricity transitions (1990–2014). Res. Policy 45, 896–913.
Giddens, A., 1979. Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis. University of California Press.
Giddens, A., 1984. The Constitution of Society. University of California Press, Berkeley and Los Angeles.
Gladwell, M., 2000. The Tipping Point: How Little Things Can Make a Big Difference. Little, Brown and Company.
Grin, J., Rotmans, J., Schot, J., 2010. Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change, Routledge Studies in Sustainability Transitions. Routledge, London.
de Haan, F.J., 2010. Towards Transition Theory (PhD Thesis). DRIFT (Dutch Research Institute for Transitions) and Faculty of Social Sciences. Erasmus University Rotterdam, Rotterdam.
de Haan, F.J., 2017. Place in transitions – concepts for when it matters: essentially, accidentally, locus and nexus. In: Urban Sustainability Transitions: Australian Cases – International Perspectives, Theory and Practice of Urban Sustainability Transitions. Springer.
de Haan, F.J., Rogers, B.C., 2014. How game changers influence transitions: a framework for analysis and an application to the Australian millennium drought. In: Presented at the TRANSIT Synthesis Workshop: The Role of Game-changers in Transformative Social Innovation. 1–2 September 2014, Rotterdam, pp. 19.
de Haan, F.J., Rotmans, J., 2011. Patterns in transitions: understanding complex chains of change. Technol. Forecast. Soc. Chang. 78, 90–102. http://dx.doi.org/10.1016/j.techfore.2010.10.008.
de Haan, F.J., Rotmans, J., 2016. They Make the Change – Roles of Actors in Transitions (MSSI Research Paper No. No. 5). Melbourne Sustainable Society Institute, The University of Melbourne.
de Haan, F.J., Ferguson, B.C., Adamowicz, R.C., Johnstone, P., Brown, R.R., Wong, T.H.F., 2014. The needs of society: a new understanding of transitions, sustainability and liveability. Technol. Forecast. Soc. Chang. 85, 121–132. http://dx.doi.org/10.1016/j.techfore.2013.09.005.
Hargreaves, T., Hielscher, S., Seyfang, G., Smith, A., 2013. Grassroots innovations in community energy: the role of intermediaries in niche development. Glob. Environ. Chang. 23, 868–880. http://dx.doi.org/10.1016/j.gloenvcha.2013.02.008.
Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S., Smits, R.E.H.M., 2007. Functions of innovation systems: a new approach for analysing technological change. Technol. Forecast. Soc. Chang. 74, 413–423.
Holland, J.H., 1975. Adaptation in Natural and Artificial Systems: An Introductory Analysis with Applications to Biology, Control, and Artificial Intelligence. University of Michigan Press.
Kemp, R., Rotmans, J., 2009. Transitioning policy: co-production of a new strategic framework for energy innovation policy in the Netherlands. Policy. Sci. 42, 303–322.
Kemp, R., Schot, J., Hoogma, R., 1998. Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. Technol. Anal. Strateg. Manag. 10, 175–195.
Kemp, R., Rotmans, J., Loorbach, D., 2007. Assessing the Dutch energy transition policy: how does it deal with dilemmas of managing transitions? J. Environ. Policy Plan. 9,

315–331.

Kivimaa, P., 2014. Government-affiliated intermediary organisations as actors in system-level transitions. Res. Policy 43, 1370–1380. http://dx.doi.org/10.1016/j.respol.2014.02.007.

van der Loo, F., Loorbach, D., 2012. The Dutch energy transition project (2000 − 2010). In: Governing the Energy Transition. Reality, Illusion or Necessity, Routledge Studies in Sustainability Transitions. Routledge, New York, pp. 220–250.

Loorbach, D., 2007. Transition Management: New Mode of Governance for Sustainable Development. International Books, Utrecht.

Loorbach, D., 2010. Transition management for sustainable development: a prescriptive, complexity-based governance framework. Governance 23, 161–183.

Loorbach, D., 2014. To Transition! Governance Panarchy in the New Transformation. Erasmus University Rotterdam.

Loorbach, D., Rotmans, J., 2006. Managing Transitions for Sustainable Development. In: Olsthoorn, X., Wieczorek, A.J. (Eds.), Understanding Industrial Transformation. Springer Netherlands, pp. 187–206.

Markard, J., Raven, R., Truffer, B., 2012. Sustainability transitions: an emerging field of research and its prospects. Res. Policy 41, 955–967. http://dx.doi.org/10.1016/j.respol.2012.02.013.

Milgram, S., 1974. Obedience to Authority: An Experimental View. Tavistock Publications, London.

Negro, S.O., Hekkert, M.P., Smits, R.E., 2007. Explaining the failure of the Dutch innovation system for biomass digestion—a functional analysis. Energy Policy 35, 925–938.

van de Poel, I., 2000. On the role of outsiders in technical development. Tech. Anal. Strat. Manag. 12, 383–397. http://dx.doi.org/10.1080/09537320050130615.

Raven, R., Schot, J., Berkhout, F., 2012. Space and scale in socio-technical transitions. Environ. Innov. Soc. Trans. 4, 63–78. http://dx.doi.org/10.1016/j.eist.2012.08.001.

Rip, A., Kemp, R., 1998. Technological change. In: Rayner, S., Malone, E.L. (Eds.), Human Choice and Climate Change. Battelle Press, Columbus, Ohio, pp. 327–399.

Rogers, B.C., Brown, R.R., de Haan, F.J., Deletic, A., 2015. Analysis of institutional work on innovation trajectories in water infrastructure systems of Melbourne, Australia. Environ. Innov. Soc. Trans. 15, 42–64. http://dx.doi.org/10.1016/j.eist.2013.12.001.

Rotmans, J., Loorbach, D., 2009. Complexity and transition management. J. Ind. Ecol. 13, 184–196. http://dx.doi.org/10.1111/j.1530-9290.2009.00116.x.

Rotmans, J., Kemp, R., van Asselt, M., 2001. More evolution than revolution: transition management in public policy. Foresight 3, 15–31.

Rotmans, J., van der Linden, M.J., Toxopeus, H., Verbruggen, S., 2014. Verandering van tijdperk: Nederland kantelt. Aeneas - uitgeverij van vakinformatie.

Sayre-McCord, G., Smith, M., 2014. Desires… and beliefs… of one's own. In: Rational and Social Agency: The Philosophy of Michael Bratman. Oxford University Press, Oxford, pp. 129.

Schlosser, M., 2015. Agency. In: Zalta, E.N. (Ed.), The Stanford Encyclopedia of Philosophy, Fall 2015 Edition. .

Schot, J., Kanger, L., Verbong, G., 2016. The roles of users in shaping transitions to new energy systems. Nat. Energy 1, 16054.

Schwartz, S.H., 2012. An overview of the Schwartz theory of basic values. Online Read. Psychol. Cult. 2, 11. http://dx.doi.org/10.9707/2307-0919.1116.

Scott, W.R., 1995. Institutions and Organizations. Sage, Thousand Oaks, CA.

Seyfang, G., Smith, A., 2007. Grassroots innovations for sustainable development: towards a new research and policy agenda. Environ. Polit. 16, 584–603.

Smink, M., Negro, S.O., Niesten, E., Hekkert, M.P., 2015. How mismatching institutional logics hinder niche–regime interaction and how boundary spanners intervene. Technol. Forecast. Soc. Chang. 100, 225–237. http://dx.doi.org/10.1016/j.techfore.2015.07.004.

Smith, A., Kern, F., 2009. The transitions storyline in Dutch environmental policy. Environ. Polit. 18, 78–98. http://dx.doi.org/10.1080/09644010802624835.

Smith, A., Raven, R., 2012. What is protective space? Reconsidering niches in transitions to sustainability. Res. Policy 41, 1025–1036. http://dx.doi.org/10.1016/j.respol.2011.12.012.

Urgenda Foundation, 2014. Final draft Translation: Summons in the Case: Urgenda Foundation v. Kingdom of the Netherlands. In: Regarding the Failure of the Dutch State to Take Sufficient Actions to Prevent Dangerous Climate Change, (version of 25 June 2014).

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