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Is 'digital transition' a syntax error? Purpose, emergence and directionality in a contemporary governance discourse

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ABSTRACT

An important precondition for responsible innovation is the awareness of directionality: Dynamic innovation processes can take different, more or less favorable, turns. The ongoing wave of digital innovations exemplifies how this directionality challenges societal actors to develop new strategic dispositions. This paper critically examines the 'digital transition' as a rather paradoxical 'knowing of governance'. It appears to refer simultaneously to digital instruments and directed automated futures and to rather spontaneously occurring digitalization. The analysis explores this apparent 'syntax error' through academic scholarship, gray literature, as well as newspaper sources. Critical discourse analysis demonstrates how directionality is obscured through various ideological representations of directed transitions but also disclosed through an increasingly rich vocabulary on emergent digitalization issues. Calling attention to the partly purposive, partly emergent nature of the transformation process, the 'digital transition' notion can help to express directionality.

'Digital transition': innovation directionality betrayed?

The quest for responsible research and innovation is not an easy undertaking. It is at risk of remaining a mere formal matter of compliance (de Saille 2015). Responsible innovation is difficult to achieve in the face of persistent misrepresentations of innovation and its governance. Critical innovation scholarship has, therefore, taken issue with the 'pro-innovation bias' in innovation discourse (Godin and Vinck 2017). A related issue is the common reification of innovations into technologies and 'things'. Instead, innovations should be understood as processes of becoming (Blok 2021). With regard to

issues of societal transformation, innovation thinking often comes with misplaced assumptions of control (Stirling 2016).

An important precondition for responsible innovation is the awareness of directionality (van Est 2017). Directionality indicates that innovation processes can take different directions, with more or less favorable consequences. Awareness of directionality is not to be confused with the channeling of innovation processes toward particular desirable directions or to consider innovations as instruments toward particular societal 'missions'. Stirling (2024) explains how this obsession with 'giving direction' keeps us in the colonial-modernist mind-set of control. The urge to give direction to innovation reproduces modernist, linear ideas of innovation processes (Rip 2006) – as if they were 'racetracks' (Stirling 2011). By contrast, the notion of innovation directionality indicates that innovations are open-ended but power-laden processes with multiple possible development paths, which can be assessed through various ethical standards and political commitments. For responsible innovation, it is crucial that this directionality becomes ingrained into common innovation thinking.

This paper engages with innovation directionality from a governance perspective. *How to deal with innovation directionality?* As Papaioannou (2024) indicates, this can be approached as a choice between Keynes-inspired governmental planning and Hayekian laissez-faire (underlining the moral and cognitive limits to rationally directed innovation). Both perspectives appear to misrepresent the governance challenges at hand, however, revolving around distributional issues, they downplay the aspects of relational equality. Premised on idealizing views on rational planning and properly functioning markets, they start from rather outdated views on political decision-making: The direction of innovation trajectories tends to result from *networked* modes of governance (Callon 1980; Leydesdorff 1997; Rammert 2000).

Seeking to explore how societal actors make sense of innovation directionality, this paper critically examines the notion of the 'digital transition' (Dannenberg et al. 2020; Rosário and Dias 2022; Sugiyama et al. 2017). This concept follows the broader rise of 'transition' as a hopeful, modernist policy concept. Its key idea is that systemic sustainability challenges call for transitions in societal systems, which can be achieved through careful modulation of ongoing innovation processes (Kemp, Loorbach, and Rotmans 2007; Voß 2014). The 'digital transition' notion is studied as a 'knowing of governance' (Voß and Freeman 2016): A set of basic representations of governance challenges, responses, processes and actors (Cf. section 'Methodology: a critical-explorative approach to paradox'). Often taken for granted, these epistemic horizons of governance merit scrutiny as exercises of power (Rose, O'malley, and Valverde 2006). Appealing to controlled yet not overly coercive societal transformation, and developed as a 'third way' between the aforementioned 'Keynesian' and 'Hayekian' paradigms (Cf. Rotmans 2005 in section 'Transitions thinking and innovation directionality'), the 'transition' concept certainly deserves critical questioning (Stirling 2016). Can this knowing of governance handle innovation directionality?

While 'energy transition' and 'mobility transition' have become common notions in the political landscape, the notion of a 'digital transition' is relatively new. This declination of transition thinking is particularly ambiguous: Often referring to digital instruments for sustainability (Münch et al. 2022), plans toward industry 4.0 or 5.0 (George and Hovan George 2023) or visions of highly automated futures (Smith and Fressoli

2021), it bears similarity to planned system transitions toward sustainable energy, mobility and circular economy. 'Digital transition' is also associated, however, with rather spontaneously occurring processes of digitalization (Andersen et al. 2021). This speaks from accompanying terms such as the 'digital divide' (Warschauer 2003), 'digital sovereignty' (Couture and Toupin 2019), the rise of the 'digital economy' (Lythreatis, Singh, and El-Kassar 2022) and the 'worker of the future' (Salles 2022). Rather than actively pursued transformations, these are transformations to adapt to or cope with. Referring at once to structural societal reforms and quasi-autonomous transformation processes, 'digital transition' is thus a rather contradictory term. The coupling between 'transition' and 'digital' seems out of place and misleading: *Does the 'digital transition' notion amount to a 'syntax error', i.e. an over-extension of transitions thinking into an area where it does not apply?* And most importantly: *Does the somewhat contradictory concept obscure innovation directionality, or does it rather inform directionality-conscious knowings of governance?*

These questions will be explored through a combination of co-production analysis (Jasanoff 2004) and critical discourse analysis (Fairclough 2013). After a brief methodological account (section 'Methodology: a critical-explorative approach to paradox'), a theoretical discussion describes the main principles of transition thinking and its ways of handling directionality (section 'Transitions thinking and innovation directionality'). The empirical analysis unpacks the 'digital transition' along the key distinction between purposive and emergent transitions (section 'Analysis'). The conclusion wraps up the main observations. 'Digital transition' discourse obscures innovation directionality through various ideological representations, yet it is important to mind the discursive nuances: It also contains a rich vocabulary that helps to articulate the directionality.

Methodology: a critical-explorative approach to paradox

This paper poses critical-explorative research questions on 'digital transition', a paradoxical and potentially misleading 'knowing of governance'. Methodologically, this implies a strategy in the critical-theoretical tradition (Alvesson and Sköldberg 2017): *What is it that makes the term appear self-contradictory? What are its semantic origins and implicit assumptions? What does it highlight and what does it obscure?*

The analysis moves beyond abstract conceptual deconstruction. Aiming for empirical nuance, the analysis takes a critical-*explorative* approach. Rather than unmasking the 'digital transition' as a misleading or oppressive discourse, it seeks to disclose the nuances of this somewhat paradoxical concept (Pel et al. 2023a). Attending to its hegemonic and counterhegemonic discursive elements equally (Fairclough 2013), the analysis aims to disclose the many intermediate positions, nuances and discursive layers involved. As will be shown in section 'Analysis', the 'digital transition' discourse exhibits certain obsessions with 'digital tools', yet it also contains critical awareness of innovation directionality. Clear examples of this are the notions of 'digital sovereignty' (Couture and Toupin 2019) and the 'digital divide' (Lythreatis, Singh, and El-Kassar 2022).

The critical-explorative analysis combines critical discourse analysis and co-productionist modes of inquiry. The first focuses on the contents of the 'digital transition' discourse. Taken as a framing of governance challenges, the concept can be compared with governance discourses such as 'ecological modernization' (Hajer 1995), 'eco-shaming'

(Vandenhole, Bauler, and Block 2023) or 'exnovation' (Ziegler 2023). Investigating its underlying assumptions, critical discourse analysis helps to examine what the 'digital transition' framing is showing and hiding – and which representations of society it naturalizes into supposedly common-sense knowledge (Fairclough 2013, 30–31). Beyond the description of evolving language structures, critical discourse analysis seeks to disclose the associated power structures and 'ideological discursive formations'. It emphasizes that new governance discourses tend to introduce new 'governmentalities', i.e. new assumptions about how society can be governed, managed and monitored (Rose, O'malley, and Valverde 2006). The analysis highlights, for example, how the 'digital transition' discourse contains certain obsessions with digital 'tools' and projections of directed innovation (Cf. Stirling 2024). As elaborated in section 'Analysis', these functionalist understandings are actively promoted by developers, industry leaders, consultants and enthusiastic technology users.

A second element of the methodology is co-productionist analysis. As discussed earlier, transition thinking can be analyzed as a scientific discourse, a 'third way' in the debate between Keynesian and Hayekian approaches (Papaioannou 2024). Transition thinking and 'digital transition' are co-produced notions, they emerge from science-society interactions (Jasanoff 2004). Voß (2014) describes how transition thinking, and the various associated heuristics, governance models and management frameworks, have gained ground as a governance concept with both scientific and political authority. These two forms of credibility reinforce each other. The 'transition' concept has thus circulated in society through interactions between activist innovation researchers, policy makers, consultants, lobbyists, activists, think tanks and media. Voß and Freeman (2016) called these co-produced governance concepts 'knowings of governance'. These are basic representations of governance challenges, responses, processes and actors. Transmitted and enacted through model building, simulation studies, scenario-workshops, monitoring schemes, databases, experiments, knowledge platforms as well as policy discourses are the epistemic horizons within which governance processes take place (Voß and Freeman 2016, 4). Coelho et al. (2023) describe, for example, how 'Industry 5.0' discourse emerged initially in blogs and social networks.

Studied as such a co-produced 'knowing of governance', 'digital transition' discourse has been examined along different communication channels (Jasanoff 2004). Next to academic scholarship, the analysis also draws on gray literature and newspaper coverage. From the viewpoint of current multi-media and digital humanities methodologies, the latter may appear to be rather outdated data sources (Deacon et al. 2021). They still provide important indications of shifting societal moods; however, they can be powerful shapers of knowings of governance: for example, by framing citizens as either 'change agents' or 'victims' of the energy crisis (Laakso et al. 2024). Regarding the 'digital transition' discourse, newspaper sources provided a valuable diversity of perspectives: From governmental actors, business representatives and union activists to various technology watchers and lifestyle commentators at the edges of political debate.

The empirical research has been conducted in the context of the LAMARTRA project on 'bridging decarbonization and labor market in sustainability transitions'. In this context, the 'digital transition' counts primarily as an area of innovative instruments toward decarbonization – with certain effects on issues of work and employment (Forney and Epiney 2022). Taking place in Belgium, this research identified 'la transition

numérique' (the digital transition) as a digitalization-related knowing of governance. Using the search term 'transition numérique', the (French-speaking) Belgian newspaper 'le Soir' has been used for media analysis. Filtering out the articles in which the concept was only mentioned in passing, the search yielded 127 articles over the period 2015–2022. Importantly, this paper does not aim for an exhaustive coverage of these empirical materials. Similar to the exploration of 'digital sovereignty' by Couture and Toupin (2019), the strategy is to unfold the semantic dimensions of 'digital transition' discourse. The data support empirically informed conceptual reasoning.

Transition thinking and innovation directionality

The notion of a 'digital transition' forms part of the broader rise of transition thinking as a knowing of governance. After describing its main principles (section 'Transitions thinking, a systemic 'knowing of governance''), it is discussed how transition thinking often betrays innovation directionality (section 'Transitions thinking: directionality betrayed?'). It can also articulate it, however, through the basic distinction between 'purposive' and 'emergent' transitions (section 'Directionality acknowledged: emergent/purposive transition').

Transition thinking, a systemic 'knowing of governance'

Various concepts have been developed to make sense of digital technologies and their societal implications. Next to common notions such as 'digital economy' and 'digitalization', 'digital *transition*' is a prominent notion as well (Andersen et al. 2021). It derives from sustainability transitions discourse, a 'knowing of governance' that has gained currency as a systemic understanding of environmental governance.

Voß (2014) describes how transition thinking, and especially the governance model of 'transition management', has gained ground as a knowing of governance with epistemic as well as political authority. Its key selling point has arguably been the promise of 'breeding an alternative sociotechnical system that can replace the incumbent one' Voß (2014, 318). It presents a model of experimental, exploratory governance: Structural changes in societal systems (mobility; energy; agriculture) can be governed through the modulation, i.e. the selective support, of ongoing innovation processes. 'Transition' governance is long-term oriented governance, influencing the co-evolution between innovations in technologies, institutions, practices and infrastructures (Grin, Rotmans, and Schot 2010). This idea of guided co-evolution is captured most evocatively through the Multi-Level Perspective (MLP) on transitions (Geels 2005) and the associated projections of transition 'pathways'. Another persuasive concept is the transition S-curve, distinguishing transition phases of pre-development, take-off, acceleration and stabilization (Rotmans 2005).

Transition thinking is a particularly hopeful knowing of governance. As elaborated under the header of strategic niche management (Kemp, Schot, and Hoogma 1998), it provides practice-tested guidelines on the development of radical alternatives. Empowered through collective learning, embedding in actor networks and management of user expectations, such 'niche' innovations can eventually win the uphill struggle against unsustainable socio-technical 'regime' structures and incumbent actors.

Transition thinking is appreciative of the little steps forward. Envisioning societal transformation as a process of co-evolving innovations, it underlines the transformative potentials of even apparently marginal innovations: They could turn out as the proverbial butterflies unleashing tornadoes (Pel and Achten 2022).

Transition thinking has introduced a systemic understanding of governance issues. Importantly, it has been endorsed as a theoretical description of governance and as proposals for actual governance. Gaining validity across the science-policy divide, it has become an influential knowing of governance (Voß 2014, 322). Discussing the ever-increasing receptiveness of policy makers, Turnheim et al. (2020, 116) indicate how the typical 'need to transform core societal systems is increasingly acknowledged in the language and logic of strategic policy documents'. Aykut et al. (2022, 521) similarly point out the rise of 'the grand narrative of an ongoing 'planetary transition' to a decarbonized world economy, which is crafted and circulated by key governance actors'.

Transition thinking: directionality betrayed?

Transition thinking epitomizes current beliefs in resolving societal challenges through innovation strategies. Describing its particular allure, Smith, Voß, and Grin (2010) identified the following paradox as its working substance: While representing current governance issues as complex and deep-rooted societal challenges, it also renders them tractable. Transition thinking amounts to a form of 'incantatory governance', in which ritualized symbolic performances and narratives of 'transition' are key instruments (Aykut, Morena, and Foyer 2022, 521). Similar to the notion of the circular economy, it operates as an empowering 'policy fiction' – even if it may be not attainable, it does manage to mobilize and guide political actors (Kovacic, Strand, and Völker 2019). Having made its mark in areas such as mobility, energy, food, circular economy and water management, this persuasive knowing of governance also asserts itself for other somehow 'systemic' governance issues – such as digitalization-related transformation processes.

The 'transitions' framing is not innocent, however. It is indeed a form of 'incantatory governance' (Aykut, Morena, and Foyer 2022): Uplifting, but also enchanting and potentially bewitching. It has invited uncritical infatuation (Shove and Walker 2007). Turnheim, Asquith, and Geels (2020, 119) warn that it, similar to the political uptake of the 'innovation systems' concept, could end up in simplistic, 'scoreboard'-based governance. Various troubles on the science-policy interface have been reported already. Transition thinking has proven vulnerable to political capture (Meadowcroft 2009), for example. Smith, Voß, and Grin (2010) rightly criticized its overly schematic representation of societal transformation processes, and Kenis, Bono, and Mathijs (2016) showed the technocratic, 'post-political' temptations of transition practice.

The most incisive critiques revolve around the negligence of innovation directionality. As Stirling (2011) pointed out, transition thinking is rooted in evolutionary economics and complex adaptive systems ideas: Transitions are processes of co-evolving innovations (Cf. section 'Transitions thinking, a systemic 'knowing of governance''). By implication, innovation trajectories can take various courses, and there is a diversity of possible transition 'pathways'. These are often misrepresented as linear, controllable 'racetracks', however. Equally problematic are the common simplifications of transition governance as mere challenges of 'upscaling', of surmounting 'barriers to innovation' or

of 'accelerating the transition': All of these framings wrongly assume known, normatively unambiguous and as such incontestable transition end points.

Directionality is often downplayed, not only in transition practice but also in transition scholarship. Its crucial importance has been articulated through philosophical reflections on the purposes and ethical rationales of transition (Bening, Blum, and Schmidt 2015; Schlaile et al. 2017; Ziegler 2020), through innovation-theoretical analyses on the dynamic (Blok 2021) and opaque (Kemp and van Lente 2024) character of innovation processes, through system modeling explorations of evolutionary 'branching points' (Papachristos 2011; Foxon 2013) and through governance analyses of innovation in institutionally fragmented contexts (Pel, Raven, and van Est 2020).

Directionality remains difficult to handle. Even if starting from such critical awareness, struggles for emancipation and transformative change often remain stuck into control-oriented mind-sets (Stirling 2016; 2019). Notwithstanding the popularization of its complex systems outlook, it still tends to be enacted through managerial dispositions toward 'upscaling', overcoming of 'barriers' and the development of 'roadmaps'. So while transition practice appears to become more directionality conscious through the consideration of 'exnovation' and phase-out strategies (Ziegler 2023), it also remains difficult to shake off the obsessions with control and direction: Stirling (2024) unfolds how transition directionality keeps being betrayed through common categories such as 'advancing', 'diffusion', 'early movers', 'catching up', 'latecomers', 'forging ahead', 'leapfrogging' and 'falling behind'.

Directionality acknowledged: emergent/purposive transition

Through assumptions of comprehensive understanding, unambiguous goals, and capacities to steer innovation processes in certain directions, transition thinking easily downplays the directionality involved. Forgetting about the myopia of change agents in complex innovation processes (Kemp and van Lente 2024), it easily turns into an *un*-knowing of governance.

Such dismissal would be premature. Directionality may have gone lost in many translations, and transition governance 'in the wild' may display the managerial vocabulary that pervades political life, but the betrayal of directionality is not at all inherent to transition thinking. In fact, a key transitions-theoretical tenet is that transitions are partly purposive, partly emergent processes (Rotmans 2005; Smith, Stirling, and Berkhout 2005). Especially this dual, rather paradoxical representation of governance processes makes it a very directionality-conscious governance concept.

Coming up in the 1990s, transition thinking started from insights into the limits to steering in polycentric governance contexts (Leydesdorff 1997; Luhmann and Heidbrink 2004; Mayntz and Scharpf 1995). These network governance insights foreground the irony of trying to steer co-evolutionary processes, whilst one knows these to be beyond control (Rip 2006). Early formulations conceived of transition governance as reflexive governance, cautiously responding to the shifting states of the systems to be transformed. Other than the 'steering' or 'accelerating' of transitions that became common expressions later, the key verbs were 'influencing', 'guiding' and 'modulating' (Kemp, Loorbach, and Rotmans 2007). Despite its unfortunate labeling as 'management', transition management was developed as a diversity-embracing cycle of problem

definition, network development, learning from experiments and reflexive monitoring (Loorbach 2007).

These ideas from network governance have been radicalized through complexity theory. The associated ideas about mechanisms and leverage points in complex systems may have informed certain over-confident knowings of governance (Smith, Voß, and Grin 2010; Stirling 2016), yet they have equally inspired quite modest steering philosophies. Walker and Shove (2007) stressed the implications of fundamental ambivalence and uncertainty, for example, while Teisman, van Buuren, and Gerrits (2009) emphasized the practical need for flexible, adaptive modes of coordination between governance actors. Transition thinking also contains this awareness of irreducible complexity, and of co-evolution processes that can only be influenced or 'modulated' (Kemp, Loorbach, and Rotmans 2007).

As mentioned earlier, transition thinking can be considered a 'third way' in governance thinking. It respects the Hayekian admonition that complex systems cannot be fully known or controlled, yet it also retains a dissatisfaction with laissez-faire. This 'third way' position is most apparent in Rotmans (2005, 4), in his inaugural lecture entitled 'Societal innovation: Between dream and reality lies complexity':

> There are no easy, off-the-shelf solutions for persistent societal problems, because these are caused by fundamental flaws in our societal systems. Such systemic errors demand radical changes in our thinking and actions, i.e. transitions and system innovations. Transitions require a long period (one to two generations), and take time, patience, money, confidence, but also courage, daring and perseverance to gain the upper hand over various types of resistance.

The belief in directed transitions resides in the observation that multiple innovations and changes in technologies, institutions, social practices and infrastructures can be purposively reinforced to induce structural transformations in societal systems. Meanwhile, it is also acknowledged that these 'cascades of innovations' gain their direction through rather unpredictable system feedback: Transitions are emergent outcomes of those. Classifying a range of historical and contemporary transitions, Figure 1 highlights this dual purposive/emergent character of transitions:

At the core of the typology lies the distinction between 'targeted' (purposive) and 'emergent' transitions. Importantly, it is not proposed as an absolute dichotomy: The 'biomass', 'mobility', and 'demography' transitions are sketched as parts of a continuum. Other than classifying particular transition processes as either emergent or purposive, the typology mainly serves to highlight the similarities between past and present transformation processes. Meanwhile, the figure does indicate that transition processes do come with different governance challenges. Rotmans (2005, 16) distinguishes between ' … emergent, hardly coordinated and highly aggregated transitions, such as the internet revolution', and 'teleological, highly coordinated and slightly aggregated transitions, such as the transition from coal to gas'.

The typology clarifies the paradoxical nature of the 'digital transition' concept. It seems to cover a rather wide spectrum of markedly different governance situations: In 2005, Rotmans associated the 'ICT revolution' or 'internet boom' with quasi-spontaneous demographic transitions (shifts toward low fertility and mortality rates) and economic–cultural shifts, more than with planned energy transition policies. 19 years
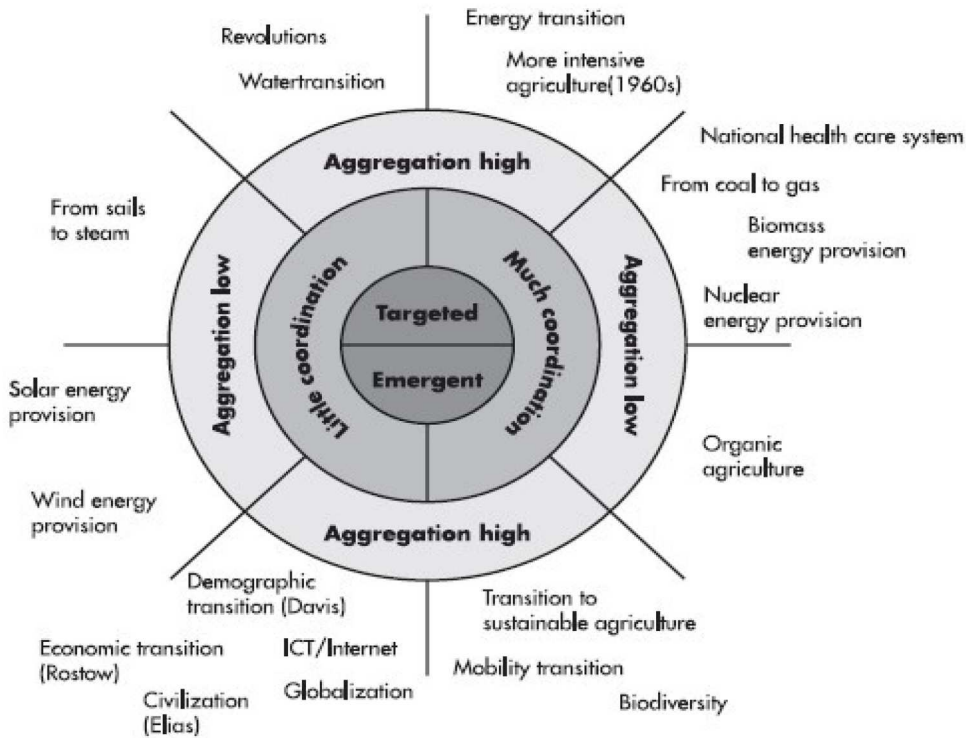
Figure 1. Typology of transitions (Rotmans 2005, 16).

later, he might reclassify, however, and consider the new stage that the transition has evolved. In light of the emergent dynamics of 'surveillance capitalism' structures (Zuboff 2020), he might consider the governance challenges similar to those of 'globalization'. However, he might also consider how governments and industrial-societal alliances launched visions of purposive transition: After the vision of 'Industry 4.0' as the fourth industrial revolution (2011), the European Commission presented its 'Industry 5.0' vision in 2021. The latter may be considered a more ethically motivated, sustainability and justice-driven understanding of digital transition (Coelho et al. 2023), and it may indicate a more 'human-centric' rather than technology-focused view (Xu et al. 2021). Yet whatever the desirability of the projected futures, the very existence of this ethical-political turn is telling: Anno 2023, various societal actors have come to see 'digital transition' in 'purposive transition' terms.

Analysis

The 'digital transition' notion is an application of transition thinking to digitalization issues. Discussing a literature search on the nexus between transition, sustainability and digitalization, Mouthaan et al. (2023) identify 'digitalization' as the more generic term (see also Andersen et al. (2021)). Referring to the increased ICT capacity to generate, process, synthesize and operationalize large quantities of data at a high speed runs from the earlier 'internet/ICT revolution' of Rotmans (2005) to the currently fast-

accelerating development of self-learning machines. 'Digital transition' is thus a knowing of governance covering various empirical phenomena: Intelligent transportation systems, smart grids, the platform economy, precision farming, E-governance, environmental management, or the shift toward a data-driven sports industry.

The analysis of 'digital transition' discourse will first describe the representations of it as a 'purposive' transition (section ''Digital transition' as purposive transition'), and then the contrasting representations as an 'emergent' transition (section ''Digital transition' as emergent transition'). Figure 2 visualizes this as a continuum, rather than as an absolute dichotomy. Similar to the Rotmans (2005) typology it differentiates the main 'purposive'/ 'emergent' distinction through further questions. Approached as a knowing of governance, 'digital transition' discourse will be unpacked along key assumptions about the governance challenges at issue: Assumed similarities to other transition processes, assessments of the scope of the transition, active or reactive strategic orientations, ideas about control and knowledge of the transition, optimistic or pessimistic outlooks, or emphases on particular transition dynamics.

'Digital transition' as a purposive transition

Digital *transition* can be distinguished from framings such as 'digital revolution', 'digitalization', 'digital economy' or 'digital capitalism' (Fuchs 2024). Sugiyama et al. (2017, 11) consider 'digital transition' an attractive framing. It approaches digitalization issues in line with ideas on energy transition and transition management: Targeted to a specific domain, referring to strongly coordinated political efforts and emphasizing the scope for intervention in transition processes. Through these associations, 'digital transition' often comes forward as a rather confident knowing of governance. Evoking images of directed transitions, digitalization is represented in terms of targeted interventions,
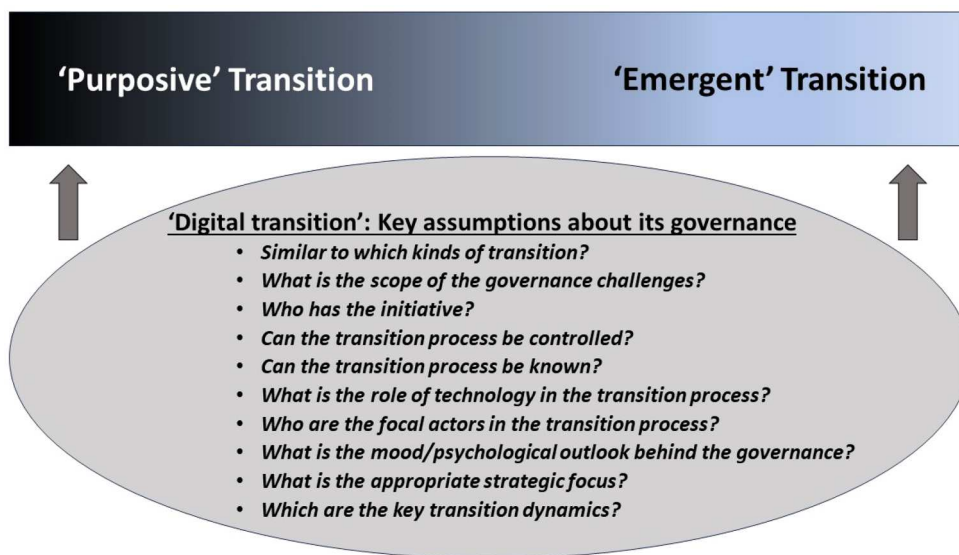
Figure 2. 'Purposive' and 'Emergent' Transition – key assumptions about its governance.

digital tools and policy instruments – as processes actively directed by pioneers, start-ups and the leading companies in the fourth digital revolution. Exemplars of this purposive transition imaginary are the SMEs seizing the possibilities of E-commerce (Laloux 2020), the digital cooperatives (Fortuny-Sicart and Pansera, 2024), the open source movement (Jain et al. 2023), and the governmental efforts to guide society toward a more efficient and/or humane industry 4.0 (Xu et al. 2021). In these examples, 'digital transition' appears similar to purposive political projects envisioning energy, mobility transition or agriculture transitions.

The idea of purposive 'digital transition' also speaks from action-oriented expressions. As Rosário and Carmo Dias (2022, 1) indicate, there is a widespread search for 'effective management of the digital transition that achieves sustainability goals'. Seeking to 'seize the opportunity of digital transition to solve sustainability problems' (Rosário and Carmo Dias 2022, 2), they consider it accordingly relevant to 'demonstrate the potential contributions of the digital transition to environmental, economic, and social sustainability aspects' (Rosário and Carmo Dias 2022, 1). These typical active verbs of *managing*, *achieving* and *seizing* opportunities reflect a mind-set of action: The 'digital transition' is something that one initiates, engages in, strives for. It is something that one *does*. Telling examples are the newspaper reports on digital competence centers and internship positions (July 2022), digital campuses (Padoan 2022), and on the budgetary prioritization of digital agendas in the post-COVID19 plans for economic recovery (De Muelenaere 2021). Particularly illustrative for the active, initiative-taking understanding of the digital transition is the economic development plan in the Belgian region of Wallonia: 'Marshall 4.0' (Deffet 2015).

The 'purposive transition' understanding of 'digital transition' does not speak only from the active verbs used. It only resides in the expressions of somehow *targeted* changes – despite the multi-purpose character of many digital technologies (Sugiyama et al. 2017). An insightful example is the policy concept of the 'twin' green/digital transition. In principle this is a generic concept, indicating efforts to mobilize the digital transition for sustainability objectives. Yet as elaborated by Münch et al. (2022), the 'twin' transition is an umbrella term. It refers to a range of specific technologies and innovations, applied in particular economic sectors. The various 'industry 4.0' and 'industry 5.0' roadmaps (George and Hovan George 2023) are similarly envisioning targeted transition processes in particular industries. Presented as a more human-centric and empowering paradigm than the '4.0' predecessor (Coelho et al. 2023; Xu et al. 2021), the '5.0' notion radicalizes the point: The digital transition should be made *truly* purposive. The ideas of sectoral, targeted 'digital transition' processes appear to be widespread knowings of governance. This speaks from common newspaper accounts of sector-specific and/or region-specific digital transition: Efforts to boost the regional digital economy, to become 'the new Copenhagen' (Scharès 2019) through digital social innovation, and to stimulate sectors into 'going digital'. Other examples are the governmental calls for digital *projects* (Le Soir 2019) and the associated digitalization awards (Bodeux 2019) to incite and distinguish the most promising ones. The fascination with project-based activities reflects an imaginary of targeted, purposive transitioning.

The understanding of a purposive 'digital transition' process speaks not only from literal statements of purposes. 'Purposive transition' understandings are also expressed through references to intended, planned, desirable consequences – and through

assumptions of known, controllable and 'legible' (Scott 1998) transition processes. A prominent example is precision agriculture. Whether taking place through rationalizing and alienating digital farming or through the embodied knowledge of 'cyborg farmers' (van der Velden et al. 2023), 'purposive transition' accounts often describe digitalization in terms of precision and fine-tuning. Declaring her 'technologically-optimist attitude' toward digital transition, European Commission president Von der Leyen invoked the symbolically even more powerful example of precision surgery (von der Leyen 2020).

'Purposive transition' assumptions also speak from the frequent discussions of traceability (Laloux 2022a). It is a striking example of purposive, functionalist framings. Coupled closely with governance principles of transparency and accountability, this technological functionality has almost become a governance principle itself. Understanding 'digital transition' in terms of increased control, it is only natural to conceptualize its governance in terms of digital technologies. As Stirling (2024) substantiates extensively, contemporary knowings of governance are indeed pervaded with mechanistic metaphors such as 'roadmaps' and 'dashboards'. 'Digital transition' discourse – 'purposive transition' variations of it, at least – is taking this much further. The digital metaphors become 'hard-wired' into governance: One can think of the common metaphors of 'system updates', '2.0 versions' and 'synchronization challenges', or the reliance on Hackathons as governance instruments (De Vogelaere 2019b).

Assumptions of purposive transition are embodied particularly strongly in notions of digital *instruments*. This echoes the analysis of Lascoumes and Le Galès (2007) and Le Galès (2011): It has become common-sense in political life to understand technological devices and policy instruments as means toward ends. Examples are newspaper articles on digitalization toward effective policing (Le Soir 2015a), or to help promote francophone literature in libraries (Le Soir 2015b). Instrumental understandings overlook how the purposes and effects of 'tools' tend to emerge only out of their negotiated applications in specific contexts. The instrumentalizing mind-set remains quite intuitive, however. In 'digital transition' discourse, technological devices are often elevated into 'instruments'. Familiar examples are the accounts of Open Data arrangements and of instruments toward the 'smart city' or democratization (Bialas 2020). More generally, the 'purposive digital transition' discourses show a strong affinity with E-governance. The 'instrument' framing is also very prominent through discussions on the robotization of work. Alongside the issues of automatization and possible replacement of jobs, this also calls attention to the possible empowerment of impaired people – fulfilling their jobs through the aid of digital instruments (Colinet 2019). Importantly, these instrumental assumptions are shared across 'incumbent' and critical voices. As discussed by Deron and McDonald (2022), the digital industry tends to ward off critical questions through claims of 'instrument neutrality'. Critical voices often contest this alleged neutrality, but not the idea of instrumentality: Pointing out that the digital transition should not be mistaken for an end in itself, an open letter of critical academics insisted that digital instruments should be deployed to further societal goals (Le Soir 2021).

The infatuation with digital instruments is connected strongly with optimistic, utopian mind-sets. The 'purposive transition' framing also speaks from strategical dispositions toward the acceleration of transition processes. As elaborated in Stirling (2016) and discussed in various empirical studies on transitions directionality, this 'race-track' understanding enters contemporary knowings of governance through various

pervasive metaphors. Prominent examples are the newspaper headlines on the 'traditional' construction sector in which workers are struggling to 'catch up' with the digital transition (Leonardi 2021), the school children 'falling behind' in the acquisition of digital skills (Hutin 2022), or the alarming numbers of citizens finding themselves 'in the digital galleys' (Laloux 2022c). Other examples are the calls 'not to miss the train' of the increasingly informatics-oriented curricula in other European countries (Le Soir 2018), or of the roll-out of 5G communication networks (Deffet 2018). These metaphors project end states, finish lines and benchmarks as if they were naturally given. Especially the ideas of progressive automation futures are widespread: One can think of the ascending automation levels projected in intelligent transportation systems (Pel, Raven, and van Est 2020), or the wider tendency to assume steadily increasing automation (Smith and Fressoli 2021). An article on the digital education program in the Walloon region expressed the digital 'racetrack' clearly: '4.0 is now!' (Demianoff 2019)

A last striking characteristic of 'purposive transition' discourse is the sustained emphasis on *innovation* activities. The minister for digital transition in the Brussels region summarized her mandate as 'using technology to improve Brussels' citizens' lives' (Le Soir 2016). A similar focus on innovation activities speaks from Dannenberg et al. (2020), describing the rise of on-line grocery retail in the context of the COVID-19 pandemic. In this 'digital transition' narrative, the pandemic featured as the typical 'landscape' development – opening a window of opportunity for this digital 'niche' innovation. These narratives on digital innovation reflect the broader ideological structures of an innovation society, in which innovating is the default way to make sense of a changing society (Godin and Vinck 2017). The idea of a 'digital transition' stages digitalization similarly as a heroic struggle between transformation-seeking innovators and system-reproducing 'incumbents'. Instructive analyses along this line are the Geels et al. (2012) book on mobility transitions and the analysis of Røpke (2012) on the directionality of the broadband internet transition. Highlighting novelty and heroic efforts toward change-making, innovation narratives are an attractive media format. The idea of a purposive 'digital transition' is easily conveyed through reports on innovators and incubators in exciting technologies such as drones (De Vogelaere 2019a), and on local enterprises seeking to 'claim their piece of the cake' (Fabes 2016).

However, compelling and intuitive, these innovation narratives do provide a rather agentic, purposive reading of the digital transition, however. In so doing, they downplay the relevance of structural developments, the changing digital 'landscape'. By contrast, the relevance of the latter is underlined in the narratives of *emergent* 'digital transition'. Remarkably, digitalization is also often spoken about as a set of 'developments', i.e. as a transition that just *happens*.

'Digital transition' as an emergent transition

It may be an intuitive idea to consider the 'digital transition' as something that one *does*. However, on many accounts, 'digital transition' appears to be rather something that one is confronted with. It can be understood as a somewhat uncontrollable collective outcome of multiple self-organizing actors: 'Big Tech' companies, and the start-ups, the regulators, the consumers, the professionals that adopt and promote digital tools, the initiators of digital innovation ecosystems and digital platforms – or indeed the

digital 'actants' whose agency is highlighted in Castells' (1996) account of the 'network society' and the more recent diagnosis of 'surveillance capitalism' (Zuboff 2020).

Fuchs (2024) militates against the latter accounts as they de-emphasize the purposive aspects of what he calls 'digital capitalism': Acts of exploitation, accumulation, extraction and 'digital violence'. The 'emergent transition' understanding does not deny purposive agency. It rather highlights how the digital transition is shaped by a multitude of actors, each appropriating and shaping the digital technologies and their affordances along their logics, interests and purposes. Each of these actors may indeed pursue certain visions of a purposive 'digital transition'. Yet the overall result may be perceived as a quite chaotic process of emergent transition. Luhmann and Heidbrink (2004) spoke prophetic words about the 'digital tools' that are currently being deployed for sustainability purposes: The digital tools may sensitize and empower actors in state, market and science systems, yet as hyper-communicative devices they also create sense-making and decision-making patterns that are increasingly difficult to oversee and control.

It is striking how often 'digital transition' is actually associated with spontaneous, quasi-autonomous and uncontrollable processes. In line with Figure 1, it is often associated with developments such as globalization processes, demographic transitions, or broad sociological shifts. A hyperbolic example is the image of a 'technological tsunami' (Le Soir 2015c), but the digital transition is depicted quite commonly as a 'development', a 'wave', or a structural 'trend' that poses challenges for economic sectors and societal domains. This corresponds with the 'deep transitions' analyses that theorize the digital transition as rather dispersed and emergent processes, occurring transversally across societal sectors. The shifts in industrial mass production are an example (Kanger and Sillak 2020). Schot and Kanger (2018) and Kanger and Schot (2019) also discuss a deep *digital* transition, understood as a fundamental shift in the techno-economic paradigm with wide systemic repercussions. Described as a paradigm shift, the purposive elements of the transition are downplayed. Focusing on the automobility system, Geels et al. (2012) also analyze the ICT revolution as a broad 'landscape' development. This frames the matter not as innovation, but rather as an innovation *context*.

These notions of 'developments', 'waves' or 'trends' do not necessarily form part of governance analyses. Newspaper coverage usefully reminds us that digitalization issues are also being discussed in economic-financial analyses, in sociological reflections on societal trends, in lifestyle sections, and in reviews of technological 'gadgets'. Yet wherever it appears, this language of 'developments' does express certain knowings of governance. Framing the digital transition in terms of rather extensive, somewhat boundless developments, it becomes less natural to consider it as an object of governance. The widely used 'transversal' (Casavecchia 2021) adjective is a noteworthy in-between form. Indicating the sector-transcendent nature of the digital transition, it expresses the elusiveness of the development. On the other hand, it is a typical administrative term. Hinting at interdepartmental action and joined-up governance, it restores the idea of digital transition as something governable.

Conceiving of it as a rather elusive 'non-object of governance', the 'emergent digital transition' discourse lacks the 'purposive' verbs of 'initiating', 'seizing' and 'initiating'. Very typical is the coverage of the AI week, organized by 'AI4Belgium': The event was to help the public to 'deal with' and 'confront' the ongoing transition (Casavecchia

2021). Digital transition discourse – perhaps all the more so in a relatively small country such as Belgium – contains many of these rather reactive framings: How to accommodate the datacenters? (Casavecchia 2022) Where to find the requisite numbers of technology-teachers? (Casavecchia 2022) How to 'program' the youth against the risks of future unemployment? (Leprince 2015) The transition is cast as something to *respond to*.

Related to this reactive strategic orientation is the focus on the unintended consequences involved – the silent disappearance of bank offices in the neighborhood for example (BELGA 2015). Likewise, in contrast with the overviews of sustainability potentials (Rosário and Dias 2022), Sugiyama et al. (2017) discuss 'digital transition' as a wide array of unintended consequences. Importantly, such narratives do not deny that digital instruments are developed, used and adapted by purposive actors. They underline that we are dealing with general-purpose technologies: Jumping between application contexts (Sugiyama et al. 2017, 1), and linking up with other technologies easily, the resulting interconnected technological systems comes with unforeseeable risks (Sugiyama et al. 2017, 8). This attention to unintended, emergent consequences has become an integral part of 'digital transition' discourse. This speaks from the reflections on rampant Artificial Intelligence (Laloux 2022b), the escalating material-energetic 'digital footprint' (Pitron 2022), and the emergence of disruptive economic activities such as those of Uber (Vassart 2015). Furthermore, 'unintended consequences' discourses tend to highlight uncertainty. They typically avoid the projections of distant digital futures that pervade 'purposive transition' discourse.

The 'purposive digital transition' mind-set revolves around beliefs in digital 'instruments' (section "Digital transition' as purposive transition'). Accompanied by various common-sense notions of 'users', 'functions' and technical specifics, alternative representations are difficult to conceive. The discourse on digital *impacts* is gaining ground however: Striking manifestations are the newspaper reports about the so-called 'digital divide' (Lulling et al 2021) and the associated vulnerability (Colinet 2021) of social groups. Another noteworthy example is the notion of digital sovereignty. As indicated by Couture and Toupin (2019), political actors typically invoke it to challenge a digital transition dominated by hegemonic actors and ideologies. It serves to defend against the undesirable impacts and domination effects of what is sometimes diagnosed as 'digital capitalism' (Fuchs 2024). The 'impact' oriented discourses challenge prevailing knowings of governance.

The discursive shift from technological 'instruments' to 'impacts' is closely connected to another one: Rather than focusing on the so-called transition 'frontrunners', transition processes can be recast into stories of 'laggards', followers, and late adopters (Godin and Vinck 2017). Telling are the newspaper reports on school students 'falling behind' in the use of digital tools (Hutin 2022), or on regions, industries or municipalities that are seeking to 'catch up'. This may still coincide with the 'racetrack' understandings of transition processes that dominate narratives of directed, purposive transition (Stirling 2024). Still, when taking tail-enders or the 'peloton' as the focal actors, the transition trajectory is depicted a bit differently: Questions come up regarding the fate of those dropping out, regarding the bearable tempo of the transition, and indeed regarding the course that the transition is taking.

'Purposive' digital transition discourse is pervaded with a strategic disposition toward acceleration and upscaling. The 'updating towards 4.0' is a key notion in this sense-

making process. Interestingly, 'emergent' digital transition discourse contains immediate discursive counterparts: The metaphors of 'switching off', 'unplugging' and 'disconnecting' are equally intuitive. There is a remarkable proliferation of neologisms such as the 'digital vacation' and the associated psychological needs of individuals to 'disconnect' – from social media, from computers, from communications, or from societal pressures (Burgraff 2022). Alongside cultural movements of 'digital sobriety', one can also consider the administrative impulses to disconnect, to interrupt, to control, to compartmentalize, and to create dedicated rather than unfettered flows of data. Unsurprisingly for a Belgian newspaper, 'le Soir' follows the proceedings of the European Commission closely – including its efforts to regulate (Le Soir 2017), tax (Laloux 2019) and contain an otherwise too disruptive 'digital transition'.

'Digital transition' discourse also displays the typical disposition toward 'redirecting', 'modulating' and 'channeling', the key transition verbs according to reflexive governance scholarship (Pel, Raven, and van Est 2020; Rip 2006; Walker and Shove 2007). Telling examples are the calls for 'redirection' (D4S 2022) and 'slowing down' (Future of Life 2023) of a quasi- autonomous transition process. These strategic outlooks of 'redirection' appear to have become integral parts of the 'digital transition' imaginary. This also speaks from the discussions of a social turn (Regnier 2021) in it, from the calls for a more intensive and ethically conscious engagement with the ongoing process (Lacroix 2018), and from efforts to reduce the gender disparity that has emerged in the digital sector (Bersipont 2017). These ambitions toward redirection are of course quite similar to the purposive quests for 'industry 5.0' or otherwise more emancipating 'digital transition' processes (Cf. section "Digital transition' as purposive transition'). They are slightly different knowings of governance however: Rather than attempting to steer, they are efforts to somehow 'navigate' a largely spontaneously developing transition process.

Synthesis and conclusion

Teasing out the main observations on 'digital transition' discourse, this section answers the key question regarding this paradoxical knowing of governance: Does it obscure directionality, or disclose it? (section 'Synthesis'). The paper concludes with a consideration of limitations and wider implications (section 'Concluding reflections').

Synthesis

The empirical analysis has disclosed an expanding web of digitalization-related concepts. Importantly, the 'digital tools', 'digital start-ups', 'digital divide', 'digital skills', 'digital sovereignty', 'digital economy' and 'digital capitalism' are not mere descriptions of digitalization developments. Approaching the 'digital transition' (or 'transition numérique') as a knowing of governance, the analysis investigated the associated assumptions about governance issues.

The critical discourse analysis approach has unfolded 'digital transition' as a variegated knowing of governance. It comprises a paradoxical mixture of 'purposive transition' and 'emergent transition' understandings. As summarized in Table 1, this basic distinction is connected with a range of further distinctions – between active and reactive strategic orientations, between utopian and dystopian psychological outlooks, between

Table 1. Knowings of governance: purposive/emergent understandings of 'digital transition'.

	Purposive transition	Emergent transition
Transitions compared with	Energy transition	Globalization
Scope	Targeted	Dispersed
Initiative	Action	Reaction
Control	Intended consequences	Unintended consequences
Knowledge of process	Prediction & projection	Uncertainty
Role of technology	Instruments	Generation of impacts
Focal actors	Initiators & frontrunners	Followers and laggards
Mood/psychological outlook	Optimism/utopianism	Pessimism/dystopianism
Strategic focus	Acceleration	Redirection
Focal transition dynamics	Niche and regime innovations	Landscape developments

understandings in terms of instruments or impacts, and between intended and unintended consequences. Also noteworthy are the either targeted or dispersed understandings of the digital 'objects of governance'.

Summarizing distinctions on various discursive dimensions, the overview table helps to answer the research questions: *Does the 'digital transition' amount to a 'syntax error'? Does the somewhat contradictory concept obscure innovation directionality, or does it inform directionality-conscious knowings of governance?*

Regarding the first question, the answer is largely affirmative. The analysis has substantiated the suspicions of 'syntax error' through a range of contradictions. Striking inconsistencies are the simultaneous reference to doing and reacting, to innovations and developments, and to projected futures and deep uncertainties. These make for a highly confusing representation of steering capacity. Another remarkable twist in the 'digital transition' discourse is the alternating reference to instruments and to impacts. This yields rather inconsistent representations of the role of technology. Where the accounts of digital 'instruments' appear to overstate our control over them, the narratives of 'impacts' rather show the inverse picture of quasi-autonomous digital technologies. The idea of a digital 'transition' also starts to lose its strategic value when it refers simultaneously to 'landscape developments', to 'regime reproduction' and to radical 'niche' innovations. 'Digital transition' also amounts to 'syntax error' as far as it simultaneously suggests a resemblance to strongly planned, coordinated, political projects (e.g. the energy transition) and to quasi-spontaneous processes of globalization or cultural shifts. The notion of the 'twin' green/digital transition adds a next layer to this governing confusion. Last but not least there is the disorienting shifting of scope and focus: Represented sometimes as projects, targeted changes and precision management, the 'digital transition' is described on other occasions as widely dispersed 'developments' that as such elude control. Treating digitalization processes at once as objects and as non-objects of governance, 'digital transition' does amount to 'syntax error'.

Logical-analytical consistency is not the decisive criterion, however. 'Digital transition' has, just as transitions thinking more generally, certain 'incantatory' (Aykut, Morena, and Foyer 2022) functions of sense-making, problem structuring and political mobilization. A more important matter is whether this knowing of governance is disclosing or obscuring the directionality involved.

At first sight, it seems to obscure it. The analysis substantiates further how narratives on automated futures tend to assume predetermined trajectories (Smith and Fressoli 2021). It has shown many ideological representations of digitalization processes. The

'purposive digital transition' discourse generates particularly powerful innovation 'race-track' imaginaries: The 'industry 4.0' concept is but one example of a much broader imaginary of consecutive and forced 'updates' – of machines and also of the 'workers of the future' (Salles 2022). 'Digital transition' discourse appears to add a digital layer to an already directionality-suppressing and control-oriented ideology. Its governance challenges are often formatted in terms of 'frontrunners', 'incubators', 'startups', 'seizing opportunities', 'missing the train' and 'catching up'. When framing digitalization issues as 'digital transition', these notions of upscaling and progressive innovation phases keep asserting themselves. This obscures the directionality involved, and it feeds into the wider problem raised by Stirling (2024): The obsession with the direction of innovation processes. A knowing of governance is created in which purposive innovators and innovative solutions are center stages – neglecting unintended consequences, and downplaying the choices in the still-emerging transformation process.

Having traced the 'digital transition' discourse along its many references and connotations, a more nuanced picture arises. It is not just an ideological discourse that eclipses the directionality altogether. To begin with, it exhibits a different knowing of governance than the rather managerial ones surrounding 'energy transition' and 'mobility transition'. It is in fact pervaded with an acute awareness of the limitations of instrumentalist understandings. This speaks from the proliferation of alternative framings, counterhegemonic understandings and neologisms such as 'digital vacation', 'digital divide', and 'digital sovereignty'. Very revelatory are also the different kinds of verbs used. Alongside the typical accounts of 'initiating', 'managing' and 'accelerating' 'the' transition, there are also the frequent expressions of attempts to 'influence', 'reset', and mitigate. There is quite a clear sense in the 'digital transition' discourse that it is *not* a racetrack – and that it should be prevented from becoming one. Also telling are the media commentaries on the political backstage of politicians feeling pressured to uphold 'racetrack' discourses, to engage in the race, to unfold 'digital agendas', to 'catch up', 'stay in synch' and 'get ahead of the field'. These reflexive comments underline how 'digital transition' is actually quite a directionality-conscious knowing of discourse: It accounts for the multitude of purposes involved, and for the multitude of digital futures that may emerge from those.

Concluding reflections

'Digital transition' discourse tends toward directionality-suppressing knowings of governance, but it also reflects the growing awareness in society that things are more complicated than that. Before considering wider implications, it is important to consider some limitations of this study. Developed as an empirically informed but largely conceptual exposition (Cf. section 'Methodology: a critical-explorative approach to paradox'), its main limitation resides indeed in the conceptual approach. Even if developed as a checkered continuum, the 'purposive/emergent transition' distinction has its limitations. The most glaring one is perhaps the normative void: Ruthless digital extractivism and emancipatory moves toward digital sovereignty are thrown together as different manifestations of 'purposive digital transition'. It could be useful to refine the basic distinction through normative considerations: *Transition for which purposes?* The 'digital capitalism' literature provides very relevant concepts for this (digital sovereignty, or digital

commons), well beyond the reductionist categories of dogmatic Marxism (Fuchs 2024). Meanwhile, Smith, Stirling, and Berkhout (2005) proposed a particularly useful distinction: The steering of transition processes can be considered for 'insider' or 'outsider' purposes.

Second, it would be worthwhile to expand the narrow empirical basis. An encouraging example of 'purposive digital transition' is the rise of 'digital humanities' research methods. Other than a preoccupation with 'bigger data', this is a matter of 'critical discourse methodology 2.0'. Apart from expanding it, the corpus of texts could also be developed with greater precision. The analysis of franco-Belgian 'transition numérique' could be complemented with other contextual analyses: For example, Sugiyama et al. (2017) point out how 'digital transition' and robotization are imagined fundamentally differently in Japan. Most of all, it is important to trace the circulation of knowings of governance beyond the traditional public sphere of newspapers: Political life is rapidly changing through the very rise of digital communication channels (Ezrahi 2004).

Regarding the wider implications for future research, a first advance resides arguably in the critical-explorative investigation of directionality. Rather than 'unmasking' contemporary knowings of governance as ideological, directionality-suppressing and misleading representations, the analysis has rather unfolded how they articulate certain contradictions. Tracing the discursive finesses underneath the basic 'purposive/emergent transition' distinction, the explorative approach has shown the nuances (Cf. Pel et al. 2023b) of digitalization – its gray zones of discipline, care and control (Sovacool, Furszyfer-Del Rio, and Martiskainen 2021), the layered nature of phenomena such as 'digital divide' (Lythreatis, Singh, and El-Kassar 2022) and digitally shaped 'worker autonomy' (Forney and Epiney 2022), and the confusing dual existence of digital devices as empowering instruments and surveillance infrastructures. Most of all, the critical-explorative approach acknowledges learning, i.e. the awareness of directionality that is developing all around us in society. The popular notion of the 'digital native' is but one example of it: Transitions are partly just happening to us, we are born into them.

A second implication resides in the practical heuristic value of the 'emergent/purposive transition' distinction. Admittedly, the analysis has shown it to be a fuzzy, continuous distinction (Cf. Figure 2). Yet as Mintzberg (1987) indicated already, the point is not only that strategy tends to contain a mixture of deliberate and emergent strategies. Beyond this factual observation, there is also the more controversial political reality of framing, staging and ideology: Governance actors and outside observers tend to represent these decision-making aspects in selective ways. The 'purposive/ emergent transition' distinction is of great importance for contemporary governance – especially when it is rendered invisible. Described through quasi-natural categories of digital 'instruments' or 'impacts', 'innovations' or 'developments', digitalization issues are silently formatted into governance issues – or indeed into non-issues, in light of the alleged 'instrument neutrality' of digital technologies (Deron and McDonald 2022). As discussed in section 'Transitions thinking and innovation directionality', 'transition' discourse is often complicit in this obscuring of assumptions, choices and directionality. Notions, such as 'twin' (green and digital) (Münch et al. 2022) and 'deep' transition (Schot and Kanger 2018), are rather vague about the socio-economic directionality (Kemp et al. 2022) and the governance issues at hand. Is the digital 'deep' transition to

be considered as an action plan, similar to the visions of industry 4.0 and 5.0 (Coelho et al. 2023; Xu et al. 2021)? Is it to be considered as a deep structural transformation to adapt to, cope with, or challenge? It is crucial to keep posing this key transitions-theoretical question (Rotmans 2005; Smith, Stirling, and Berkhout 2005): *In which ways are the governance challenges of the 'digital transition' similar to, and different from, those of energy, mobility, demography or other transition processes?*

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