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The Rise of Resilience in Spatial Planning: A Journey through Disciplinary Boundaries and Contested Practices

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Abstract: Resilience has become a popular term in spatial planning, often replacing sustainability as a reference frame. However, different concepts and understandings are embedded within it, which calls for keeping a critical stance about its widespread use. In this paper, we engage with the resilience turn in spatial planning and we dwell on the relation between resilience and sustainability from a planning perspective. Building on insights from ecology, complex system theory and epistemology, we question whether resilience can effectively act as a ‘boundary object’, i.e., a concept plastic enough to foster cooperation between different research fields and yet robust enough to maintain a common identity. Whilst we do not predicate a dichotomy between resilience and sustainability, we argue that the shift in the dominant understanding of resilience from a descriptive concept, to a broader conceptual and normative framework, is bound to generate some remarkable tensions. These can be associated with three central aspects in resilience thinking: (i) the unknowability and unpredictability of the future, whence a different focus of sustainability and resilience on outcomes vs. processes, respectively, ensue; (ii) the ontological separation between the internal components of a system and an external shock; (iii) the limited consideration given by resilience to inter- and intra-generational equity. Empirical evidence on actual instances of planning for resilience from different contexts seems to confirm these trends. We advocate that resilience should be used as a descriptive concept in planning within a sustainability framework, which entails a normative and transformative component that resonates with the very *raison d’être* of planning.

Keywords: resilience; spatial planning; urban sustainability; post-political planning; boundary objects; complex systems

1. Introduction

Few terms have experienced a comparable boom in popularity among scholars over the last decade as “resilience” did. Such a surge involves different research disciplines [1] and transcends academia, the term now being recurrent in policy documents and mainstream media [2,3]. It is therefore not surprising that resilience is so popular in spatial planning. After all, planning “has a long history of absorbing new concepts and translating them into its theories and practices” [4] (p. 329) and surely is not “a discipline that could be accused to be resistant to the adoption of a fashionable buzzword” [5] (p. 276).

A search of the Scopus database of publications up to 2019 containing the words “resilience” and “planning” in the title—the latter alone or associated to the prefix “urban”, “land-use”, “territorial”, “landscape” or “regional”—yields 70 results, of which none was published before 2000, only two were published before 2011, two each in 2011 and 2012, already six in 2013 and so on, up to 13 in 2019. Counts even increase when related terms such as “urban resilience” or “resilient cities” are searched [3,6].

The literature on resilience explicitly reflects a swaying between heralding it as a potentially fruitful framework and blaming it as yet another buzzword or empty box that can be filled with almost anything depending on one's need. Is it "A Bridging Concept or a Dead End?" Davoudi [7] asked herself in a seminal paper; should we rather consider it a "Useful Approach or Empty Phrase for Spatial Planning?" as Albers and Deppisch [8] echoed. More recently, Neuman [9] provocatively wondered, "Is resilience planning's Holy Grail?" In brief, the rise of resilience did not go uncontested. As early as the term popped up in the planning literature, authors pointed out its inherent ambiguity, calling for greater conceptual rigor and clarity. Scholars also warned about its misuse and its potential subsumption into the neoliberal discourse [7,9,10]. However, as Neuman [11] (p. 110) points out, whilst there has been a lot of critical reflection amongst planning scholars on other topics, "resilience has escaped rigorous review". Or, borrowing from Beilin and Wilkinson [9] (p. 1214): "There is a neoliberal use of resilience that must continuously be addressed".

Importantly, not only resilience has gained prominence in science and policy, but it has also emerged first as a complement to, then increasingly as a substitute for, sustainability [7–16]. This 'resilience turn' was epitomized in a widely cited New York Times article by A. Zolli whose headline reads as: "Forget Sustainability. It's all about resilience" [15]. Interestingly, though the article addressed resilience and sustainability in general, it argued that we should refocus our attention from the latter to the former by resorting to the words of "an urban planner and developer" [15] about the damages caused by Hurricane Sandy to New York City in fall 2012. According to him, the storm hit hardest "right where it was most recently redeveloped: Lower Manhattan, which should have been the least vulnerable part of the island. But it was rebuilt to be 'sustainable', not resilient" (Ibid).

It is thus tempting to contrast the rising interest for resilience with the declining excitement surrounding sustainability. Earlier criticism raised towards the promise of making economic growth compatible with environmental protection focused on its conceptual vagueness, ill-defined analytical framework or unbalanced handling of social, economic and environmental issues [17–19]. More recently, scholars have been revisiting the political economy of sustainability, for instance, by arguing that sustainability policy counterintuitively opted from the very beginning for the economic imperatives of growth over any significant restriction based on ecological grounds. Afterwards, sustainability evolved into a mostly market-oriented approach that leans on private initiatives (by NGOs and corporations), downscales governance to its lowest administrative tier (local authorities) and depoliticize the public debate on environmental issues by focusing attention on technical solutions to previously framed problems [20]. Against this background, some suggest [21] that the promise held by sustainability that better living conditions for all were within reach (no matter how slow the progress) has been losing grip in the past decades of economic and social turbulences, and growing awareness of global environmental uncertainties. Meantime, academics, executives and political leaders alike became ever more interested in the different "art of living dangerously" [22].

Many studies targeted the links between sustainability and resilience, all the more so as interest in the latter concept kept increasing [23–30]. The issue has engaged scholars of environmental management and sustainability science [23–26], but others have also addressed it under specific disciplinary perspectives, including land-use and urban planning, and building design [27–30]. This body of research shows how, under their prevalent current usage, the two concepts share some similarities, for example a focus on socio-ecological system properties and dynamics, or a trust in transdisciplinary approaches to address, for instance, climate change and environmental resource depletion. At the same time, these studies identify relevant differences, concerning possibly different goals, the spatial and temporal scales of implementation, a different focus on outcomes vs. processes, and different treatment of communities and stakeholders' inputs. Recent comprehensive reviews have identified three major trends, based on whether:

1. Resilience is a component of sustainability
2. Sustainability is a component of resilience
3. Resilience and sustainability are separate, though connected, concepts [26,29].

These trends signal a potential tension between the two concepts or, at least, a need to clarify their interlinkages, which has important implications, e.g., when trying to establish integrated assessment frameworks.

In the present paper, we engage critically with the resilience turn in spatial planning and its relation with sustainability, by elaborating on both its possible underlying causes and likely developments. To that purpose, concept clarification is a precondition.

As for resilience, we shall examine the different definitions and interpretations of the concept that evolved over time and across disciplines, with a focus on spatial planning. We then investigate whether the resilience framework can provide a common ground to scholars from different disciplines to advance knowledge towards a shared end. We also identify some key interpretive features and policy implications of the resilience-thinking approach that might impede this.

On the other hand, sustainability has undergone a turbulent journey for well over three decades, being scrutinized from any viewpoint and triggering heated disputes in both academic and political forums. Although it is not the aim of this paper to review those developments, we maintain that the well-known definition provided by the Brundtland Commission [31] may still be taken as reference, to identify three core elements that stood the test of time. Hence, the principles of intergenerational equity, intragenerational equity and ecological limits to socioeconomic development [23] will be kept in mind whenever the normative character of sustainability will have to be discussed. We are aware that there is more to sustainability than these core principles and that sustainability policies have failed to deliver on both the core principles and further objectives. However, we are confident that readers may refer to the vast literature on the subject to complement our limited focus, including some seminal works that are cited in this paper [17–21]. Considering these, we come back to addressing the relation between sustainability and resilience and discuss how some key elements of the predominant resilience-thinking approach may generate theoretical and operational tensions. The outline of the paper reflects a mainly conceptual research approach, although we have complemented our theoretical reflections with secondary evidence, based on empirical studies, whenever useful to discuss the relevant lines of reasoning. The aim is to contribute to, and further stimulate, a debate within the planning research community and with other relevant disciplines.

In Section 2, we set the background by briefly recapping the different meanings and conceptualizations of resilience. In Section 3, we elaborate on the different theorizations addressing those concepts—which include both resilience and sustainability—that appear to be highly contested and yet widely appropriated across disciplinary boundaries and social worlds. Under this perspective, we discuss under what conditions may the resilience-thinking framework be worked through as a “boundary object”. Based on this conceptual work, in Section 4 we elaborate on the uses of resilience in the spatial planning domain and its relation with sustainability. We point out potential convergences and tensions, by also resorting to secondary empirical evidence when relevant. In Section 5, we draw some concluding remarks.

2. The Rise and Surge of Resilience

Several contributions have already accounted for the origin and rise of the term resilience in different scientific domains and spatial planning in particular [7–13]. Thus, we provide here just a summary of the key concepts and the state of the debate before proceeding.

2.1. Three Main Conceptualizations of Resilience

Even within its long-established use in structural engineering or material science [32,33]—often associated with the concept of hysteresis and framed in terms of the relation between stress, strain, and recovery time and extent—resilience soon triggered debates about its potential ambiguity and the need to clarify its components and types [34]. From the very onset, the concept of resilience spread across very different disciplines—including medicine [35,36] and economics [37,38]—and it took on analogical or evocative meanings.

Resilience stood the test of time while turbulent clashes among competing ontologies took place—in particular, as post-mechanistic ontologies and all different strands in systems theory strove hard to grasp complexity [39]. It is, in fact, at the crossroads between complexity studies and systems theory, past reductionism, that resilience met with growing interest for its paradigmatic potential [40]. Overall, we can group the many definitions of resilience in complex systems under three broad conceptualizations [7,14,41]:

- Engineering resilience as introduced by Holling in the 1970s [42] is the ability of a system to return to an equilibrium or steady state after a disturbance. The focus is on the property of a system to “bounce back” to the previous state, which implies the postulation of the existence of a single state of equilibrium for the system under examination. A measure of this ability is the time the system needs to go back to the previous state.
- Ecological resilience [43], also referred to as ecosystem resilience, takes into account the advancement in ecosystems ecology, acknowledging that these have different stable states and faced with disturbances, may be transformed by tipping from one stability domain to another, while still retaining their main characteristics. A classical definition of ecological resilience is “the magnitude of the disturbance that can be absorbed before the system changes its structure” [43] (p. 33).
- Evolutionary resilience is also referred to as social-ecological, transformational or adaptive resilience: the focus being on dynamic non-equilibrium, it signals that systems undergo constant changes and have no stable state. Here, resilience is the ability of the system not only to bounce back but also to adapt and transform.

Their relevance to spatial planning notwithstanding, the choice of these conceptualizations of resilience is open to debate, possibly arising both from within complex systems studies and from without. From within, as there are other disciplinary understandings of resilience, each investigated in different complex systems (with their diverse array of dimensions, disturbances and attributes), for instance, in the fields of psychology or business management [44]. Once complexity is matched to disciplines, the alternative approaches to handling resilience that coexist within the same disciplinary domain also need to be taken into account. Regarding psychology, by way of example, alternative takes on resilience may appear to be as divergent as the application of data analytic techniques from nonlinear dynamical systems to patient care [45] and the neurobiology of affiliation’s role in helping the infant adapt to the hardships of the social world [46].

A focus on resilience as framed in complex systems theory is even more questionable from without, when the constitutive bias of systems theories’ functionalist ontology is allegedly hard-wired to rely on external shocks as triggers of transitions—although attention to internal factors (of the like of vulnerability and rigidity) and adaptive capacity is increasingly being paid [47]. Given that the notion of the city is inexorably intertwined with heterogeneous social, economic and cultural processes [48], the current debate on resilience is problematic for many social scientists because it taps into early views of social systems inspired by the natural sciences, which are now highly controversial [49]. It will suffice here to trace Gunderson and Holling’s [50] understanding of the social system in their Panarchy model, to Parson’s (1951) Adaptation-Goal attainment-Integration-Latency scheme [51], while arguing that the ensuing bias towards consensus theories may not appeal to the host of scholars who are more interested in unraveling issues of diversity, inequality and power [49].

Both engineering resilience and ecological resilience, which emerged from the study of natural ecosystems and are rooted in the concept of equilibrium as framed in post-war cybernetics [7], have been identified as descriptive ecological concepts [52]. In the following subsection, we therefore recap the relevant principles of (eco)system theory before addressing resilience in complex socio-ecological systems (in Section 2.3), keeping these caveats in mind.

2.2. Resilience as an Emergent Property of Complex Systems

Under the first conceptualization, resilience is a synonym of a stability property of systems, also called elasticity. In particular, engineering resilience applied to ecological systems focuses on the persistence of population levels or communities and corresponds to both the overall area and the height of the lowest point of a population's domain of attraction [42,52].

Holling [43,53] expanded the concept, building on the theory of complex adaptive systems. In brief, ecosystems have a hierarchical structure and their functioning is regulated by living organisms with different functions (primary producers, consumers and decomposers), and abiotic processes, each operating at different spatial and temporal scales. Some fundamental structures (biotic and abiotic elements) and processes (entailing flows of matter and energy through trophic levels) underpin each system. A relatively low number of key variables can therefore describe the state of such systems [54]. Under this conceptualization, multiple stable states are possible, and resilience is “the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behaviour” [50] (p. 4) or “the capacity of a system to experience shocks while retaining essentially the same function, structure, feedbacks, and therefore identity” [54] (p. 2). Shocks may alter the system, pushing it towards another stable state—different from the previous one—but the system maintains its key characteristics and processes.

As a descriptive ecological concept, we may receive resilience as a technical, neutral term, representing an emergent property of system. Ecosystems obey the non-reducible property: the property of the whole is not reducible to the sum of the properties of the parts. This applies across hierarchical levels and spatial scales. The properties of a certain level of organization—either functional or spatial—cannot be derived by just examining the properties of the below level. A major implication is that emergent properties can be seldom measured directly, because we can apply a certain metric only to measure one specific process at one specific level of organization/scale.

Importantly, resilience is one specific property of systems, and scholar rigor would require that it be not confounded with, or used in place of, other descriptive ecological concepts. For instance, resilience is different from resistance: the latter (also called robustness) is the ability of a system not to change its functioning when a shock impacts on it. Hence, a system may be resistant and yet not resilient: a recently renovated urban neighborhood can comprise anti-seismic buildings able to resist even high magnitude earthquakes, but property owners and the community may not recover swiftly after a very major earthquake that exceeds the robustness of buildings crashing them down, because of the high investment costs of the reconstruction. The combination of resistance and resilience makes up homeostatic behavior.

Other complex systems' emergent properties, such as self-organization and openness, are connected to resilience, but they are not synonymous with it. The laws of thermodynamics ultimately rule the functioning of complex systems, and the dissipation of energy sustains self-organization and adaptation. Dissipative structures emerge spontaneously in hierarchies of larger and smaller spatial and temporal scales [55].

It soon became clear that transferring the engineering and ecological conceptualizations of resilience to urban and spatial planning—and even more to the analysis of cities and regions—would meet with puzzlement and harsh criticism. Socio-ecological systems are too complex to be described in terms of distance from a single- or even a multiple-equilibrium state. Against this background, evolutionary resilience [7] was conceived and got a foothold, including in spatial planning. This conceptualization has also been termed socio-ecological resilience [56,57] and adaptive resilience [12,13]. In the remainder of the paper we refer to it as evolutionary resilience for the sake of simplicity, and we describe it in the next sub-subsection.

2.3. Evolutionary Resilience in Complex Socio-Ecological Systems and in Planning

Evolutionary resilience finds its hard-science underpinning in Gunderson and Holling's theory of adaptive cycles or Panarchy [50]. They postulated that complex systems undergo four distinct

phases of growth or exploitation, conservation, release or creative destruction, and reorganization. Such phases are rarely cyclical and may be conceptualized as a series of nested interacting cycles. In this frame, (evolutionary) resilience refers not only to the ability of bouncing back but also to the capacity of a system to adapt and transform; it is about building “safe-to-fail” systems that can not only bounce back from shocks but also “bounce forward and constantly enhance their performance and adaptive capacity” [12] (p. 6). This conceptualization is more suitable to deal with problems like the organization of cities and regions as it explicitly recognizes the inherent complexity of socio-ecological systems. Under the evolutionary resilience perspective, systems change not only as a response to sudden major shocks but also for slow, incremental changes over long time periods [1,7,13].

The broadening of the use and understanding of resilience over time called for clarification and systematization amongst scholars. Brand and Jax [52] identified 16 different definitions of resilience and classified them in three classes. The first one comprises all definitions intending resilience as a descriptive concept, including the well-known ecological definitions, plus others from sociology and ecological economics. The second class contains definitions of resilience as a hybrid concept, i.e., including both descriptive and normative features. Definitions in this class refer to the capacity of delivering ecosystem services, emphasize coupled socio-ecological systems; and conceive resilience as an overall way of thinking, a collection of ideas about how to interpret complex systems. The third class includes understandings of resilience as a purely normative concept, including metaphoric ones by which resilience is something desirable; and sustainability-related notions focusing on the maintenance of natural capital in the long term.

Turning to planning and urban resilience, Eraidyn [1] identifies three constitutive elements of resilience in planning: adaptive capacity, self-organization and transformability. This approach is in radical contrast with the “conservative” one, i.e., the notion that resilience signifies the ability of returning to the previous state. Albers and Deppisch [8] identify eight principles for urban and regional resilience: diversity, redundancy, flexibility and adaptability, modularity, interdependency, stabilizing and buffering factors, mobility, and planning and foresight. For Sharif and Yamagata [12,13], the essential principles of urban resilience include the previous four ones, plus robustness, stability, resourcefulness, coordination capacity, modularity, collaboration, agility, efficiency, creativity, equity, foresight capacity and self-organization.

In a much-cited paper, Meerow et al., [6] (p. 39) propose a definition that aims to keep together different concepts of evolutionary resilience: “the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity”. Along similar lines, Sharif and Yamagata [12] (p. 7) define it as the ability of urban systems to develop short-term coping and long-term adaptation strategies over a range of spatial and temporal scales to mitigate hazards, withstand shocks, bounce back to baseline functioning, and adapt to disruptive events by bouncing forward to better configurations. Other recurrent concepts associated to (or explicitly defining) evolutionary resilience as approached in the fields of urban studies and spatial planning are the capacity of communities to learn by doing and self-organize, and the importance of stakeholders’ involvement, public participation and capacity building [1,7].

A major alleged merit of the resilience framework is that it can enable communication and foster cooperation between different disciplines, providing a common discourse and organization platform that can incorporate and accommodate different approaches, working at the intersection of different knowledge domains. We elaborate further on this role of resilience thinking in the next section.

3. The Mobility of the Resilience Concept across Disciplinary Boundaries and Social Worlds

Evidence of competing definitions, contested interpretations and divergent applications of a concept, of the like of those that have been reported in the previous sections regarding resilience, hints

at a widespread interest and at the crossing paths (and clashing encounters) that enable intellectual interaction across disciplinary, sectoral and cultural boundaries.

A mix of popularity and endless dispute is the common fate of both middle-range concepts and higher-level entities, and scholars have in response elaborated many frameworks to grasp the dynamics that might underpin its development.

As early as when Gallie [58] put forward the idea of *essentially contested concepts* in 1956, he had identified some main explanatory factors of such conundrums:

- the appraisive character of a concept, i.e., the concept entails a value judgement on an achievement,
- the achievement is internally complex, constitutively ambiguous and inherently open (and hence, persistently vague);
- the advocates of any specific use of the concept know that other parties contest it and will appreciate the rationale of competing claims.

As a contested concept [14], resilience followed in the footsteps of other candidates for a paradigmatic role in spatial planning, such as sustainable development [59,60] and smart city [61].

Since this work investigates the prospects for intentional efforts that work around the concept of resilience to cut across disciplinary boundaries and social worlds to advance spatial planning theory and practice, we scrutinized other approaches that seemed more relevant. In doing so, we were interested in the potential contribution of resilience to both trans-disciplinary research methodology and the research-policy-practice interface [62].

Most tools of thought that are supposed to fill these gaps have been termed after spatial or topological metaphors, beginning from the self-explanatory category of bridging concepts. In climate adaptation research and policy, resilience may prove an effective bridging concept, provided it is understood as a malleable, open conceptual framework for interaction between scientists and stakeholders (turning to resilience thinking rather than to resilience as an analytical tool) and as long as it taps into mutual and common learning among participants to incorporate a downstream normative dimension and to become tightly context-specific in terms of ontological and epistemological perspectives [63].

The prerequisite of specification seems to be generally assumed also when focusing on applications in the planning domain. Specification may be needed on both sides of the divide when, for instance, the synergies between evolutionary resilience and interpretive planning are highlighted, while warning against the risks brought about by the translation of concepts from the natural to the social sciences—as in the continuum ranging from the self-organization of ecological systems, self-reliance of local communities and the retreat of governments from their responsibilities in socio-ecological governance [7]. Indeed, planning scholars have identified ‘translation’ between different disciplinary languages as a critical role for planning theory [57,64].

The need for specification may prove even more useful to first unravel and then handle, the implicit normativity embedded in weighing the desirable and undesirable aspects of resilience. Hence, after reviewing resilience-with-adjectives phrases (perverse, unhelpful, wicked resilience) or synonyms (path dependency, institutional inertia, lock-in), that convey negative connotations, a case can be made for adopting further complementary concepts to bridge those critical approaches that have been so far affected by a disciplinary silo effect, and help make sense of the interrelations between resilience, sustainability and transitions [65].

Beyond the longer-standing role of metaphors and analogies in scientific knowledge production, the circulation of concepts, theories and methods is key to advancing the interdisciplinary practice needed to address complex problems that fall outside the remit of a single discipline [66], by promoting a dialogue between specialization and integration. It is to analyze and explain this dialogue that theories on the mobility of concepts came to the light.

Travelling concepts, as developed and popularized by Mieke Bal [67] in the humanities, help shed light on the dynamics involving what she names a “word-concept” to signal that it belongs to

a space where ordinary and theoretical language overlap. These engender controversies that can be stimulating, as long as we work through concepts in practical cases where their programmatic and normative character gets exposed along with the descriptive one, and we harness the unavoidable disputes about them on the production of knowledge. The travelling concept of resilience has been defined as a moving target, taking on different meanings depending on the context it is encountered in, but also as a mode of governance that operates by organizing configurations or assemblages “through which meanings are mobilised by particular coalitions of actors within a specific frame of reference” [68] (p. 22). Luciani and Del Curto [69] have shown how to experiment with travelling concepts as heuristic tools when they surveyed the transfer of ecological-resilience thinking to heritage and building conservation, a move that seems to raise inductive arguments (traditional and local construction practices and technologies being deemed resilient according to observation) and analogical thinking (as when translating biological diversity into cultural diversity, to postulate that the former is as conducive to natural systems resilience as the latter is key to social systems resilience).

These movements from one discipline to another were also the target of Isabelle Stengers’ [70] theorizing on nomadic concepts: the movements themselves become more important than the moving concepts as, through “operations of propagation” and “operations of passage”, they enable concepts to act as both stabilizers and agents of cultural productivity [71,72], while the exchange of concepts and models is more likely to stabilize boundaries than to abolish them [73].

It is on boundaries that we shall dwell in the remaining part of this section, as they seem to be promising artifacts to reflect on the movements of resilience across scientific disciplines and social worlds. The concept of boundary objects was introduced by Star and Griesemer in 1989 [74], who showed how different actors involved in research dealing with complex problems, produce results and advance knowledge even without reaching a full consensus on terms and conceptual frames. This applies both to scholars from different disciplines and to other actors involved in research (managers, administrators, amateurs). Each subject responds to a different rationality and approaches the problem from different viewpoints. In the process of knowledge production, these actors constantly translate, triangulate, debate, simplify and negotiate meanings to achieve results, which require substantial efforts from all involved parties. To that purpose, they develop, or resort to, “objects” that facilitate communication among different languages, jargons and conceptual frameworks.

Star and Griesemer [74] (p. 393) defined boundary objects as “both plastic enough to adapt to local needs and constraints of the several parties using them, yet robust enough to maintain a common identity across sites”. They may be concrete objects or concepts; in their first paper, the authors identified four types of such objects: repositories, ideal type or platonic objects, terrain with coincident boundaries, and forms and labels, pointing out that this classification was just preliminary. The key characteristic of such objects is that they can span across social worlds, thus facilitating communication, collaboration and cooperation within interdisciplinary communities of practice—while they help transfer, translate, share or transform knowledge, and convert it into action [75,76].

The notion of boundary objects has been since used in many fields, especially regarding complex ecological problems that require inter- and trans-disciplinary approaches [77]. Now, there is an inherent tension in the definition of boundary objects: they need to be plastic and robust; have different meanings and a common structure; inhabit several knowledge domains and satisfy the informational requirements of each of them. This tension is inherent to science, when intended as a structured social endeavor. As from its adoption by many research domains, resilience appears apt to be conceptualized as a boundary object [52], including in the urban planning field [6,12].

A certain fuzziness thus characterizes boundary objects; regardless of the stance adopted towards resilience in planning, authors concur in acknowledging that resilience has been used in a plastic, malleable and vague way [5–9,78,79]. The question is whether such malleability is a hindrance to meeting the second requisite of boundary objects, i.e., a certain robustness and the conservation of a common identity.

Brand and Jax [52] point out that all definitions of resilience they identified—descriptive, normative, or hybrid—are somehow related to the original one by Holling [42] and yet over time the term has considerably changed. They conclude that resilience has become with time a boundary object, warning however that this may hamper scientific progress given the conceptual stretching of the original ecological meaning. They suggest a clear division of labor within the scientific community, distinguishing more clearly between research efforts dealing with resilience as a descriptive concept and those that look at resilience as a malleable boundary object, designed to foster interdisciplinary work.

Interestingly enough, Star herself [80]—in her last reflections on the persisting success of the boundary object concept—noted that much of the reception had focused on the interpretive flexibility dimension, that is, “a sort of arrangement that allows different groups to work together without consensus” [80] (p. 602) or, with respect to the work processes the author valued so much, a dynamic whereby communities of practice or local groups tack back-and-forth an ill-structured concept that span different social worlds (and may be appropriated by the many because of its vague identity) and more tailored understandings specific to a social world and “therefore useful for work that is not interdisciplinary” [80] (p. 605). However, as Star warned, there are at least two other dimensions of flexible concepts that require scrutiny: as for scale, boundary concepts seem more effective at the organizational level; regarding scope, we expect a boundary concept to help communities of practice advance in their analytical understanding of both the materiality and the systemic (“infrastructure”, in the author’s words) properties of the related process or phenomenon.

Based on the highly diversified understandings of resilience that have been surveyed in the previous section with specific regard to spatial planning and urban studies [2,8,12,13], we can argue that the resilience-thinking framework offers virtually all meanings along a continuum from sheer persistence, through resistance to disturbances, to quite the opposite, i.e., the ability and propensity to change. Although, since the onset of the debate, planning scholars endorsed the latter conceptualizations (see e.g., [81]), several references to the former can be found. For instance, Davoudi [7] pointed out how the engineering, “bouncing back” meaning was predominant in many UK governmental official documents, where she detected a particular focus on the ability of local communities to face, and recover from, emergency and disasters. Of the 25 definitions of urban resilience examined in [6] (Table 1, p. 41), 10 fall in the first two broader conceptualizations, as they relate to the ability to rebound from destruction, recover from disturbance, withstand stresses, maintain current socioeconomic identity, and similar wordings.

Even under the evolutionary perspective, it proves problematic to operationalize resilience for urban and spatial planning, both conceptually and normatively [6–14,78]. By avoiding postulating the return to a “previous” state, this conceptualization relieves planners from the uncomfortable task of defining such a state, but it leaves other pressing issues unresolved. These have been effectively summarized in the literature by advancing the claim that, when speaking about resilience, one should always clarify for whom, from what, and who gets to decide [82,83]. Adopting a more formal system-theory approach, political structures, competition and cooperation processes between human groups, all interact with (and try to steer) the underlying flows of energy, matter and information. Complex self-organizing systems are constantly evolving or renegotiating their state, and the efficient appropriation of energy by human system does not uniquely determine ecosystem structure and dynamics [55]. The study of socio-ecological systems rejects an ontological dualism between humans and nature, addressing the whole-system complex dynamics of matter, energy (sociometabolism) and information from all temporal and spatial scales, including those that are uniquely human (ibid.). Accordingly, the relevance of human agency leads to a different analytical perspective whereby socio-cultural structures, history, power relationships all have a role in determining the (eco)system functioning.

In this frame, is the collection of definitions, ideas and concepts reported above still robust enough to maintain a common structure and satisfy the information needs of disciplines? Here, we intend robustness in the same sense of Star and Griesemer [74,75] i.e., as the property by which a boundary

object may have slightly different meanings in different worlds but still maintain a structure that is similar enough to make it recognizable across these worlds and enable communication and translation. This would lead to the achievement of robust findings or solutions accepted by all subjects and, hence, to coherent collective courses of action. This also entails that, at a general level, coherence is maintained “in spite of local contingencies” [75] (p. 45).

Arguably, this is not the case for ecologists and scholars engaged with system theory. We have shown in the previous section that concepts such as self-organization and robustness are specific emergent properties of systems, distinct from resilience and not deriving necessarily from the same system’s functioning mechanisms. In the first place, there is an issue of clarity and scholarly rigor, the lack of which has already been exposed and linked to lack of ecological knowledge by planners [8,84]. In its journey from a descriptive ecological concept to a broader hybrid or normative frame, the use of resilience has incorporated other originally distinct concepts, and it has become a kind of great synecdoche—i.e., a part used in substitution of the whole. Similarly, some authors referred to it as a metaphor [1,52,57,85] or a narrative [3].

In fact, an array of problems emerged when trying to operationalize resilience in planning, by defining—following Star [75]—what courses of actions we should pursue to achieve or maintain resilience. Even if we restrict the focus to the ability to absorb and recover from a shock, then this process of definition depends on which disturbances we are considering: an earthquake, flooding, a financial crisis, a pandemic? The characteristics that determine the ability of a city or a region to be resilient to distinct shocks, stresses or shifts are considerably different—even opposite. Difficulties cannot but increase when the concept of resilience is stretched further to include more system properties, as under the evolutionary conceptualization. For instance, conceptualizing resilience as adaptation to a new situation instead of (or besides) the ‘bouncing back’ notion poses similar questions on whether the system should be highly adaptable to specific threats (high adaptiveness) or be generically and shallowly adaptable to different new situations [41]. Therefore, it is problematic to define “resilient” urban designs or land-use patterns. Any meaningful metric or indicator must specify which components of the urban system are being evaluated against what disturbance [13]. As a result, very different planning solutions may be claimed to be equally resilient: low densities neighborhoods with detached generating high land consumption may not be good for flooding or against big storms, compared to dense, compact areas with high buildings, but the latter may be more vulnerable to the spread of an infectious disease. Attempts to measure urban resilience through the other system’s properties, e.g., connectivity, inevitably have to acknowledge that higher connectivity might also determine that shocks spread more widely and quickly, a proof of the “double-edged sword that connectivity represents for resilience” [86] (p. 207). Similarly, interdependency can promote communication and exchange, but modularity can prevent that a failure of a single part affects the whole system.

Overall, any attempt to operationalization will inexorably bump against the different conceptual tensions discussed so far, which can be summarized as referring to the definition of clear system boundaries (e.g., what is “urban” in urban resilience), the notion of equilibrium (single, multiple, non-equilibrium), the different foci on persistence, adaptation (general or specific) or rather transformation, and the timescale of actions [4]. However, as discussed above, the capacity of enabling coherent courses of actions despite local contingencies is ultimately what defines a boundary object.

While looking at the role of resilience as a boundary object in spatial planning theory and practice, we keep this excursus on the mobility of concepts in mind to dwell on its contribution as a conceptual framework to understanding how disruptive events (real and imagined) affect the capacity of complex territorial systems to adapt and change [87], and the ensuing risks. To that purpose, in the following section we address the relation between resilience and sustainability in planning and, subsequently, we elaborate on the political implications of the resilience turn.

4. Synergies and Divergences between Sustainability and Resilience from a Planning Perspective

Along the journey described in the previous section, the concept of resilience evolved from its original meaning of a property of materials, through its understanding as a key feature of complex systems to what is now used in policy making and research either as a descriptive concept, a normative frame, or a hybrid between the two [52]. Thus, its relation with sustainability from a planning perspective may be addressed along these lines. Whilst here we dwell on the difference between the planning approaches inspired by, respectively, resilience or sustainability, we acknowledge that they may largely overlap. What we wish to emphasize is that synergies cannot be taken for granted, as they depend on the conditions of the territorial system under investigation, on the specific elements one wants to preserve and on the values that are adopted as guiding principles.

The first point—the most common critic to resilience as a normative or hybrid concept—is that any conceptualization revolving around persistence, in the postulation of either a return to a “previous state” or of a shift to a different state where the system keeps its main functions and structure, is not necessarily desirable [5–7]. Who defines what is a desirable state and what does normality entail? What if a resilient socio-ecological system entailed dictatorship, high reliance on fossil fuels, social inequality and so on? [85,88].

From a more formal system-theory perspective, the overarching issue is that resilience of socio-ecological systems may entail the continuation along unsustainable trajectories. Derissen and coworkers [23] argued that even in a relatively simple socio-ecological system, no general deduction from sustainability to resilience, or vice versa, is possible. Whilst in some circumstances resilience to external shocks is necessary or even sufficient to guarantee system’s sustainability, this causal relation is not generalizable but rather conditional on the system’s initial status, its configurations and internal dynamics. The authors maintained that a fortiori this is valid for more complex systems and, in discussing the implications for management, they concluded that resilience and sustainability represent independent concepts characterizing systems’ dynamics. Other studies provided similar conclusions [26,29]. It does not follow that resilience and sustainability are in contrast, although synergies between the two dimensions will be highly context dependent.

A second point of tension concerns the unknowability of the future. The epistemology underlying the resilience-thinking discourse predicates that the future is too uncertain to be predicted [5,7,78,89]. This is true also in the evolutionary resilience approach, which reflects a paradigm shift in how scientists think about the world: not anymore as something “orderly, mechanical and reasonably predictable” but “chaotic, complex, uncertain, and unpredictable” [7] (p. 302). Hence, this perspective entails that the focus of human agency shifts from envisaging future scenarios and facilitating the related transitions, to improving the ability to adapt and to react to change, once it occurs [78]. By focusing on adaptive capacity and preservation of certain system properties, the resilience approach is concerned with processes rather than with outcomes [24,26,29]. Conversely, sustainability approaches examine alternative future scenarios, put a great emphasis on attributing values to them and strive to envisage effective strategies to pursue the collectively chosen objectives [24]. Even the evolutionary resilience framework that departs from the bouncing back notion to advance more progressive views, still faces two deep epistemological issues. Regardless of whether the approach favors bouncing back or forward, the underlying epistemology is that there is a system with certain features and an internal functioning mechanism that is impacted by a shock or disturbance that alters its normal functioning. This duality is at the core of the approach: the disturbance is considered as something coming from outside the systems, it is not inherent to its normal functioning. What causes the disturbance is not the key point in the resilience discourse, what matters is how the system reacts. When dealing with complex socio-ecological systems, such a schematization rarely holds. Even if we focus on resilience to natural disasters, only few shocks (e.g., earthquakes) may not be related to the functioning of the system. All climate-related events like flooding, hurricanes or heat waves are affected by anthropogenic greenhouse gas emissions, thus being related to the very functioning of cities and territories. In shifting the focus from the causes to the response to the crisis, the resilience-thinking approach diverges from

the sustainability one, whereby transformation may require more radical changes to the very systems' structures and dynamics, once they have been recognized as untenable or unjust [24,25].

For example, the 2008–2009 financial crisis is widely portrayed in official accounts as an example of external and unforeseeable shock (see e.g., [89–91] for critical reflections). It started as a subprime mortgage crisis following the burst of the real estate bubble: hence, from a planning perspective, should it be considered an “external shock”, or was it the outcome of what was considered until then the ‘normal functioning’ of that system, which includes the planning activities that facilitate it or failed to prevent it? The real estate bubble would have not been possible without prior authorization of new urban developments by land use plans and was exacerbated by specific planning choices. For example, Chakraborty and coworkers [92] investigated the relation between municipal land use plans, with special regard to zoning, and the risk of foreclosure in 129 municipalities from 6 major urban areas in the US. They found that certain municipalities, those with less diverse housing stocks and higher shares of mono-functional residential areas zoned under low and very low density, had a higher risk of foreclosure. The typical suburban expansion model of single-family detached houses proved to decrease the ability of borrowers to pay the loans, given higher costs for commuting, higher house prices, and lack of different price options for different income groups (ibid.). Thus they identified a direct causal relation between planning choices and the “shock” of the real estate bubble burst. Similarly, the effect of climate-related disasters, such as flooding, cannot be considered separately and independently from the vulnerability of the system as a result, among other factors, of previous planning choices, for example allowing urban development in flood-prone areas or promoting low-densities urbanization that increase soil sealing. That is to say, the inner dynamics of the planning system under its “normal” functioning may be among the drivers of the shock.

A further potential tension between resilience and sustainability concerns the spatial and temporal scales of action. While sustainability approaches tend to frame local problems in the broader picture of global dynamics, adaptive strategies are often specific and local [24]. In resilience thinking, emphasis is more often put on the “local” as the preferred level of action [1] and on the celebration of local knowledge and local entrepreneurship [89,93]. However, the “local turn” in spatial planning has been subject of criticism as a way to further weaken statutory public planning [94] and on the basis of the dysfunctionalities that occur in very fragmented planning systems when many local authorities act in an uncoordinated way [95]. Similarly, whilst the time horizon of sustainability is by definition the long run, resilience thinking tends to focus on short-term responses [24–26,29,30], which may prove unsustainable in the longer term [30]. Furthermore, resilience at one temporal or spatial scale may be achieved at the expense of another [6,26,28]. Linked to this is the consideration of equity: whilst inter and intra-generational equity, as seen, are core elements in sustainability, resilience does not imply nor requires equity [25].

To this regard, though empirical research on the actual outcomes of planning for resilience is still relatively limited [96], some recent studies seem to confirm that it tends not to incorporate equity and social justice. An interesting case is provided by the New York City (2016) strategic planning process where the impact of a climatic event (Hurricane Sandy) in 2012 might have facilitated a shift in planning discourse from sustainable development to climate adaptation [97]. In the 2007 PlaNYC strategic plan, the focus was on creating “a greener, greater New York”; and the plan’s contents covered aspects that relate to affordable housing, green spaces, waste management, clean air and energy. Planners addressed climate change mitigation in terms of the reduction of greenhouse gas emissions. In the 2013 update, drafted in the disaster’s aftermath, the vision is no longer on building a green sustainable city, but “a stronger, more resilient” city, by enhancing the resilience of New York’s key infrastructures, networks and utilities. Overall, Fainstein [98] described this shift in planning focus as a way to obscure distributional impacts and contribute to the interests of developers. Anguelovski and coworkers [99] examined eight cases of cities that adopted diverse planning strategies, explicitly aimed at climate adaptation or disaster risk reduction and to promote resilience, and found that planning outcomes reinforced historic trends of socioeconomic vulnerability and created new sources of inequality.

A wider analysis of how equity and justice were considered in a sample of 31 “City Resilience Strategies”—an initiative funded by the Rockefeller Foundation aiming at mainstreaming resilience thinking into urban planning—found that, overall, the examined strategies had not inherently focused on issues of structural inequality and that actions focusing on inequality and justice were piece-meal across participating cities [96]. According to a critical account of the results of the same initiative in two Indonesian cities [100], the resilient strategies ended up favoring the marketization of the city, but also encountered opposition from the local communities. A more nuanced evaluation of the same initiative [101], but limited to the analysis of 10 cities (nine of which are in the US) concluded that, whilst resilience may not be inherently antithetical to equity, there are some general areas for improvement.

Based on a preliminary survey of planning processes, the actual implementation of resilience planning on the ground seems to date to be not adequately considering inequalities and justice, and to overlook the ecological limitations to human development.

In summary, in terms of system theory, we can render the resilience vs. sustainability debate by stressing the former’s focus on adaptation against the latter’s propensity for transformation. Adaptation calls into play incremental changes and thus is more conservative in nature. Transformation, conversely, entails a more radical change in the system’s organization, towards specific objectives and outcomes, and is therefore more in tune with sustainability science [24,25].

From a planning perspective, this calls into question what the overarching purpose of planning should be. The tension between resilience and sustainability and the internal contradictions of resilience-thinking ultimately emerge because of the shift of resilience from a descriptive concept to a normative or hybrid one. If resilience is adopted as a descriptive concept, with no normative aspects attached to it, it can be used as a valid technical tool to support any planning process. Planners have nothing but to gain from becoming more familiar with it and, more in general, with complex systems theory. However, as Derissen and coworkers [23] put it, the property of resilience should not be confused with the positive normative connotations of sustainability, and, vice versa, other criteria rather than resilience alone have to be taken into account when planning for sustainable development. In this context, planning may be understood as intentionally interfering with the socio-spatial processes that produce the cities and other territorial arrangements [102], by engaging with future scenarios, integrating normative values into decision making through open, deliberative processes, while promoting transformative changes when the current situation is neither addressing structural power imbalances nor delivering well-being and equity—within planetary boundaries—and envisaging pathways to progress towards more collectively desirable conditions.

To sum up, adopting resilience thinking as a broader frame for planning compared to resilience as a descriptive concept may imply a retreat of planning from its normative dimension into a more technical activity focused on process rather than outcomes. The “political” may therefore be further subtracted from planning’s purview, thus reinforcing a trend that many scholars have identified and discussed under the label of “post-political planning”. This is understood as a condition where contestation and conflicts are replaced by consensus-based politics in ways that foreclose anything but narrow debate around a pre-defined agenda, which in turn is often dominated by the interests of the most powerful actors, as in neoliberal growth policies [103]. This is in line with above-mentioned warnings made by scholars of a neoliberal use of the resilience-thinking frame, in policy making in general [89,90,104] and specifically in planning [7,78]. Hence, further research shall explore more in depth the relation between resilience planning as theorized and practiced and the post-political planning frame.

5. Conclusions

In this paper, we discussed the evolution of the use of the concept of resilience in spatial planning. After reviewing the diverse roots of resilience in engineering, ecology and complex systems theory, we elaborated on its potential role in bridging disciplinary domains and policy-making sectors. To do so, we identified the theory of boundary objects, among alternative but related approaches, as a

guiding analytical construct to investigate the use of resilience by planning theorists, practitioners and authorities. Following this line of research, we were inexorably confronted with the problematic relation between resilience and sustainability, from a planning perspective. Our conceptual study, along with a preliminary survey of resilience planning processes (as reflected in the relevant literature) does not predicate a dichotomy between resilience and sustainability but rather acknowledges that there may be synergies between the two, particularly with regard to a deeper understanding of the dynamics of socio-ecological systems. However, we argue that the shift in dominant meaning of resilience from a descriptive concept, signifying a specific property of systems, to a broader conceptual framework laden with normative components, is bound to generate some remarkable tensions. These revolve around three central aspects in the resilience-thinking frame: (i) the unknowability and unpredictability of the future, whence a different focus of sustainability and resilience on, respectively, outcomes vs. processes; (ii) the ontological separation between the internal components of a system and an external shock; (iii) the limited consideration given by resilience thinking to inter- and intra-generational equity, which are instead central in the sustainability discourse—although often considered as its weak legs in policy implementation [60]. Empirical evidence on the actual implementation of resilience planning on the ground, though still limited, seems to confirm these trends and therefore calls for keeping a critical eye on the use of the concept.

Planning as we intend it is about promoting transformative changes in territorial governance, engaging with long-term perspectives, and negotiating values through open, deliberative processes, while addressing power imbalances and creatively envisaging pathways to secure human wellbeing within planetary boundaries.

We therefore advocate to refocus the attention on sustainability as the guiding paradigm of spatial planning, while resilience can and shall be used as a useful descriptive concept indicating a specific property of complex system. This could go hand in hand with enhancing the knowledge of the basic complex systems theory and concepts by planners. The sustainability framework—imperfect and contested as it may be—entails a normative and transformative component that resonates with the very *raison d'être* of planning.

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