The politics of directionality in innovation policy through the lens of policy process frameworks

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Abstract

'Directionality' in innovation policy is assumed to contribute to transformative change needed for urgent societal challenges. While directionality arguably lacks explicit conceptualization, the political and temporal nature of directionality suggests it can be viewed as a political process, in which diverse actors negotiate different directions. Through an integrative literature review of policy process literature, this paper discusses the politics of directionality by analyzing: *'who gives which direction, where, when, how, and why'*, using concepts from five policy process frameworks: Multiple Streams Framework (MSF), Punctuated Equilibrium Theory (PET), Policy Feedback Theory (PFT), Advocacy Coalition Framework (ACF) and the Narrative Policy Framework (NPF). We find that policy process frameworks provide relevant concepts to understand the political nature of policies and policymaking processes that are integral to directionality in innovation policy, such as *policy subsystems*, *belief systems* and *policy conflict*. Moreover, the study points to a relevant distinction between *giving direction* and *directionality*.

Key words: directionality, innovation, societal challenges, sustainability transitions, policy processes, politics

1. Introduction

Given the increasing urgency for policy to address societal challenges, transformative innovation policy and mission-oriented innovation policy approaches have advocated the notion of 'directionality' in the field of innovation policy (Diercks et al., 2019; Grillitsch et al., 2019; Lindner et al., 2016; Schot & Steinmueller, 2018; Weber & Rohracher, 2012). Despite its multiple use, the notion of directionality seems to lack an explicit definition and holds diverse meanings in different studies. Conceptualizations stemming primarily from research on sustainability transitions range from broad development of (interacting) transitions in a certain direction (Andersson et al., 2021; Schot & Kanger, 2018) and possible socio-technical pathways in transitions (Foxon et al., 2013; Pel et al., 2020; Rosenbloom, 2017; Rosenbloom et al., 2018, 2019; Stirling, 2008, 2011), the provision of normative directionality through particular visions of desirable futures (Kemp & Loorbach, 2006; Loorbach, 2010; Smith et al., 2005), the formulation of expectations and policies shaping the selection environment and 'guiding the search' in innovation systems (Bergek et al., 2008; Elzinga et al., 2023; Yap & Truffer, 2019), and specific innovation policies steering innovation in a particular, more sustainable direction (Diercks et al., 2019; Grillitsch et al., 2019; Laatsit et al., 2022; Schot & Steinmueller, 2018; Weber & Rohracher, 2012).

Our view on directionality departs from previous conceptualizations in the innovation policy and sustainability transition literature that have not yet engaged more deeply with the political character of the concept. The suggested interpretation of directionality points to co-existence of both a diversity of possible development trajectories and pathways in systemic transitions, as well as the materialization of certain specific directions in public policies. These policies are not to be seen as neutral, but as a negotiated outcome influenced by different actors in different positions of power, both in and beyond the public policy sphere (Durnova et al., 2016; Fischer & Forester, 1993; Fischer & Newig, 2016; Majone, 1989). As a consequence, a broad range of actors are affected by the resulting direction, and can win or lose depending on which direction prevails. We, therefore, consider any policy direction taken as the outcome of a *political decision-making process* and prioritization.

Understanding directionality in innovation policy benefits from highlighting the political nature of the concept and the application of a process-orientated view. The processes that define the diversity of possible futures and desirable pathways, and subsequent decision-making processes of prioritization and convergence, are inherently normative and political. Following this view, we understand directionality as "*a political process of negotiating a diversity of normative directions, with the subsequent materialization of direction in public policies, influencing the pathways of transitions over time.*"

A relevant starting point for studying directionality is a political view of policy and policymaking, in which the ontological distinction between politics and policy is challenged. Instead, policy processes and decision-making are seen as fundamentally political activities pursued through beliefs, sense-making, and argumentation (Durnova et al., 2016; Fischer & Forester, 1993; Majone,

1989). We argue that policy- and decision-making procedures have an inherently political character, which implies that innovation policy is, as any other policy domain, situated in spaces of broader political debate. Particularly those policy issues related to complex societal challenges can be politically contested, and policymaking around such issues rarely happens in a political vacuum (Wanzenböck et al., 2020).

Furthermore, the existing views of directionality highlight the relevance of a process-oriented and temporal perspective. Indeed, directionality and the policies that influence this process unfold over time. Policy dynamics interact with dynamics in transitions, resulting from processes of positive and negative feedback that govern socio-technical systems. Such systemic interactions lead to interchanging periods of openness to change in different directions, and later closing down and lock-in of more specific pathways (Edmondson et al., 2019; Foxon et al., 2013; Geels & Schot, 2007; Rosenbloom, 2017; Rosenbloom et al., 2018; Stirling, 2008; Wanzenböck et al., 2020). Within such broader change processes, policies also unfold and interact over time. Policy rationales, objectives and instruments will emerge due to changing institutional context, evolve and fade away (Howlett et al., 2009). Applied to innovation policy, the policy paradigms of traditional science and innovation policy, innovation systems policy and transformative and mission-oriented policies can be seen as undergoing both persistence and change in their evolution (Diercks et al., 2019; Ghazinoory et al., 2023; Schot & Steinmueller, 2018). For example, existing instruments may be difficult to deconstruct, while new kinds of incentives and forms of collaboration may simultaneously emerge from pressures related to addressing urgent societal challenges.

Despite the relevance of viewing directionality through the lens of political policy processes, there has been relatively little attention to integrating relevant *policy process theory* to better understand directionality. This limits our understanding of how the wider processes of innovation policy formulation are subject to dynamics of actor interactions, negotiations and subsequent policymaking processes (Haddad et al., 2022; Kern & Rogge, 2018; Parks, 2022; Salas Gironés et al., 2020; Wanzenböck et al., 2020). Instead, more attention in the innovation policy literature has been paid to policy instruments related to directionality (Borrás & Schwaag Serger, 2022; Edler & Boon, 2018; te Kulve et al., 2018), the governance of directionality (Borrás & Schwaag Serger, 2022; Lindner et al., 2016; Pel et al., 2020; Salas Gironés et al., 2020), the outcomes of directionality (Andersson et al., 2021), and how directionality is brought into policy practice (Bergek et al., 2023; Parks, 2022).

This article builds on these existing insights on directionality, by paying explicit attention to its political nature and dimensions, and integrating relevant insights from policy process literature. We draw on various prominent policy process frameworks from the field of policy studies. The main aim herein is to harvest relevant conceptual contributions from policy process theory for the conceptualization of the politics of directionality, which are discussed along the question of *who gives which direction, where, when, how, and why,* as inspired by Lasswell (1936).

Our study is guided by the following research question: *How can the politics of directionality be conceptualized using policy process frameworks?* By answering this question through an integrative literature review approach (Paré et al., 2015), the article provides a relevant contribution to understanding innovation policy as subject to political processes of decision-making; a view that has remained underdeveloped in earlier conceptualisations of directionality. Furthermore, it contributes to an explicit formulation of the concept of directionality, its political nature, and relevant questions related to the politics of directionality. Lastly, the article mobilises new insights from political science with regards to these political questions, which will have important implications for the innovation policy field.

In the next section, the article discusses various political dimensions of directionality, and how existing literature on directionality fits into the questions of *who gives which direction, where, when, how, and why.* Section 3 outlines the methodology, data collection and analytical steps of the integrative literature review, and introduces the policy process frameworks used in the analysis. Relevant conceptual contributions from the policy process frameworks for the politics of directionality are discussed in Chapter 4. Chapter 5 concludes with a critical theoretical and methodological reflection, a formulation of an empirical research agenda, and relevant implications for the field and practice of transformative innovation policy.

2. The politics of directionality

The way in which this article discusses specific political aspects of directionality is inspired by a classic definition of politics by Harold D. Lasswell (1936): *'who gets what, where, when, how and why'*. In the context of directionality in innovation policy, the politics of directionality can be reformulated as: *'who gives which direction, where, when, how, and why'*. This view of politics presents a clear, understandable way to study politics, specifically the politics of directionality. We use Lasswell's definition of politics as inspiration for structuring the discussion of different political questions around directionality rather than aiming to present an all-encompassing view of politics. Hereafter, each question will be introduced and discussed in light of existing literature on innovation policy and societal challenges, giving an entry point for how to engage with a political understanding of directionality, and highlighting current gaps that emerge when viewing directionality from a political perspective.

2.1 Who gives direction?

The question of who is involved in processes of directionality points to the relevance of power, participation and inclusion, as it matters 'who is giving direction' (Parks, 2022; Salas Gironés et al., 2020; Stirling, 2008). Who gives direction has ramifications for which directions are recognized and reflected in policy goals, and whether short-term activities by actors giving direction will contribute to or hinder progress towards these goals. As the debate on 'just sustainability transitions' highlights, these matters have important implications for the democratic legitimacy of policy (Avelino, 2021; Bennett et al., 2019; Hendriks, 2009; Swilling, 2019), which is why, as Stirling argues, more attention should be paid to diversity in directionality (Stirling, 2011).

The question of who gives direction relates to participation in policy processes. From a perspective of democratic legitimacy, directionality is ideally influenced by a diverse group of actors, such that societal engagement is a major source for direction-setting (Könnölä et al., 2021; Lindner et al., 2016; Schot & Steinmueller, 2018). For instance, Kuhlmann & Rip (2018) emphasize the role of non-state actors and collaborative governance approaches related to transformative innovation policy, acknowledging that many actors might be involved in establishing desirable directions of change.

However, despite the will and effort for democratic participation in processes of directionality, relevant decision-making largely happens outside of open debate. Instead, having relevant resources, access to significant policy actors, interest and skills to influence policy formulation and development are important for 'who gives direction'. Therefore, Salas Gironés et al. (2020) have focused on *policy entrepreneurs;* actors who are most likely to have an interest and ability to initiate policy change. Similarly, Grillitsch et al. (2019) argue that *institutional entrepreneurs* (Battilana et al., 2009) may be essential for providing directionality, through their intentional pursuit of a specific interest and capability to mobilize required resources to influence socio-technical regimes.

Nevertheless, power to influence direction remains distributed and dispersed, and may be exerted from different sources to divergent normative ends (Stirling, 2008). While *policy entrepreneurs*

(Salas Gironés et al., 2020) and *institutional entrepreneurs* (Battilana et al., 2009; Grillitsch et al., 2019) provide relevant examples of who can give direction, more attention is yet to be paid to how these actors are embedded in broader networks of actors involved in decision-making processes, how their directing activities influence power (im)balances within those networks, and to which normative ends these activities are directed.

2.2 Which direction is given?

Important for understanding which normative direction is given, is the political nature of the directions themselves. However, little attention has been given to the character of directions beyond technological dimensions (Andersson et al., 2021). For example, choosing between two alternative technologies for decarbonizing the energy system is connected to different pathways towards carbon neutrality, affects different sets of actors, and may prioritize different values. Moreover, Pel et al. (2020) suggest directionality is characterized by a multiplicity of competing socio-technical configurations, diverse forms of normative appraisal and assumptions, as well as the temporal and process-oriented character of the transition pathways a direction is associated with. Therefore, deciding on a particular solution likely has ramifications for innovation and societal development beyond technology selection.

Still, open questions remain regarding how the normativity of directionality and the political ideologies underlying different directions fit into current understandings of directionality. A potential way to engage with these questions and foreground more the political nature of directions is through studying directions as a discourse. Importantly, discourses do not merely concern ideas, values, and norms regarding desirable futures, but also relate to how different actors view policy problems and solutions to societal challenges. Discourses materialize in written text and language, and are inherently connected to social practices of sensemaking and wider construing aspects of ideological perspectives and power relations (Fairclough, 2013). As such, directions can manifest in policy texts, and are enacted through the social practices related to a particular direction and the related material elements of a solution. Through power, certain directions become dominant and reinforced by institutional structures (Schmidt, 2011).

2.3 Where is direction given?

Where direction is given is another question regarding directionality that has yet to be explicitly discussed, although recent work by Andersson et al. (2021) provides a relevant first contribution. The authors show that the space in which directions develop is multidimensional, characterized by spatial (global, national, local configurations), socio-technical (production and consumption system of a focal product), and temporal dimensions (changes to the socio-technical system over time). Furthermore, Grillitsch et al. 2019 show directionality takes form across different geographical scales and policy domains, emphasizing the need for opening up collaboration networks and busting existing policy silos to promote policy learning and coordination in directionality.

The latter contribution shows that from a political point of view, spaces of policymaking, decision-making, and broader political arenas are relevant sites of directionality. Relevant contributions in the field of sustainability transitions have been made in linking policy processes, politics, and actor coalitions to transition dynamics which are relevant for directionality (e.g., Edmondson et al., 2019; Markard et al., 2016; Normann, 2015, 2017). These studies have pointed to how actor groups can exploit 'windows of opportunity' to mobilize support for certain solutions and technologies (Normann, 2015), how policy mixes co-evolve with socio-technical systems (Edmondson et al., 2019), and how actor coalitions and networks compete over influence on (energy) policy (Markard et al., 2016; Normann, 2017). Furthermore, the concept of an 'arena' has been introduced to describe the space where actors come together to formulate and govern societal missions (Wesseling & Meijerhof, 2023), develop a shared problem perception, vision and agenda among frontrunners in a transition (Loorbach, 2010), or where institutions, technologies, visions and practices come together in a cognitive space (Jørgensen & Sørensen, 2002). While these contributions form relevant insights when it comes to 'where direction is given', they often do not explicitly link the spaces of political decision-making to the dynamics of directionality.

2.4 When do directions change?

Directionality as a process inherently points to the relevance of temporal dynamics in the emergence, development, and outcomes of different directions over time. Such dynamics have been relatively well covered in existing literature, examining relevant positive and negative feedback mechanisms (Edmondson et al., 2019), which create dynamics of openness for change in direction, and subsequent closing down and lock-in (Foxon et al., 2013; Pel et al., 2020; Rosenbloom, 2017; Stirling, 2008).

From a political point of view, an important way to view the temporal question of when directions change is to gain insight into when, and by whom, moments of openness and closing are influenced. During moments of openness, political choices can impact the pace and direction of change (Foxon et al., 2013; Pel et al., 2020; Rosenbloom et al., 2018; Stirling, 2011). Critical moments are at so-called 'branching points', when choices made by actors in response to internal or external pressures determine whether and in what ways the pathway is followed (Foxon et al., 2013, p. 148).

At the same time, directionality is characterized by path dependency, meaning early sequences of choices can set in motion self-reinforcing courses of development that limit the possibilities for change in direction (Rosenbloom et al., 2019; Stirling, 2008). While it is an accumulating sequence of choices that shape the outcomes of directionality, the particular policy choices influence the ways in which self-reinforcing patterns of development can be enacted (Rosenbloom et al., 2019).

2.5 How is direction given?

From a political point of view, the governance approaches by which direction is given matter for the prevailing direction, that is, the outcome. Different governance approaches are possible based on plurality and bottom-up, or selectivity and top-down strategies. Starting from a pluralistic perspective,

bottom-up approaches of experimentation and participatory governance aim to align the interests of broad stakeholder groups, creating shared expectations and coordinated action (Könnölä et al., 2021; Kuhlmann & Rip, 2018; Schot & Steinmueller, 2018). In contrast, mission-driven governance implies a more top-down policy approach, in which a 'coalition of the willing' is involved in defining the mission that dictates the direction of change, with a role for policy to tilt the playing field in favor of the mission and related actors (Kattel & Mazzucato, 2018; Mazzucato, 2018).

Both approaches place a large responsibility on public policy actors to shape the direction of innovation and sustainability transitions (Bergek et al., 2023; Laatsit et al., 2022). For example, directionality requires policymakers to stimulate innovation in societally desirable directions (Könnölä et al., 2021; Salas Gironés et al., 2020; Weber & Rohracher, 2012), while also phasing out activities that hinder transformative change towards sustainability (Kivimaa & Kern, 2016). This requires competences for reflexive governance, such as balancing short-term action with long-term visions and range of possible pathways towards this desired future, and interacting, learning, and experimenting with a variety of actors. This is no easy task, as is shown by Bergek et al. (2023), who outline the many challenges that come with 'how to give direction', related to translating overarching societal challenges into actionable policy. For example, handling conflicting policy goals, identifying realistic pathways, mobilizing relevant policy domains and accessing intervention points.

2.6 Why do some directions prevail over others?

Why certain directions prevail over others can be seen as an outcome of the aforementioned aspects of directionality. For instance, temporal dynamics related to path dependency can influence the composition of the group of actors involved in the negotiation and decision-making processes (who), and spaces where directionality takes place. In this sense, directions more closely related to current perspectives regarding societal challenges and their desired solutions will likely prevail over those more divergent. As the diversity of possible directions closes down, a path dependency is formed for a particular transition pathway as a consequence of cumulative choices favoring a certain direction over others (Rosenbloom, 2017; Rosenbloom et al., 2019).

Importantly, as the literature on critical discourse highlights (e.g., Fairclough, 2010, 2013; Howarth & Griggs, 2015; Sum & Jessop, 2015), which direction prevails and has historically prevailed, is also a question of power, and thus is related to '*who gives direction*'. Power in relation to directionality can be seen as a productive means to promote certain understandings, meaning and value to a direction, implying some directions are recognized and formalized, while others are excluded or marginalized.

3. Review approach

Within the broad scope of literature reviews that each have their own approaches and purpose, this study most closely aligns with the aim of an integrative literature review, which is to assess and synthesize the literature on a research topic in a way that enables new theoretical frameworks and perspectives to emerge (Paré et al., 2015; Snyder, 2019; Torraco, 2005, 2016). We will use the various aspects of politics in directionality (*who, which, where, when, how, and why)* to review policy process frameworks. Our aim is not to present an all-encompassing overview of the policy process field, but rather to harvest relevant insights from policy process frameworks for innovation policy and sustainability transition studies, as to advance our theoretical knowledge on the politics of directionality.

Integrative reviews are often criticized for lack of rigor and transparency, due to the lack of standards and guidelines in their methodology (Grant & Booth, 2009; Paré et al., 2015; Snyder, 2019). However, when applied appropriately, these reviews can yield significant value in terms of new theoretical insight and conceptual frameworks, sharpening conceptual understanding and creating opportunities for more targeted empirical work (Paré et al., 2015; Snyder, 2019). For this article, analyzing policy process frameworks specifically with a political lens will provide deeper insight into political aspects of policy processes relevant to understanding directionality.

Policy process literature

Within policy studies and broader political science, this review focuses specifically on policy process frameworks.[1] While recognizing the relevance of other policy studies literature, policy process frameworks give a particularly suitable starting point for introducing theoretical insights on political processes into the innovation policy community. Literature on policy process frameworks contains continuously developed knowledge regarding policy processes, and discussion regarding their advantages, limitations, and future research avenues. This review article aims to translate these insights for the study of the directionality understood in terms of a political negotiation process and in terms of broader temporal dynamics of policymaking.

As a first step to arrive at a selection of relevant policy process frameworks, the following selection and inclusion criteria were formulated prior to the analysis:
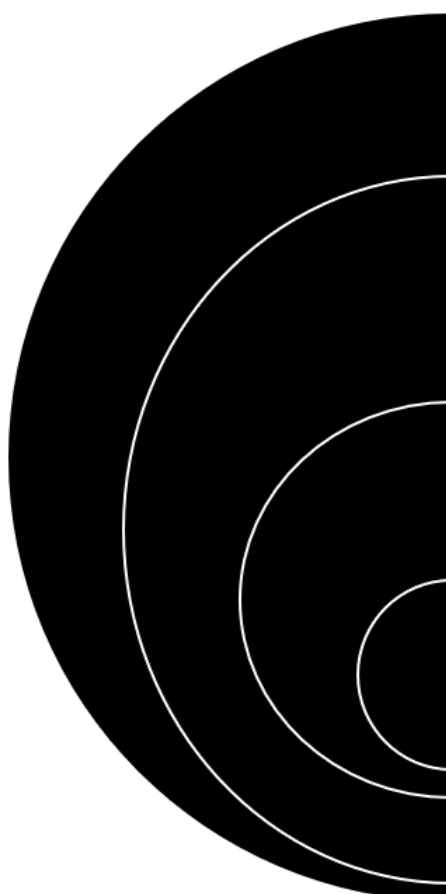
- Well-known and theoretically mature: the framework has been developed and empirically employed across diverse geographical, temporal and (policy) field-specfic contexts for a long period of time (i.e., at least more than ten years).
- An active research community exists around the framework: the framework shows continuous effort to challenge, revise and enhance theoretical conceptions based on recent contributions and publications.
- Engages with complex policy dynamics of stability and change: the framework gives insight into the policy process with attention to complex dynamics of stability and change, beyond policy stage heuristics and short-term policy cycles.

- Engages with policy processes broadly: the framework addresses political negotiation processes within spheres of decision-making, while linking to sites of broader political debate.

As a second step, a screening took place within the field of policy process studies, to identify multiple policy process frameworks (n=11), which could potentially fit the evaluation criteria. After consideration of each of these frameworks against the criteria formulated above, the following policy process frameworks were selected: Multiple Streams Framework (MSF), Punctuated Equilibrium Theory (PET), Policy Feedback Theory (PFT), Advocacy Coalition Framework (ACF) and the Narrative Policy Framework (NPF). Table 1 presents an overview of the different frameworks, their key concepts, and the evaluation against the selection criteria above and a list of selected sources.

Data collection: Collecting sources

Different kinds of sources were collected for analysis, which was performed through a process of expanding and layering outwards from seminal work and foundational papers of each framework (see Figure 1).

Figure 1: Data collection and analysis process based on expansion until saturation ¶
MSF: Multiple Streams Framework, PET: Punctuated Equilibrium Theory, PFT: Policy Feedback Theory, ACF: Advocacy Coalition Framework, NPF: Narrative Policy Framework
Time period web search in step 4: no start date - 2022

The key purpose of this review to identify relevant concepts for understanding and conceptualizing the politics of directionality guided the data collection process, adding conceptual insight with each expansion. First, foundational works and key publications were gathered to understand foundational underpinnings, assumptions, and core concepts. Hereafter, relevant chapters of *Theories of the Policy Process* (Sabatier & Weible, 2018) provided further elaboration on basic concepts, as well as recent contributions to the frameworks. Sources listed in the third ring cover at least two of the frameworks, enabling a comparison between the frameworks, their respective strengths and weaknesses and understanding of their historical context. Lastly, additional sources were gathered through snowballing from collected sources and searching scientific databases Scopus and Web of Science using the title of each framework as search terms. The additional sources gathered through these methods contain empirical reviews, conceptual or theoretical innovations to the frameworks, in-depth discussion of a particular concept and/or applications of the framework in the field of innovation policy and/or sustainability transitions.

Introducing the policy process frameworks

In the table below, introductory information about the policy process frameworks is presented. It includes their aims and scope, theory of policy change, core concepts, evaluation of the selection criteria and respective sources used for analysis. For a more comprehensive and detailed overview of the frameworks see Cairney (2013); Heikkila & Cairney (2018); Nowlin (2011); Petridou (2014) or, in the context of sustainability transitions: Kern & Rogge (2018).

Table 1: Summary overview of the policy process frameworks.

	Multiple Streams Framework (MSF)	Punctuated Equilibrium Theory (PET)	Policy Feedback Theory (PFT)	Advocacy Coalition Framework (ACF)	Narrative Policy Framework (NPF)
Research aims and scope	Explain how agenda setting and policy making happen under conditions of ambiguity, with specific attention to why a limited set of issues and alternatives are considered by policy makers at certain points in time.	Explain why and how political systems are characterized by punctuated equilibrium: long periods of stability and incrementalism, occasionally producing large departures from the past	Explain how current policies shape future policies and subsequent political processes in the form of attitudes and behaviors electorates, policymaking institutions, and interest group formation	Explain how and why coalitions form, policy learning in coalitions, their stability and structure, and their effect on policy change (specifically in high-conflict policy contexts).	Explains how and why narratives shape the policy process at different levels; how narratives are structured, how they reflect policy beliefs and how they shape public opinion.
Policy change	The policy stream, political stream and problem stream are brought together in a window of opportunity by policy entrepreneurs to bring issues on the agenda and potentially cause major policy change	Periods of stability and negative feedback in political systems are created by stable institutional arrangements. Over time, built up friction can lead to further gridlock or, when pressure is sufficient, (and/or substantial change in policy image and/or focusing event) issues reach the macropolitical agenda and may lead to major policy change.	Past policies shape new policies through affecting meaning of citizenship, forms of governance, power of groups, political agendas, and problem definition. A second strand of literature focuses on feedback mechanisms between policy and mass political behavior (resource effects and interpretive effects of policies influence civic engagement)	Coalitions compete and use various strategies to influence policy outcomes. Opportunities, constraints, and resources of coalitions are conditioned by institutional structures and external events. Four conceptual paths to policy change: external events, internal events, policy learning and negotiated agreement	Narratives are strategically constructed by coalitions with the aim of influencing policy outputs. This process is influenced by changes in the external environment, cultural context, and public opinion (latter also serves as resource for coalitions)
Core concepts	Problem stream, policy stream, political stream, policy entrepreneur, policy window / window of opportunity,	Policy subsystems, macropolitics, positive feedback, negative feedback, policy image, policy monopolies, friction, disproportionate information processing,	Policy feedback (reinforcing and undermining), path dependency of past policies, resource effects, interpretive effects, 'policyscape' of existing policies	Policy subsystems, advocacy coalitions, belief systems, policy-oriented learning, negotiated agreement, policy conflict, devil-shift	Narratives, policy subsystems, advocacy coalitions, narrative elements (setting, character, plot, moral), narrative strategies (scope of conflict, causal mechanisms, devil-angel shift)

Evaluation of selection criteria 1. Well-known, theoretically mature, and widely empirically employed	Foundational work citations: > 30,000. Empirically employed in 65 different countries, across 22 different policy areas, and has > 300 peer-reviewed (English) journal articles between 2000-2013 (Jones et al., 2016).	Foundational work citations: > 11,000. Empirically employed in 393 publications in 1993-2016. Originally in US context, with expansion to non-US contexts (36% of studies in US context after 2005) (Baumgartner et al., 2018, p. 84).	Foundational works citations: > 10,000. Empirically employed in Western contexts, but with recent expansion to non-Western countries and new policy areas (Mettler & Sorelle, 2018).	Foundational works citations: 3612, 5200, and 1163 citations respectively. Empirically employed in >240 publications in 1987-2014 in mostly Western contexts, and in diverse policy fields.	Relatively new (since 2010). Foundational works citations; 212, 1089, and 542 respectively. Origins in the US, with increasing application in non-US contexts (Shanahan, Jones, McBeth, et al., 2018).
2. Active research community	Examples of recent publications with theoretical contributions: Herweg et al., 2015, 2018; Zohlnhöfer & Rüb, 2016	Examples of recent publications with theoretical contributions: Baumgartner et al., 2018; Eissler et al., 2016; Green-Pedersen & Princen, 2016	Examples of recent publications with theoretical contributions: Béland et al., 2022; Béland & Schlager, 2019; Mettler & Sorelle, 2018	Examples of recent publications with theoretical contributions: Jenkins-Smith et al., 2018; Pierce et al., 2020; Weible et al., 2020	Examples of recent publications with theoretical contributions: Jones, 2018; Kuenzler & Stauffer, 2022
3. Addresses stability and change	Policies and agenda-setting are seen as stable until a 'window of opportunity' opens	Policies and agenda-setting are seen as stable until a 'policy punctuation' occurs	Past policies create strong reinforcing feedback mechanisms that create stability, but policy change can occur due to undermining feedbacks	Addresses how advocacy coalitions compete to influence existing policies with the aim of changing policy outcomes	Addresses how advocacy coalitions use narrative strategies to influence existing policies with the aim of changing policy outcomes
4.Broadness in explaining the policy process	Addresses spaces of policymaking (the policy stream) and politics (the political stream)	Addresses policy subsystems and macropolitics	Addresses past policies as context in which new policies are made, as well as linking policies and politics	Focuses mainly on policy subsystem dynamics	Focuses mainly on policy subsystem dynamics, although also addresses macrolevel narratives
Framework specific sources used for analysis	Béland & Howlett, 2016; Derwort et al., 2022; Elzen et al., 2011; Herweg et al., 2015; Herweg, 2016; Herweg et al., 2018; Jones et al., 2016; Kingdon, 1984, 2011; Knaggård, 2015; Normann, 2015; Zahariadis, 2007; Zohlnhöfer & Rüb, 2016	Baumgartner et al., 2006, 2009, 2011, 2018; Baumgartner & Jones, 1993, 2009; Boushey, 2012; Eissler et al., 2016; Farstad et al., 2022; Givel, 2010; Green-Pedersen & Princen, 2016; Jones et al., 2003; Jones & Baumgartner, 2012; Kuhlmann & van der Heijden, 2018; Princen, 2013; Schneider & Ollmann, 2013	Béland, 2010; Béland et al., 2022; Béland & Schlager, 2019; Campbell, 2012; Edmondson et al., 2017, 2019; Jacobs & Weaver, 2015; Larsen, 2019; Lockwood, 2022; Lockwood et al., 2017; Mettler & Sorelle, 2018; Moynihan & Soss, 2014; Pierson, 1993, 2000; Rosenbloom et al., 2019; Skocpol, 1992; Smith, 2020	Gabehart et al., 2022; Geels & Penna, 2015; Haukkala, 2018; Jenkins-Smith et al., 2018; Jones & Jenkins-Smith, 2009; Markard et al., 2016; Pierce et al., 2017, 2020; Sabatier, 1986, 1988; Sabatier & Jenkins-Smith, 1993, 1999; Sabatier & Weible, 2007; Weible et al., 2009, 2020; Weible & Jenkins-Smith, 2016; Weible & Sabatier, 2009	Jones, 2018; Jones et al., 2014; Jones & McBeth, 2010; Jones & Radaelli, 2015; Kuenzler & Stauffer, 2022; McBeth et al., 2007, 2022; Schlaufer et al., 2022; Shanahan et al., 2011, 2013; Shanahan, Jones, & McBeth, 2018; Shanahan, Jones, McBeth, et al., 2018
Additional sources	Cairney, 2013; Heikkila & Cairney, 2018; Howlett et al., 2016, 2017; Kern & Rogge, 2018; Nowlin, 2011; Orach & Schlüter, 2016; Petridou, 2014; Sobeck, 2003				

Data analysis

Data analysis of the five different policy process frameworks was organized in three steps (see Figure 2). The coding process was iterative, in which first-order codes were generated deductively, based on codebooks containing core information about the frameworks (step 1) and their political aspects (step 2), with subcodes emerging during the coding process. All data was coded using NVivo version 1.5.1 released November 2021 (QSR International Pty Ltd, 2021). The codebooks are presented in the Appendix.

Step 1: Understanding core concepts of the frameworks

Coding for each framework:

* Core concepts
* Origins and development
* Aims
* Assumptions
* Scope and level of analysis
* Mechanisms of policy change
* Strengths, critiques, and future research

(See Codebook 1, Appendix)

Step 2: Understanding the politics of policy process frameworks

Coding political dimensions for each framework:

* Who - actors and roles
* What - outcomes
* Where - spaces of policy making and politics
* When - temporal dynamics
* How - interaction and governance
* Why - underlying mechanisms

(see Codebook 2, Appendix)

Step 3: Integrating insights to conceptualize the politics of directionality

Concepts (step 1) are integrated with political dimensions (step 2) for the analysis of the politics of directionality:

* Who gives direction?
* Which direction is given?
* Where is direction given?
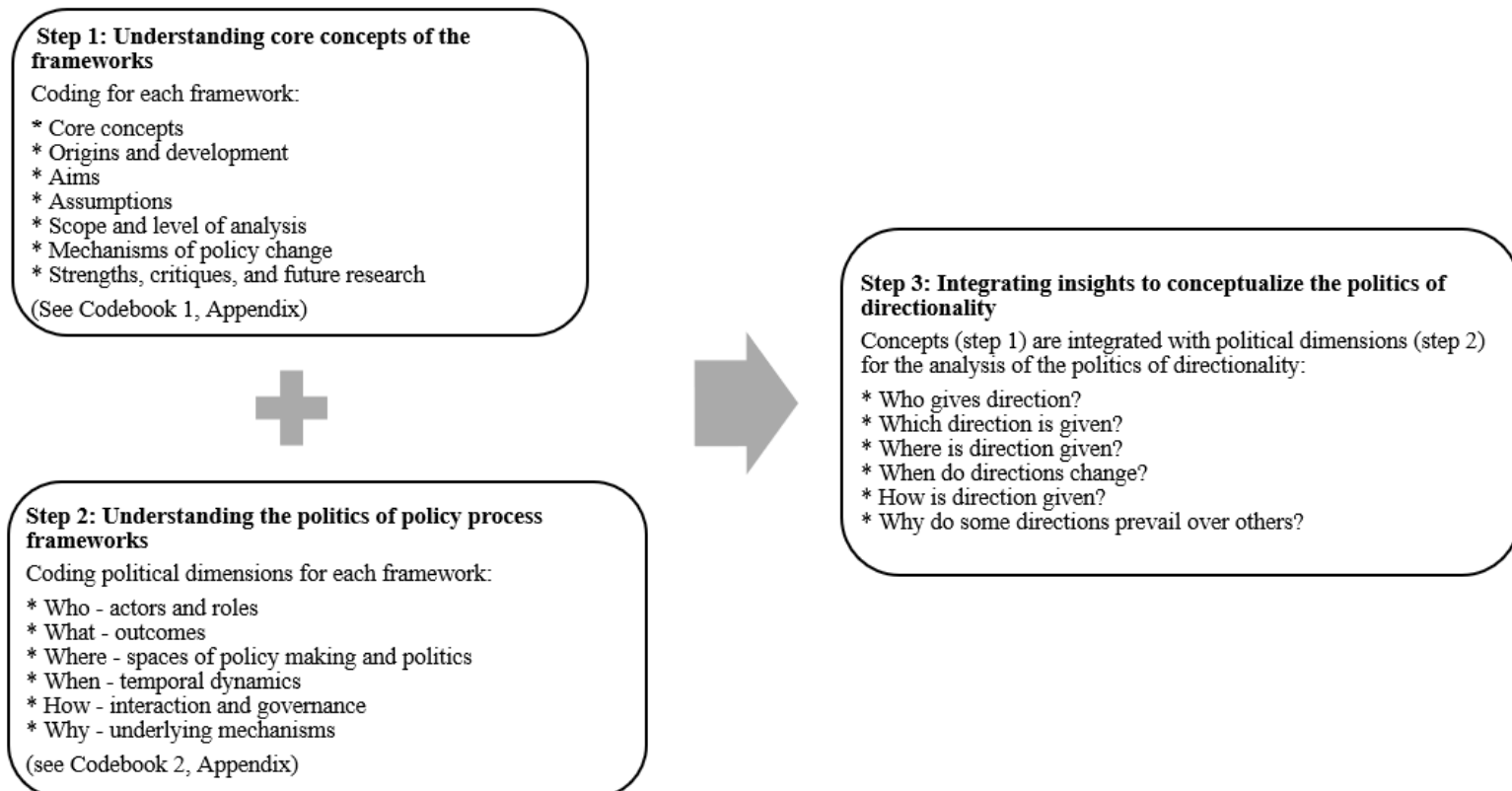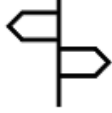* When do directions change?
* How is direction given?
* Why do some directions prevail over others?

Figure 2: Data analysis process

In step 1 (top-left box in Figure 2), foundational works, book chapters from *Theories of the Policy Process* and sources covering multiple frameworks were coded with the aim of understanding core ideas and concepts, including how the framework conceptualizes policy change, strengths, and weaknesses of the framework (see Codebook 1, Appendix). After understanding each framework more in depth, the second round of analysis (step 2) reorients the focus to political aspects of policy process frameworks. In this second step, questions related to *who, what, where, when, how, and why* are analyzed in all sources related to a framework (see Codebook 2, Appendix). In the last analytical step (step 3), core insights from the frameworks (step 1), as well as specific insights on their political dimensions (step 2), are applied to inform the conceptualization of the politics of directionality in chapter 4. Concepts specifically relevant to the questions *who gives which direction, where, when, how, and why* are selected and discussed.

4. The politics of directionality through the lens of policy process frameworks

This chapter contains insights from the previously introduced policy process frameworks, which are mobilized for the conceptualization of the politics of directionality. This analysis builds on foundational discussions of *who gives which direction, where, when, how, and why* from chapter 2, by introducing relevant concepts from policy process frameworks that are useful for engaging with the questions related to the politics of directionality.

An overview of the results is presented below in Table 2.

Table 2: Overview of relevant concepts from policy process frameworks for the conceptualization of the politics of directionality

Who gives direction?	Which direction is given?	Where is direction given?	When do directions change?	How is direction given?	Why do some directions prevail over others?
Policy subsystem (PET, ACF, NPF)	Belief system (ACF, NPF)	Policy subsystem (PET, ACF, NPF)	Stability and lock-in (PET, PFT)	Softening up (MSF)	Path dependence (PET, PFT)
Policy monopoly (PET)	Policy image (PET)	Macropolitical arena (PET)	Friction (PET)	Policy conflict (ACF, NPF)	Problem recognition and agenda-setting (MSF, PET)
Actor involvement (MSF, ACF, PET, PFT, NPF)		Problem stream, policy stream, political stream (MSF)	Policy change (MSF, PET, ACF, NPF)		Resources as source of power (MSF, ACF)
Policy entrepreneur (MSF)		Policy venue (PET, ACF, NPF)	Windows of opportunity (MSF)		

MSF: Multiple Streams Framework, PET: Punctuated Equilibrium Theory, PFT: Policy Feedback Theory, ACF: Advocacy Coalition Framework, NPF: Narrative Policy Framework

4.1 Who gives direction?

The question of '*who gives direction'* points to the relevance of which actors are included in processes of negotiations and decision-making surrounding processes of directionality. Policy process frameworks can build on existing insights regarding who gives direction by means of a conceptual view on policy actors and their configurations, through the concepts of policy subsystems, policy monopolies and policy entrepreneurs.

The policy process frameworks present the variety of actors involved in the policy process as a '**policy subsystem**' (PET, ACF, NPF), or a 'policy community' (MSF). Specific to a policy subsystem is its nature as both issue-bound and particular to a geographical area, making it a useful concept for contextualizing both 'who gives direction', as well as 'where is direction given'. Note that 'issue-bound'

does not necessitate being specific to a particular policy domain, as policy issues such as climate change can impact multiple policy domains.

Moreover, the policy subsystem concept can include actors from both within, and beyond the policy sphere. It hereby informs further understanding around **actor involvement in decision-making processes** regarding direction setting. The frameworks PET and MSF emphasize that important decisions in policy subsystems or policy communities are predominantly made by a limited group of actors, consisting, for example, of policy experts, political party advisors, academics, consultants, bureaucrats and lobbyists (Green-Pedersen & Princen, 2016; Herweg, 2016). In contrast, the ACF and NPF suggest a broader range of actors to be relevant in policy subsystems, from policymakers at any level of government, to private sector actors, representatives from non-governmental organizations, media, and research organizations.

The level of influence on policy decisions within and between policy subsystem(s) can thus differ. In fact, PET suggests such networks can become **monopolies** of influential actors with a single interest, supported by a strong policy image and institutional structure. Such monopolies may prevent groups outside the dominant policy subsystem from engaging in significant decision-making (Baumgartner et al., 2018; Givel, 2010). Who gives direction may be subject to path dependencies, as decision-making structures, state capacities, interest group formation and broader membership in the political community are shaped by how policy processes have historically developed (PFT).

Consequently, most policy issues are seen as treated outside of wider political debate and discussion (PET). Policy process literature hereby seems to indicate that the call for broadening participation in direction-setting and stimulating political debate related to societal challenges may prove more challenging than existing literature on directionality literature suggests. The concepts of policy subsystems and especially policy monopolies, shows that significant decision-making happens rather behind closed doors, implying a need for deeper engagement with participation beyond open calls for broadening inclusion in decision-making processes. Importantly, such engagement is crucial because of the political nature of directionality in the context of sustainability transitions, and the need for democratic legitimacy in direction-setting.

Aside from questions of inclusion in policymaking processes, who gives direction is also a matter of who has relevant resources, capabilities, power, and political support for initiating policy change. The MSF has introduced the concept of '**policy entrepreneur**' (Kingdon, 1984, 2011), and later the additional notions of a 'problem broker' (Knaggård, 2015) and 'political entrepreneur' (Herweg et al., 2015, 2018), which are relevant for conceptualizing those actors that can institute policy change. Policy entrepreneurs advance specific proposals and adapt them to find broad support among members of the policy community. Their role is to attach problems to their solutions and find politicians who are receptive to these ideas (Herweg et al., 2018). Attention is brought to specific problems by 'problem brokers', who frame conditions as public problems and work to make policymakers accept these frames (Knaggård, 2015). Problem brokers can also be policy entrepreneurs, linking their

preferred solution to the identified problem, but not necessarily. Once the problem and potential solution have been brought to the agenda, policy makers with a relevant formal leadership position, that is, 'political entrepreneurs', can seek a majority for the proposal after which a decision can be made (Herweg et al., 2018).

4.2 Which direction is given?

Which directions result as an outcome of processes of directionality has been a relevant gap in the literature (Andersson et al., 2021). Policy process literature contains relevant concepts for understanding the normativity of directions that emerge, relating to which values, norms, and ideas may be represented in policies and policy discourse.

A first concept which provides insight into the political nature of directions is that of the '**belief system**', *"a set of basic values, causal assumptions and problem perceptions".* The belief system provides individuals with meaning and sensemaking (ACF, NPF) (Sabatier & Jenkins-Smith, 1993, p. 25). It consists of three layers, the first of which concerns the 'deep core beliefs', related to fundamental normative values and political ideology (Sabatier & Jenkins-Smith, 1999). Second are the 'policy core beliefs', which are specific in scope and topic to the policy subsystem, and contain empirical assessments of the causes of the problem and preferred solutions, next to normative value priorities and identifying whose welfare is of greatest concern (Sabatier & Jenkins-Smith, 1999). Last are the secondary beliefs, which hold more narrow beliefs regarding the seriousness of the problem, the relative importance of different factors contributing to the policy problem, or the design of a specific policy instrument (Sabatier & Jenkins-Smith, 1999). The different layers of the belief system provide a new way of understanding the political characteristics of directions beyond alternative technologies.

Most importantly, the concept of the belief system is relevant to understanding how directions are materialized in the form of public policies. ACF and NPF analysts consider policies as the translations of a belief system as manifested in goals, rules, incentives, taxes, and other policy instruments. Public policies are thereby never neutral but reflect the narratives, beliefs, political values, problem frames and preferred solutions of the actor coalition that prevailed in the policy debate.

Additionally, the notion of a '**policy image'** (PET) can be helpful to further understand the stability of such policy belief systems. In combination with emotive appeals and empirical information, political values can be used to reproduce a frame around a particular policy problem and how a particular policy is understood (Baumgartner et al., 2018; Baumgartner & Jones, 1993). As long as subsystem politics remain stable, the assumptions related to a particular policy problem are taken for granted, and the policy image hereby contributes to feedback processes reinforcing the stability of existing policy monopolies and related venues (Baumgartner et al., 2018; Princen, 2013).

Both concepts of a 'policy image' and a 'belief system' thus point to the relevance of normative and ideological values that guide directionality. This has relevant ramifications for which direction is given through policy, as directions do not only concern specific technological or non-technological

solutions to a particular sustainability problem (such as renewable energy as a solution to climate change), but also relate to ideas, values and norms regarding desirable futures (e.g., how justice plays a role in how renewable energy is governed).

4.3 Where is direction given?

The spaces where directionality takes place have been suggested to have multiple dimensions, such as spatial, temporal, socio-technical (Andersson et al., 2021). While these dimensions give an indication of how directionality takes form systemically, it leaves questions of how networks of (policy) actors and spaces of policymaking and politics are situated within these dimensions.

The policy process frameworks suggest policy processes take place both within arenas of policymaking, such as **policy subsystems** (PET, ACF, NPF), and in spaces of **macropolitics** (PET, PFT). Both are relevant for directionality, as directions, problem frames and pathways may be discussed in broader political arenas, as well as having their ramifications for policy formulation and objectives. As such, there are inherent linkages between the spaces of directionality and the political activities that take place within. Additionally, past policies may shape the '**policyscape**' in which current policies are formulated and debated, implying broader political spaces and policy subsystems are further connected through the ways in which past policies shape the context in which directionality is given (PFT).

The MSF contains more elaborate concepts related to the distinction between spaces of policymaking and politics, as well as how they can be connected during specific moments in time called 'windows of opportunity' (Kingdon, 1984) (also see chapter 4.4). The MSF identifies three main spaces: the problem stream, the policy stream, and the political stream (Kingdon, 1984). The **problem stream** is where changes in societal indicators, feedback from previous policies or focusing events are framed into problems. As problem frames are an important part of directions, the problem stream can be seen as a space where directions emerge. In the **policy stream**, many policy solutions to the policy issues are generated by the policy community, which are gradually reduced through discussion, modification, and recombination of different ideas. Here, directions are shaped further through the identification of a diversity of policy solutions. The **political stream** is where majorities are sought for the proposals that have been brought to the agenda in the policy stream. In the political stream, negotiation processes around directions occur, and may be influenced by (changes in) 'national mood', the degree of interest group mobilization, and changes in ideological preferences related to political cycles (Herweg et al., 2018)

Lastly, the concept of the '**policy venue**' may be important as space for directionality, as this is where (narrative) debates regarding specific policy issues between opposing coalitions of actors play out (ACF, NPF). Policy venues may take form in formal institutions, such as parliaments, or informal ones, such as (social) media platforms (NPF, PET).

4.4 When do directions change?

Existing literature on directionality has pointed to the relevance of feedback mechanisms, pathways with moments of openness, and subsequent lock-in related to when directions change. While such temporal dimensions of directionality have been well developed in the literature, policy process theory can still be of additional value through insights on policy dynamics and -change.

Firstly, as in broader system dynamics, policy dynamics are characterized by feedback mechanisms and path dependency, characterizing policy processes mostly with **stability and lock-in effects,** rather than dynamic policy change (PFT, PET). However, agenda change and policy change do occur and are conceptualized in different ways by different frameworks.

Punctuated equilibrium theory (PET) sees policy change to be related to short lurches of potentially major deviations from past policies. Such major **policy change** stems from built-up **friction** in the form of unaddressed issues (Baumgartner & Jones, 1993). When pressures for change are sufficient, policy issues move from the policy subsystems onto the macropolitical and governmental agenda, potentially leading to major policy change led by previously uninvolved political actors (Baumgartner et al., 2018). A new equilibrium is established as new institutions are put in place by a new, or newly altered policy community, and public and political involvement recede (Baumgartner et al., 2018).

The Advocacy Coalition Framework (ACF) identifies four conceptual avenues for **policy change** including: (1) events external to the subsystem, such as crises (2) internal events, such as policy failures or scandals, (3) policy learning through gradual altering of concepts and assumptions of subsystem participants, or (4) negotiated agreement among previously warring coalitions (Jenkins-Smith et al., 2018, pp. 145–146). Any of these paths can contribute to major policy change, though they should be considered more as a necessary, but not sufficient source of major policy change (Jenkins-Smith et al., 2018).

Furthermore, policy narratives also affect the likelihood of **policy change** (NPF) (Shanahan et al., 2011; Shanahan, Jones, McBeth, et al., 2018). The relative strength, stability, and cohesion of these policy narratives provide the 'coalitional glue' that binds coalition actors. It has been hypothesized that this glue is likely to provide focus and purpose within an advocacy coalition, making it more likely that a coalition is successful in realizing their preferred policy outcomes (NPF) (Shanahan et al., 2011, 2018).

Lastly, the idea of critical branching points as moments where choices can be made to alter direction throughout processes of directionality may align with the idea of a '**window of opportunity**' (MSF). Such a window presents a period where a condition in society is seen as a problem, a potential solution is 'coupled' to this problem, and has political support from policymakers, providing the necessary conditions for agenda-change and subsequent decision-making (MSF).

4.5 How is direction given?

Giving direction can imply different governance strategies with regards to navigating the challenging combination of stimulating transformative innovations and the phase-out of undesirable activities in light of relevant societal transitions. Policy process literature offers additional insights regarding the question of navigating policy conflict and gaining deeper insights into decision-making politics.

Firstly, the concept of '**softening up**' gives a relevant idea of how direction is given (MSF). 'Softening up' is seen as a process of discussing, altering, and recombining alternatives, filtering out many policy alternatives along the way (MSF). In this way, many directions advocated by diverse actors may be filtered out during the policy process.

How direction is given can be characterized by pluralistic governance seeking consensus among a broad group of stakeholders (Grillitsch et al., 2019; Kuhlmann & Rip, 2018; Stirling, 2008, 2011; Weber & Rohracher, 2012), or through top-down directing by a 'coalition of the willing' (Kattel & Mazzucato, 2018; Mazzucato, 2018). While these approaches may not be mutually exclusive, they can bring varying levels of **policy conflict**. It can be difficult to overcome widely diverging normative values between diverse stakeholders in seeking consensus (Grillitsch et al., 2019), while more selective processes of giving direction might lack democratic legitimacy and give issues of political acceptance.

Policy process frameworks such as the Advocacy Coalition Framework (ACF) and the Narrative Policy Framework (NPF) give relevant insight into the dynamics of **policy conflict**, indicating that the level of conflict (i.e., the extent to which actor coalitions perceive the objectives or actions of opponents as a threat), depends on which **strategies** they employ to influence the policy process. For instance, if an actor coalition perceives themselves as losing a policy debate, they are more inclined to used strategies related to expanding conflict (NPF), exaggeration of maliciousness of the opponent, growing mistrust and obstruction of policy solutions (ACF). Overcoming policy conflict is easier when coalitions converge on policy beliefs, or negotiated agreement is facilitated by mutual interaction, broad representation, commitment, and trust (ACF).

Lastly, how direction is given by different actors may vary over time, and between spaces of policymaking and macropolitics (PET, MSF). In a policy subsystem with a dominant monopoly of actors, and a widely accepted policy image, there may be lower levels of contestation and conflict, compared to periods when a policy issue enters the macropolitical arena, where political mobilization and societal debate are the main modes of interaction (PET). Likewise, modes of interaction in the policy stream are characterized more by arguing and linking problem frames with proposed solutions, whereas in the political stream, bargaining and powering for political support are dominant modes of interaction (MSF).

4.6 Why do some directions prevail over others?

Explanations of why certain directions prevail over others can arguably be seen as a combination of **path dependency** of existing directions, as well as a question of **power** to promote certain

understandings, meaning and value to a direction, implying some directions are recognized and formalized, while others are excluded or marginalized. Ideas, values, and envisioned solutions to societal challenges that are more closely aligned with current directions will likely prevail over those that are more divergent. Policy process literature, specifically Policy Feedback Theory (PFT), extensively studies path dependencies in policy processes, which can add to these existing insights.

PFT suggests past policies are important in shaping current policies and politics, making current directions and direction-setting dependent on past choices and pathways (Rosenbloom et al., 2019). This framework suggests a plurality of **self-reinforcing feedback mechanisms** among which are feedbacks related to economic returns, expansion of state capacities in existing domains, sociopolitical, fiscal, informational, and interpretive feedbacks. Through these feedback processes, path dependencies result in terms of agenda-setting, offering frames for interpretation, imposing resource restrictions and commitments, configuring governing capacity and institutionalizing standard operating procedures. Additionally, policy outcomes shape politics through shaping the social, economic and political conditions in which individuals and groups take part in the policy process and the goals they pursue (Mettler & Sorelle, 2018; Pierson, 1993).

Besides giving insight into why and how certain directions may prevail because of feedback mechanisms and path dependency, policy process theory also sheds light on why certain directions may prevail due to particular **problem recognition**. Limited periods and serial processing of information affect the recognition and attention to certain problems and their related solutions over others (PET, MSF, ACF). Additionally, problems have become more contested, while the relevance of traditional ideologies guiding policymaking has decreased, particularly in parliamentary systems (Herweg et al., 2015, 2018). This implies that choosing between solutions is ever more difficult for policymakers, making them more receptive to lobbying and public opinion. As a result, policy processes are characterized by ambiguity (MSF) and non-linearity (PET). Under these conditions, values, belief systems (ACF) and policy narratives (NPF) are central for sensemaking and legitimizing which directions are relevant.

Legitimization of certain directions is not only related to ambiguity, complexity, and path dependency, but is also inherently related and interdependent on **power**, as power legitimizes certain problem understandings, meaning and value of a direction, while others are excluded or marginalized. Such power can stem from **resources**, like formal authority to make policy decisions, influence on public opinion, access to relevant information and networks, ability to mobility support, time, financial resources, and skills related to leadership, negotiating and persistency (MSF, ACF).

5. Discussion and conclusion

This study started from the call for more 'directionality' in the transformative innovation policy and sustainability transition literatures, with the aim of contributing to transformative change needed in the face of urgent societal challenges. While these literatures hold somewhat different meanings to the concept of directionality, they all point to the relevance of a process-oriented and political understanding of directionality. We have therefore proposed a view of directionality as "*a political process of negotiating a diversity of normative directions, with subsequent materialization through public policies, influencing the pathways of transitions over time*". Starting from such a political understanding of directionality, we addressed the question *how can the politics of directionality be conceptualized using policy process theory*?

Key insights

The five policy process frameworks analyzed in this study prove to be relevant in understanding the politics of directionality, which has been investigated along a discussion of *who gives which direction, where, when, how, and why*. For each of these questions, several insights from the policy process frameworks have emerged that contribute to a better understanding of the politics of directionality, the most important of which will be highlighted in this discussion.

Policy subsystem is a relevant concept to understand actor involvement in giving direction (*who gives direction)* and as a space of decision-making *where* direction is given.

The concept of a *policy subsystem* is used in multiple policy process frameworks, such as the ACF, PET, and NPF. It shows how the actors involved in a certain policy issue are bound by the topical demarcations of the issue, as well as acting in a specific geography. Furthermore, it brings forth a way to study actor involvement and participation in directionality, through highlighting which actors are involved in a certain policy issue in and beyond the public policy sphere. Policy process frameworks such as the PET argue that critical decision-making processes take place among a limited group of actors, outside of broader political debate and discussion. This highlights important challenges for the call from diverse authors regarding the need for more democratic engagement in processes of directionality. As such, there is a need for more critical engagement with *who gives direction* and its implications for democratizing policy processes related to giving direction for innovation policies directed at societal challenges.

Belief systems and *policy images* give a complementary understanding of *which direction is given* as a political concept beyond technological trajectories.

The characteristics of the directions that result as an outcome of processes of directionality has been a relevant gap in the literature, as they often remain limited to projections around a certain technology (Andersson et al., 2021). Policy process literature, and more specifically concepts of the belief system (ACF) and policy image (PET), give a better understanding of the political side of directions. Both concepts show that public policies, which can be seen as integral manifestations of directions, are never

neutral but reflect the political values, problem frames, beliefs, narratives and preferred solutions of those actors that were successful in influencing the policy debate. Furthermore, directions are stabilized through the reiteration of dominant policy images around a particular problem and the related assumptions by existing policy subsystem actors.

Policy process literature provides insight into *policy conflict* and how to overcome it, contributing to understanding and resolving challenges that come with *how direction is given*.

With regards to *how direction is given,* policy process theory has additional insights to offer to recent studies in transformative innovation policy that have begun to empirically investigate how direction is given by innovation policy actors (Bergek et al., 2023; Grillitsch et al., 2019; Parks, 2022; Salas Gironés et al., 2020). Relevant challenges in such a process include navigating conflicting interests and normative values underlying directionality (Bergek et al., 2023; Schlaile et al., 2017), and creating shared expectations and coordinating action (Grillitsch et al., 2019; Weber & Rohracher, 2012). This is no easy task – in fact, empirical findings from Grillitsch et al. (2019) suggest the inability to resolve policy conflict related to diverging interests can result in vague policy formulation and lack of direction. The ACF and NPF give insights into how and why policy conflict arises, enabling a better understanding of policy conflict and how to overcome it. For instance, if an actor coalition perceives themselves as losing a policy debate, they are more inclined to use strategies related to expanding conflict (NPF), portraying opponents as malicious, growing mistrust and obstruction of policy solutions (ACF). Overcoming policy conflict is easier when coalitions converge on policy beliefs, or negotiated agreement is facilitated by mutual interaction, broad representation, commitment, and trust (ACF). These insights indicate that in giving direction, there is a need to be reflexive about the underlying beliefs and values of different actors trying to coordinate and find relevant policy solutions, and to foster conditions of trust and commitment.

Policy process literature highlights the essential distinction between *directionality* and *giving direction*.

While both *giving direction* and *directionality* have previously been discussed under the term *directionality*, this study reveals a relevant distinction is to be made between them. The questions of *who gives direction* and *how direction is given* are clear examples of giving direction, which relates to activities of public policymaking and the actors involved in policy processes, who may guide, block, or accelerate processes of innovation and regime destabilization (Bergek et al., 2023; Salas Gironés et al., 2020; Weber & Rohracher, 2012). These questions are most relevant for understanding and engaging with policy subsystem politics and decision-making, and potentially speak most to the innovation policy community. On the other hand, questions such as *when directions change and why some directions prevail over others,* are relevant for analyzing directionality from a more long-term perspective of evolving societal development and potential changing pathways. Such questions are more systemic in nature, and might therefore be more relevant among sustainability transition scholars.

Despite having a different focus, giving direction and directionality are inherently related and interdependent. For instance, societal progression in a certain direction over time may be reflected in discourses about desirable futures and development pathways, and these can, in turn, be reflected in public policies and current decision-making in different ways, such as evaluation criteria regarding innovation activities, or the formulation of long-term policy goals and missions. While converging directions can hereby materialize in specific policies advocated by different actors, plurality and diversity may still be prevalent when it comes to overall transition pathways and development trajectories. We advocate an understanding of directionality that captures both giving direction and systemic directionality, through seeing it as a policy process that involves negotiating different directions, which manifest in decision-making processes around development pathways and policy formulation.

Implications for innovation policy

Within the innovation policy community - both in academic literature and policy practice - three rationales for policy intervention have materialized, related to market- and system failures, and transformative paradigms (Diercks et al., 2019; Schot & Steinmueller, 2018; Weber & Rohracher, 2012). Each of these rationales is based on a policy discourse, which represents a distinct normative direction (what), involves specific actors (who), in a specific policy subsystem (where), who influence the policy discourse over time (when). These discourses now exist alongside each other, both in academic literature and policy practice (Diercks et al., 2019; Schot & Steinmueller, 2018). For example, policy instruments related to growth-based R&D incentives co-exist with policies that aim to increase interaction and coordination between academic, corporate, and public actors, and policies fostering experimentation for transformative change. Important to emphasize here is that these distinct directions contain alternative political values, which have relevant ramifications for which direction is given through policy. While economic growth, neoliberalism, and limited state involvement have historically underpinned market- and system-oriented innovation policies, transformative approaches aim to support social and ecological sustainability transitions. The co-existence of these different directions has two important implications.

First, it implies that resulting policies and instruments from market- and system failure approaches are by no means as 'neutral' as the call for more 'directionality' to innovation policy seems to indicate. Even those R&D instruments that are meant to be generic in stimulating technological development 'horizontally' instead of favoring a particular technology, have political consequences in terms of the kinds of industries and firms that are able to benefit from such policies (Rodrik, 2009). For example, manufacturing industries will profit more from R&D subsidies compared to services due to lower involvement of services in R&D activities eligible for subsidies (Frenken, 2017). As such, innovation policy, like any other type of policy, knows winners and losers, and is subject to ongoing struggles between actor groups for influence on decision-making, prioritization, and policy outcomes.

Resulting policies and instruments can therefore be seen as translations of prevailing actors' beliefs and ideologies, challenging the assumption that innovation policy has been 'non-directional' before, and now requires 'more direction'.

Second, if the innovation policy community aims to contribute to transformative change in the direction of sustainability transitions, the coexistence of these discourses might prove challenging, as well as undesirable. This is because the normative and ideological values they represent (i.e., economic growth vs sustainability) have been historically at odds with one another. As such, current innovation policy discourse can give rise to policy conflict that can lead to political compromise inhibiting transformative action towards sustainability, as has been empirically shown by Grillitsch et al. (2019). Contributing more to transformative change in the direction of sustainability transitions will therefore require prioritizing values such as environmental sustainability, democracy, and social justice in innovation policy and phasing-out traditional growth-aiming rationales. This involves being reflexive and explicit about the values underlying current innovation policy instruments, challenging existing power relations in relevant policy subsystems, and overcoming arising policy conflict through converging policy beliefs, mutual interaction, broad representation, and fostering commitment and trust among actors involved.

Nevertheless, changing direction away from economic paradigms will be no easy task. Relevant path dependencies exist in policy processes, such as the problems that are recognized through agenda-setting. Existing policies offer strong frames for the interpretation of new policies, as well as imposing resource restrictions and commitments (Pierson, 2000). Furthermore, these path dependencies are reinforced through legitimation by the monopolies in power and supported by important institutions (Baumgartner et al., 2018; Givel, 2010).

Limitations and methodological discussion

The previous discussion shows policy process literature has relevant insights to offer with regards to the politics of directionality. However, the policy process frameworks were not written with this explicit purpose in mind, which implies there are limitations to this study to consider.

Firstly, no single framework offers a silver bullet for understanding the politics of directionality. Some frameworks offer more insight into different aspects of directionality. For instance, Punctuated Equilibrium Theory (PET) and Policy Feedback Theory (PFT), have strong temporal characteristics, focusing on feedback mechanisms, policy change and path dependency. As such, these frameworks are more relevant for understanding *when* directions change or *why* some are more persistent than others, compared to questions such as *who* gives direction, or *how* is direction given. For the latter questions, the Multiple Streams Framework (MSF), the Advocacy Coalition Framework (ACF), and the Narrative Policy Framework (NPF) offer more relevant insights, for instance, around navigating and understanding policy conflict among different actor coalitions.

Secondly, the policy process frameworks studied in this article comprise large research communities and bodies of literature in and of themselves. Through the integrative review approach used in this article, much of their depth and nuance is lost in the need for a concise understanding of their core concepts and their potential use for conceptualizing the politics of directionality. While it was not the purpose of this review to be all-encompassing or systematic in presenting the policy process frameworks, other methods would be more suitable when aiming for a complete picture of one or more policy process framework(s).

Lastly, as also discussed by Kern & Rogge, (2018), policy process frameworks differ in their ontological and epistemological foundations and assumptions. Some have a more positivist history and application, with assumptions related to bounded rationality (e.g. the ACF), while others have more post-positivist, constructivist characteristics (e.g. MSF or NPF). In studying policy processes, it is important to be aware of such differences when applying them in new contexts such as transformative innovation policy or sustainability transitions. Regarding the politics of directionality, arguably a more interpretive and constructive understanding of policy reality is fitting, as this involves a view of policymaking as characterized by sensemaking processes and argumentation, rather than a causal chain of events. Nonetheless, it would lack the necessary nuance in understanding any of the frameworks as fully positivist, or fully constructivist, as they may contain an epistemology that may not traditionally fit with its ontology. A telling example is the Narrative Policy Framework, which holds a constructivist ontology, while many studies employ quantitative methods, which are traditionally related to a more positivist epistemology (Jones & Radaelli, 2015).

Promising avenues for future research

This paper has proposed a temporal and political understanding of directionality as a policy process. While this article has hereby made a relevant contribution to further conceptualize directionality more explicitly, directionality has thus far remained ambiguous. Work remains to be done to create a better understanding of conceptual distinctions between 'directionality', 'giving direction' and 'directions'. Furthermore, future research could develop an empirical knowledge base on directionality as seen from the perspective of a policy process.

Such empirical analysis could firstly be focused on the historical development of how policy actors have negotiated and defined different directions over time (in different policy domains), with subsequent materialization in policy development and formulation. Important insights could be gained in more specifically identifying and analyzing periods of openness to policy change, or 'windows of opportunity' (MSF), and moments where a clear direction was given by specific policy actors. Literature on policy change can help to provide knowledge on how to better understand the conditions under which directions change and how they can be fostered in light of relevant societal challenges.

Secondly, this study points to the relevance of an actor-centered approach when it comes to studying directionality. Indeed, it matters *who gives direction*, and *how direction is given*. For different

policy subsystems related to specific socio-technical systems, this study points to the relevance of gaining insights into which actors are involved and excluded from relevant decision-making processes regarding different possible directions. Enriching current empirical insights into how different actors give direction and the challenges they encounter related to navigating diverging interests, values, identifying pathways, formulating strategies and stimulating coordinated action (Bergek et al., 2023; Grillitsch et al., 2019) will undoubtedly render relevant learning opportunities for innovation policy practitioners and academics. Interesting would be to explore sectoral and geographical differences in this regard, with the aim of generating more geographically and domain-specific insights on giving direction.

Lastly, empirical attention is needed to *which direction* is given through policy, as an outcome of policy processes related to directionality. Such empirical investigation should centralize the normative values underlying different directions and stimulate reflexive discussion on their desirability considering societal challenges, e.g. how they might align or create tensions with the pursuit for just sustainability transitions. Important to consider here is the relative power position of different actors in influencing the direction of change. The power to give direction has important implications for which directions are seen as legitimate, related to both which problems are seen as relevant and urgent, as well as which solutions and accompanying visions of desirable futures are to be stimulated through public policies. It would be relevant for future research to relate the legitimacy of certain directions to the actors involved in relevant policy subsystems, and their strategies used to promote certain directions.

Conclusion

This paper has studied the politics of directionality through the lens of policy process frameworks. Relevant concepts and ideas from the frameworks have been identified and applied to advance the conceptualization of the politics of directionality. Importantly, this study has begun to engage with directionality and giving direction as fundamentally political processes, for which political theory has relevant insights.

For innovation policy scholars and practitioners, it is important to engage meaningfully with the politics of current innovation policy rationales and their implications in the context of pressing societal challenges. It implies that the call for 'more directionality' may be challenged, as this rests on the flawed assumption that innovation policy has been neutral or 'non-directional' before. From the perspective of policy processes, innovation policy rationales and instruments contain their own political values and ideologies and should therefore be treated as political in nature. Overcoming the differences between them will undoubtedly raise difficult questions of prioritization, require reflexivity and challenging existing belief systems, policy images, practices, and power relations. Additionally, all (policy) actors involved will face the challenges of navigating new conflicts that come with the political and complex character of the societal challenges transformative innovation policy aims to address.

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Notes

1. In the words of Jenkins-Smith et al. (p.138): *"The purpose of a framework is to provide a shared research platform that enables analysts to work together in describing, explaining, and, sometimes, predicting phenomena within and across different contexts. (...) Frameworks are not directly testable but provide guidance toward specific areas of descriptive and explanatory inquiry."* In this sense, frameworks are broader than theories, which provide more precise conceptual and operational definitions in the form of testable and falsifiable hypotheses. We therefore prefer the term 'policy process frameworks' for this study, even though some frameworks are commonly referred to as theories, such as Punctuated Equilibrium Theory, or Policy Feedback Theory.

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Appendix

Codebook analysis round 1

Core concepts	How are key concepts defined?
Origins and development over time	How, where, when and why did the framework emerge? How have concepts and applications broadly developed over time?
Aims	How can the aims of the framework be described?
Assumptions	What does the framework assume in terms of individual actor behavior? What are broader assumptions of the framework regarding policy processes?
Scope and level of analysis	Which level(s) of analysis is/are used – micro-, meso- and/or macrolevel? • Microlevel: interaction between policy processes and the individual • Meso: processes at the policy subsystem level • Macro: processes embedded at system level, e.g. institutions, culture, political system
Mechanisms of policy change	How is policy change conceptualized?
Strengths	What aspects of the framework are regarded as strengths in the literature?
Critiques and future research avenues	What aspects of the framework are regarded as weaknesses, or identified as gaps in the literature in need of further development and future research?

Codebook analysis round 2

Who: Who is involved in the policy process and to what extent?	Participation & in- and exclusion: Which actors are involved in the policy process? How is this group of actors conceptualized?
	Influence and decision-making authority: This code represents the relative importance of actors in the policy process; who has influence on the policy process, and who has decision-making authority?
What: outcomes of the policy process	What are the resulting outcomes of the policy process? How are the outcomes shaped by the process?
Where: where is the policy process taking place?	Spaces of policymaking and politics: how are spaces of policymaking and politics conceptualized?
	Contextual conditions: place-based exogenous variables (all except for historical context and institutions, these fall under 'when' and 'why' respectively)
When: temporal dynamics of the policy process	Policy change: how are mechanisms of policy change conceptualized?
	Path dependencies and legacies: how are mechanisms of stability conceptualized?
	Policy feedbacks and interactions: how do temporal mechanisms interact?
How: policy enactment, actor interaction, implementation, multi-level interaction	Top-down / bottom-up interactions: how is the interplay between top-down and bottom-up governance processes conceptualized?
	Interaction between actors or actor groups: how is the interaction between actor groups conceptualized?
	Interaction between policy levels: how is the interaction between different components of the political system conceptualized?
Why: Why do some policy problems and / or solutions receive more attention, or are more successful compared to others? What are important mechanisms underlying the policy process?	Assumptions about individual behavior: explain why actors behave a certain way
	Actor resources, skills and power (relations): explain why certain actors or actor groups are able to exert more influence on the policy process compared to others
	Institutions: explain the formal and informal rules guiding the policy process and political system