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The Evolution of Innovation Policy: Two Promising Directions for Tackling Societal Challenges

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ABSTRACT
This article explores how public innovation policies can address today's Grand Challenges – complex societal and environmental problems such as climate change and AI transformation. It presents two approaches: mission-oriented policies and local, procedural "small-wins" strategies. Mission-oriented innovation policies emphasize proactive state involvement in steering large-scale transformations, as seen in ecological and AI-focused initiatives in Europe and France. These policies aim to shape markets and foster long-term technological breakthroughs. In contrast, small-wins strategies prioritize localized, iterative innovations driven by stakeholder engagement, flexibility, and experimentation. While mission-oriented policies set broad national directions, small-wins initiatives offer bottom-up, adaptive responses tailored to specific contexts. The article argues for a complementary use of both approaches to foster sustainable and inclusive innovation.

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This dual framework could enable public actors to tackle systemic uncertainty, promote green and digital transitions, and build resilient innovation ecosystems across scales.

KEYWORDS: Public Innovation, Mission-Oriented Policies, Grand Challenges, Ecological and Digital Transition, Small Wins

JEL CODES: O30, O35, O38

In times marked by crises and major environmental and societal upheavals, the intervention of public actors to stimulate and support the innovations of tomorrow seems crucial. However, such an intervention raises a series of questions, the primary one being: how should society deal with the Grand Challenges it is facing?

Grand Challenges are societal problems often described as "wicked problems" (Rittel, Weber, 1973), that are complex and difficult to predict: global warming, the protection of biodiversity, health issues (*e.g.* pandemics), and the ageing of populations are just a few examples. These challenges are characterised by significant implications, unknown solutions, and intertwined and evolving technical and social interactions (Eisenhardt *et al.*, 2016, p. 1115). They most often require us to explore solutions via different disciplines and to solve technical and societal issues at the same time (Ferraro *et al.*, 2015). By their very nature, major societal challenges resist easy solutions, which can sometimes contribute to reinforcing their degree of complexity and marginalising certain stakeholders.

The second question involves the direction of innovations. Should public decision-makers leave this to market mechanisms, or should they guide and/or lead the major innovations of tomorrow (see Foray, 2024)? According to the latter perspective, public policies should not only fill market gaps but anticipate and shape new markets and sectors. This leads to a vision of a pro-active or entrepreneurial state (Mazzucato, 2016). More broadly, academic and political actors are warning about the need to develop new types of policies and tools in this area and even to move towards a radical transition of all socio-technical systems, involving significant changes in infrastructures, industry structures, regulations, and user behaviours (Schot, Steinmueller, 2018). The very nature of the processes at work is also being questioned. In a growing number of fields, encouraging scientific and technological innovations is becoming increasingly difficult, as the societal dimension of these innovations must also be taken into account (Boutillier *et al.*, 2020; Debref *et al.*, 2022).

The aim of this article is to shed light on some of these crucial and complex issues. The first section is dedicated to mission-oriented policies for ecological and digital/AI transitions. In the second section, we explore new types of

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innovation policies, such as the "small-wins" approach, formulated and implemented locally and focusing on procedural aspects, and discuss the extent to which they are considered complementary to mission-oriented policies.

Mission-Oriented Policies

Given major societal challenges such as climate change and the ecological transition, policy responses are proving difficult, and often biased and unproductive (including assessments by mainstream scholars such as Nordhaus, 2015). Consequently, many researchers are calling for a renewal of innovation policies and more of a voice in the transformative innovation policy literature (Mazzucato, 2016; Mazzucato, Semeniuk, 2018). This approach assigns a key role to government and public agencies in setting the direction of tomorrow's major innovations and in implementing research programmes. A common belief is that private interests – alone and through markets – cannot tackle major societal challenges, as they lack the breadth of vision and the capacity to deal with radical uncertainty that only states have[1].

The Ecological Transition

The mission-oriented approach has only recently gained traction, chiefly through the economist Mariana Mazzucato's persuasive communication skills and the consultancy services provided by the Institute for Innovation and Public Purpose to government bodies (*e.g.,* European Commission, Scotland, Norway). The very emphasis of the NextGenEU programme on "missions" can be traced back to the ideas about mission-oriented policies that are spreading among policy practitioners. One of the key NextGenEU missions is the *grandest* societal challenge of all-namely, ecological transition. Scholarly work advocating the mission-oriented approach of market creation to avert the climate crisis, with a critical rejection of the traditional market-fixing recipe, has been flourishing in recent years, beginning with Mazzucato (2015), her follow-up work (Mazzucato, Semieniuk, 2018; Lamperti *et al.*, 2019; Voldsgaard *et al.*, 2022), and other contributions (Chen, Chen, 2023; Svoboda, 2019; Szalavetz, 2021).

The roots of the mission-oriented approach dig deep into an ideal timeline of economic thought on innovation policy, as the relevance it can assume in tackling ecological issues was already clear to scholars and public innovation

1. This approach has also garnered a few criticisms. For example, the state would suffer from a lack of skills and expertise to assess risk and to experiment and learn (Karlson *et al.*, 2021), which would open the state to influence by large firms in the definition and implementation of policies.

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agencies in the late 1960s and early 1970s, when scientific evidence of global warming was just beginning to emerge and the most pressing ecological issue was resource depletion. In fact, the field of ecological economics shares foundational principles with the evolutionary economics of innovation. Just as the pillars of ecological economics are uncertainty and complexity (Costanza, 1991), an evolutionary perspective on economics is motivated by the acknowledgement of substantial uncertainty (Dosi, Egidi, 1991) and complexity (Dosi, 2023; Dosi, Roventini, 2019).

Carbon lock-in phenomena, studied by Unruh (2000, 2002) and others, testify to the relevance of increasing returns in selection and learning processes that are essential in evolutionary economics (Dosi, Nelson, 1994). Policy prescriptions from agent-based model simulations in Lamperti *et al.* (2020a, 2020b) support the adoption of command-and-control and innovation support measures, better if through direct involvement of public research agencies and laboratories (Amendola *et al.*, 2024; Dosi *et al.*, 2023). In doing so, such works align with insights in ecological economics that caution against reliance on market-based instruments and, therefore, against the market-fixing logic.

Appropriately, participants joining the debate sparked by the Club of Rome's *Limits to Growth* report (Meadows *et al.*, 1972) included, among others, the economist Christopher Freeman, who took a critical, albeit constructive, stance. Freeman and others questioned the notion that all technological innovation is doomed to increase pollution, as Meadows and colleagues neglected changes in values which can alter trends (Julien, Freeman, 1974). Today, with the benefit of time, we can interpret that criticism in two, though not mutually exclusive, ways. The first is that relative market values (*i.e.* prices) can drive innovative efforts towards more ecologically friendly technologies (see also Pasqualino *et al.* [2024] on induced innovation). The second is that societal values can veer towards promoting resource saving, circularity, climate-neutrality as choice criteria in private consumption and investment decisions, thereby fostering green R&D through a demand – push mechanism. Does this mean that Freeman and collaborators were optimistic about the future? Not entirely, as they argued that "*there is no room for complacency, since dealing with these* (physical) *limits and distributing the fruits of growth equitably will require radical political and social, as well as technological, change*" (Cole *et al.*, 1973).

A new generation of scholars coming from SPRU (Science Policy Research Unit, University of Sussex) in the 1980s paved the way towards formulating mission-oriented energy and ecological policy recommendations. Soete and Arundel (1995) advocated the use of direct regulation and public procurement by the European Commission to guide the direction of

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environmentally sustainable technical change. According to the authors, the European Commission should have committed to coordinating long-term signals for the development and diffusion of new and green technologies.

The emphasis of the mission-oriented approach on "blue sky thinking" and on shaping new markets is appropriately rooted in the historical theory of technological revolutions by Perez (2010). In Perez's timeline, the (near) century that started in 1875 (opening of the Carnegie Bessemer steel factory) and ended in 1971 (collapse of the Bretton Woods system) housed both today's problem (fossil fuels exploited on a large scale since the 4th Technological Revolution) and today's solution (electricity, the protagonist of the 3rd Technological Revolution). The interconnection of technologies is grounded in common scientific knowledge, similar skill demands, stimulation of supply and distribution networks, and cross-learning effects across sectors. The effects of occasional interventions in a sector or in a node of the innovation network cannot be fully understood without acknowledging complexity. Thus, in ecologically relevant domains, too, the emergence of a technological revolution relies on criteria that cannot credibly be met through *laissez-faire* plus market fixing. Equally hard to believe is that any private agent alone would face the uncertainty of such large-scale techno-economic system transitions. The mission-oriented approach is well suited to take on the challenge proposed by Freeman (1996), who, in reflecting upon sustainable innovation, advocated a combination of the linear innovation model with features of the systemic innovation model.

Scholars promoting a mission-oriented policy approach to green innovation rely on noteworthy case studies of radical, wide-ranging innovations developed with the essential orchestration of public agencies tackling grand societal challenges. A case in point is innovation in energy efficiency, a key step in climate change mitigation and energy independence. Mazzucato (2018) claimed that energy efficiency and security are among the key contemporary challenges that should be tackled through mission-oriented projects, requiring long-term commitments by both public and private agents. Even before this, in discussing technology gaps between Europe and the United States, Dosi *et al.* (2006, p. 1462) claimed that the EU should "*develop large-scale, technologically daring missions justifiable in terms of their intrinsic social and political value and able to match in terms of size and ambition the US (often more military-oriented) programs*' and identified '*energy conservation*" among the target fields.

Energy efficiency has been one of the goals of mission-oriented policies implemented in the United States (US Department of Energy; ARPA-E) and Europe, including Germany's Energiewende and public investment bank KfW (Mazzucato, 2018). ARPA-E is a notable case, as it deliberately pursues

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advances in high-potential, high-impact energy technologies that are too early for private-sector investment. For example, in 2022 Nokia Bell Labs was selected for ARPA-E funding to develop energy-efficient data centre technologies. Other examples of new and radical energy-efficient technologies in manufacturing include heat pumps and mechanical and thermal vapour recompression, anaerobic treatment of effluents and homogenisation valves (see CanmetENERGY, 2020), and 5G (Ericsson, 2020). Public entities and state-owned enterprises also offer advisory services to companies willing to invest in energy efficiency, thereby signalling a public commitment to societal challenges. This is the case with KfW in Germany (see Mazzucato, Penna, 2016) and Enel X and Eniverse in Italy, spinoffs of the former public monopolists in the electricity and gas sectors.

Digital and AI Transition

AI has been the subject of many important publications across all disciplines in recent years, in an effort to understand its forms, evolutions, and implications for society. From an economic and managerial perspective, research explores the effects of AI in various domains: the internal organisation of companies, sectoral transformation, employment, growth, innovation, patents, entrepreneurship, ethics, data governance, and the challenges of generative AI in education. These enquiries are legitimate because AI is the origin of a new industrial revolution: it becomes the foundation for multiple, radical innovations, much like electricity or computing were in their time, that can revolutionise all fields of the economy. These profound transformations are already having an impact in many sectors (*e.g.* healthcare, automotive, financial services, agriculture) and many business functions (*e.g.*, logistics, legal, commercial, communication, security) (Mateu, Pluchart, 2019). Major American and Chinese digital players are deeply involved in this technology and hold leading positions in patent filings (Cour des Comptes, 2023a; Dibbiagio *et al.*, 2022). The development of AI is therefore viewed by some as a Grand Challenge that society must face and which public authorities, in particular, must grasp to provide appropriate responses. In this sense, identifying AI as a Grand Challenge makes sense because the technology spans the entire globe, affects all sectors, and forces all actors, whoever they may be, to rethink their ways of operating, producing, consuming, living, and working.

This raises the question of the ambivalent nature of AI. Is it a source of wicked problems, or does it help solve them? For example, is AI a potential vector for reducing society's ecological footprint, or does it worsen it? This question echoes a broader issue of the ecological footprint of digital technologies (Geoffron, 2023). Some studies have shown, for example, that the

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emergence of AI can, in some respects, be a wicked problem (Holtel, 2016). From a business perspective, implementing an AI system can be extremely complex and take on the attributes of a wicked problem, according to Conklin (2005), who mentions six attributes: (1) the problem is not understood until after the formulation of a solution, (2) wicked problems have no stopping rule, (3) solutions to wicked problems are not right or wrong, (4) every wicked problem is essentially novel and unique, (5) every solution to a wicked problem is a "one-shot operation", and (6) wicked problems have no given alternative solutions. Conversely, AI can provide solutions to help address major problems such as the ecological transition: in France, as part of the SNIA (Stratégie Nationale sur l'IA en France), a call for projects titled "AI frugal demonstrators in territories for ecological transition" is an example[2].

Tackling the Grand Challenge of AI is therefore crucial for national public authorities, but this is extremely complex. Overall, the public sector faces a double bind that proves contradictory, as Kuziemski and Misuraca (2020, p. 2) highlighted: "*the public sector's predicament is a tragic double bind: […] to govern algorithms, while governing by algorithms*". How can actions aiming to support/protect citizens from AI be reconciled with the simultaneous promotion/use of the technology and its dissemination to the economy and within its own services? Other questions also arise. How does public action support public policies of innovation in favour of AI directed at companies, research and training? How does public action transform its public services (towards the citizen) and its own internal organisation (Bertolucci, 2024; Van Noordt, Misuraca, 2022; Wirtz *et al.*, 2021)? Finally, the regulation of AI at the European and global levels is a crucial issue for public authorities. The AI Act[3] established by Europe in March 2024 has generated wide discussion. As part of the European project, some forms of AI need to be regulated. This supervision must involve compliance with technical standards. Technical standards are therefore considered to be the means of implementing the essential requirements applicable to high-risk AI throughout its life cycle.

The interactions between public policy and AI can be illustrated with a French example. AI has become an increasing priority for public authorities in France. Since 2017, the country (as well as others, such as the United States and Finland) has adopted national plans to encourage its dissemination and development and to work towards raising the technological level of countries (Cour des Comptes, 2023a). These various programmes have, from a global perspective, helped to raise several pillars of AI innovation: an increase in the number of start-ups in the field, a rise in their fundraising from venture

2. https://aides-territoires.beta.gouv.fr/aides/5252-appel-a-projet-demonstrateurs-dintellligence-/
3. https://artificialintelligenceact.eu/fr/ai-act-explorer/

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capital, and a growth in research publications. The French strategy, like in most other countries, is commonly labelled as "mission-oriented innovation policy" (OECD report, Larrue, 2021). This OECD report, highlighting four major types regarding AI, emphasises the French desire to implement major thematic programmes.

The French AI support strategy (SNIA; as part of the France 2030 plan) launched its first phase in March 2018. With a budget of 1,527 billion euros, the plan, scheduled for 2018-2022, placed a strong emphasis on research (445 million euros), followed by defence and security (410 million euros), the economy (business support: 390 million euros), public sector transformation (154 million euros), and training (128 million euros). This first phase contributed to the emergence of more than 600 AI start-ups (2021-2023), including 76 in generative AI. Notably, 3.2 billion euros were raised in 2022 by AI companies. Current AI models such as Llama and Mistral were trained and developed in France.

The second phase, known as the acceleration phase (2022-2025), allocates a budget of 1.5 billion euros and addresses some weaknesses of the first phase, notably with a substantial increase in AI training (with a budget of 776 million euros) (Cour des Comptes, 2023b). The funding is dedicated to strengthening centres of excellence. The goal of this phase is to disseminate AI across the economy. "*Intelligent systems will have to contribute to improving our industrial competitiveness and, more generally, individual and collective well-being*" (press release, 22/05/2024). The phase particularly targets priority areas: embedded AI, trustworthy AI, frugal AI, and generative AI.

Although it is still early to provide an overall assessment of the French programme, some results are already visible: 80 research laboratories are involved in AI, more than 600 start-ups are working on AI (+24% between 2021 and 2023), 76 start-ups are devoted to generative AI (sound, text, video, and image), and 13,500 jobs have been created in the sector[4].

Mission-Oriented Policy Versus Procedural and Local Approaches

While the discussion on mission-oriented policies is flourishing and likely to continue, other attempts to transform the governance of public innovation policies are worth mentioning, even if they are implemented at the

4. https://www.info.gouv.fr/upload/media/content/0001/10/f111886ce0bd3882137dc5eea7222d0f6c0b37b4.pdf

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local/regional level. One potential direction for the future could be national mission-oriented policies supplemented by local policies led by innovative policy governance.

In general, local approaches tend to focus more on the processes than on the overall objectives. Policy and governance are considered more as procedural tools than as substantive tools. In other words, policies zoom in more on the rules, the practices, the interactions and learning than on the results[5]. For example, Kuhlmann *et al.* (2019) argue in favour of the concept of "tentative policy governance", which represents "*provisional, flexible, revisable, dynamic and open approaches to governance that include experimentation, learning, reflexivity and reversibility*" (Kuhlmann *et al.*, 2019, p. 1091). According to this viewpoint, innovation policy should concentrate on tending to provisional responses, including stakeholders in the process, demonstrating reflexivity and the ability to easily change rules (Kuhlmann, Rip, 2018; Liotard, Revest, 2024). To this end, it seems necessary and vital to stimulate the building of capacities and skills among the players involved in managing challenges, enabling them to analyse and adapt quickly to new contexts or environments. For other scholars on governance, public decision-makers should focus more on managing conflicts than on trying to resolve them, with the aim to achieve coherent actions but not necessarily provide final solutions (Head, 2019). Another path involves fragmenting major issues into more manageable challenges (Head, 2019). Building networks of organisations and stakeholders capable of adapting quickly would be an additional resource (Klijn, Koppenjan, 2015). This would involve working in collective processes of learning, exploration, and experimentation, which could be effective in stimulating collaborative behaviour, reducing potential conflicts between stakeholders, and building trust.

A final direction which we want to underscore in particular combines both procedural and local perspectives. Here, regional approaches to innovation policies are associated with the "small-wins" concept (Bours *et al.*, 2022; Morisson *et al.*, 2023). "*A small-wins governance strategy follows a logic of stimulating distributed innovation efforts to foster gradual, yet in-depth change in a desired direction*" (Bours *et al.*, 2022, p. 2246). Governance in terms of small wins can complement regional innovation systems. Yet, instead of focusing on the structural arrangements of regional players, as is usually the case, a small-wins strategy targets processes and mechanisms that can potentially transform existing system configurations. In other words, a small-wins perspective could lead policies based on regional innovation systems to adopt

5. For example, Demircioglu and Vivona's (2021) article on public procurement can serve as a procedural tool for innovation.

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a Grand Challenges perspective (Tödtling, Auer, 2021). Small wins generally emerge from a wide variety of bottom-up initiatives, rooted in local contexts. They are based on the assumption that actions that start from the ground up, even on a small scale, are often more transformative than more global, centralised measures in response to specific contexts: environmental, social, and political (Von Wirth *et al*., 2019). According to this perspective, the dynamics of change stem from the initiative of stakeholders, different interest groups, civil society, or the public sector (Termeer, Dewulf, 2019). This avenue thus highlights the role of local niches as "life-size tests" for multidimensional change dynamics.

Small wins include technical, social and institutional innovations. The experiences gained can then help to extend and diffuse to other places, through appropriate derived policies, standards or regulations (Wanzenböck *et al*., 2020). To identify small wins, Termeer and Dewulf (2019) highlight four properties: (i) governance must lead to concrete and visible results; (ii) it must affect current practices and, therefore, routines, beliefs, and values; (iii) it should operate on a local or regional scale; and (iv) it should be beneficial to a group of actors without worsening the position of opponents. Following this perspective, Bours *et al.* (2022) study bottom-up initiatives in the Netherlands to move towards plastic-free waterways. This issue can be conceived as a Grand Challenge: combating plastic pollution, while integrating a regional policy dimension. The authors identified 17 bottom-up initiatives to fight against plastic pollution of waterways between 2012 and 2017 in the Netherlands. These initiatives fulfilled the four properties of small wins mentioned previously (concrete outcome, moderate importance, in-depth change and judged positively)[6]. Another example of the small-wins approach comes from urban policies research. Von Wirth *et al.* (2019) compared initiatives in Rotterdam (the Netherlands) and Malmö (Sweden) to regenerate cities. One initiative was the BlueCityLab in Rotterdam, which represents a platform for the circular economy, developing innovative approaches to stimulate material flows, providing spaces for co-creation, hosting events (waste free), and offering a space for experimentation. This type of laboratory is used to experiment how a city could move towards zero waste and recycled materials. More generally, living labs can serve as active sites for experimentation and the emergence of new knowledge and as places for testing the viability of solutions. The strategies mobilised and implemented can in turn help to

6. Among these initiatives, six are technical in nature (innovations in the development phase on waste catching technology to clean water initiated by the Port of Rotterdam), and three are societal (*e.g.*, retail shops selling eco-friendly nylon bags or collaboration in organizing and participating in a cleanup). Others are linked to 'networking and supporting leisure', such as the partnership between the provinces of Brabant and Limburg, the Ministry of Infrastructure and Water Management, municipalities, local parties, companies, and volunteers.

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spread more sustainable value structures and cultures and illustrate different ways of innovating.

These concrete examples highlight the interest in small-wins practices that can arise at the local level in meeting, at least partly, some dimensions of societal challenges. One issue would be determining whether a local approach such as small wins is complementary or alternative to mission-oriented policies. According to Bours *et al.* (2022, p. 2246), however, this follows an opposite logic: "*instead of aiming for 'big wins' through radical innovation in science and industry, as common in the discourse of innovation missions (Mazzucato, 2018), [a] small-wins governance strategy follows a logic of stimulating distributed innovation efforts to foster gradual, yet in-depth, change in a desired direction*". In our view, the two approaches could be considered – and mobilised – in a complementary way, under certain conditions. First, these forms of governance should not be considered at the same level of analysis. The policies emerging from the mission-oriented approach should provide the broad (macro) directions for tomorrow's innovations, while local policies (small wins) should enable experimentation (micro). Second, at certain times, the focus should be on mission-oriented policies and, at other times, on processes and innovative practices. One thing, however, remains certain: as Grand Challenges are complex and changing, innovation governance policy should continually adapt and demonstrate imagination and creativity.

Conclusion

This article aimed to illuminate promising directions for addressing the major societal challenges we currently face. The first avenue explored refers to the now well-established mission-oriented approach in the context of two major challenges: ecological transition and the disruption generated by artificial intelligence development and digital transformation. In the first case, several experiences – particularly in energy-related domains – highlight the positive impact of partnerships between public actors (including public investment banks) and large public enterprises in initiating new energy resource proposals from a sustainable perspective. Such partnerships enable the advancement of emerging technologies that are not yet mature enough to attract private sector interest but which hold significant promise. In the second case, the presence of public actors also appears advantageous, as AI can represent both a source of wicked problems and offer processes to solve wicked problems. For example, supporting and facilitating the emergence of AI startups in France is part of a public policy strategy implemented for 2030, which is beginning to bear fruit.

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The second direction is of a different nature: it involves reflection on local and procedural approaches to public innovation policies. How can innovation policies with societal aims be effectively implemented in practice? The proposed responses differ from the previously mentioned mission-oriented policies by highlighting the implementation (procedures) at the local level of actions that generate changes in agreement with stakeholders. The practices of "small wins" found in various European countries thus appear to be a promising path as they allow for inclusivity, adaptability, and reflexivity. Ultimately, the two approaches prove complementary and could be deployed across multiple levels and in various forms. As societal challenges are varied and complex, the response deserves to be commensurate.

Presentation Of the Special Issue

The articles in this special issue examine certain issues from different angles and deal with some examples, in an effort to improve understanding. Julia Werneth, Christian Von Deimling and Michaël Eßig focus on innovation contests as a potential tool for public procurement. First, they propose a literature-based distinction of challenges from other policy instruments to shed light on their particularities, such as the task's openness, the degree of elaboration of the solution, or the incentives system. Second, they conduct a case study of two German organisations: KOINNO (Competence Center Innovative Procurement) and SPRIN-D (Federal Agency for Disruptive Innovation). They selected these companies for their distinct roles in organising and participating in innovation contests in the public sector. Through expert interviews and document analysis, the authors research the specific characteristics, processes, and key success factors of challenges, including motivation, task specificity, degree of elaboration, and organisational structure. Identification of the success factors for challenges in public procurement can provide valuable insights and guidance for practitioners and serve as an ideal process model for administering innovation contests in the public sector.

The article by Cristina Chaminade, Clara Dallaire, and Ellen Hillbom deals with the transformative capacities of nation-states in responding to global environmental challenges such as climate change and biodiversity loss. In the face of these crises, states must develop transformative capacity that enables them to initiate, support, and manage sustainable changes. However, the relationship between innovation policy and transformative capacity remains poorly understood. The article presents a conceptual approach, based on a systematic literature review, to analyse how innovation policies can support states in this transformation. The authors highlight

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three key dimensions: capacity broadening (co-creation of visions), deepening (profound institutional changes), and governance (proactive adaptation). The proposed framework evaluates the policy implications for each phase of transformation, including stabilisation. The authors conclude by emphasising the importance of a dynamic, holistic, and ongoing perspective that integrates policies tailored to each stage to achieve sustainable transformations.

The third article from Nathalie Lazaric, Loubna Echajari, and Dorota Leszczynska deals with potential changes to organisational routines in the face of Grand Challenges to reduce pesticide use. The authors address the following question: How do sustainability issues create opportunities and challenges that question both the actions and patterns promoting a multiplicity of paths? Their findings are based on a qualitative case study in the Bordeaux winemaking region between 2018 and 2019. The study relies on data collected from 17 winemakers, some of whom were more inclined to continue with traditional (*i.e.*, unsustainable) routines and others who were keen on experimenting with more sustainable methods. New public policies call for a deeper engagement of policy-makers and public actors to evaluate current routines. Reflection – anticipatory, collective and critical – is a structural component that can induce the emergence of new patterns aligned with sustainable practices.

Finally, the *Syllogism* proposed by Matthias Weber deepens our analysis by highlighting both strengths and obstacles confronting a transformative innovation policy framework. The article examines different strands within this paradigm while reassessing key critiques – whether regarding market principles, governmental and market failures, or coordination-related transaction costs inherent to transformative governance. The author contends that several criticisms can be dismissed as they fail to account for contemporary political discourse and the intrinsic nature of major societal challenges. Other concerns, particularly those addressing governance modalities, could be mitigated through diversified approaches operating across national, regional, and sectoral dimensions. This multi-level strategy would acknowledge the inherent character of innovation activities while fostering greater adaptability and transformative potential.

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