



Article

Maladaptive Planning and the Pro-Innovation Bias: Considering the Case of Automated Vehicles

António Ferreira ^{1,*} , Kim Carlotta von Schönfeld ² , Wendy Tan ^{2,3} and Enrica Papa ⁴

¹ Centre for Research on Territory, Transports and Environment, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

² Department of Environmental Sciences, Wageningen University and Research, Droevendaalsesteeg 3, 6708PB Wageningen, The Netherlands; kim.vonschonfeld@wur.nl (K.C.v.S.); wendy.tan@wur.nl (W.T.)

³ Department of Civil Engineering, Western Norway University of Applied Sciences, Inndalveien 28, 5063 Bergen, Norway

⁴ School of Architecture and Cities, University of Westminster, 35 Marylebone Road, London NW1 5LS, UK; e.papa@westminster.ac.uk

* Correspondence: acf@fe.up.pt

Received: 4 August 2020; Accepted: 27 August 2020; Published: 1 September 2020



Abstract: This article argues that a more critical approach to innovation policy within planning is needed and offers recommendations for achieving this. These recommendations entail rethinking the values, focus, speed, and legitimacy of innovations. It takes a critical perspective on how contemporary societies treat rapid innovation as having necessarily positive results in the achievement of objectives such as sustainability and justice. This critical perspective is needed because innovation can both contribute to and drive a form of *maladaptive planning*: a collective approach to reality that imposes constant and rapid changes to societal configurations due to an obsession with the new and with too little rapport with the problems in place or that it creates. A maladaptive direction for transport planning is used as a sectorial illustration of the broader conceptual ideas presented: for both sustainability and social justice reasons, it would be desirable to see *peak car* occurring. However, the car industry is presenting driving automation as an innovation with the potential to restore the vitality of the private vehicles market while creating effective means to dismiss alternatives to car dominance.

Keywords: innovation; responsibility; evolution; maladaptation; contrived change; automated mobility; automated vehicles

1. Introduction

This article aims to challenge the dominant innovation logic applied today in planning generally and in transport planning particularly. In our view, this logic is not sufficiently self-critical and is leading policy-makers to actively engage with what is referred to here as *maladaptive planning*. This innovation-driven form of planning is characterized by the imposition of constant and rapid changes to existing configurations beyond (or instead of) what is constructive. This leads it to fail to address emerging problems while creating unnecessary risks and new problems for urban areas and their citizens. That is, in policy-making environments dominated by maladaptive planning, social and technological configurations change for the sake of changing due to a fascination with innovation as a meta-goal of public policy [1,2] and with too little rapport and concern with the problems being faced on the ground—as warned against by UN-Habitat ([3] p. 95).

It is well accepted today that the fast-paced and unchecked development of an increasing number of so-called *smart* technologies, propelled by the driver of technological innovation, represents a

massive governance and research challenge, as well as a substantial source of social, economic, and environmental risks [4–10]. These risks are being accepted because innovation as an intrinsically positive value has found a stronghold in contemporary societies, policy-making circles, and academic communities [7,11]. The so-called *pro-innovation bias* [7] is now well-established. For example, innovation has been positioned as essential for the economic growth of urban areas as they compete for limited resources [12]. This has happened without a serious reflection about whether innovation, and also urban competition and even economic growth, are desirable to address the problem of urban resource scarcity [13–15]. As a result of the pro-innovation bias, a growing number of authors and institutions have been asking for more technologically and socially innovative policies, technologies, and initiatives to be implemented at an increasingly faster pace (e.g., [16–21]). The time is ripe for planners to stand back for a moment from this innovation-driven Great Acceleration [5,6,22–25] and to carefully think about what is being gained or lost due to it. Without wanting to argue that innovation is necessarily problematic in all circumstances—as in many cases the best approach might be, indeed, to innovate (for examples of arguments in favour, or supportive, of innovation, see [20,26–31])—we actively want to spark a lively debate about this topic by adopting a purposefully critical and radical approach to innovation.

The argument defended by pro-innovation stakeholders is that a number of problems, such as economic underperformance, poor health, lack of environmental sustainability, and social exclusion, can (and must) be resolved through constant, disruptive, and rapid innovation (see, for example, [16,18,20,28,29,32,33]). However, there is increasing awareness that, if poorly governed, innovations can be applied too fast and irresponsibly [34,35]. Innovations can also be unhelpful or even destructive [8,9], can have unintended and undesirable consequences [7], and can damage democracy due to the inescapable incapacity of democratic institutions to quickly respond to excessively rapid and radical changes [6]. Promoting continuous and rapid changes through repetitive rounds of disruptive innovation can disconnect solutions from the problems they mean to address and lead to the proliferation of pointless novelties [9]. In fact, excessively rapid and uncritical innovation can foster the implementation of contrived policies likely to become sources of new problems (and therefore contribute to the gradual accumulation of unresolved problems) and where, paradoxically, the benefits of previous innovations are not explored while new innovations are already emerging [36,37]. It has been shown that innovation-oriented urban policies can serve little else than the interests of predatory forms of capitalism in repetitive rounds of urban regeneration, gentrification, and urban obsolescence [38–41]. All these above mentioned examples are potential drivers of what this article refers to as maladaptive planning.

Following Godin [42], innovation can be defined as a non-trivial and novel change in established institutional structures, social practices, technologies, artefacts, symbols, or narratives. As innovations have different scales of magnitude, Freeman and Perez [43] proposed the now classic taxonomy for innovations: incremental (likely to continuously occur within a given organization or sector); radical (typically resulting from carefully crafted collaborations between governments, research institutions, and the private sector); changes of the technological system (with the potential to lead to consequences in several activity sectors); and changes of the techno-economic paradigm (which represent mutations at a societal level). This taxonomy suggests that important synergies between innovation studies and evolutionary theory could be identified. For this reason, the article uses some aspects of evolutionary theory (see, for example, [44–48]) in an exploratory way to address the proposed topic. We have adopted an approach to evolutionary theory that is based on four key sequential principles: (i) generation of alternatives for future initiatives, (ii) competition among alternatives and reduction of variety through some mechanism of assessment; (iii) selection for implementation based on the assessment; and (iv) dissemination. These principles serve to structure the argument of the article.

It should be acknowledged that there is the potential for major evolutionary improvements to result from high-magnitude innovations, particularly when they resolve crucial social or environmental challenges created and or maintained by the existing lock-in. As noted by Boon and Edler [49], recent developments in innovation policy are seeking to harmonize emerging innovations with grand

societal challenges such as climate change and ageing populations. There are, however, other ways to achieve constructive outcomes beyond innovation. These include, for example, the return to abandoned historical configurations that, seen retrospectively, provided simple but sound solutions: Consider the case of promoting cycling in contemporary cities as a means to achieve sustainable and active mobility. Similarly, producing and consuming less, and exploiting natural resources more sparsely and respectfully, might be the solution for many of the problems that affect contemporary societies beyond the need for any type of innovation [50,51].

This article is based on a systematic review conducted by the authors of the literature concerned with innovation, sustainable mobility and transport automation, and evolutionary theory applied to urban and transport planning. This led to a collective debate and reflection that has culminated in the production of the present article. From this joint reflection, it became clear that planning—and particularly transport planning—has not yet fully engaged with an emerging branch of more critical literature concerned with (responsible versus irresponsible) innovation. This systematic literature review has also shown that there is a significant lack of synergies between innovation scholars and those engaged with evolutionary theory. These knowledge and research gaps are probably leading transport planning organizations to implement policies and initiatives that are not as informed as they could be. Hopefully, the present article will serve to partially address this research gap and planning issue.

Before concluding this introduction, it is important to clarify that the article was written using a critical and somewhat radical voice. This choice was purposefully made to spark reactions and induce debate. The reader should therefore be aware of this intention and subsequent choice in terms of writing style while reading the article, which is structured as follows. In the next section, we critically discuss the complex subject of innovation and some of its interconnections with the planning field. After this, we present our approach to evolutionary theory. This allows us to offer an evolutionary reflection on innovation, making use of the example of automated vehicles for illustration. Even though we use an example from transport, the argument has cross-sectoral relevance, and it could have been illustrated with a variety of examples from other fields of activity without any connection with either transport or urban planning. We conclude the article with some policy implications and summarizing thoughts.

2. Innovation in Planning: A Most Needed Critical Perspective

Innovating is defined here as a process that alters the existing order through novel changes in institutions, technologies, social practices, and understandings [7]. In contemporary language, the word *innovation* is often interchangeably used as referring to the act of innovating (process); the result of that act, that is, the innovation itself (object); or the positive quality of something that is simultaneously considered new and good (value). In alignment with the nature of our argument presented below, we have refrained from considering “innovation” or “innovative” as intrinsically positive qualities of a given object or process. This implies that innovations can be both constructive and problematic for the public interest—as highlighted by researchers concerned with responsible innovation [34,52,53].

The positive connotation contemporarily given to the innovative is a recent phenomenon. Godin [42] shows that the concept of innovation has experienced five stages across history. First, innovation was seen as a forbidden concept. For example, during the Renaissance, innovation was considered heresy. Second, from the 17th century, it became a polemical concept and a rhetorical device to combat rapid and radical change. Innovation then became a pejorative term to be used against those attempting to change the establishment. Third, from the 19th century, innovation started to be seen as a positive concept and a means to achieve economic gains, although those undertaking innovations were not yet given much credit. Fourth, around the 1960s, innovation became a fully-fledged concept receiving positive attention, especially from economic theorists. According to Godin, the fifth and current stage corresponds to a situation where contrived change (that is, innovation for the sake of innovation) is uncritically accepted as positive by a variety of organizations and political forces.

This means that creating novel technologies, organizations, practices, and understandings is now seen by several key innovation stakeholders as an intrinsically desirable meta-goal of public policy to be transversally applied to all policy-making fields, from education to health and from immigration to transport [1,19,20,33]. As Godin ([42] p. 53) notes, today ‘innovation has turned into a catchword or a buzzword, with a legitimizing function’ frequently used to attract funding, sales, and attention.

Soete [54] argues that innovation is today frequently used as a form of destructive creation (in opposition to creative destruction), that is, innovation serving the interests of the few against the public interest. Innovations aimed at promoting planned obsolescence of technological devices are an example of destructive creation. Paradoxically, and even though planned obsolescence is essentially unethical and against the public interest, contemporary societies became very receptive to so-called innovative technologies that were designed according to the principles of planned obsolescence and that are, therefore, unlikely to work for long while creating massive waste problems. Urban planning has not escaped the logic of obsolescence and has, to a large extent, integrated it in the way it deals with space. This is to be observed in a number of urban regeneration processes and experiments across the world, where the obsolescence of the built environment is in many cases cyclically used as a means to serve the vested interests of the elites [38,39,55,56]. In line with this, a growing number of authors is alerting that planning is becoming increasingly bound to use innovative approaches to facilitate capital accumulation for the exclusive benefit of the super-rich [14,40,41].

The high value given to fast and frequent innovation is also problematic for learning. As Sveiby [35] alerts, regular and rapid changes make it difficult to learn about the emergent socio-technical configurations before they become obsolete and the next set of skills needs to be developed. This can lead both individuals and organizations to respond to problems and events in ways that are downright inappropriate. In Sveiby’s view (but see also [54]), the 2008 economic crisis was, to a large extent, the result of excessive innovation in the financial sector, disabling the capacity of finance agents to understand what was happening and the risks they were taking.

As long as innovation is credited as a public goal in itself, it can distract policy-makers from public goals proper, such as promoting sustainability and justice. This happens because the relationships between means and ends are harder to discern in the case of sustainability and justice than when means and ends are one and the same, as happens in the less critical (but very dominant) strands of innovation policy where implementing innovations is desirable in itself because it is innovative. This is a circular logic, but an effective and resilient one in contemporary discourses and policy-making (see, for examples, [9]). There is, indeed, some advantage for the advocators of any idea to intertwine means and ends because that makes it more straightforward to politically sell the idea, implement it, and claim that it was successful. It is easy to claim that an innovation-oriented policy was successful because it led to the implementation of innovations (due to the self-fulfilling prophecy logic of such reasoning). Conversely, it can be quite difficult to claim that a sustainability-oriented (or social justice-oriented) policy was successful, as sustainability (or social justice) is harder to achieve and consensually measure. The benefits for policy makers of intertwining certain means and ends are therefore clear.

Sen [57] argues that a given course of action can only be considered more desirable over others if it leads to more effective end benefits than its alternatives, and not simply because it is characterized by a given design feature (such as being innovative). In line with this, we propose that it is worthwhile and necessary to continue making the effort of separating means (such as innovating) from proper public goals (such as sustainability and social justice), as this is a key precondition for the critical analysis of the efficacy of choices. Moreover, considering that it is necessary to implement an innovation to solve a problem can, de facto, serve to make it difficult to effectively solve the problem because the best solution for the problem might not be innovative. Due to this possibility, the pro-innovation bias can also serve to force problem-solvers to engage in questionable rhetoric exercises to present the adoption of a traditional solution as being innovative [58].

Furthermore, as discussed by Krüger and Pellicer-Sifrean [59], an excessive focus on innovation can mislead collective judgement and decision-making, leading policy-makers to believe that only

through innovation can constructive changes emerge (therefore dismissing alternative possibilities such as self-empowerment and the return to solutions effectively used in the past); it can lead to the excessive activation of not yet fully drained personal, social, and environmental resources; and it can contribute to downplaying the importance of maintaining democratic debates when seeking solutions to wicked problems—as a fiction is created where forthcoming novelties will allegedly be able to solve all sorts of difficulties in a constructive and harmonious way. Additionally, the same authors argue that this focus on innovation can downplay the value of traditional lifestyles, which are rendered outdated even though they might have solutions for many of the socio-ecological problems that innovations are supposed to solve (see also [58]).

However, the current social and economic order imposed by Big Tech firms, and specifically those that promote surveillance forms of capitalism, requires the legitimization of constant and rapid innovation to maintain their own dominance. Big Tech firms need the constant growth of data acquisition means so that they can successfully continue their business of data extraction from individuals, prediction of their behavior, and sales of these predictions to other companies [60,61]. This is a key challenge that Big Tech firms experience today, which Zuboff [61] calls the data extraction imperative. As we will see, automated vehicles are a key element of the strategy to satisfy the data extraction imperative of Big Tech firms, through which they can further assert their dominance in the urban environment as a non-virtual space of data extraction and behavioral control. For stakeholders of this nature, innovation is essential because only a discourse fundamentally supportive of it can legitimize their corporate strategies.

Before continuing, it is important to note that Big Tech firms are not alone in the adoption of profit- and control-seeking corporate behavior, as well as in the adoption of undemocratic strategies. The planning and planning-related literature presents a variety of examples where capital accumulation processes have employed novel and highly ingenuous means to act against the public interest while depoliticizing institutions and downgrading democracy. This body of literature presents multiple theorizations and examples from both urban planning and land use policy (e.g., [38,62–65]) and transport planning (e.g., [66,67]). Reigner and Brenac [66] alert their readers to a particularly ingenuous, and subtle, anti-democratic trend to be observed today in transport planning: the tendency to permeate transport policies with moralistic claims (e.g., “to move without creating pollution” or “to move but without harm”). This apparently benign trend is problematic because policies implemented under such moralistic banners are very difficult to contest, even when they are creating significant problems in other, or even the same, moral terms.

In summary, and in light of the abovementioned scholarly contributions, the emergence of automated vehicles (AVs) can be seen as one of the latest developments in the process of capital accumulation, following the increasingly dominant logic of techno-finance fixing [68]. This logic is characterized by the advocacy of innovative and technologically-intensive free-market solutions (frequently saturated with moralistic claims, e.g., “human driving errors kill people and therefore driving automation is a policy imperative”) that maintain neoliberal business-as-usual while failing to address the social and sustainability problems in place. The innovation and techno-finance fixing nexus can represent a serious evolutionary problem for our societies: While their complexity increases due to constant new waves of (increasingly inept) innovations, their (very real) problems accumulate. Historically, this pattern of evolution has been associated with societal collapse [69]. This takes us to the next section.

3. Evolutionary Theory Applied to Planning Processes: A Brief Overview

Evolution is a process of change driven by dynamics of adaptation to existing or emerging conditions. When evolution is specifically seen as a concept capable of informing public policy, there is a variety of evolutionary approaches to be considered, particularly strategic niche management, transition management, and time strategies [70]. These approaches have a number of important theoretical and practical distinctions; however, they have in common the understanding that evolutionary approaches to policy-making in one way or another adopt the following basic sequential principles:

1. Promotion of variety through the creation of alternatives,
2. Assessment of alternatives,
3. Selection of one alternative for implementation in the local context,
4. Dissemination in various contexts if, when, and where appropriate.

Innovating is a process in which variety of alternatives is promoted. Therefore, it can assist the first principle of evolution. However, the alternatives can also be historically retrieved (that is, when abandoned technologies and practices are adopted again) or result from combinations of the historically retrieved with the established, the innovative, and the do-nothing alternative.

Note that the four principles do not necessarily occur in the given order. For example, some initiatives are assessed after implementation, while the promotion of variety can happen during dissemination. However, as will be discussed later, changing the sequence can have drawbacks. Note as well that the assessment of fitness is simultaneously carried out by policy-makers, funding agencies and planners, organizations, and the public, as well as by the social, economic, and natural environments. Acknowledging these human and non-human agents and their roles in evolutionary processes is relevant because maladaptation emerges from their dialectic actions and emergent relationships.

Maladaptation occurs when policy-makers, funding agencies, planners, and other relevant political stakeholders insist on proliferating and then positively assessing, implementing, and disseminating initiatives that have too little rapport with, and or are not fit for, the challenges being experienced in the social, economic, and natural environments. Alkemade and Hekkert [71] alert for the excessive orientation of innovation policy to promote competitiveness and economic growth—in many cases at the expense of environmental sustainability. With this, innovation contributes to maintaining the existing unsustainability lock-in instead of contributing to promote systemic change towards sustainability. The case to be introduced below—that of automated vehicles—is a paradigmatic example of this orientation: In a moment when *peak car* might be finally taking place (for a discussion see [72]), innovators emerge as rescuers of the car industry and car dominance.

Three clarifying remarks are necessary before continuing. First, we are not focusing on evolution at the level of individuals or species. The adopted approach is instead based on the work of theorists such as Bertolini [46,47,73], Moroni [44], and Van Assche and Beunen [45] who focus on the evolution of institutions and policy-making practices rather than of individuals. The units of analysis here are therefore policy-making practices and policies and the technologies and social practices co-endorsed by them.

Second, in our view, evolution is bereft of ethical orientations. It is not, by default, aimed at moving systems from the worse to the better, as is sometimes implied, for instance, in European Commission or Organization for Economic Co-operation and Development (OECD) documents [16–19]. In the sense we give it, saying that something is more evolved is not a statement about its enhanced qualities in comparison to something that is less evolved. Instead, it is a statement about the extent to which something has been exposed to repeated iterations of variety creation, assessment, selection, and dissemination. An example: Automated vehicles will be more evolved than those requiring a human driver, as they will be the result of substantially more evolutionary iterations. Are they better, though? Maybe not: The current debate in academic circles raises skepticism about their added value for the public interest [4,74–76].

Third, evolution simultaneously occurs within various nested evolutionary milieus. These might be associated with different and, in some cases, contradictory assessments of fitness. This leads to evolutionary paradoxes. Consider the case of climate change driven by the transport sector: The use of the automobile is an evolution supported by many societies. This evolution is problematic for the natural environment and can eventually lead to a situation in which humans cannot survive in it. This means that what can be perceived as an adaptation in a given evolutionary milieu (e.g., using private cars in car-friendly cities for private benefit) is a maladaptation in another evolutionary milieu that includes the previous one (e.g., using private cars in car-friendly cities that exist in a fragile world experiencing climate change). This paradox is at the core of our argument: Promoting innovation can

easily lead to the selection of certain alternatives that become very successful in the policy environment (and are, therefore, funded and promoted by key stakeholders). These can be, however, maladaptive in the social and natural environments in which the policy environment is nested.

4. Maladaptive Policy-Making and Automated Transport

This section will explore some possible mechanisms leading to the emergence of maladaptive policies due to an excessive focus on innovation. For this, it will use the four evolutionary principles presented above. The mechanisms will be discussed using the case of automated vehicles (AVs) for illustration.

AVs are understood here as cars with the ability to independently perform all driving tasks in any street or road environment—a definition that essentially matches the so-called “level 5” of vehicle automation [77]. Litman [78] foresees that some pioneer AV models might start to operate in some places already in the 2020s. Originally conceived in the 1940s to reduce traffic fatalities and increase safety, it is most likely that much can be gained (but also lost) from their deployment [79]. Examples of the potential benefits of such machines are: enhanced energy efficiency; reduced traffic accidents; greater mobility for disabled people, the elderly and all those unable to drive; reduction of urban areas dedicated to car parking; customized mobility services; and optimized delivery of goods—among many other possibilities. However, AVs have now become entangled in a narrative where they are presented as a silver bullet solution for the key problems experienced in the transport sector and that any problems they might generate will be addressed by additional technological enhancements. As stated by Shladover [80] p. 199, these narratives have transformed “qualified statements by system developers into seriously inflated and unrealistic interpretations” (e.g., [81]). As we will see below, the way AVs are emerging constitute an example of how innovation is driving societal dynamics most unlikely to be aligned with the public interest. These dynamics constitute a planning orientation that manifests the tendency of contemporary mobility to both reinforce and internalize risk at a systemic, quasi-ontological, level [82].

Note that maladaptive tendencies can manifest because of other drivers besides the excessive focus on innovation. For example, policy makers and public servants might become too focused on playing *blame games*, that is, they become primarily interested in protecting their own careers and agencies while attacking other careers and agencies in ways that are disconnected from the purpose of their institutions [83]. This is a specific case of a more general phenomenon where public servants develop working cultures that are focused on individual objectives misaligned with the collective objectives of the institution for which they work—a problem potentially resulting from the implementation of poor assessment metrics [84] or by excessively intricate bureaucracies [85]. In summary, maladaptive planning can be generated and aggravated by a range of factors. This article specifically discusses how an excessive focus on innovation can contribute to the emergence of maladaptive tendencies in (transport) planning. It uses evolutionary theory to structure the argument and automated vehicles as an example.

4.1. Maladaptation and the First Evolutionary Principle: Promotion of Variety through the Creation of Alternatives

Maladaptive planning practices can emerge when stakeholders engage in processes that either promote variety of alternatives exclusively within a narrow area of (their) interest or, conversely, when they block the emergence of alternatives outside that area of interest. Both situations are problematic because adaptive capacity is favored by having multiple alternatives of very different natures available when challenges appear. Even if many of these alternatives will prove to be inadequate, the more alternatives there are, the greater the probability that at least some will offer suitable responses to emerging problems. If, however, stakeholders establish excessively strong priorities for a given technological or social area or, even worse, to a given alternative within that area—see the notions of technology push and policy pull by Von Schomberg [34]—it becomes possible that the most suitable

solutions for emergent problems are to be found completely outside the chosen area of investment. This is maladaptive because collective human action leads to situations that are unfavorable to their own capacity to adjust to the unknown. This reasoning is supported by Pfothenauer and Juhl [1], for whom the narrowing of policy options is one of the consequences of the pro-innovation logic. This seems to be a paradox as, at first sight, innovation comes across as a means to expand policy options. However, in practice, the dominant pro-innovation logic systematically downgrades and alienates other logics that fail to comply with the imperative of continuously and rapidly replacing the old by the new.

Application to Automated Transport

AVs require top artificial intelligence abilities, refined motoring and safety devices, and cutting-edge navigation and communication technologies. In this sense, AVs represent not only a future vision that requires innovation to emerge, but also powerful catalysts for innovation and generators of alternatives for the future within a clearly high-tech area of development [76]. The advocates of AVs argue that these machines will lead to several benefits of great importance precisely because these machines will incorporate all these innovations. Some of the benefits they ask the public to expect are higher levels of car sharing; reduced costs of travel for people and freight; improved quality of road travel experience; reduced congestion, accidents, and car ownership; and economic growth [86–89].

However, there is a flipside to this optimistic perspective. Justified by these potential benefits (which are being questioned by an increasing number of critical authors, see [4,75,76,79]), the increased focus on AVs can lead, and probably is already leading, to decreased attention for public transport and other mobility solutions. Indeed, several of their proponents see AVs as direct competitors and as suitable replacements for public transport solutions that are likely to effectively decrease the use of such solutions (and of active modes of travel as well) [89–91]. It is still uncertain how AVs will interact with pedestrians, cyclists, and other active modes of transport [92]. In other words, focusing on AVs is likely to be associated with a decrease in attention to, and a decrease of use of, other modes of transport and, possibly, to the creation of urban environments where these other modes will be seen as undesirable or even unsafe alternatives by travelers and commuters. This is a lost opportunity for active travelling and the addressing of obesity and physical inactivity problems through transport policy (for insights on the relevance of doing so, see [93,94]).

Additionally, AVs are most likely to be part of a covert surveillance strategy promoted by Big Tech firms [60,61]. This strategy is aimed at using not only the internet, but also the (smart) city as a whole, as a comprehensive and integrated space of data collection, behavior prediction and control, and very deep commodification of human emotion, cognition, and behavior. Important questions emerge from such a possibility: Is the smart city a space where alternatives to surveillance technologies are not to be found? Will privacy constitute a high-end luxury for the very few [95]? AVs are thus also examples of surveillance and control devices of the smart city paradigm: They are not only supposed to fully monitor where people go, they will also be able to fully control where people go and what they are allowed to experience during the trip—in particular, if Big Tech firms are allowed to implement a corporate ownership model for AVs [96].

The emphasis on AVs we see today is thus problematic because it threatens the viability of the first evolutionary principle: While it is promoting variety of alternatives within the narrow area of transport automation—and is therefore ignoring important criticisms made on the excessive reliance on technology to solve societal problems [8,9]—it is becoming a threat for variety outside it.

4.2. Maladaptation and the Second and Third Evolutionary Principles: Assessment and Selection of Alternatives for Local Implementation

The second and third evolutionary principles (assessment and selection) will be jointly considered here. In order to achieve high adaptive capacity, it is constructive if stakeholders assess and select

alternatives using the most holistic and informed evaluation methodologies at hand. As alerted by Urban and associates [48], evolutionary assessment approaches require multiple types of validity. In other words, creating assessment tools and selecting alternatives based on their ability to perform particularly well in just one assessment dimension, but not in several, is a potentially maladaptive policy-making practice. Supporting this logic, the work of Bertolini [46,47,73] suggests that—in the presence of high levels of complexity and uncertainty about the future as those we have today—it is important that policy makers prepare societies in general, and the transport sector in particular, to be not only resilient, but also adaptive. In the same vein, Stilgoe and Owen [52] argued that responsiveness (that is, the capacity to change the direction and type of innovation-oriented developments when confronted with the unexpected) is a key dimension of what he calls *responsible innovation*. Von Schomberg [34] asks for the systematic use of technology assessment and technology foresight approaches. This echoes the views of Docherty and Marsden [4], who alert their readers for the need to balance well the short-term benefits and costs of a given mobility innovation with their long-term consequences.

Application to Automated Transport

Regarding assessment and selection of alternatives, the automotive industry is promoting an (overly) optimistic imagination about AVs at the same time that they are doing their best efforts to accelerate the implementation of such vehicles. As noted by Docherty and Marsden [4], contemporary imaginings of mobility are, to a large extent, crafted by the producers of mobility innovations. This happens because the automotive industry has high stakes in the development and positive marketing of AVs: The car is losing its original appeal and economic profitability, as younger generations seem to be consistently reducing its use [97,98]. The success of AVs would potentially mean a new prosperous phase for this industry [90]. At the same time, local authorities see the economic short-term advantages of allowing AVs in their streets because this might provide them with some credits in terms of urban marketing and positioning in city rankings. Critical authors argue that AVs can lead to very negative consequences for urban areas if poorly governed (e.g., [4,79]), but this research continues to be relatively marginal while major interests portray smart transportation as a highly beneficial innovation to be promoted and lavishly funded [86,99]. The willingness to promote this agenda is leading the engaged stakeholders to depict it as offering high benefits so that the societal costs associated with developing it can be seen as reasonable by the public. As Zuboff [61] describes, Big Tech firms systematically use their substantial budgets and massive influence to force the rapid implementation of disruptive innovations so that a new normal can rapidly be created. To work, this needs to be done before any serious democratic or ethical scrutiny, and before the establishment of legal frameworks capable of blocking or shaping actions so that they might serve the public interest (see, also, [4]).

If the focus on innovation was not so strong today, there would likely be a more critical appreciation of these situations, as well as more inclusive democratic discussions about which innovations should be considered desirable or undesirable. As contemporary policy-making embraces a pro-innovation bias strongly enforced by Big Tech, what we are witnessing is an increasing number of cities preparing to welcome AVs onto their streets (see, for example, [86]) without making a serious effort to determine the benefits and costs of such an innovation. Cities are moving towards this future also without seriously asking whether citizens desire or at least accept it—a key social inclusion practice recognized as needed both by transport [100,101] and critical innovation scholars [52]. In this way, pro-innovation forces are interfering with the evolutionary principles by crushing the first principle (creation of variety) onto the second and third principles (assessment and selection of initiatives) so that they can rapidly move towards dissemination. In desirable circumstances, new ideas appear and are then tested and discussed to determine the extent to which they are valid and should be implemented and disseminated. Under the pro-innovation logic, new ideas *must* be rapidly disseminated without such scrutiny or discussion [1,9,61].

4.3. Maladaptation and the Fourth Evolutionary Principle: Dissemination in Various Contexts

Dissemination is the fourth, and final, evolutionary principle for good reasons. First, because it should typically be applied after its object was successfully tested in a limited number of places and proved to have benefits that exceed the costs of dissemination. Second, and in connection with the first, because—if it proves to be problematic—the localized scope of implementation and testing geographically limits the negative consequences. As recommended by Stilgoe and Owen [52], innovations should be implemented in ways that allow for responsiveness to the unpredictable. Dissemination being typically the last step is, therefore, a precautionary and sensible choice in most cases and one likely to contribute to avoiding the risks of maladaptive initiatives proliferating too rapidly. For further insights see, for example, the critical reflections on urban experimentation as an increasingly dominant practice in contemporary urban policy-making provided by Savini and Bertolini [102].

Application to Automated Transport

As AVs are still in an initial stage of development, it seems rather unlikely that there are already safe, ethical, and economically sound conditions to disseminate these machines. However, dissemination is already taking place for testing purposes [90]. This is problematic for several reasons. First, it takes advantage of the legal void concerning this innovation to create a new normal while exploring different geographical areas and gather sensitive data without giving time to local authorities and national governments to prepare and scrutinize the process [61]. As alerted by Stilgoe and Owen [52], emerging innovations have the tendency to fall into institutional voids (see, also, [103]). Actively capitalizing on these voids is well-aligned with the principles of cybernetic urbanism [60], according to which decisions should automatically flow from data analysis and technological advances without the need for political debate. This is not only coercive and unethical, but also a threat to democracy [61] and an obvious problem for the governance of the transport sector [4]. Even though this is not maladaptive in itself (even though it is necessarily undemocratic), it can lead to all sorts of problematic outcomes. Indeed, and as argued by Milakis and associates [104], AVs are likely to have short-term benefits, for example, reduced accidents and emissions while promoting greater road capacity and fuel efficiency. However, it is unclear whether the middle- and long-term outcomes will be positive, as expressed in changes in economic vitality, public health, and social justice. This suggests that disseminating AVs is an option to be considered with great care and to be carefully governed [4,79]. However, as shown in research about planners, “the constraints of neo-liberal politics that shape the context of planning have led some planners into an almost existential doubt over the extent to which AVs can be shaped by planning and public policy at all” [105] p. 99. At the same time, a range of academics are assuming that the introduction of AVs into the urban environment is a certainty that cities should prepare themselves for (e.g., through appropriate land use and parking policies) instead of something that should be democratically debated. This nihilistic understanding held by a growing number of public officials and even academic researchers is a sign of alarm. It reveals the extent to which pro-innovation corporate powers in general, and the car industry in particular, have gathered immense powers to shape our imaginations about urban futures (as noted by [4]). Indeed, there is a growing public consensus that technological development is a quasi-natural force that societies need to adapt to, instead of being merely the result of unregulated actions conducted by concrete people working for specific corporations [61].

5. Re-Thinking Innovation in Planning: Policy Recommendations

The previous sections presented a critical analysis of some mechanisms through which an excessive focus on innovation might lead to the emergence of maladaptive policies and initiatives in planning. This allows us to present a summarizing table (Table 1) where a number of key policy recommendations are offered. These recommendations may inspire planners in general, and transport planners in

particular, to think about how to govern emergent innovations. Even though we have used the example of AVs, this table has the potential to inform many other areas of activity beyond both urban and transport planning.

Table 1 was produced assuming a number of shifts that innovation policy applied to planning could experience in the name of the public interest. Four shifts in particular should be highlighted. They are phrased in a purposefully radical manner, so that they are more prone to spark reactions and promote debate among planners about this topic.

The first shift concerns *values*: From a current logic where innovation and the innovative are considered positive values and goals, we would make a shift towards a logic where innovation is merely a means to achieve meaningful values and goals (e.g., sustainability, justice).

The second shift would complement the first and would be about *focus*: Presently, innovation receives high levels of attention from a wide variety of stakeholders, and has taken a key place in contemporary discourses. After this shift, innovation would be considered only when relevant, as well as *maintenance of the establishment* (that is, to adopt the do-nothing alternative) and *retrieval of previous configurations* (that is, to adopt technologies and practices that were constructively used in the past and were, to a larger or lesser extent, abandoned—consider, for example, cycling).

This leads us to the third shift, which would be concerned with *speed*: At the moment, there is a substantial support for rapid and disruptive innovations as market-driven mechanisms to promote economic growth. After this shift, the speed of innovations and the level of disruption induced by them should be carefully and critically considered when analyzing the specific characteristics of places, people, organizations, technologies, and the goals to be achieved (among other possible factors to be identified through reflection and experience).

The fourth and last shift would be about *legitimacy*: Innovations of all kinds (including those with massive disruptive potential) are today being freely implemented in contemporary societies as they are presented as free market products. After this shift, disruptive innovations would be disseminated only after they are critically assessed by democratic means as contributing to the public interest and an appropriate legal and governance framework was created to receive them.

Table 1. List of policy recommendations for planners concerned with innovation policy in general and automated vehicles (AVs) in particular.

Evolutionary Principle	Policy Recommendations for Planners
Promotion of variety through the creation of alternatives	<ul style="list-style-type: none"> • Encourage policies capable of generating alternatives that might prove to be useful in the future, even if the scenarios where these alternatives will be needed are considered unlikely today. Conversely, avoid the promotion of alternatives strictly within a narrow area of policy interest (e.g., automated vehicles) and—above all—avoid placing too many resources and attention on a given alternative (e.g., a given model or brand of automated vehicles). • Promote a rich and varied market while avoiding the establishment of corporate monopolies with the power to enforce their products and services in the market beyond the reach of other competitors. • Avoid placing too much emphasis on AVs and other smart-mobility solutions; instead, maintain a variety of options under consideration. These should include both high-tech (e.g., AVs) but also low tech (e.g., cycling) alternatives, as well as both collective and individual transport alternatives. The same could be said about varieties of fuels adopted, about having global and high-mobility oriented alternatives (e.g., high-speed trains), and local and low-mobility ones (e.g., favorable conditions for walking and using local products and services), as well as both smart and non-digital technologies. • Seriously consider the do-nothing alternative. Consider the possibility of using the lack of change as an opportunity to evaluate and learn about the long-term effects of previous innovations and answering questions such as: What have previous innovations brought to society? Where they useful, ethical, constructive? Who has lost and who has won from them? How could they have been better implemented? Which alternatives were discarded and should not have been? Should we return to previous configurations? Should we maintain the do-nothing approach? For how long? Why?
Assessment and selection of alternatives for local implementation	<ul style="list-style-type: none"> • Assess and select alternatives using the most holistic and comprehensive evaluation methodologies possible. The best is to promote alternatives that score high in diverse forms of assessment characterized by diverse (and even mutually contradictory) goals and, at the same time, can be adapted or adjusted to unpredictable developments and future scenarios. • Use a variety of methodologies for assessment, both econometric and non-econometric. Avoid relying too much on methodologies for assessment that are excessively bound by the technical and ideological principles of a given disciplinary area, e.g., Cost-Benefit Analysis (as it is excessively associated with econometric assessment principles). • Carefully analyze who gains and who loses from the implementation of the innovation under consideration as it is unlikely that a given innovation will benefit all. • Avoid implementing alternatives that require an excessive level of commitment to and reliance on its success. Instead, give preference to alternatives that—if, where, and when they fail—are sufficiently easy to adapt, retrofit, or—if needed—dismiss. This means that planners should not be preparing cities to the advent of AVs (and smart forms of mobility in general) while taking that advent for granted. Instead, planners should prepare cities for the possibility that AVs may emerge and become dominant, just as much as for a reality in which they emerge and fail; or in which they never emerge. • Seriously consider the do-nothing alternative and, with this, keep open the possibility of non-implementation.
Dissemination in various contexts if, when and where appropriate	<ul style="list-style-type: none"> • Accept and support dissemination of disruptive innovations only if, when, and where there is a suitable and democratically established legal framework in the places where the innovations are to be disseminated. Consider making use of ethical boards, audits, and public participation events as means to inform the legal framework and the dissemination strategy. • Disseminate slowly and incrementally in tandem with monitoring and evaluation processes so that it becomes possible to identify unexpected outcomes that were not observed before. • Maintain a skeptical attitude towards “for-profit” Big Tech companies (e.g., Google, Cisco, Amazon, Facebook, etc.) and their fast-paced dissemination initiatives. Critically analyze who are the likely losers and winners from each disseminated innovation. • Seriously consider the do-nothing alternative and, with this, keep open the possibility of non-dissemination.

6. Conclusions

In this article, we have highlighted the drawbacks associated with the excessive focus on innovation experienced today. We achieved this through the lenses of evolutionary theory. Our fundamental point is that innovations, if poorly governed, can, and are even likely to, lead societal evolution along a path that is maladaptive. That is, social and technological configurations change for the sake of changing due to a fascination with the innovative as a meta-goal of public policy and with too little connection with the problems in place. Under the rule of maladaptive forces, planning can follow a problematic direction where new configurations come to be assessed as positive and deserving of selection and dissemination for no other reason than being novel. This is one of the key traits of the dominant innovation agenda we have today, and it is something that needs to be acknowledged as a serious governance problem.

This problem is clearly taking place in the transport sector due to the dominance of technological developers in its governance and in the funding of academic research. Indeed, digitalization in general and automation in particular are very powerful trends in this sector [106] and are a serious challenge for its governance [4]. Furthermore, transport systems and technologies are very conducive to produce and benefit from real-time data. However, and as alerted by Zuboff [61] (among other critical authors), it is precisely in the possibility of data extraction that lies both the power and the source of revenues from Big Tech companies. These have clearly demonstrated that their intentions are not as ethical as would be desirable [61,107] and are in need of a strong regulatory framework capable of guiding their actions in general, and their new products in particular. The time is ripe for planners to more critically evaluate innovations and their added societal value, in view of the recommendations provided above (for a summary, see Table 1).

We have proposed here a number of concrete policy recommendations for a new generation of innovation policies applied to planning in general, and transport planning in particular. These recommendations entail rethinking the values, focus, speed, and legitimacy of innovations. Still, future critical research in this area is most needed. We are experiencing a societal lock-in, where our economic system became dependent on disruptive innovations to keep itself working. Instead of considering this a problem, major institutions, such as the EU, place this dependency at the core of their strategies (see, for example, [20]). Exploring ways out of this lock-in is a relevant and even urgent research enterprise, and we hope that this article will motivate others to embrace it.

Author Contributions: Conceptualization, K.C.v.S. and A.F.; methodology, A.F., K.C.v.S., W.T. and E.P.; formal analysis, A.F., K.C.v.S., W.T. and E.P.; investigation, A.F., K.C.v.S., W.T. and E.P.; resources, A.F., K.C.v.S., W.T. and E.P.; writing—original draft preparation, A.F. and K.C.v.S.; writing—review and editing, A.F., K.C.v.S. and W.T.; project administration, A.F. All authors have read and agreed to the published version of the manuscript.

Funding: The work of the first author of this research was funded by Project POCI-01-0145-FEDER-016431—funded by European Structural and Investment Funds (FEER) through Programa Operacional Competitividade e Internacionalização—COMPETE2020 and by national funds through FCT—Fundação para a Ciência e a Tecnologia, I.P.



Conflicts of Interest: The authors declare no conflict of interest.

References

1. Pfothenhauer, S.; Juhl, J.; Aarden, E. Challenging the “deficit model” of innovation: Framing policy under the innovation imperative. *Res. Policy* **2019**, *48*, 895–904. [[CrossRef](#)]

2. Mirowski, P. *Never Let a Serious Crisis Go to Waste: How Neoliberalism Survived the Financial Meltdown*; Verso: London, UK, 2013.
3. UN-Habitat. *Urbanization and Development: Emerging Futures—World Cities Report 2016*; United Nations Human Settlements Programme: Nairobi, Kenya, 2016.
4. Docherty, I.; Marsden, G.; Anable, J. The governance of smart mobility. *Transp. Res. Part A* **2018**, *115*, 114–125. [[CrossRef](#)]
5. Rosa, H. Social Acceleration: Ethical and Political Consequences of a Desynchronized High-Speed Society. *Constellations* **2003**, *10*, 3–33. [[CrossRef](#)]
6. Rosa, H. *Social Acceleration: A New Theory of Modernity*; Columbia University Press: New York, NY, USA, 2015.
7. Sveiby, K.; Gripenberg, P.; Segercrantz, B. (Eds.) *Challenging the Innovation Paradigm*; Routledge: New York, NY, USA, 2012.
8. Gray, J. *Heresies: Against Progress and Other Illusions*; Granta Books: Surrey, UK, 2004.
9. Morozov, E. *To Save Everything, Click here: Technology, Solutionism, and the Urge to Fix Problems that Don't Exist*; Penguin Books: London, UK, 2014.
10. Mora, L.; Reid, A.; Angelidou, M. The current status of smart city research: Exposing the division. In *Smart Cities in the Post-Algorithmic Era*; Komninos, N., Kakderi, C., Eds.; Edward Elgar: Cheltenham, UK, 2019; pp. 17–35.
11. Fagerberg, J.; Verspagen, B. Innovation studies—The emerging structure of a new scientific field. *Res. Policy* **2009**, *38*, 218–233. [[CrossRef](#)]
12. Dente, B.; Coletti, P. Measuring Governance in Urban Innovation. *Local Gov. Stud.* **2011**, *37*, 43–56. [[CrossRef](#)]
13. Kallis, G. *Degrowth*; Agenda Publishing Ltd.: Newcastle upon Tyne, UK, 2018.
14. Ferreira, A.; von Schönfeld, K. Interlacing planning and degrowth scholarship—A manifesto for an interdisciplinary alliance. *Disp. Plan. Rev.* **2020**, *56*, 53–64. [[CrossRef](#)]
15. Raworth, K. *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*; Random House Business Books: London, UK, 2017.
16. European Commission. *New Trends in Social Innovation*; European Commission: Brussels, Belgium, 2017.
17. OECD. *The Measurement of Scientific and Technological Activities—Proposed Guidelines for Collecting and Interpreting Technological Innovation Data: Oslo Manual*, 2nd ed.; Organisation for Economic Co-operation and Development: Paris, France, 1997.
18. European Commission. *Social Innovation as a Trigger for Transformations—The Role of Research*; Publications Office of the European Union: Luxembourg, 2017.
19. OECD. *Embracing Innovation in Government: Global Trends 2018*; Organisation for Economic Co-operation and Development: Paris, France, 2018.
20. European Commission. *Mission-Oriented Research & Innovation in the European Union: A Problem-Solving Approach to Fuel Innovation-Led Growth*; European Commission: Brussels, Belgium, 2018.
21. European Commission. *Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3)*; European Commission: Brussels, Belgium, 2012.
22. Steffen, W.; Broadgate, W.; Deutsch, L.; Gaffney, O.; Ludwig, C. The Trajectory of the Anthropocene: The Great Acceleration. *Anthr. Rev.* **2015**, *2*, 81–98. [[CrossRef](#)]
23. Rosa, H. Full speed burnout? From the pleasures of the motorcycle to the bleakness of the treadmill: The dual face of social acceleration. *Int. J. Motorcycle Stud.* **2010**, *6*, 1–13.
24. Rosa, H.; Henning, C. (Eds.) *The Good Life Beyond Growth*; Routledge: London, UK, 2018.
25. von Schönfeld, K.; Ferreira, A.; Pinho, P. The dialectics between social acceleration and the growth paradigm: Innovation and transport in neoliberal planning. In *Proceedings of the Institutionalisation of Degrowth & Post-growth: The European level*, Brussels, Belgium, 17–19 September 2018.
26. Vecchio, G.; Tricarico, L. “May the force be with you”: Roles and actors of information sharing devices in urban mobility. *Cities* **2019**, *88*, 261–268. [[CrossRef](#)]
27. Gavanas, N. Autonomous Road Vehicles: Challenges for Urban Planning in European Cities. *Urban Sci.* **2019**, *3*, 61. [[CrossRef](#)]
28. European Commission. European Commission Policy: Open Disruptive Innovation. Available online: <https://ec.europa.eu/digital-single-market/en/open-disruptive-innovation> (accessed on 15 July 2020).
29. Etzkowitz, H. Innovation in innovation: The Triple Helix of university-industry-government relations. *Soc. Sci. Inf.* **2003**, *42*, 293–337. [[CrossRef](#)]

30. Howaldt, J.; Kaletka, C.; Schröder, A.; Zirngiebl, M. (Eds.) *Atlas of Social Innovation: New Practices for a Better Future*; ZWE Sozialforschungsstelle: Dortmund, Germany, 2018.
31. Moulaert, F.; MacCallum, D.; Mehmood, A.; Hamdouch, A. (Eds.) *The International Handbook on Social Innovation: Collective Action, Social Learning and Transdisciplinary Research*; Edward Elgar: Cheltenham, UK, 2013.
32. European Commission. *State of the Innovation Union: Taking Stock 2010–2014*; European Union: Luxembourg, 2014.
33. European Commission. *A Renewed European Agenda for Research and Innovation: Europe's Chance to Shape Its Future*; European Commission: Brussels, Belgium, 2018.
34. Von Schomberg, R. A vision of Responsible Research and Innovation. In *Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society*; Owen, R., Heintz, M., Bessan, J., Eds.; John Wiley: London, UK, 2013; pp. 51–74.
35. Sveiby, K. Innovation and the global financial crisis—systemic consequences of incompetence. *Int. J. Entrep. Innov. Manag.* **2012**, *16*, 30–50. [[CrossRef](#)]
36. Raisch, S.; Birkinshaw, J.; Probst, G.; Tushman, M. Organizational Ambidexterity: Balancing Exploitation and Exploration for Sustained Performance. *Organ. Sci.* **2009**, *20*, 685–834. [[CrossRef](#)]
37. Gibson, C.; Birkinshaw, J. The Antecedents, Consequences, and Mediating Role of Organizational Ambidexterity. *Acad. Manag. J.* **2004**, *47*, 209–226.
38. Camerin, F. From “Ribera Plan” to “Diagonal Mar”, passing through 1992 “Vila Olímpica”. How urban renewal took place as urban regeneration in Poblenou district (Barcelona). *Land Use Policy* **2019**, *89*, 104226. [[CrossRef](#)]
39. Camerin, F.; Mora, Á. Regenerating Bilbao: From ‘productive industries’ to ‘productive services’. *Territorio* **2019**, *89*, 145–154. [[CrossRef](#)]
40. Stein, S. *Capital City: Gentrification and the Real Estate State*; Verso Books: London, UK, 2019.
41. Atkinson, R. *Alpha City: How London Was Captured by the Super-Rich*; Verso: London, UK, 2020.
42. Godin, B. An Old Word for a New World, or the De’Contestation of a Political and Contested Concept. In *Challenging the Innovation Paradigm*; Sveiby, K.-E., Gripenberg, P., Segercrantz, B., Eds.; Routledge: London, UK, 2012; pp. 37–60.
43. Freeman, C.; Perez, C. Structural crises of adjustment, business cycles and investment behaviour. In *Technical Change and Economic Theory*; Dosi, G., Freeman, C., Nelson, R., Silverberg, G., Soete, L., Eds.; Pinter: London, UK, 1988; pp. 38–66.
44. Moroni, S. An evolutionary theory of institutions and a dynamic approach to reform. *Plan. Theory* **2010**, *9*, 275–297. [[CrossRef](#)]
45. Van Assche, K.; Beunen, R.; Duineveld, M. *Evolutionary Governance Theory: An Introduction*; Springer: Berlin/Heidelberg, Germany, 2014.
46. Bertolini, L. Evolutionary urban transportation planning: An exploration. *Environ. Plan. A* **2007**, *39*, 1998–2019. [[CrossRef](#)]
47. Bertolini, L. Complex systems, evolutionary planning? In *New Directions in Planning Theory*; de Roo, G., Silva, E., Eds.; Ashgate: Farnham, UK, 2010; pp. 81–98.
48. Urban, J.; Hargraves, M.; Trochim, W. Evolutionary Evaluation: Implications for evaluators, researchers, practitioners, funders and the evidence-based program mandate. *Eval. Program Plan.* **2014**, *45*, 127–139. [[CrossRef](#)]
49. Boon, W.; Edler, J. Demand, challenges, and innovation. Making sense of new trends in innovation policy. *Sci. Public Policy* **2018**, *45*, 435–447. [[CrossRef](#)]
50. Jackson, T. *Prosperity without Growth: Foundations for the Economy of Tomorrow*, 2nd ed.; Routledge: Oxon, UK, 2017.
51. Alexander, S. Planned economic contraction: The emerging case for degrowth. *Environ. Politics* **2012**, *21*, 349–368. [[CrossRef](#)]
52. Stilgoe, J.; Owen, R.; Macnaghten, P. Developing a framework for responsible innovation. *Res. Policy* **2013**, *42*, 1568–1580. [[CrossRef](#)]
53. Von Schomberg, R. Prospects for Technology Assessment in a framework of responsible research and innovation. In *Technikfolgen Abschätzen Lehren: Bildungspotenziale Transdisziplinärer Methoden*; Dusseldorp, M., Beecroft, R., Eds.; Vs Verlag: Wiesbaden, Germany, 2012; pp. 39–61.

54. Soete, L. Is Innovation Always Good? In *Innovation Studies: Evolution and Future Challenges*; Fagerberg, J., Martin, B., Andersen, E., Eds.; Oxford University Press: Oxford, UK, 2013; pp. 134–144.
55. Houghton, G.; McManus, P. Neoliberal Experiments with Urban Infrastructure: The Cross City Tunnel, Sydney. *Int. J. Urban Reg. Res.* **2012**, *36*, 90–105. [[CrossRef](#)]
56. Evans, J. Resilience, ecology and adaptation in the experimental city. *Trans. Inst. Br. Geogr.* **2011**, *36*, 223–237. [[CrossRef](#)]
57. Sen, A. *The Idea of Justice*; Harvard University Press: Cambridge, MA, USA, 2009.
58. Krüger, T. Wider den Innovationsimperativ! Eine Kritik am Konzept der sozialen Innovation aus Postwachstumsperspektive. In *Postwachstumsstadt: Konturen Einer Solidarischen Stadtpolitik*; Brokow-Loga, A., Eckardt, F., Eds.; Oekom: Munich, Germany, 2020; pp. 120–137.
59. Krüger, T.; Pellicer-Sifres, V. From innovations to exnovations. Conflicts,(De-)Politicization processes, and power relations are key in analysing the ecological crisis. *Innov. Eur. J. Soc. Sci.* **2020**, *33*, 115–123. [[CrossRef](#)]
60. Krivý, M. Towards a critique of cybernetic urbanism: The smart city and the society of control. *Plan. Theory* **2016**, *17*, 8–30. [[CrossRef](#)]
61. Zuboff, S. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*; Profile Books: London, UK, 2019.
62. Sager, T. Neo-liberal urban planning policies: A literature survey 1990–2010. *Prog. Plan.* **2011**, *76*, 147–199. [[CrossRef](#)]
63. Peck, J.; Tickell, A. Neoliberalizing Space. *Antipode* **2002**, *34*, 381–404. [[CrossRef](#)]
64. Harvey, D. Globalization and the “Spatial Fix”. *Geogr. Rev.* **2001**, *2*, 23–30.
65. Swyngedouw, E. Governance Innovation and the Citizen: The Janus Face of Governance-beyond-the-State. *Urban Stud.* **2005**, *42*, 1991–2006. [[CrossRef](#)]
66. Reigner, H.; Brenac, T. Safe, sustainable... but depoliticized and uneven—A critical view of urban transport policies in France. *Transp. Res. A* **2019**, *121*, 218–234. [[CrossRef](#)]
67. Gössling, S.; Cohen, S. Why sustainable transport policies will fail: EU climate policy in the light of transport taboos. *J. Transp. Geogr.* **2014**, *39*, 197–207. [[CrossRef](#)]
68. Morgan, T. The techno-finance fix: A critical analysis of international and regional environmental policy documents and their implications for planning. *Prog. Plan.* **2018**, *119*, 1–29. [[CrossRef](#)]
69. Tainter, J. *The Collapse of Complex Societies*; Cambridge University Press: Cambridge, UK, 1988.
70. Nill, J.; Kemp, R. Evolutionary approaches for sustainable innovation policies: From niche to paradigm? *Res. Policy* **2009**, *38*, 668–680. [[CrossRef](#)]
71. Alkemade, F.; Hekkert, M.; Negro, S. Transition policy and innovation policy: Friends or foes? *Environ. Innov. Soc. Transit.* **2011**, *1*, 125–129. [[CrossRef](#)]
72. Goodwin, P.; Van Dender, K. ‘Peak Car’—Themes and Issues. *Transp. Rev.* **2013**, *33*, 243–254. [[CrossRef](#)]
73. Bertolini, L. Coping with irreducible uncertainties of planning: An evolutionary approach. In *Ashgate Research Companion to Planning Theory: Theoretical Challenges for Spatial Planning*; Healey, P., Hillier, J., Eds.; Ashgate: Aldershot, UK, 2010; pp. 413–424.
74. Kyriakidis, M.; Happee, R.; de Winter, J. Public opinion on automated driving: Results of an international questionnaire among 5000 respondents. *Transp. Res. Part F* **2015**, *32*, 127–140. [[CrossRef](#)]
75. Milakis, D. Long-term implications of automated vehicles: An introduction. *Transp. Rev.* **2019**, *39*, 1–8. [[CrossRef](#)]
76. Wadud, Z.; MacKenzie, D.; Leiby, P. Help or hindrance? The travel, energy and carbon impacts of highly automated vehicles. *Transp. Res. Part A Policy Pract.* **2016**, *86*, 1–18. [[CrossRef](#)]
77. SAE. *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*; SAE International: Hong Kong, China, 2016.
78. Litman, T. *Autonomous Vehicle Implementation Predictions: Implications for Transport Planning*; Victoria Transport Policy Institute: Victoria, BC, Canada, 2015.
79. Papa, E.; Ferreira, A. Sustainable Accessibility and the Implementation of Automated Vehicles: Identifying Critical Decisions. *Urban Sci.* **2018**, *2*, 5. [[CrossRef](#)]
80. Shladover, S. Connected and automated vehicle systems: Introduction and overview. *J. Intell. Transp. Syst.* **2018**, *22*, 190–200. [[CrossRef](#)]
81. WIRED. Autonomous Cars Will Make Us Safer. Available online: <https://www.wired.com/2009/11/autonomous-cars/> (accessed on 12 July 2020).

82. Kesselring, S. The mobile risk society. In *Tracing Mobilities: Towards a Cosmopolitan Perspective*; Canzler, W., Kaufmann, V., Kesselring, S., Eds.; Ashgate: London, UK, 2008; pp. 77–102.
83. Hood, C. *The Blame Game: Spin, Bureaucracy, and Self-Preservation in Government*; Princeton University Press: Princeton, NJ, USA, 2011.
84. Muller, J. *The Tyranny of Metrics*; Princeton University Press: Princeton, NJ, USA, 2018.
85. Baum, H. *The Invisible Bureaucracy: The Unconscious in Organizational Problem Solving*; Oxford University Press: Oxford, UK, 1987.
86. Department for Transport. *The Pathway to Driverless Cars: Summary Report and Action Plan*; Department for Transport: London, UK, 2015.
87. Hayes, B. Leave the driving to it. *Am. Sci.* **2011**, *99*, 362–366. [[CrossRef](#)]
88. Alessandrini, A.; Campagna, A.; Delle Site, P.; Filippi, F.; Persia, L. Automated Vehicles and the Rethinking of Mobility and Cities. *Transp. Res. Procedia* **2015**, *5*, 145–160. [[CrossRef](#)]
89. Clements, L.; Kockelman, K. Economic Effects of Automated Vehicles. *Transp. Res. Rec.* **2017**, *2606*, 106–114. [[CrossRef](#)]
90. Wolmar, C. *Driverless Cars: On a Road to Nowhere*; London Publishing Partnership: London, UK, 2018.
91. Soteropoulos, A.; Berger, M.; Ciari, F. Impacts of automated vehicles on travel behaviour and land use: An international review of modelling studies. *Transp. Rev.* **2019**, *39*, 29–49. [[CrossRef](#)]
92. Millard-Ball, A. Pedestrians, autonomous vehicles, and cities. *J. Plan. Educ. Res.* **2018**, *38*, 6–12. [[CrossRef](#)]
93. Frank, L.; Andresen, M.; Schmid, T. Obesity relationships with community design, physical activity, and time spent in cars. *Am. J. Prev. Med.* **2004**, *27*, 87–96. [[CrossRef](#)]
94. Frank, L.; Saelens, B.; Powell, K.; Chapman, J. Stepping towards causation: Do built environments or neighborhood and travel preferences explain physical activity, driving, and obesity? *Soc. Sci. Med.* **2007**, *65*, 1898–1914. [[CrossRef](#)]
95. Sadowski, J.; Pasquale, F. The spectrum of control: A social theory of the smart city. *First Monday* **2015**, *20*, 1–22. [[CrossRef](#)]
96. Ferdman, A. Corporate ownership of automated vehicles: Discussing potential negative externalities. *Transp. Rev.* **2020**, *40*, 95–113. [[CrossRef](#)]
97. McDonald, N. Are Millennials Really the “Go-Nowhere” Generation? *J. Am. Plan. Assoc.* **2015**, *81*, 90–103. [[CrossRef](#)]
98. Zhong, L.; Lee, B. Carless or Car Later?: Declining Car Ownership of Millennial Households in the Puget Sound Region, Washington State. *Transp. Res. Rec.* **2017**, *2664*, 69–78. [[CrossRef](#)]
99. Nederlandse Organisatie voor Wetenschappelijk Onderzoek. *Call for Proposals: Smart Urban Regions of the Future (SURF)*; Nederlandse Organisatie voor Wetenschappelijk Onderzoek: Den Haag, The Netherlands, 2015.
100. Papa, E.; Lauwers, D. Mobility governance in smart cities of the future. In *Adaptive Mobility: A New Policy and Research Agenda on Mobility in Horizontal Metropolis*; Boelens, L., Lauwers, D., Witlox, F., Eds.; In-Planning: Groningen, The Netherlands, 2015; pp. 177–190.
101. Banister, D. The sustainable mobility paradigm. *Transp. Policy* **2008**, *15*, 73–80. [[CrossRef](#)]
102. Savini, F.; Bertolini, L. Urban experimentation as a politics of niches. *Environ. Plan. A* **2019**, *51*, 831–848. [[CrossRef](#)]
103. Hajer, M. Policy without polity? Policy analysis and the institutional void. *Policy Sci.* **2003**, *36*, 175–195. [[CrossRef](#)]
104. Milakis, D.; van Arem, B.; van Wee, B. Policy and society related implications of automated driving: A review of literature and directions for future research. *J. Intell. Transp. Syst.* **2017**, *21*, 324–348. [[CrossRef](#)]
105. Legacy, C.; Ashmore, D.; Scheurer, J.; Stone, J.; Curtis, C. Planning the driverless city. *Transp. Rev.* **2019**, *39*, 84–102. [[CrossRef](#)]
106. Creutzig, F.; Franzen, M.; Moeckel, R.; Heinrichs, D.; Nagel, K.; Nieland, S.; Weisz, H. Leveraging digitalization for sustainability in urban transport. *Glob. Sustain.* **2019**, *2*, 1–6. [[CrossRef](#)]
107. Foroohar, R. *Don't Be Evil: The Case Against Big Tech*; Penguin: London, UK, 2019.

