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Fostering Transformation. A Governance Frame for Large Public and Private Organisations as Change Agents in Transformations

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Abstract

This article seeks to fill a critical gap in the context of mission oriented and transformative policies by conceptualising generic governance conditions for large public and private organisations to engage constructively with the transformation of wider socio-technological systems as an ongoing learning process.

So far, innovation and other policies to achieve transformative missions tend to rely on established instruments, mostly supply side, fostering research and innovation activities to move in desired directions. More sophisticated approaches stimulate absorption and diffusion of innovation and support market creation and uptake. However, for existing socio-technological systems to shift towards sustainability, constitutive actors within such systems, like large public and private organisations, need to actively foster the transformation, as a process of internal and external organisational experimentation and innovation. They are critical actors in their respective system context in two ways: in the past they have co-produced the problematic effects of existing systems; in the future they can severely influence the speed and direction of transition of systems and act as change agents towards more sustainable systems - provided they manage to transform themselves, too.

Those actors are very diverse organisations, ranging from large companies, governmental funding bodies, higher education institutions, and related intermediary organisations. They are situated between the individuals and their behaviour on the one hand and the broader systems level on the other, i.e. at the meso level of systems change, where they fulfil critical systemic functions.

In order to adjust to and support transformations, they need to re-orientate their organisational missions, strategies and behaviours – far beyond their research and innovation activities – and to re-configure their internal and external relationships. They have to actively engage in the very process of defining directions and orchestrating the system transformation, critically reflecting about their roles in related processes, and to build up capabilities to change. If critical meso-level actors resist change, transformations will be hindered or fail altogether. Therefore, in this article we explore – in a diagnostic manner – generic governance conditions that diverse critical actors will need to become constructive and effective change agents. We do so by drawing on and expanding a set of (meta-)governance (Jessop 2002) principles that originally were developed in the context of 'responsible research and innovation', a context posing very similar challenges for corporate actors (Kuhlmann et al. 2016; Randles 2017).

We illustrate the relevance of these governance conditions with three short vignettes of critical actors in Europe, a major public-private energy provider, a governmental funding agency, and a university of technology. Inspecting the suggested generic conditions helps to reveal fostering and hampering factors for transformative ambitions of these actors and their capacity to act as change agents.

Highlights

- Large public and private organisations can be critical for system transformation.
- As transformative change agents large public and private organisations need to re-configure their internal and external identity and organisational ways of working.
- We suggest an array of generic meta-governance principles as diagnostic measures and requirements for constructive and productive organizational change.

1 Introduction: The quest for system transformation and the critical role of large public and private organizations

Most governments, international organisations and an increasing number of political actors agree that climate change, energy crises, global health threats and other grand challenges ask for major transformations of incumbent socio-technological and socio-economic systems. Recent examples include the "Green Deal" of the European Commission (2019), the "Immediate Climate Action Programme" of the German Government (Federal Government 2022) and the United States' "Inflation Reduction Act" addressing climate change (Larsen et al. 2022). Yet, purposeful system transformation is complex and normatively highly contested. The starting point of this article is that one cannot devise a straightforward top-down governance approach to induce and deliver desired transformations.

Our premise is that, to trigger and sustain system transformation, we need to focus on critical systemic roles of large public and private organizations (LPPOs) as central change agents in socio-technological systems, such as large companies, governmental research and innovation funding bodies, higher education institutions, and related intermediary organisations. Large companies can help to develop products, processes and markets to meet transformative requirements; funding bodies can introduce transformative research and innovation programmes; higher education and research institutions can develop new knowledge and educate new generations of transformative change agents.

This paper explores in a diagnostic manner and tentatively applies a meta-governance framework to understand and support the role of such LPPOs as change agents in transitions. In our concept 'governance' includes all related actors, their resources, interests and power, fora for debate and arenas for negotiation between actors, rules of the game, and policy instruments applied helping to achieve legitimate agreements (Kuhlmann 2001; Benz 2006), while 'meta-governance' is about "organising the conditions of governance" (Jessop 2002, p. 242).

Why is this perspective relevant? Since the early 2000s science, technology and innovation policies have increasingly become geared towards addressing objectives reaching beyond an immediate economic focus on growth and competitiveness (Lindner et al. 2016; Boon and Edler 2018). This 'normative turn' is expressed in the strategic reorientation of national and supranational research and innovation policies to address the 'Grand Societal Challenges' such as health, demographic change, wellbeing and sustainability (Foray et al. 2012; Kallerud et al. 2013; Kuhlmann and Rip 2018) or, on a more operational level, societal missions (Mazzucato 2018).

However, system transformation is often occurring very slowly or at risk to fail because of the inherent contestation for the direction and scope of change, the complexity of required interwoven changes and the heterogeneity of the actor landscape and related practices. Also, it remains an open question "how transformative change policies can go beyond some niche social and geographical spaces, and scale up to influence the current world-wide organization of production and consumption." (Giuliani 2018, p. 1580)

Failures concern poor 'directionality' of change in underlying science and innovation activities (Stirling 2024), as well as societal practice, policy coordination, demand-articulation and reflexivity (Weber and Rohracher 2012; Schot and Steinmueller 2018). Even more basic, the required transformations "[…] are too complex to be addressed in versions of a 'command and control' mode. While there will still be roles for central, more, or less authoritative actors, like governments, their action would be more like modulation of ongoing dynamics (…) and versions of nudging […]", as Kuhlmann and Rip put it (2018,

p. 1). In other words, change will come about only as a result of an interplay of different actor strategies. Therefore, scholars and policymakers need to unpack notions of directionality, experimentation, demand articulation, policy coordination and learning in innovation systems (Diercks et al. 2019; Grillitsch et al. 2019; Wanzenböck et al. 2020; Kern and Rogge 2016), with particular attention to the role of LPPOs. As Giuliani (2018, p. 1580) puts it: big corporate actors "have demonstrated an ability to shape the world we live in, in many fundamental ways". Increasingly LPPOs, such as global 'Tech Giants' are drawing on and even foster "asymmetric, predatory relations in the innovation process" (Rikap and Lundvall 2021, p. 59; similar: Mazzucato and Robinson 2018). If such LPPOs are "[…] part of the problem, they should be also part of the solution. (…) any policy solution that does not contemplate them to the full is likely to have a marginal impact" (Giuliani 2018, p. 1580). Still, while recent calls for transformative mission-based policies have addressed the critical role of LPPOs (e.g. Mazzucato 2018; Robinson and Mazzucato 2019, Turnheim and Sovacool 2020), there are two shortcomings in existing studies on LPPO. First, the majority of studies on large organisations focus on incumbent firms. But for system transformation to happen, the broader actor landscape and many kinds of actors need to be involved and mobilised (Lindner et al. 2016, Turnheim and Sovacool 2020). For organisations as agents in the distributed agency of transformations, a key premise is their role as intentional actors, which is part of the governance definition of 'intentional' coordinative action (Lindner et al. 2016; Borrás and Edler 2014). This means that organisational actors are not objects, but subjects of transformation. Thus, it is critical to understand who all the major agents are, what material interests, motivations and capabilities they have (Mazzucato et al. 2020).

Second, existing literature analyses the strategic behaviour of large organisations, i.e. firms mainly, but they do not dig deeper into the meso-level organisational conditions and management practices *within* large critical actors that need to actively both adapt to and influence the direction of the transformation.

These are important shortcomings. As the 'nature' and urgency of articulated challenges and of needs for system-transformative are societally contested (Kuhlmann and Rip 2018), the problem perception and framing of a challenge and related mission by incumbent and new system actors at meso-levels is challenged as well and will change during time. Consequently, the governance and management of LPPOs need to facilitate their organisational capacity and reflexive capabilities to cope with contestation, to overcome imprinted problem perceptions, to reflect, and to adopt the responsibility and capability to learn.

We apply a broad understanding of LPPOs and their potential role as change agents. LPPOs "[…] have a constitution which defines their legitimate domain, potential membership, and operational rules." At the same time, as organisations they "[…] are internally differentiated, and their actions are often the product of internal conflicts and power struggles." LPPOs are not necessarily and "[…] primarily output-oriented; they engage in symbolic as well as defensive action, reciprocate favours, and may need to be prodded and provoked before they move." (Mayntz 1986, p. 19). To overcome their structural inertia, LPPOs need external turbulence, pressure and incentives, such as the above-mentioned major governmental policy initiatives, and favourable internal governance conditions, the focal interest of our paper.

We regard LPPOs as critical actors if they are being situated in central industrial, societal or political positions that are closely interwoven with decision making processes and markets that are directly related with the system transition. They operate between the individuals and their behaviour on the one hand and the broader systems level on the other, i.e. at the meso level of systems change, where they fulfil critical systemic functions. In their positions they possess the ability to drive and/or block

systemic change; they may, for example, have crucial influence on the acknowledgement, conceptualisation and advancement of the transformation of energy infrastructures and markets, either explicitly, or implicitly embodied. LPPOs are simultaneously actors within transformation processes but at the same time have the agency to become and fulfil a role as critical actors in which they can actively contribute and shape, either by fostering or hindering, the ongoing societal transformation processes, including agendas and changes of the environment (markets, regulatory frameworks, networks and relationships with other actors) in which they are situated in. This might in some instance include forms of starting/setting things in motion, as well as adapting to ongoing transformation processes which have been set in motion by other actors.

We have selected a rather broad definition of what constitutes an LPPO, due to the fact that organisations or institutions being critical actors, can have various, multifaceted forms and actors with diverse structural characteristics. What unifies them however under our understanding of LPPOs, is that these actors are all of a substantial size (either considering their body of employees or market share which they hold) and/or all uphold forms of strategic and influential (power) positions, through which they have the agency to actively impact their environment or the markets on which they operate and interact with. Due to their relative position vis-à-vis the transformation, they are de facto veto players, either advancing or (at least) slowing down other actors in their transformational processes, given their meaning in the transformation at hand. Although these organisations might be guided by very different institutional logics, organisational models, and positions, they can be classified as critical actors due to these conditions and characteristics.

As highlighted by our principles and further analysis (see p.14-15), organisations and institutions which can be considered under our definition of LPPOs, are not necessarily and inherently fulfilling their role towards being or becoming critical actors. LPPOs which do not actively become involved in the dynamics of the ongoing transformation processes in which they are situated, namely through forms of direction setting, re-structuring or engagement with other stakeholders, thus cannot be considered critical actors in our definition. It is important to highlight here that we understand the term and instances of "becoming active" here as any form of action by actors, both encompassing actions that might support or foster transformation processes, as well as forms of hinderance and actively resisting (through selective, strategic passive resistance or active counterplaying actions). Additionally, through a flexible and diverse understanding of such LPPOs as critical actors, we are indicating that there is an array of actors which are equally important with regards to studying transformations in societies and ongoing processes of transformative change with regards to large-scale societal problems such as the energy transition.

Although we recognise the transformative potential and capabilities of smaller scales of organisations like system intermediaries, startups or citizen movements as change agents (e.g. Kemp et al. 1998; Schot and Geels 2008; Raven et al. 2010), our focus is set at more large scale systematic change and overarching societal influence of such critical actors due to their central and deeply embedded positions of incumbent power, political influence, visibility and established (industrial) market positions. LPPOs as critical actors can directly enable, guide and hinder large scale systematic transformative change.

We presume that, even though the activities of LPPOs in socio-technological systems are quite diverse, there are also generic core structures and processes influencing their respective organisational capacity and reflexive capabilities to act in transformative ways. These conditions need to be explored, understood and addressed. Successful changes have a critical potential to contribute to effective system-

wide transformations in ways that make those transformations more legitimate and effective. We specifically want to highlight that our overarching approach and corresponding meta-governance framework beyond analysing mere forms of organisational change within the internal structure of LPPOs that are only reactive to changes around them. Instead, our understanding of the term "governance" should highlight the specific role of LPPOs as change agents, which enables them to actively contribute to the transformation process itself by changing their organisational structure, vision and/or (business) strategy. As highlighted through our principles (see p. 14-15), such actions of change agents are multifaceted, whereby we consider forms of internal reorganisation as being only one part of the overall contribution and influence change agents have on ongoing transformation processes.

To function as effective change agents, LPPOs will profit from a set of *generic* orientating principles as to how to organise system transformation processes across a range of diverse organisational and corporate actors and their respective organisational remits, institutional incentives, regulatory constraints, normative expectations in constructive and productive ways. As we will show in Section 2 below, relevant bodies of literature (on organisational change, on sociotechnical system transitions and on related policies) do not sufficiently capture such generic conditions of organisational change. Therefore, in Section 3 of this paper we will complement extant literature with an overarching governance concept originally developed to foster responsible research and innovation ("RRI", e.g. von Schomberg 2013). This orientating RRI framework ("Responsibility Navigator", Kuhlmann et al. 2016) aims to facilitate responsibility-related debates, strategic reflection and decision-making processes in research and innovation organisations, in ways that are perceived by involved actors as constructive and productive. We will modify and further develop this framework to address the specific transformative conditions of LPPOs as change agents.

Given the above intricacies of system transformation and the essential role of LPPOs in this process, a generic overarching framework is required to support the transformation of a diverse range of actors, such as funding organisations; ministries; boards of universities and of companies; civil society organisations. Our two conceptual questions are:

- What are the external and internal conditions and organisational practices that shape the willingness and ability of LPPOs in the socio-technological systems to contribute as change agents constructively to system transformation that is seen as legitimate and in line with societal preferences?
- How can the diagnostic lens of overarching governance principles support our understanding of those conditions and practices and help to foster the willingness and ability of change agents to support system transformation?

Tackling those research questions also responds to recent claims within the systems transition literature, which has recognised the need to re-appraise the role of large organisational players who are incumbents in the system that is about to be transformed (Bien and Sassen 2020; Bögel et al. 2019; Turnheim and Sovacool 2020; Köhler et al. 2019; Mühlemeier 2019; Heiskanen et al. 2018; Heiberg et al. 2022). Turnheim and Sovacool (2020) ask for a re-assessment of their roles and call for more emphasis on the resources those organisations can deploy, such as capability, material, political, or ideational to "change their strategies over time" (ibid p. 182) and actually support transformation, whereby organisational change becomes "integral part of transition processes" (Bögel et al. 2019, p. 359). In this article, we offer a foundational conceptual approach that focuses on internal governance conditions in order to make this critical change happen, embedded in a dynamically evolving political and economic environment. We thus go beyond approaches which focus on how purposive transition

initiatives support or interact with organisational change (Bos and Brown 2014; Bögel et al. 2019; Breznitz et al. 2018), as we assume that the adequacy and effectiveness of those schemes rests on a sound understanding of the transformation conditions of those critical actors (see also a related recent literature review by Borras et al. 2023). Our concept is not, however, an attempt to understand transitions as such better, but the role LPPOs can play within them.

This article is structured as follows. The next section outlines the requirements for LPPOs to engage productively in the purposeful transformation of systems. This is based mainly on organisational change related literature and transition literature. Section 3 will then introduce overarching principles and guidance for change agents to meet those requirements. In Section 4 the working of these principles and guidelines will be illustrated through three empirical vignettes. Section 5 will then summarise the main contribution of this conceptual approach and draw conclusions on how to further extend and enhance the concept for LPPOs as change agents in transformation.

2 Literature perspectives on LPPOs and system transformation

In this paper we consider LPPOs as organised actors engaging in markets, public policy and civil society, such as large companies, universities, governmental funding bodies, related intermediary organisations, at local, national and international levels. They are *critical* actors because they have considerable organisational weight in their respective systems *and* they can adopt at least three critical roles and become essential change agents in system transformation:

- They have co-produced and they embody material, knowledge, market and regulatory structures of different domains within incumbent socio-technological systems.
- This said, they would have to adopt, internalize and enact the new, transformative structures to be effective for their respective domain and system transformation at large.
- Successful change agents can serve as avantgarde and positive role model for other LPPOs in their domain.

In these critical roles LPPOs need to be confronted with and exposed to significant environmental turbulence – such as radical political and regulation shifts; disruptive technologies; natural disasters – disarranging their incumbent internal and external rule regimes. While LPPOs can be regulated and incentivised by public policy towards supporting transformation, our starting assumption is that if they are unwilling or unable to support the transformation, and to adjust their own role in the process, transformation will be impeded, slowed down or distorted. We thus question, what are the generic institutional requirements for LPPOs to engage productively in the purposeful transformation of systems?

In order to better understand and further conceptualise strategic orientations and requirements for change agents, we mobilise extant conceptual and empirical work on organisational change and transformations before we link it with the debate on responsible research and innovation which inspires us to reflect about preconditions to become a productive agent of change. We start with rather general organisational theory approaches that deal with the need of organisations to adapt to environmental change.

2.1 Organisational change literature

One major concern of organisational studies, going back at least to Cyert and March (1963), has been the adaptation of organisations. There are a range of major organisational theories that focus on the questions how and why firms adapt to changes in their environment. In distinguishing "adaptation" from any form of strategic change management, a broad review of adaptation approaches has identified four key major characteristics of adaptation processes in organisations (Sarta et al. 2021, p. 46): the change in organisations is intentional, i.e. "[…] rooted in organizational members' awareness of their environment, resulting in a choice to react to, anticipate, or ignore changes in the environment […]" (ibd. p. 46); relational, meaning that the organisation and the environment influence each other; conditioned, i.e. the changes in the environment and in the organisation are also influenced by other organisations in that environment, and finally convergent, meaning that the organisational characteristics move towards a functional fit with the (changing) environment.

From the various organisational theories that explain adaptation behaviour, organisational sociology (Greenwood and Hinnings 2014), contingent theory approaches (Petrovska and Berzins 2000; Alves et al. 2017; Donaldson 1987), and variation-selection-retention models (Henderson and Stern 2004) focus on the changes, pressures and opportunities stemming from changes in the environment (Sarta et al. 2021, p. 49). These complementary theoretical approaches all postulate that there needs to be a

functional fit between the structure and strategy of an organisation on the one hand and its environment and the role the organisation plays in this environment on the other hand. The quality of this functional fit determines the level of organisational performance. Thus, changes in the environment of organisations – the contingencies – will influence the role the organisation performs as well as its structure and strategy. A related approach in management and political science, the punctuated equilibrium approach (Gersick 1991; Romanelli and Tushman 2017) stresses the disruptive nature of many adaptation processes implying that "[…] organisations will typically accomplish fundamental transformations in short, discontinuous bursts of change involving most or all key dominant domains of organisational activity. These include changes in strategy, structure, power distribution, and control systems." (Lam 2005, p. 135-136).

This, however, is not a deterministic process, there rather is a "structural adjustment to regain fit" (Donaldson 1987). As both performance and environmental changes (contingency) are multidimensional (Adegbite et al. 2018, p. 30), there is no deterministic relationship and thus there are strategic choices to be made. One of the most important dimensions of those is normative. Value judgements – and their changes – by strategic leadership determine the choices to be made in the course of the re-adjustment to environmental changes that optimise normative fit and secure necessary acceptance by external expectations (Boiral 2007; Le Mens et al. 2011; Henderson and Stern 2004). The organisational mechanisms based on those normative adjustments for adaptation are numerous, mostly encompassing a combination of changing internal resources and behaviour, organisational routines, capabilities and knowledge in the organisation (for a summary see Sarta et al. 2021).

These insights from organisational and management studies are very useful as they demonstrate the need for companies to keep in mind their functional fit to their environment and to react to changes in their environment. The more fundamental the environmental changes, the more fundamental the needs for organisations to react, and the more important to understand the feedback loops of organisational change and environmental change. While those studies focus on economic performance and survival of firms, these insights can easily be extended to the role and performance of other organisations in their respective systems.

For our purpose of developing a concept for the understanding of governance within large organisations in the context of transitions, we must now turn to literature that deals with organisational change requirements in the context of fundamental contingencies, i.e. system transformation. This embedding into the transition literature is crucial because we postulate that the changes in the organisational environment that characterise system transitions are different in various ways. First, they are more fundamental and holistic then most changes in markets that the organisational change literature is normally concerned with. All elements of a functional system such as energy, mobility, health etc. are under pressure to perform differently, societal expectations and standards of legitimate action within a system change, and with it regulatory framework conditions, infrastructure provision, necessary skills, technologies and value chains and social practices. This may put pressure on the very identity of LPPOs and the value they provide to that system. At the same time, as outlined above, the LPPO itself is critical for the direction and speed of transformation, i.e. it will experience some sort of demand for change and not to act as a veto player for the transformation. Further, depending on the nature of the LPPO and its function in the system, for the LPPO to simply fail is not an option if there is no functional equivalent. Many LPPOs are sticky, in the public realm they are often without functional equivalent, in the marketplace they are often too big to fail or exert too much downstream pressure. Thus, failure to adapt may not necessarily result in the failure of the LPPO, but it will inevitably hinder the transition itself, adding to the societal and potentially political pressure to change.

2.2 System transitions literature and change requirement of critical actors

Understanding LPPOs as incumbents within larger socio-technical systems and organisational structures, more contemporary literature (such as Van Mossel et al. 2018, Turnheim and Sovacool 2020), further enriches the perspective on LPPOs being situated within processes of transformation. Most often, in the transition literature incumbents are conceptualised as reacting to transitions that are triggered elsewhere, in the niche outside the regime the LPPO is situated in. Incumbents are often found to remain in an inert position or actively delaying the ongoing transition within their environment are mentioned in the literature (Van Mossel et al. 2018, p. 57). In some instances, incumbents might actively resist change (Geels 2014) or working against fundamental change through forms of cooperation with other incumbents (Hess 2014; Musiolik et al. 2012), either of economic or political nature (Van Mossel et al. 2018, p. 44, 53). Moreover, such a form of resistance can also be exerted through strategical technology development or setting technical standards that hinder the advancement of ongoing transition processes (Smink et al. 2013; Cooper and Schendel 1976; Dunford 1987; Van Mossel et al. 2018, p. 44, 53). Importantly, Berggren et al. (2015) demonstrate that firms may be both sticking to the old system and at the same time support the development of niches. Situated in the MLP approach and linking it with technology strategy literature, Berggren et al. show how incumbents can be productive through policies that provide bridges between the niche markets and the established regime markets. (Berggren et al. 2015, p. 1026)

The flexibility and dynamic capabilities of incumbents for coping with the transition processes around them is dependent on their previously set routines and the resources that might be valuable in the transitioning environment (Walker et al. 2002; Miller and Shamsie 1996; Rumelt 1984; Thornhill and Amit 2003; Eisenhardt and Martin 2000; Van Mossel et al. 2018, pp. 51-52, 56). However, it also needs to be noted that not all forms of transformative capacity are developed, and not all actions of incumbents are made solely sourced from their environment. Here, practices of retaining routines and strategies by dominant LPPOs based on their previously successful history, even if they do not prove to be aligned with their current environment, are noted in the literature (Henderson and Clark 1990; Starbuck 1983; Van Mossel et al. 2018, pp. 50, 56). These findings, in fact, point to the very need of better understanding what drives or hinders the build up of awareness for the need to change in the context of transitions and subsequent internal organisational changes to happen that are conducive to that change.

For this approach to develop, we deliberately do not situate ourselves firmly within one distinct transition approach such as MLP or Transition Management. Their inherent pre-theoretical assumptions and major perspectives would limit our approach, as we seek to provide a framework to understand the internal governance requirements regardless of the role LPPOs are attributed with theoretically. For example, the MLP approach conceptualises powerful incumbent players, mainly firms, rarely as pro-active change agents, as here change is driven bottom up, from niches outside the regime and its incumbents (for an overview see Turnheim and Sovacool 2020). What is thus needed is a framework that is generic in the sense of being applicable to the entire scope of roles played by incumbents, from incumbents as reacting to bottom-up dynamics that challenge their very role in existing systems (reactive mode) to incumbents as a source of change (pro-active mode). Further, we need to expand the view to literature that seeks to dig deeper into the internal processes in organisations in the context of transition. A decade ago, Ansari and Krop (2012) have conceptualised that firms react differently to transformative challenges depending on properties in three dimensions: their organisational field, the

kinds of innovative challenges they are faced with and the pre-existing incumbent firm properties such as capabilities, boundary management and strategies.

To develop the latter dimension of organisational properties, we cannot lean to one particular transition approach, rather we mobilise complementary literature in an eclectic manner. Overall, Lindner et al. (2016) identify and operationalise four types of capacity on system and actor levels: self-reflection (including demand articulation); bridging/integrating capacity (absorptive capacity, opening up etc.); anticipation; and experimentation. In a similar vein Grillitsch et al. (2019) plot four dimensions (directionality; experimentation; demand articulation; policy learning / coordination) against three levels (actors and their interests; networks; institutions). They claim that organisational actors need to develop capabilities to play transformative roles in their respective networks and regimes, and that they need policy support to do so (Grillitsch et al. 2019, pp. 1050). The article hints at the need to distinguish between capabilities of actors to support change, and capabilities to deal with the consequences of the change for their own organisation. Accordingly, simple programmes or appeals towards actors to change are not very promising if one does not understand their respective institutional context, soft factors, capabilities and normative orientation.

One recent strand of literature looks at the capabilities public policy actors need to support transformation through policy design and implementation. Mazzucato et al. (2020) identify challenges of cognitive paralysis given the wicked problems of transformation that are hard to grasp. Those cognitive challenges are met with traditional policy views and instruments which tends to lead to organisational inertia. To overcome those challenges, they formulate several "dynamic capabilities" of public policy actors, such as the ability to engage with social actors, the mobilisation of a diverse set of competencies and the ability to reflect and evaluate changes in strategies. In a similar vein, with more differentiation, a literature review of Borrás et al. (2023) identify five categories of capabilities for public sector organisations supporting transitions, i.e. analytical, coordination capacity, operational, regulatory, anticipatory capabilities.

Next to the requirement to develop capacities internally, organisations also face pressure to adapt structurally. Analysing the organisational changes within the innovation agency Vinnova, Fünfschilling et al. (2017) highlight that organisations that seek to influence transformations also need to adjust their own internal structures to match the cross-sectoral and challenge driven requirements of the transformation. They need to set in place reflexive mechanisms to monitor how appropriate new, transformative activities are and if they need to be readjusted. This is in line with insights of sociological management studies, stating that organisational learning in transitions also requires to adapt organisational routines to the changes in context (van Mierlo and Beers 2020, p. 259). They find that engaging in transformations means to engage with a broad spectrum of actors within those transformations. Further, transformational actors appear to rely on an interplay of strong transformational leadership on the one hand and support of bottom-up initiatives (Fünfschilling et al. 2017; van Mierlo and Beers 2020).

The literature finally asserts the need for changes in the very identity of organisational actors. All organisational changes required for actors supporting transformations culminate in what management studies have long coined ‘organisational learning’ which van Mierlo and Beers (2020) have reviewed in the context of transitions. The wickedness *and* openness of transformational dynamics results in a quest for a new orientation as to the very role of the organisation. What is needed is collective sensemaking (Lindner et al. 2016; Bien and Sassen 2020), or collaborative "negotiation of meaning" (van Mierlo and Beers 2020) which can create internal and external legitimacy for change (Lindner et al.

2016). This complex process rests on the organisational ability to be reflexive. These considerations within the transformation literature point to a more general strand of literature that has been dealing with the needs for and conditions of major organisational change.

The learning processes needed for transformational change alters the very core of the organisational self-image. The *organisational learning* strand of literature highlights that through multiple learning loops within the organisations and in interaction with other actors "[…] individuals modify their images of the organisation and their understandings of organisational phenomena" (van Mierlo and Beers 2020, p. 261). The authors go on to claim that organisational learning "must become embedded in the images of organisation held in its members' minds, and/or in the epistemological artefacts (the maps, memories and programs) embedded in the organisational environment" (Argyris and Schön 1996, p. 16, as quoted in van Mierlo and Beers 2020, p. 261). This reasoning is in line with the more general observation of historians that institutions of scientific and technical progress tend to fall victim to their own self-referentiality (Renn 2020, p. 19). LPPOs as change agents need to escape the evolutionary feedback loops of scientific and technological 'progress' that they have co-produced as part of their own organisational life cycles. This is a critical insight for the understanding of the role of LPPOs in system transformations that goes beyond the management approaches reviewed above. System transformations may challenge their very role dramatically, and thus their very identity, and it is a complex and cumbersome process of organisational learning that is needed to make this organisational transition. Related learning capability and processes will differ across LPPOs being critical actors – which is why in this article we are interested in generic 'meta'-conditions.

A related strand of literature, focused on transformation as a policy problem, confirms and further differentiates the requirements organisations face in transformations. Wanzenböck et al. (2020, p. 474) assert that the understanding of societal problems "should be based on three dimensions of wickedness: (1) contestation; (2) complexity; and (3) uncertainty", and that this understanding then should be the basis for transformative policy design. While change agents are desperately needed to support mission orientation and necessary system transformation at the meso-level, they are hardly prepared to cope with such wickedness. Rather, as organisations they tend to develop organisational inertia (Hannan and Freeman 1984; Barnett and Pontikes 2008) which in turn can lead to failure of ambitious national (or other) policies. Such policies tend to neglect the complexities and the auto-dynamics of critical actors down the road, such as LPPOs (Rip 1998; Pressman and Wildavsky 1984).

In the literature on transformative innovation policy the inertia issue has been addressed as "reflexivity failure" (Weber and Rohracher 2012), though without a focus on the particular governance and management conditions of meso-level organisations (e.g. Todnem By 2005). LPPOs need to overcome 'imprinted' internal and external 'world views', path dependence and instruments. Marquis and Tilcsik (2013, p. 201) define imprinting "[…] as a process whereby, during a brief period of susceptibility, a focal entity develops characteristics that reflect prominent features of the environment, and these characteristics continue to persist despite significant environmental changes in subsequent periods".

For LPPOs this means that they have to construct orientation for the directionality discourse. They must engage in coordination and to express (future) preferences in relation to transformation, being a competent user, and engaging in user-producer interaction. Again, all this requires reflexivity: change agents need to engage in collective sense making (Bien and Sassen 2020) which in turn asks for internal capabilities to do so, continuous monitoring and anticipation, absorptive capacities to follow and contribute to expert-based discourses.

2.3 Summary and a gap to fill

To sum up the above literature review, there are high demands for critical actors to change in order to play a constructive role in transformations as postulated by various strands of literature concerned: For LPPOs to become change agents they need to

- consider their critical roles in transformations and build up capabilities for change,
- adjust internal and influence external normative frameworks,
- re-orientate behaviour and to re-configure internal and external relationships,
- actively engage in the process of negotiating, defining directions, orchestrating and co-creating organisational and systems change,
- and in doing so may be pushed to adapt their very organisational and corporate identity.

What is missing in this on-going and increasingly important debate is a sound and differentiated conceptualisation of the internal governance processes and requirements that facilitate transformative, responsive and legitimate governance of change agents. What we need, in other words, is a generic meta-governance framework for LPPOs as change agents. It would also help to fill the lacunae found in the three strands of literature above. Having reviewed three complementary strands of literature on the need for organisations to change within transformations of their systems, the strategic organisational change literature more generally and the policy change literature, we can now turn towards a conceptual approach that operationalises the governance requirements within critical actors.

3 Meta-governance Frame for LPPOs as change agents

3.1 Governance approach: the basic idea

In conceptualising the conditions for organisational change in the context of system transformation, we can fruitfully link the current debates on transformative innovation policies with a quest for 'Responsible Research and Innovation' (e.g. von Schomberg 2013; Stilgoe et al. 2013; Guston 2014; Van Oudheusden and Shelley-Egan 2021). In essence, responsible innovation aims at improving the alignment of the impacts of technology and innovation with societal demands and values as far as possible. However, 'directionality' and 'responsibility' have always been subject to changing value choices and contestation (e.g. Arnaldi and Gorgoni 2016). Rather than trying to define what responsible innovation should mean in substance (e.g. Stilgoe et al. 2013; Pandza and Ellwood 2013; de Saille 2015) for LPPOs it can be crucial to better understand and organise the often contested transformation procedures, i.e. the processes of negotiating and co-creating directionality (Robinson et al. 2021). Recent studies of the institutionalisation of responsible innovation through organisational change (Wittrock et al. 2021; Randles 2017) found limited grounding of RRI, e.g. in universities, but rather a performative and contested discourse 'in the making' (Owen et al. 2021). Therefore, instead of downplaying tensions and potential conflicts, it was suggested to identify meta-conditions and viable mechanisms that facilitate the capacities and capabilities of relevant actors to engage in constructive and productive negotiations (Kuhlmann et al. 2016) [2].

For system and organisational transformation in a LPPO to happen, the change must be seen by key members as legitimate, and the measures taken to transform must be effective. For this, we suggest a meta-governance framework with a set of principles and guidelines. Here we take advantage of the above discussed literature. The working of these principles and guidelines will be illustrated through three empirical vignettes.

Why would we need such an overarching governance approach? LPPO engage in very diverse transformative situations, in different sectors and markets, varieties of technologies and knowledges, diverging regulatory frames, and societal attitudes and culture. Given the idiosyncrasies of organisational contexts, simple one-size-fits-all governance recipes for transformation would fail. The open-endedness of ongoing transformations, with emerging new spaces for articulating and negotiating problem views and innovative ways of coping with problems, will prompt LPPOs to draw on generic modes of meta-governance as "organising the conditions for governance" (Jessop 2002, p. 242), thus complementing modes of market exchange and hierarchic command. Meta-governance can help to experiment in tentative ways (Kuhlmann et al. 2019) with governance constellations that can be more or less productive in a particular context. A meta-governance framework thus helps to understand, systematise the external and internal conditions and organisational practices, and subsequently help to improve the willingness and ability of critical actors in the socio-technological systems to contribute constructively to system transformation that is seen as legitimate and in line with societal preferences.

Our development of the meta-governance framework in LPPOs is deductive. Based on the literature discussed above we explore the working of a pre-existing RRI governance framework to the requirements of transformation of critical actors in transforming systems. For illustrative purposes in Section 4 (below) we will apply this deductive framework and its principles to three LPPOs. This will help us to further adjust and develop the framework. The resulting governance principles and requirements (Section 5, below) can be used as a blueprint for *increased reflection on and decision-making for* changed

directionality in ways that then best fit the specific change situation of an LPPO – the meta framework is not meant to work as a tool for immediate and specific advice for individual LPPOs and their management.

The overarching governance approach chosen draws largely on and expands a related concept, developed in the context of policies for RRI ("Responsibility Navigator", Kuhlmann et al. 2016). This framework aims to foster responsibility-related debates, strategic reflection and decision-making processes in research and innovation organisations, in ways that are perceived as constructive and productive.

The principles and guidelines suggested by the "Responsibility Navigator" are organised along three major governance approaches:

a. ensuring the quality of interaction among incumbent and new stakeholders,
b. positioning and orchestration of old vs. new procedures and modes of organisation, and
c. developing supportive premises, with organisational capabilities and reflexive capabilities to cope with transformative change.

For this RRI governance framework, we can claim a high degree of robustness of the suggested principles given a strong empirical foundation (Randles et al. 2016; Mejlgaard and Griessler 2016) plus a fine-tuning and testing in an elaborated 'co-construction process' with key meso-level stakeholders from meso-level research and innovation organisations in Europe and beyond (Bryndum et al. 2016). For the transformation challenge at the level of change agent, we now develop those principles further and adjust them according to the requirements and demands derived from the transitions literature and the mission policies literature discussed above.

Consequently, we suggest the following set of meta-governance principles and requirements for change agents, enabling them to drive transformation.

3.2 Governance approach A: Ensuring quality of interaction

Key organisational actors aiming for transformative innovation will have to prepare for a radically changing organisational and corporate environment. They will face new clients, business partners, political and regulatory agents, and competitors, and they will have interacted with them in productive ways. At the same time, they will have to abandon incumbent partners whose contribution is no longer considered sustainable. New partnerships also require new knowledge. Given the fluid and contested nature of transformation directions and requirements the modes of knowledge production and use need particular attention.

Principle 1.1., Inclusion: navigation through innovation missions will be transformative if key meso-level organisations (as intermediaries, sponsors, regulators, organisers) mobilise the diversity of both internal and system actors relevant for the wanted system change, in a way that engages them directly and effectively in debate and activities, in such a way that they perceive processes of decision making and policy implementation as legitimate, transparent and trustworthy.

Principle 1.2., Moderation: organizational modes appropriate to build up trust, collect data and organize dialogue are needed in the form of 'fora', institutionalized places or procedures for interaction and for 'bridging' different perspectives between contesting internal and system actors, after which an identification of (potentially diverging) transformative goals, measures and procedures is achieved.

Principle 1.3., Deliberation: system transformation – confronted with uncertainty and competing interests – requires new knowledge and a re-orientation of organisational objectives and values. Critical

actors need to facilitate exploration, anticipation, assessment, sense-making, decision-making, reflexivity and learning among actors with different knowledge claims, and with different positions in current and transformed systems.

3.3 Governance approach B: Positioning & orchestrating structural change

Key critical actors need to 're-invent' and re-build their organisation, internally and vis-à-vis their changing environments.

Principle 2.1., Modularity and flexibility: transformation of firms requires navigation in "unchartered waters" (van de Ven et al. 2000). Change strategies will combine 'hard' and 'soft' regulatory mechanisms, allowing for self-regulation and organisation, external control and accountability structures (e.g. supervision), where flexibility of governance arrangements should not lead to arbitrariness.

Principle 2.2., Subsidiarity: transformation will have to happen at all organisational and corporate levels. Complementary to the self-governance some level of hierarchical command-and-control process may be necessary in certain circumstances, performed mainly by independent actors, capable to oversee and enforce.

Principle 2.3., Adaptability: LPPOs need to understand the particular historical situation of the transformation process they aim to boost with their own organisation, requiring targeted adaptation and implementation of overarching transformation requests. Such calibration requires to assess how governance arrangements found in other, external organisations would have to be customised to effectively and legitimately serve own transformative goals.

3.4 Governance approach C: Building supportive premises

Key critical actors need to "un-learn" imprinted organisational routines and practices, and to develop new capabilities and capacities.

Principle 3.1., Capabilities: supporting reflexive individuals capable of recognizing, anticipating, deliberating, communicating, and pursuing in a collective manner societally desired processes and outcomes of corporate activities, including their evaluation ('governance literacy').

Principle 3.2., Capacities: for capabilities to unfold, they need a supportive organisational and network infrastructure, such as access to information, knowledge, and resources for participation.

Principle 3.3., Institutional entrepreneurship: engaged leadership is needed, top-level and continuous support, vision and strategy, lobby work and the rewarding of institutional improvement to facilitate transformative change.

Principle 3.4., Culture of transparency and tolerance: the need for and direction of organisational and corporate transformation will be debated, if not contested. Such reorganisation processes can be misapplied and corrupted. Therefore, basic democratic principles such as rule of law and freedom of speech, will make transformation-related governance effective and sustained overtime.

4 Empirical illustrations: Meta-governance Frame for LPPOs as change agents

4.1 Case selection and methodology

We illustrate the relevance of these governance conditions with short vignettes of transformative ambitions in three different organisational and corporate contexts.

We deliberately chose three diverse functional areas, i.e. one firm in the marketplace, one public actor in the area of education/science supporting the intellectual infrastructure for transitions and one funding organisation supporting those that support the intellectual infrastructure for transitions. The choice was not meant to represent the broad diversity of functional areas within transitions. However, by deliberately selecting those three functional areas we sought to have a sufficient breadth in the coverage of cases to demonstrate the broad value of the concept, in line with the demand of Turnheim and Sovacool (2020) extending the realm of the marketplace and firms. Once we made this basic choice, we then selected the organisations on the basis of a broad international screening to detect those with an important, critical role within their functional areas and for whom we had indications of clear transformative ambitions in each of the functional areas and where processes were still on-going. A last criterion was convenience as to what access we could get in those organisations representing the three functional areas and meeting the criteria.

In sum, the selection made sure that the three case vignettes differed in in three major dimensions:

1) type of LPPO (public, private, regulatory context),
2) kind of transformations (economic, technological, political, societal and cultural embedding),
3) transformation 'situation' of the LPPO (politics and powering, social movements, markets, windows of opportunity).

Our three illustrative cases are sufficiently different, based on their institutional character, geographical location, their mission, business orientation and organisational structure and their position in their environment and societal context. We want to further note that a vignette-style of illustrative cases, such as we have presented, cannot possibly cover the multifaceted nature or organisational structures, context and institutional characters of actors for which our framework could be applied and become useful. Our three exemplary cases thus are more targeted towards providing examples and institutional logics with which our academic audience might most likely be familiar with and thus providing direct indications on how our meta-framework could become relevant for their own research and/or reflections on their own institutions.

The selected LPPOs are:

- EnBW Energie Baden-Württemberg AG, a public-private energy company which since 2013 engaged in a transformative agenda towards climate-friendly future of energy, applying a holistic approach with changing technologies, markets, internal organisation, and client relations; the transformation can be considered as a halfway success.
- Vinnova, a government innovation funding agency which in 2011 launched a transformative agenda towards grand societal challenges, breaking with expectations of incumbents, oriented towards more inclusion of societal actors and new types of programmes; the full transformation potential of the agency has not yet realised.

- University of Twente, a university of technology, active in competitive international markets, which in 2019 designed a strategy towards 2030, with new technologies and capabilities for healthcare, smart materials and industries digitalised society, and resilience; the implementation of the transformative strategy turned out to be cumbersome.

For each vignette, extensive document analyses were performed based on publicly available information, forms of representation online and in media, presentations and advertisements, as well as on publicly accessible reports, strategy papers and other internal documents from the organisations. For case (2), a national agency for research and innovation, the insights from our document analysis were enriched by a selection of academic literature on the same organisation (see Eriksson 2006; Schwaag-Serger and Palmberg 2021; Fünfschilling et al. 2017; OECD 2016).

In addition to this, three to five expert interviews with key actors in the transformation processes have been conducted for each case. For these interviews, individuals with long-term expertise and employment in these organisations have been selected, providing extensive insights and knowledge on their internal structure, culture and organisational identity. These selected *senior* individuals thus were able to adequately depict their organisations transformational change throughout the last years and to further illustrate how they, as individuals in their positions themselves, have significantly contributed to the realisation of the transformative ambitions within their organisations.

The following sections provide a detailed overview of the insights that could be derived based on the document analyses and expert interviews. Each vignette will be represented through a small description on their transformative ambitions, as well as a tabular illustration on which principles from our meta-governance framework have been found.

4.2 A major public-private energy provider

This LPPO claims to be one of the initial drivers of the transformative process in the German energy sector, presenting themselves as early adopters of a transformative agenda that is centred around the significant expansion of renewable energies. They have presented a holistic approach with changing technologies, markets, internal organisation, and client relations, that should acknowledge their economic, ecological and social responsibility, while being in direct line with the overarching aim of the company to become climate neutral by 2035 (EnBW 2021b, c, d, e, f, g).

Since this new agenda was presented in 2013, the LPPO claims to have gradually developed from their role as a traditional energy provider towards a strong industry partner with expertise in energy and infrastructure. Additionally, they claim to be the first major energy company that started to present a cultural shift in the companies' identity that resolutely aligns themselves to the opportunities offered by the Energiewende. According to them, this LPPO has been "[…] looking at the bigger picture earlier than other competitors." (EnBW 2021a). The organisations transformation towards realising these goals, can be considered as a halfway success.

Since presenting their transformative agenda in 2013, the company has shown a significant development in realising their goal to gradually develop from their role as a traditional energy provider towards a strong industry partner with expertise in energy and infrastructure. This has been shown through the LPPO's investments and company restructuring, systematically transforming and realigning their company portfolio towards more sustainability and a significant expansion of renewable energies (EnBW 2021c, d). Three sources for renewable energies are imagined with this regard,

hydropower, wind energy and solar energy and are supported through the companies' various international investments and pilot projects (EnBW 2021a, h, i).

Along these increasing investments into new forms of energy generation, the LPPO's transformative corporate agenda presented the gradual and systematic phasing out and discontinuation of fossil fuel and nuclear power-based energy generation. Until 2022, all the LPPO's nuclear power plants, and by 2035 all of their coal-fired power generation should be discontinued and then dismantled (EnBW 2021c, d, h). In 2020, 40% of the company's particularly carbon-intensive electricity generation was already phased out. To date, four nuclear power plants of the company are being dismantled, an application to decommission an additional one has been submitted (EnBW 2021c, h).

With regards to forms of moderation, the company showed forms of using and participating in partnership cooperation models for engagement with municipal utilities and communities, thus applying novel forms of organisational modes for increased dialogue with citizens and municipalities as a basis for establishing new relationships, building trust and organised places and opportunities for the exchange of ideas (EnBW 2021b). This form of engagement was presented by the company as forms of supporting local authorities and households in becoming sustainable energy producers themselves (EnBW 2021c).

A major shift in the company's internal culture and identity towards acknowledging economic, ecological and social responsibility could be noticed. This vision towards corporate responsibility extends towards its body of employees. Responsibility for the climate, a clean environment and the conservation of biodiversity is considered a major task for the entire company (EnBW 2021j). Awareness for the responsibility individual employees have in their own personal working environment should be raised and employees should be motivated to get involved in sustainable behaviour (EnBW 2021e; EnBW 2021h; EnBW 2020; Interview A 2021; Interview B 2021). All employees should be considered with regards to phasing out coal- and nuclear power-based energy generation and the changes associated with it. The company presents itself as being committed to providing opportunities for the personal development of employees and maintaining their employability, through retraining and further qualification measures with regards to positions that might be closed due to this discontinuation process (EnBW 2021h; EnBW 2020).The successful development of an environmental conscious and responsible corporate culture and employee identity is closely related to individuals in leadership positions or on the management level. This importance of leadership positions for the transformative process within the LPPO was mainly shown through one individual that had embodied and represented this role, namely the LPPO's CEO. When he started, the CEO was presented with the major challenge to transform the group towards more sustainable energy generation, mainly rooted in the rapid rise of public pressure after the nuclear disaster of Fukushima in 2011 (Interview B 2021; Tagesschau 2021). This created an economic hardship that urgently needed to be changed, because the exit from nuclear power generation created a strong pressure to transform the company. In addition to the often lengthy and bureaucratic processes that sometimes hinder the groups new investments in renewable energy production, the drastic transformation towards new forms of energy production meant limited financial earnings for the initial years of their implementation and operation (Interview A 2021; Tagesschau 2021; Ntv 2019; FAZ 2021). Instead of opting for a top-down regulatory approach, the CEO tried and succeeded in activating employees and getting them involved in the transformation. Applying this deliberation approach he embodied the transformation strategy that was developed through his actions and the guidance he gave to the management level of the group (Interview A 2021).

Although there was significant success in the transformative process of the company, there are still some persistent issues and challenges which hinder the full realisation of the LPPO's transformative potential. One of these issues is that there are tendencies among some employees (especially at management level) regarding the change of solely using renewable energy sources in the long run for the company's business portfolio. The perception of the LPPO from these individuals appears to be still very traditional and linked to the companies' image as a traditional (fossil) energy supplier. Here, coal and nuclear power plants are seen as the real, reliable power sources and as driving forces for the company. The dismantling of these branches of the company is thus building up resistance and fear of redundancy among some employees. These tendencies have already been seen with the nuclear phase-out and can now also be noticed with the dismantling of the companies' coal-fired power plants (Interview A 2021; Interview B 2021; Tagesschau 2021).

A second challenge for the company is to truly present and embody the envisioned holistic approach for the companies' competences across all business investments and portfolios, as well as internally across all company sections. A final challenge for the realisation of the transformative agenda of the LPPO as change agent are hindrances through some aspects of bureaucratic and regulatory frameworks in which the company operates, both on national and international levels (Interview B 2021).

The main lessons from this case of a major public-private energy provider were

- A strategic internal restructuring and gradual transformation of company expertise and portfolio.
- Creating an internal group culture that perceives employees and their habits as an essential part of the transformative process.
- The successful development of an environmental conscious and responsible corporate culture and employee identity, especially through individuals in leadership positions

Process characteristics inhibiting more comprehensive transformation were:

- Persisting reluctant tendencies with regards to phasing out of traditional business portfolios from individuals in leadership positions and some employees.
- Truly presenting and embodying the envisioned holistic approach for the companies' competences.
- Hindrances through some aspects of bureaucratic and regulatory frameworks in which the company operates.

4.3 A national agency for research and innovation

Founded as a national innovation agency in 2001, this LPPO's main mission was to "[…] promote sustainable economic growth by financing needs-driven R&D and by developing innovation systems […]" (Eriksson 2006, p. 8). Within the innovation systems failure rationale, like many other innovation agencies, it was focused on strengthening research cooperation between academia, companies and politics/public sector in the Swedish innovation system. In 2011, the innovation funding agency launched a transformative agenda towards grand societal challenges, breaking with expectations of incumbents, with more inclusion of societal actors and new types of programmes. To date, while the organisation has transformed considerably, the full transformation potential of the agency has not yet been fully realised.

A major shift happened in 2011 with the development of the challenge-driven innovation programme (Fünfschilling et al. 2017; OECD 2016). Building on first earlier ideas, e.g. in the area of regional sustainable growth, this finally signalled a development of the agency towards a needs driven approach,

whereby up to 10% (Fünfschilling et al. 2017) of the funding now was being allocated based on the contribution to satisfying societal needs (Vinnova 2014, as cited in Schwaag-Serger and Palmberg 2021).

Four basic themes were designed within which consortia could propose R&D projects that could promise a strong emphasis on societal impact. Consequently, societal actors and public sector was now included stronger than before. A second programme, the Strategic Innovation Programme SIP, launched in 2012, also added more directionality and strategic intent. SIP was intended to generate somewhat more transformative innovation agendas built on a strong bottom-up element of deliberation with the communities (Interview Z), and in parts it succeeded, especially in a refined second and third version of the programme (OECD 2016, p. 110). The agency took a further step in the development towards a transformative organisation when it orientated its activities along the Sustainable Development Goals. Meanwhile, the programme portfolio now shows a number of large scale explicitly transformative programmes. While some internal and external critics feared and that the agency would neglect too much its traditional and critical role as programme implementing agency for economic well-being, the agency has nevertheless been labelled "pioneer in designing and implementing transformative innovation programs with explicit references also to societal challenges and the SDGs" (Schwaag-Serger and Palmberg 2021, p. 31).

However, the full transformative potential of the agency is not realised. Some of the approaches required were still missing, such as supporting the demand side or embedding into other policy areas that are critical for supporting transformations (Schwaag-Serger and Palmberg 2021). Further, there is still some way to go to change the internal funding logic away from many rather small scale projects towards focusing on large, systemic transformative projects (Interview X, Interview Y).

The main lessons from this case of a national agency for research and innovation as change agent were as follows. Positive enablers were:

- Strategic leadership
- A high level of autonomy in the system
- Mobilisation of highly credible external expertise internationally
- Normative link to and mobilisation of other critical policy initiatives (SDGs, EU level declaration)
- Strategic intelligence, and understanding limits of systems analysis, identifying game changing development
- Process characteristics inhibiting more comprehensive transformation were: Limitations in establishing a more radical culture shift to a system change facilitator beyond small scale projects
- De facto sticking to a traditional role of the agency and its civil servants as small-scale programme implementers.

4.4 A technical university

This technical university, founded in 1961, is one of four polytechnics in the Netherlands. The university has a tradition of combining technology, science and engineering with social sciences. It has been listed among the top 200 universities in the world by various ranking tables, and it is a partner in the European Consortium of Innovative Universities (ECIU). With almost 12.000 students the university is a small to medium sized higher education institution in its national context. The four technical universities compete against each other in national and international markets for education and research, while they also collaborate via an institutional alliance (4TU.Federation 2017). In 2017-2018, in the context of a 'National Research Agenda' process and effort to mobilize extra public funding for research and

higher education, the 4TU Federation launched the slogan 'High-tech for a sustainable future', claiming to effectively resolving societal challenges in the long term (4TU.Federation 2017).

Against this background, in 2019, the university Board stated: "[…] we all must rethink our lives and help redesign society. For us, this calls for a reinvention of our university". Consequently, an organisation-wide process was launched for designing a strategy towards 2030, finally establishing the mission to become the "ultimate people-first university of technology. We empower society through sustainable solutions." (University of Twente 2020)

With this transformative ambition ("reinvention") the university made an effort to position itself strategically in competitive national and international markets for funds, researchers and students. In the Netherlands, public universities enjoy a relatively high degree of strategic discretion in the Dutch public science system. While the adopted transformative vision is rather ambitious, its implementation as a strategy across the university turned out to be cumbersome, slow and fuzzy.

The term 'people-first' in the new mission statement was supposed to mean that "the wellbeing of people is our guiding principle". As a technological university the LPPO claimed to take responsibility "for ensuring that the power of science and technology is harnessed to achieve the best possible impact in a changing world", drawing on a rich tradition of combining technical and social sciences in an interdisciplinary manner (University of Twente 2020).

The mission was then translated into the vision to contribute to developing a "fair, sustainable and digital society" until 2030, inclusive, open and entrepreneurial ways. The vision was broken down to three strategic goals (University of Twente 2020):

- "Shaping society", with social challenges are a guiding principle and aiming to become a sustainable organisation.
- "Shaping connections", with a strong presence outside the campus, a fostered citizen science movement, and engagement with the "European University of Innovation".
- "Shaping individuals", with the university spurring academic social entrepreneurship and improved talent development.

To implement these goals in 2020 six thematic "special interest groups" were established to create synergy between colleagues, teams and departments (Innovation of Education; Citizen Science; Individuals and Teams; Digitalization; Inclusion; Sustainability), with 34 quite heterogeneous targets, and a number of short-term goals for 2023 were identified for short-term development and implementation. When this article was written, these short-term goals had been achieved only partly, differing considerably per theme group. For instance, an ambitious "new way of working for staff and students" was elaborated by the thematic group on "Individuals and Teams", yet only slowly adopted in daily human resource policy routines (University of Twente 2021).

During the ideation and design phase of this transformative strategy process, pro-active university leaders and enthused, engaged working groups and individuals were able to instigate and drive the development. In the subsequent implementation phases though, when short-term targets and measures needed to be rolled out across the entire organisation, they were received and picked up by the different, semi-autonomous faculties, units and individuals to quite diverging degrees.

The translation of transformative goals into daily work contexts of academics and administrators turned out to be troublesome. Professional and inspiring leadership was required not only at the organisational top but also in each academic and administrative unit. Such leadership would include setting targets and taking risks (financial, academic, career-wise), recognizing that this could put

individuals and units in conflict with the traditional benchmarks of their wider professional context, locally and internationally.

Main lessons from this case of a technical university were

- Designing a strategic vision and mission for the LPPO as change agent is crucial, with broad inclusion of people across the organisation and beyond.
- Moderation and deliberation, supported by "strategic intelligence" helps to trigger creative visioning.
- Institutional entrepreneurship is indispensable for instigating and launching the transformative strategy.

Process characteristics inhibiting more comprehensive transformation were:

- Public universities are complex organisations, with different academic and epistemic cultures, and diverse incentive structures.
- Confronted with potential transformative change, organisational units and individuals tend to play "waiting games" to avoid first mover risks (Scharpf 1997).
- The transformative ambition will spark tensions and conflicts of interest within and beyond the LPPO; they should not be ignored but actively addressed, as political issues.
- A conscious and well-resourced implementation phase of the transformation process becomes a decisive component. It would also include targeted revisions of decision-making criteria and processes.
- Career development criteria should enable risk taking and transformative capacity.
- If supportive career development criteria are not anchored at all levels and in all relevant units of the organisation, they will have second-tier relevance.
- Throughout the implementation phase institutional entrepreneurship is needed, also at lower levels of the organisational hierarchy.

To sum up, the three illustrative vignettes provide a structured and systematic application of the chosen meta-governance framework in three different LPPOs with diverse organisational and corporate contexts. The insights derived from our document analyses and expert interviews indicate the usefulness of the framework, as a simplifying device to understand the challenges and levers for change agents to transform in the context of system transformations. At the same time, our focus on internal and external organisational conditions of change revealed missing dimensions in the chosen meta-governance framework. Therefore, in the closing section of this paper, we will further accentuate the relevance and complement these depicted generic meta-governance principles and requirements for the particular needs of LPPOs as change agents, enabling them to foster transformation.

5 Discussion and Conclusions

This paper aimed to explore two conceptual questions: (1) What are the external and internal conditions and organisational practices that shape the willingness and ability of LPPOs in the socio-technological systems to contribute as change agents constructively to system transformation that is seen as legitimate and in line with societal preferences? (2) How can the diagnostic lens of overarching governance principles support our understanding of those conditions and practices and help to foster the willingness and ability of change agents to support system transformation?

Based on the insights on requirements of organisations to adapt to their changing environments derived from organisational, transition and policy studies, our two main starting assumptions were that LPPOs are critical for transformation, and that for them to play constructive and effective roles in transformations, they actively and consciously need to transform themselves.

We have identified and analysed three cases of LPPOs in different institutional contexts. These cases served as *illustrative examples* for LPPOs in various organisational contexts and provide a multifaceted basis for applying and presenting our framework. The selection was based on an explorative screening of LPPOs for which we observed an explicit ambition to go through a process of transformation and which covered a range of criteria across three functional areas. We stress that these conclusions are not meant to be a generalisation, a result of representative and deep case study work. Rather, on the basis of this paper such a study would now be possible. We can draw explorative conclusions though.

Applying the suggested governance principles as diagnostic lenses helped to reveal fostering and hampering factors for transformative ambitions of these actors and their capacity to act as change agent. In all three cases we found serious, credible strategies designed and implemented to transform the organisations. Across all three major dimensions of our framework (quality of interactions; positioning and orchestration; supportive environments), all three organisations implemented strategic action.

We do not want to appraise the relative success of those three transformations in any greater detail. Nevertheless, our analysis shows that all organisations managed to initiate a strategic departure that led to substantive change. To achieve those changes, they managed to put in place a range of innovative governance practices.

We have seen that the specific implementation of the meta-governance principles that we have used to analyse their strategies ("Responsibility Navigator", Kuhlmann et al. 2016) has been instrumental in moving the organisation in the desired direction. At the same time, the three cases have also shown that the interaction between organisational change and the changes in the context – i.e. the socio-technological, political and economic transformation – has been critical. The importance of this interplay between organisational change and contextual change suggests extending the initial meta-governance in important ways.

As set out at the beginning of this paper our framework is designed as tool for facilitating and accelerating *reflection processes* by actors on the institutional structures they are a part of. We are convinced that our approach has heuristic value as a tool that provides actors with support for (self-)reflection/ "self-help" in diverse contexts, and not a concrete recipe for change and decision-making that provides detailed and situational advice.

The three illustrative cases lead us to several cross-cutting lessons learned (also in line with a recent literature review on the transformative capacity of public sector organizations, Borrás et al. 2023), as well as to lessons for our three major governance dimensions. We start with *cross-cutting observations*. All three organisations, to different degrees, still have some way to go. There are stubborn structural and cultural internal and external challenges that are hard to overcome for achieving what, we think, is the ultimate necessity when transforming an LPPO, a change of vision of what the organisation shall be, and a translation of this identity into the incentive structures and managerial practices at all levels of the organisations: from a provider of electricity to an agent of change in the energy transitions and provider of new electricity services; from a funder of R&D projects in different areas of science, technology and the economy to an agent of systems change through developing transformative system wide programmes and projects; from a provider of basic and applied research and tertiary education to an enabler and even active driver of socio-technological change. All those changes mean more than developing new capabilities and adding a few activities. Rather, the question is how the organisations, all their members, perceive their roles in the wider system context.

While bottom-up dynamics can build up pressure for change, in all three cases a strong, credible intention from the very top was critical. While this sounds like a management commonplace, for processes initiating a revision of the very vision and mission of an organisation leadership is indispensable. In all three cases it was the leadership that created conditions for the three dimensions of our framework: quality of interaction, positioning and orchestrating as well as creating supportive environments.

Moreover, transforming an organisation does not happen in isolation. Rather, it needs to take into consideration the wider institutional and systemic context of the organisation, which can be both supportive and hindering. For example, the workforce of any LPPO develops its capabilities and professional ethics not only against the strategic choices of the given organisation, but also in view of the institutional demands of the wider labour market and other peer organisations, which in turn might function as a countervailing force for change.

At the same time, transforming LPPOs can take advantage of external pressures or external incentives and create a productive interplay with internal strategic intent. For example, the utility company linked its transformative ambition to a narrative of economic inevitability, long before competing utilities followed. The innovation agency supported the political drive of the country and the EU towards SDGs very directly, thereby constructing an inevitable link to its own organisational purpose. The University developed the transformative strategy in view of their future competitive position in national and international markets for higher education and research.

Further, in all three cases the *three dimensions of conceptual meta-governance principles* that we have employed to diagnose their strategies, helped us to show how the LPPOs have moved their organisation in a desired direction, while at the same time revealing persistent challenges that none of the three actors could fully overcome:

- *Quality of interaction:* Inclusion, moderation and deliberation are clearly crucial to push-start transformative strategies of an LPPO as change agent in their ideation phase. In later phases of the strategy implementation the modes, content and composition of inclusion, moderation and deliberation may have to be revised and adjusted.
- *Positioning and orchestrating:* The notions of modularity, subsidiarity and adaptability capture meta-governance conditions that have particular relevance in the LPPO's strategy implementation phase. There is a tendency in LPPO to, over time, fall back in deeply rooted organisation routines, hampering the envisaged transformative thrust.

- *Supportive internal premises:* The requirement to build and draw on transformative capabilities of both individuals and organisational units is visible in all three cases. At the same time institutional entrepreneurship and leadership are indispensable. A change agent culture of transparency and tolerance will increase the credibility and legitimacy of change agents.

The persistent shortcomings to fully transform in each case leads us to conclude that to be useful for LPPOs as change agents, the chosen meta-governance framework needs to be further developed. We suggest devising a research programme focussing on three main areas:

(1) The main areas of development are *internal incentive structures* and their adaptation over time. In our framework we have included internal incentive structures within the dimensions 'capabilities and capacities'. The cases have shown that the normative motivation of members of an organisation cannot depart too much from the demands of the incentive structure they face in the organisation and its external environment. Therefore, for the future we suggest to pay more attention to the organisational and contextual incentive structures for members of the organisations at all levels more prominently, starting from top management to shop floor members. Rethinking the role and modes of incentives could also be an important lesson for the extant transition policy and 'responsibility' literature.

(2) At the same time, our three vignettes show that the specific characteristics and particular missions of different change agents, and their respective *idiosyncrasies*, cannot be underestimated: the public-private energy provider found itself in a radically shifting, highly competitive energy market. They had to 'sink or swim' when they started their transformative journey, there was and is a considerable 'sense of urgency'. The national agency for research and innovation, a government-owned intermediary, traditionally enjoys a relatively high degree of leeway. The technical university, as a higher education institution, is exposed to a classical tension between a role as "shaper of values of societies" and a role as parent organisation of only loosely coupled sub-systems (Godemann et al. 2014). These idiosyncrasies underline that applying a guiding, but flexible meta-governance approach is useful. And again, rethinking the role and modes of idiosyncrasies could also be an important lesson for the extant transition, policy and 'responsibility' literature.

(3) We have seen how transformation governance faces different challenges over time: the ideation phase and kick-off towards a transformative agenda requires other governance approaches and capabilities than at later stages. More research and critical reflection is needed about changing organisational challenges and needs along the *time axis*. Can we identify typical learning curves, "obligatory passage points" (Callon 1984) and life cycles of LPPO transformations? Also here, extant transition, policy and 'responsibility' literature should more explicitly include the time dimension.

All of those findings have of course implications beyond the management of LPPOs as change agents. They lead to the conclusion that transformative policy should indeed take note of the governance and capability requirements within critical actors as defined in this study, and be ready to react with support if the inactivity or inability of incumbents risks not only to make them fail, but to hinder desired transitions. Capability building in a broader sense may then become a further role of the state (Borrás and Edler 2020). Transformative policy needs to be based on an understanding of how critical those organisations are, and how hard their transformation is. Support could then be offered both discursively, creating joint narratives of transformations that enables organisations to find their new roles, and institutionally, supporting regulatory and educational reform needed to allow not only the new business models and identities to thrive, but also all members of the organisations to be part of this transformation.

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[1] For a broad literature review on those see Sarta et al. 2021.

[2] See also Owen et al. 2021, who stress the importance to build up legitimacy for the institutionalisation of RI within organisations.