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Legal enclaves as a test environment for innovative products: Toward legally resilient experimentation policies[1]

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Abstract

Many countries adhere to the Organisation for Economic Co-operation and Development creed that innovation is good for the economy. Experiments are often used to intentionally create space for innovation. Decisions allowing experiments result in temporary legal enclaves for a few, excluding many others. Therefore, they come with risks. The aim of this article is to provide a set of guidelines that help improve the legal resilience of experimentation policies, so they are better able to withstand legal attacks when they occur. To do so, we first arranged the existing diversity of legal experiments in a theoretical model. Special attention was paid to two archetypes of legal experiments: statutory experiments and regulatory sandboxes. Second, we analyzed the impact of both types of experiments on four core legal principles: legality, certainty, equality, and public accountability. From this assessment, we eventually formulated a set of guidelines to secure or improve legal resilience.

Keywords: innovation, legal resilience, regulatory sandbox, statutory experiments.

1. Introduction

Many countries adhere to the Organisation for Economic Co-operation and Development (OECD) creed that innovation is good for the economy (OECD 2015 p. 17; Ranchordas 2014, p. 20; Fenwick *et al.* 2018, p. 91–93). This creed often encourages the development and implementation of laws and policies that create space for the introduction of innovative products – both goods and services.[2] Such laws and policies can be in the best interest of the developing entrepreneur, because they often create certainty on the compatibility of the innovative product with the law. The demand for clarity seems particularly high in densely regulated contexts, such as financial, pharmaceutical, and medical markets. Uncertainty as to the legal position translates into financial risks. In the worst-case scenario, the introduction of a new product under uncertain legal circumstances could end in a prohibition of the product. As a result, this will lead to the evaporation of investments in the development of the product. We note that some innovators embrace the low-regulated condition, trying to extend it for as long as possible (Christensen 1997, p. 239). However, no innovation ever operates in a legal void (Wagner 2018). Moreover, sorting out legal complications cannot be postponed endlessly (BBC News 2019; Wyman 2017; Butenko & Larouche 2015 p. 66; Fenwick *et al.* 2017 p. 568; different view Leenes *et al.* 2017 p. 20).

One of the ways to offer (more) certainty on the legality of an innovative product and to spark and facilitate innovation is to create space for experimentation (Fenwick *et al.* 2017 p. 577). For that purpose, government institutions avail themselves of various instruments depending on their constitutional position and the legal

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framework in which they operate. The instruments have in common that for a limited number of actors and a limited period of time, a legal regime is put in place that differs from the one that applies to all other actors in the given market. From a legal perspective, experiments are problematic because they pose a threat to core legal principles of legality, certainty, equality, and public accountability, also referred to as rule-of-law principles (Castro 2019).

Legal experiments not only promote innovation but also provide relevant government authorities the opportunity to figure out what the best future regulation for the innovative product could look like. Legal experiments introduce feedback mechanisms, with which information can be collected regarding the functionalities and externalities of the product and its regulation. These mechanisms inform the government on the choice of regulatory instruments after termination of the experiment. Legal experiments thereby potentially improve the quality of the regulation in today's complex and dynamic environment.

In sum, legal experiments often have added value, but at the same time do not go without drawbacks. This article aims at developing a normative framework for the deployment of experimentation policies with a substantial level of legal resilience. Legal resilience in this sense refers to the ability to prepare, plan for, and absorb legal attacks on the experiment (Marchant & Stevens 2017, p. 244). The benefit of using the term resilience from a legal perspective is that it prevents the impression of one single way to set up experiments in a (legally) correct manner, or with full *ex ante* certainty on the legality of an experiment. Such a simple narrative would not mirror the complexity and multifaceted nature of the permissive policies we studied.

This article focuses in particular on improving the legal resilience of two types of legal experiments, namely statutory experiments and regulatory sandboxes. Our study into both types of experiments was primarily based on data from two jurisdictions: the Netherlands and the United Kingdom. However, the insights obtained from both jurisdictions were abstracted from their concrete contexts and tested on the main features of regulatory sandboxes and statutory experiments in other jurisdictions. Where it was not our intention to compare countries or jurisdictions, the article focuses on regulatory sandboxes and statutory experiments irrespective of geographic delimitation and aims at offering reliable guidance across jurisdictional boundaries. However, the insights from this study should always be considered in a concrete context as the institutional layout as well as the concrete attitudes toward regulators may vary per jurisdiction.

This article is related to earlier publications on temporary legislation that uncovered the variety of legal constructs that have been deployed over time creating legislation with an initial and intentional openness to revision (van Gestel & van Dijck 2011; Ranchordas 2014; Bar-Siman-Tov & Harari-Heit 2020). However, we do not aim to further this specific legisprudential research, if only because not all temporary legislation is experimental, and not all experimental policies can be facilitated by temporary legislation (Kouroutakis & Ranchordas 2016; Bar-Siman-Tov 2018). Nevertheless, in the development of our guidelines that promote legally resilient decision-making of experiment permissions, we build on this research.

This article is structured as follows. The next section offers a brief historical context, which shows that until quite recently the attitude toward technological or industrial change was less welcoming to newcomers than it might be nowadays. Although the various legal constructs we study could in themselves be traced back in history, the policy context showed little favor for the innovators as that section demonstrates. In today's positive innovation, climate government authorities are often prepared to allow greater risks, which also entails risks on the side of the government. We subsequently report on statutory experiments and regulatory sandboxes as tools for legal experimentation in Sections 2 and 3. We use both phenomena to draw up a theoretical model in Section 4. Section 5 then moves on to assess the compatibility issues that the various modalities of experimentation share when confronted with basic legal principles feeding into the development of guidelines. To assist in strengthening the legal resilience of sandboxes and statutory experiments, we present in Section 6 guidelines to be observed in permissive decision-making. The final section presents our conclusions and offers avenues for future research.

2. A brief historical account

The aim of this section is to showcase that, irrespective of the fact that predecessors of the legal constructs we have in view can be traced back in history (Ranchordas 2018; Gersen 2007 on the US history), the political context was more often than not beneficial to incumbents instead of innovators. The explicit aim underlying

statutory experiments and sandboxes nowadays, that is, to promote and enable innovation and technological transitions, has not always been a dominant government attitude. This becomes obvious in a lengthy historical study by Stout and de Jong (2005) on the impact of legally based government interventions with regard to technological transitions in the utilities in the Netherlands. It throws light on how various legal instruments used in regulation have affected the relative position of technological pioneers in infrastructure markets vis-à-vis incumbent owners and exploiters of dominant technologies. They found that, by and large, the influence of public regulation on innovators has been predominantly negative rather than positive in the period 1850–2000, especially in cases where the state itself had a financial stake in the services attached to the incumbent technologies. Strategic behavior among incumbents (both public and private enterprises) and public shareholders in infrastructure services based on existing technologies had a large role to play in this. This occurred through lobbying, denying, or delaying required support and especially "perverse" law-making (de Jong & Stout 2003). In the technological transition from telegraph to telephone in the second half of the 19th century, for instance, Dutch King William was a major shareholder in the older dominant telegraph and enacted a variety of legal measures to complicate the broader adoption of the new telephone services (de Jong & Stout 2007). Although this was the first empirical example, many more examples of the negative material impact of regulation on technological innovation were to follow in the late 19th and throughout the 20th century.

A closer look at the how and why of this negative impact of legal action on innovators revealed that the influence was especially harmful under the following conditions:

1 The granting of concessions or permits for required operations was delayed or even denied.
2 Serious restrictions were included in these concessions or permits for deploying new technological applications.
3 New legislation was enacted prohibiting or constraining actions related to the new technologies to reduce proclaimed risks to public order or safety.
4 Taxes of various kinds were imposed on them.
5 Exclusive rights were granted to incumbent parties, which seriously wronged the position of newcomers.

Conversely, four types of legal instruments that favored the position of newcomers in comparison with incumbents were as follows:

1 Reserving (through legislation) facilities or capacities for services offered through the new technologies.
2 Offering (financial) subsidies to innovators not provided to incumbents.
3 Imposing taxes of various kinds on owners and exploiters of dominant technologies.
4 Making knowledge and expertise available through public resources to facilitate the development of new technologies.

Although the instruments administering positive incentives on innovation tended to be less often used and less impactful than the former group, the frequency of these positive incentives visibly increased over time. More recent cases in the late 20th century, such as the transitions from analogue to digital television and from gas heat to hydrogen heat demonstrated sometimes explicitly formulated strategies to facilitate rather than hamper innovation (see Taylor *et al.* (2005) and Blind *et al.* (2017) on correlation with context specifics). In that sense, modern government, albeit far from perfect, appears to have evolved a more benign attitude toward technological innovation in recent years. The adoption of statutory experiments and regulatory sandboxes both represent examples of the trend toward this direction, since these can be seen as the explicit adoption of incentives where a reactive or even prohibitive attitude on the part of the government is replaced with one where proactive and encouraging measures are taken to further innovation. In fact, they are versions of type 1 interventions as mentioned earlier, that is, legal instruments favoring innovation. Applying these, especially in combination with one or more of the other three types, would constitute the enactment of a mix of policy instruments propelling regulatory space for technological and other experimentation. In the following sections, we will focus on the administrative and judicial implications of these two modern versions of enabling legal incentives: statutory experiments and regulatory sandboxes.

3. The statutory experiment

One way to enable experiments is by creating a statutory basis for the experiment. Such a basis offers the executive a competence to deviate from existing norms by toying around with a new idea. One can roughly identify two types of statutory experiments.

First, the experiments of private innovators facilitated by experimental legislation. In this case, statutory provisions offer legislators the possibility to exempt private actors from existing legislation, so they are able to test their prototype in real-life circumstances. These experiments can be referred to as experiments *by* legislation as opposed to the experiments "*with*" legislation discussed later. The essence of experiments by legislation is to create a mechanism for the real-life introduction of an innovative product. In the process of the development of an innovative product, the exposure to real-life conditions is often of paramount importance. By lifting regulatory barriers, the legislator actively enables innovators to test their products. At the same time, this testing allows the regulators to decide how to best regulate the innovative product in the future by, for example, experiencing what the negative side effects of the product are. Statutory experiments provide some solidity in cases of accumulated uncertainty. This is specifically the case where the inherent uncertainty of regulation (will this work?) coincides with the dynamics of innovation (what outcome will we get?), visible in cases of innovative products without precedent or parallel. The private experimenter and the public regulator can work hand-in-hand to reduce the level of uncertainty by discovering the impact of the product together in real life, with a limited scope and scale. By doing so, an intermediate strategy can be followed between anticipatory legislation and deferral of legislative intervention (Gersen & Posner 2007). In this article, we will focus on this type of statutory experiments.

Second, there are statutory experiments that seek to test new ways of regulating a specific sector. This often means specific rules will temporarily be suspended and/or new rules will be applied to a limited number of actors (Ingelse 2018). This type of statutory experiment is geared toward testing whether such new rules, or less rules, lead to a better realization of existing policy goals than in the status quo. To test whether the new legal arrangement is effective, the relevant sector is (often) divided in two (sub)groups. One is placed under the experiment and the other serves as the control group. The experimental group is then exposed to the new regulation and the effects of the change in legal regime are monitored. Essential to this type of experiment is the evaluation, which feeds into the decision-making process on how to regulate the entire sector in the future. One could call this an *ex ante* evaluation of future regulation (SERV, Sociaal Economische Raad Vlaanderen 2016, p. 19) or refer to these experiments as experiments "*with*" legislation. In this type of experiment, the government itself is experimenting. The experiment takes effect as soon as the change in legal rules is enacted. This type of experiments falls outside the ambit of this article. The differences in context compared with the experiments discussed earlier are significant. Theorizing on this type of experiments draws for a considerable part on a different body of literature, which is related to the study of effective policy instruments for the state. Although we believe that a framework of the kind we develop in Sections 5 and 6 can also be produced for these experiments with regulation, we do not claim that it will have the same appearance.

Statutory experiments fit into and draw from contemporary trends in regulatory theory and practices, such as interactive regulation, evidence-based regulation and smart regulation (Hanebury 2006; van Gestel & van Dijck 2011; Gunningham & Sinclair 2017; Bar-Siman-Tov 2018). Rules are developed in a process of searching and learning (SERV 2016, p. 26), instead of being announced once and for all. The concept *smart regulation* refers to these forms of responsive and adaptive regulation, which have emerged as a response to increasing complexity of society and innovative products. This generated the wish to include the whole policy cycle in the regulatory process and accordingly involve a variety of actors in the process of production and evaluation of rules (European Commission 2010). The assumption behind any form of smart regulation is that regulation will be better when actors in the field bring to the table their special knowledge of the matter at hand. In this course of action, regulation evolves from command-and-control to interaction and a regulatory mix (Gunningham & Sinclair 2017, p. 134; Zetsche *et al.* 2017; Di Castri & Plaitakis 2018; Leenes *et al.* 2017, p. 36 for reservations against stakeholder engagement).

4. Regulatory sandboxes

The regulatory sandbox is the next legal instrument discussed in this article that promotes experiments with new products. It is widely recognized that the British Financial Conduct Authority (FCA) coined this

terminology for its proactive policy toward technological innovation in finance. The first regulatory sandbox was launched in June 2016 (Allen 2019 p. 580; Toronto Centre 2017, p. 3). Regulators in other jurisdictions soon followed, and in the first quarter of 2018 a new regulatory sandbox was announced almost every week; now counting over 30 and more to come (UNSGSA FinTech Working Group and CCAF 2019). The competition for the most innovative economy had gotten hold of this instrument, which was no longer limited to innovation of financial services. For example, economies in Asia connected the sandbox instrument to innovation in health care and agribusiness.[3]

The regulatory sandbox differs from the statutory experiment discussed earlier, as it is not a form of regulation, but a policy regarding the enforcement of the existing legal framework. The concept "sandbox" stems from the world of software and game developers and refers to a kind of demarcated digital playpen where an intermediate version of the new game is released to the users or players. They generate tentative improvements and give feedback while playing. The sandbox owner then decides how this information can be used for the development of the game from a prototype or beta-version to the next level product (or for the cessation of the production process).

In the legal sandbox, the regulatory authority demarcates a legal area for experimenting with innovative products, where the inhibitions stemming from the current application of the rules are suspended temporarily. The details differ from country to country, but a majority of regulators have opted for a case-by-case scenario, as for example stressed by the Dutch regulators in their tailor-made for innovation offer.[4] Case-by-case refers to the practice that innovators can receive individual permissions for testing a specified product in the sandbox. The Australian Securities and Investment Commission (ASIC) provides an example of a class waiver. Financial service providers can count on a slot in the experiment, as long as they meet certain requirements and report to the ASIC. When no oppositional decision is made, experimentation is allowed for 12 months.[5]

The case-by-case scenario of the FCA is well explained (Toronto Centre 2017, p. 3) by a description of the practice on the regulator's website.[6] First of all, an experimenting firm requires an authorization, as every regulated service provider does under the relevant legislation. This can apply to an incumbent who seeks to test an extension of its service catalogue, or to a start-up firm that is a rookie in the market. To aspiring sandbox firms, the FCA offers a tailored application process, adapted to the prospected limitations in the sandbox, accompanied by the offer of individual guidance, so that an interactive process precedes the FCA permission. Authorizations require a fee. Secondly, the FCA offers to relieve the restrictions of "an unduly burdensome rule" by modifying or waiving that rule for the period of the test. What is considered unduly burdensome is not specified. It is explained, however, that this can only relate to rules that are within the competency of the FCA and not to rules of national or international law. Where the previously mentioned options do not offer relief, the FCA can fall back on a written promise not to take enforcement action. This can apply to foreseen and unforeseen breaches of the rules, the latter more particularly under the condition that the sandbox firm deals openly with the regulator and has stayed within the parameters of the test. Third-party interests are mentioned explicitly here, where these so-called "No Action Letters" never cover unfair customer treatment and do not exclude liability for when things go awry in the course of the experiment.

Especially financial regulators appear to be very sensitive to the risk of overstating their competency, this is not surprising in EU member states where financial regulation and oversight is divided between national central banks and the European Central Bank (ECB). The member state institutions explicitly state on their sandbox platforms that experimentations shall not move into ECB territory. The ECB shares a positive attitude toward sandboxing but offers no regulatory sandbox itself.[7]

5. Theoretical model

The specific national appearances of the legal design of statutory experiments and regulatory sandboxes are diverse. We structured the variety of experimental arrangements in Figure 1. The model aims to systematize and categorize the variation in experimentation arrangements found in our data. We end up with four quadrants, with each quadrant representing a unique composition of norms and a differential impact on policy implementation. We note that the scope of the rest of this article is limited to the arrangements in the two quadrants on the right.

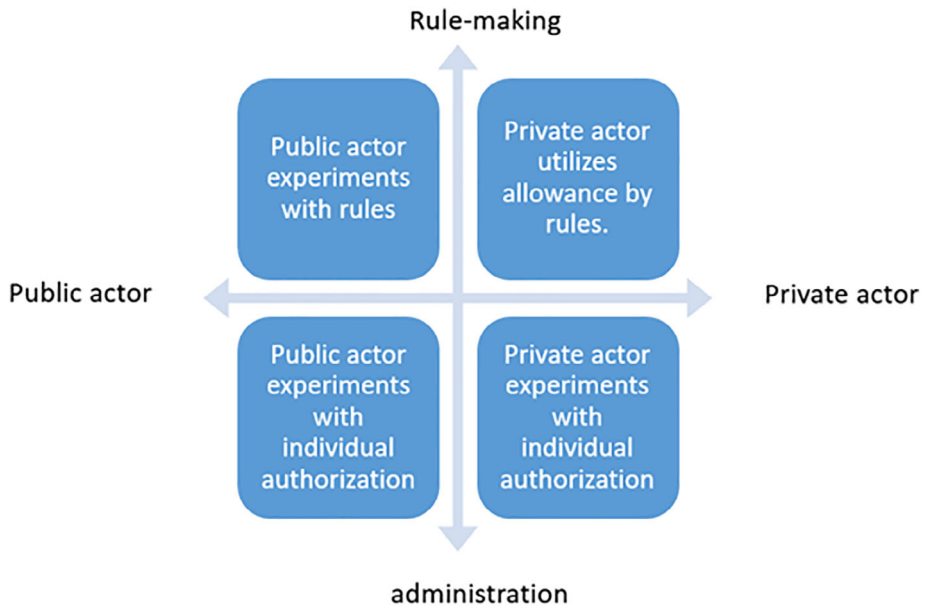

Figure 1 Theoretical model.

The vertical axis represents the core legal feature of the phenomena, the extremes express two of the three classical ideal types of Montesquieu: rulemaking power and executive power or the administration. This distinction is agnostic to any kind of legal quality judgment of a concrete arrangement. We systematize what we have observed or expect to observe in (policy) practice. Our vertical axis differs in two ways from the system designed by Heldeweg (2015). We include both regulations and concrete permissions, while Heldeweg focuses on regulation only. In addition, Heldeweg digs deeper into the content of the concrete rules and typifies the legal distinctions in detail, where we combine the legal axis with the empirical distinction between experimenting actors. We thereby pinpoint the legal analysis at the level of sophistication necessary for our purpose, which is at the grassroots.

At the top end of Figure 1, we find situations in which space for experiments is created by providing new rules. Most statutory experiments will be located in the top two quadrants. The basis for the experiment is provided for by statutory experimental provisions. In addition, the rules on the experiment itself are often elaborated in delegated legislation produced by the executive. This legislation replaces the existing rules for the duration of the experiment. At the bottom end of the vertical axis, experimental space is created by only suspending the enforcement of the current rules, without providing for any new norms. Most regulatory sandboxes are situated in the bottom two quadrants. Unsurprisingly the instruments placed above the crossing of the axis are developed in the realm of government institutions with legislative competence, predominantly but not exclusively national (state) authorities. Instruments below the crossing will be found in the praxis of institutions with executive powers, or administrative agencies, more specifically market regulators or inspectorates.

In practice, an instrument rarely fits the extremes of the vertical axis. The strongest example of this can be found in the ambiguous character of specific sandboxing instruments applied by a number of market supervisors. They combine the legal core feature of the sandbox, suspending the current legal framework, with detailing – in guidelines – what conditions and expectations for conducting the experiment they uphold, thereby in effect also providing new norms.

The horizontal axis is of a different nature than the vertical axis and represents the variation in actors conducting the experiment: the experimenters. This variation moves between the government authority as sole experimenter on the left-hand side and the private experimenter on the right-hand side, where the government does nothing but creating a permissive legal situation. Left from the crossing, we find government authorities experimenting with different regulatory content, abolishing current norms, or replacing old rules with new ones in order to see how private actors respond to it. As was stated earlier, this type of experiment is geared toward

testing whether new rules, or less rules, lead to a better realization of existing policy goals. On the left side of the axis, the introduction of new rules therefore coincides in time with the actual start of the experiment. On the right-hand side of the crossing, the new legislative context merely facilitates private experimenters. The permitting government gives way to private actors to conduct an experiment. A clear example is the situation in which the government allows the producers of autonomous vehicles to test their cars on the public roads or their autonomous ships on the waterways.[8]

As is explained earlier for the vertical axis, on this horizontal axis the pure forms of the extremes are also unlikely to be found. Even in a predominantly permitting condition – on the far right side of the horizontal axis – the government authority does some testing itself, because it will very often also try to collect data on how to best regulate the innovative product in the future, for example, data on the response of actors affected by the experiment without being the experimenters, for example, road users in an experiment with autonomous vehicles.

Country and/or sector-specific policy initiatives under statutory experiments or regulatory sandboxes can be categorized relative to each other with the help of the crossing axes mentioned earlier, by assigning them to one of the four quadrants. This categorization will help to identify the main legal vulnerabilities of the experiment. These vulnerabilities follow from the interplay of the variables on the horizontal and vertical axes, meaning the difference in the experimenting actor and the legal characteristic (rule based or executive based). The vulnerabilities can be expressed in terms of core legal principles (i.e. rule-of-law principles (Bingham 2010, Zoller 2008, p. 75–78) that come under pressure due to the specific make-up of the concrete experiment. These principles are legality, certainty, equality, and accountability.

For any specific quadrant, the combination of the actor-feature and the legal characteristic leads to a specific tension regarding the aforementioned rule-of-law principles. One can therefore say that each quadrant comes with a specific challenge, representing the dominant vulnerability of the experimental decision located in that quadrant. Due to the difference in vulnerability, the probable legal attacks on the experiments in the different quadrants will also vary. Therefore, the proactive shock absorption mechanism that increases the legal resilience will have to be adjusted to each specific challenge.

However, to be able to increase the legal resilience, a concrete definition of the possible attacks is necessary. Challenges include various forms of lawsuit. Depending on jurisdictional idiosyncrasies, these challenges can be tort-based, but also based on public law appeals. A concrete challenge or attack of an experiment will always be the result of general vulnerability that is invoked by a challenger. A challenger in this sense is an actor with a stake in the experiment. A challenger will call upon one of the vulnerabilities to safeguard his or her own interests.

A concrete resilience measure can only be proposed by taking into account both the variety of actors and the claims they can make to the core legal principles, or general legal vulnerabilities. With regard to the experiments that are at the core of this article, at least three actors should be considered: the experimenter; the companies, organizations, or persons that will take part in the experiment as object; and finally, the other companies (or: competitors) in the same market or sector. There is of course a fourth actor, which is the government agency, facilitating the experiment by statutory changes or a regulatory sandbox. However, this fourth actor is the object of the challenges and can therefore be discarded, although it should be noted that the government will be responsible for the implementation of the resilience measure.

In the following sections, we will examine the general vulnerabilities and probable legal challenges for the two types of experiments that are at the core of this article and that are located in the two quadrants on the right side of the vertical axes – statutory experiments and regulatory sandboxes with private actors.

6. Challenges Vis-à-Vis legal principles

As set out in the previous section, the legal vulnerability of any of the four quadrants is determined by the two variables on the horizontal and vertical axes in Figure 1. These vulnerabilities can be expressed in terms of rule-of-law principles (see already Horn (1989) on the German constitutional principles). In this section, we will give a general overview of the vulnerabilities of regulatory sandboxes and statutory experiments with private actors. We will explain which challenges can be formulated based on the legal principles of legality, certainty, equality,

and accountability, and which actors are most likely to come up with the challenge. At this point, it is important to note that the principles distinguished later show overlap when operationalized in concrete contexts. Consequently, it is sometimes possible to allocate a specific attack to several legal principles, but this would neither reduce the essential nature of the challenge nor change the distribution of the experiment over the quadrants in Figure 1.

6.1. Legality

The principle of legality refers to the norm that governments need a legal basis for interfering in the lives and interests of private individuals and companies. An (explicit) legal basis for an experiment is important not only because it helps realizing some of the other legal values that we will discuss later – like legal certainty – but also because an explicit authorization to experiment by the law can offer democratic legitimacy of the allocation of risks that inevitably coincide with experimenting.

Statutory experiments are usually not vulnerable legality wise. This is because a statute explicitly facilitates the replacement of a set of rules by an alternative, temporary set of rules for the purpose of the experiment. In addition, statutes are a product of a parliamentary process. Democratically elected representatives therefore have a say in the scope and conditions of the experiment. In addition, extra parliamentary involvement can be safeguarded on the delegated legislation that will be drafted upon the statutory experimentation provision. This delegated regulation for a concrete experiment is usually framed as a specific type of bylaw, of which parliament can demand to be explicitly informed before it enters into force.

Regulatory sandboxes are much more vulnerable when it comes to the legality principle. The legality principle and the values that coincide with it are not automatically respected for regulatory sandboxes. In the sandboxes we looked at, no examples were found of an explicit authorization by parliament for a regulatory authority to conduct experiments in the sandbox. The decisions to establish a sandbox were all taken by executive agencies. Executive authorities establishing a sandbox often make use of discretionary powers granted to them, although when granting these powers, the legislator almost never anticipated the use of the discretionary powers for the introduction of experimental policies.

The competitors of an experimenting company might attack a regulatory sandbox for violating the legality principle, claiming that the government agency that allows for experimentation oversteps its competence. Very often such claim will coincide with claims of unfair competition. Third parties, such as the companies, organizations, or persons, which are the object of the experiment might also find a sound base for their claim in the legality principle. They will often focus on the unacceptable or unpredictable risks that come along with the experiment. A lack of legal basis for the experiment is then converted into a complaint about the nontransparent assessment of the risks involved and the allocation of risks. A concrete sandbox is often a product of dialogue between the authority and the experimenting company. Consequently, society needs to rely on the self-control of the authority to prevent the allocation of intolerable risks to third parties.

6.2. Certainty

Legal certainty as a principle prescribes that individuals should have a minimum level of information to foresee their rights and obligations. It requires that the legal positions are foreseeable (predictable, not volatile) and accessible (available; understandable). In general, experiments will lead to uncertainty as to the applicable legislation. This is often the consequence of a multilayered normative framework, such as statutes, bylaws, and concrete permissions. Such a framework may be understood by lawyers, but to ordinary citizens and businesses these will remain rather opaque. This becomes problematic when these citizens are the object of the experiment. In addition to this challenge, competitors can attack an experiment claiming that they must compete under disadvantageous circumstances. This holds in particular when they had no preknowledge of the concrete experiment or no change to enter the experiment.

Legal certainty also entails the duty for the government to meet reasonable expectations, particularly in cases where the authority has raised expectations or contributed to expectations. Authorities that involve themselves as partners in innovation processes run an increased risk of stimulating such expectations. Especially the experimenter, the company wishing to conduct the experiment, has a vivid interest in certainty for the duration of the

experiment and beyond. These experimenters might attack the design of the experiment for a lack of certainty as to their rights and obligations. In addition, they can also attack government agencies for decisions made after the experiment, claiming that the design of the experiment created justified expectations for the time after the experiment.

6.3. Equality

Legal certainty, defined as the possibility for citizens to determine which rules apply to them or in which legal relationship they enter, is closely related to the principle of equality, which states that citizens and businesses have a right to be subjected to the same rules under the same circumstances. Experimental settings usually involve groups of considerable size that are not treated equally. Very often the unequal treatment of citizens in similar circumstances is justified by the potential benefits of the innovation.

The main challenge to legal experiments based on the equality principle might be posed by competitors. This holds ground for competitors who may desire to take part in the experiment or conduct a similar experiment on their own. Sandboxes and statutory experiments are by nature limited in size. This makes sense because of the unknown (side) effects of the new product. To learn more on those (side) effects under controlled circumstances is the very reason that the experiment is conducted. Because they are limited in size, only a certain number of entrepreneurs can be admitted to these experiments. When the number of potential experimenters is higher than the experiment allows, the question arises to whom the possibility to experiment must be offered. In other words, how should we evaluate the disruption of the level playing field between competitors?

6.4. Public accountability

The final vulnerability of statutory experiments and regulatory sandboxes with private actors lies in the domain of the principle of public accountability, the generic requirement that public authority must be able to account for their actions and the consequences thereof when applying their powers. This principle is put under pressure in the case-by-case arrangements in the regulatory sandbox practice. We observed an intention in most sandbox designs that both the authority and the entrepreneur(s) become participant in the experiment and enter into a dialogue on the best shape and form of the experiment (Ringe & Ruof 2018, p. 36–37). This entails the risk of rendering the separate positions of regulator and experimenter more blurred. Where there is less distinction, there will be less clarity as to who is responsible for what consequences, which impedes public accountability on the side of the authority. In addition, this reduction of clear demarcation can even lead to liability risks on the side of the public authority: a liability risk that is invoked by competitors or third parties to the experiment. Granting permission to experiment is for some cases dependent on a proper arrangement for the risks that the consumers involved in the experiment face (FCA (Financial Conduct Authority) 2015, pp. 21–22; AFM/DNB 2016, pp. 5–6). Unforeseen risks should be included in such arrangements as well, in order not to allocate these to unsuspecting third parties (Hanebury 2006, p. 54; Wagner 2018, p. 3).

Statutory experiments carry a lower risk of blurring the responsibilities stemming from the principle of public accountability, and therefore public accountability is not a vulnerability for statutory experiments. The statutory text almost always includes a clear demarcation of the positions, which communicates the accountability status to the public.

6.5. Taking stock

In this section, we have so far discussed the various vulnerabilities of statutory experiments and regulatory sandboxes in situations in which private companies experiment. We ordered these vulnerabilities in terms of general legal principles, that is, rule-of-law principles. We have meted out the stakes for the public body, the experimenter and his competitors and the objects in the experiment. Our point of departure was a normative view of the rule-of-law in public administration, in which the public authority has a responsibility to take into account the interests of individual citizens or businesses. It is wise for public authorities to think of ways to meet their responsibilities by increasing the legal resilience of the design of the experiment. With this in mind, we now move on to offer guidance for doing so.

7. Guidance to secure or improve legal resilience

The assessment of vulnerabilities in the previous section offers a basis to come to concrete measures and increase the resilience of statutory experiments and regulatory sandboxes with private actors. Actual products, markets, and legal contexts are so diverse that we cannot offer clear-cut yes-or-no guidance for all experiments. However, proactively safeguarding the observance of these guidelines secures a minimum level of proper public governance in various experiments. It presents a strategy to prepare *ex ante* legal challenges of the specific experimental policy and handle those challenges more proficiently when they occur during the experiment or afterwards. The intention is to assist in extending the adaptivity (Ruhl & Fischman 2010, p. 428) to legal shocks beforehand. Where and when those legal shocks may be exerted varies with the local status of the law.

Our guidelines are supposed to be observed in the pre-experimental stage when deliberation takes place on whether the experiment should be facilitated and in what form. Our plea to explicitly reflect on the guidelines sets out below connects with common practices under administrative law, where the authority gives a reasoned decision upon the request of the experimenter, which request is accompanied with the documentation as to the permissibility. However, the more an experimental arrangement moves away from the format of concrete permissions, that is, less case-by-case and thus upwards along the vertical axis in the model (Fig. 1), the more abstract the authorities' considerations will be. Thereby the projections of the legal risks will be less and less specific, as a consequence of which the prescribed risk-countering strategies should also be more general. A general guideline therefore is to reserve the more abstract rulebook approach for experiments with risks that are less serious or less irreversible for the rights of individual persons and companies, where trial and error would be inappropriate (discussion with Marchant & Stevens 2017, p. 254).

Building on Section 5, we establish the following additional guidelines. Firstly, to uphold the principle of legality to a maximum level, the government authority initiating the experiment must clearly demarcate its own position with regard to the experiment. This means that the authority must ensure that it is competent to initiate the experiment in its desired form. Moreover, in as far as the government authority is competent, it should certify that it acts within the powers granted by law.

Second, as an element of public accountability and legal certainty, it is commendable to provide clarity on the respective responsibilities of the agency and the owner of the experiment regarding the execution of the experiment and the risks that coincide with the experiment before carrying it out. Different possible futures should be explored in the preparation stage, including worst-case scenarios, in order to arrive at such clarity.

Third, the government should provide clarity to the experimenter on the condition(s) under which the experiment is a success and/or can be extended. This requirement flows from the principle of legal certainty. It is important to note that such clarity should comprise the clause that a positive evaluation of the experiment does not as such entail the promise that the product will be allowed onto the market. The option of refusing access to the market after the experiment or imposing conditions on market access that carry an additional burden on the acting company should be on the table. Even when the experiment leads to the conclusion that the product will land profitably on the market, the authority may rule against it for various reasons (WRR 2014, p. 39). One of those will be the necessity of a change in laws and regulations for which the relevant authority is not competent. This is especially a risk with regulatory sandboxes (Jacobs 2018, p. 50; Ringe & Ruof 2018, p. 55; Fenwick *et al.* 2017, 587). Another may be that related public interest considerations plead against admission. At the same time, the government must behave as a reliable partner in the process, so an unsubstantiated disconnect between the success of an experiment and the future possibility of introducing the product to the market would be unfair and legally unacceptable.

Fourth, the government must safeguard the interests of third parties. Prior to the experiment, the government must guarantee that the duration of the experiment is limited. The experiment should never last longer than strictly necessary to achieve its objectives. The government must apply as much transparency about the experiment as possible. This means that experiments ought always to be announced in advance. Such announcements at least entail a statement that in a certain market or sector, permissions to experiment have been granted. In addition, it would usually be desirable to be transparent about who will come into contact with the experiment as test objects. And no more citizens may be confronted with the experiment than is strictly necessary for a good execution of the experiment. If the experiment allows, it is preferable also to include specific information on the

experiment in the public announcement, such as the experimenter, the goals of the experiment, and the duration of the experiment. This allows for some form of accountability, be it indirect and possibly after conclusion of the experimentation phase.

The government should prevent that the level of transparency we propose here conflicts with ethical codes on experimentation. In randomized controlled studies, test persons often cannot be aware whether they are exposed to the experimental manipulation or whether they are part of the control group. Information on their position would influence the attitude and action of the test person and render the outcome of the experiment unreliable (contending: Bruns *et al.* 2018). Nonetheless, individuals should always be informed if and when they are involved in an experiment (Dench *et al.* 2004, p. 63; WRR 2014, p. 74). Transparency should result in the opportunity of the potential test objects *not* to take part in the experiment as such. A withdrawal from the entire experiment should always be an option. Although the application of empirical research standards is not that simple, the experiment sometimes takes place outside a controllable environment. Experimentation with autonomous cars on the public road provides a nice example of that. The question is: Should the self-driving cars be recognizable as such? Clear markings will communicate the experimental situation, but supposedly affects the behavior of the other drivers and therefore the reliability of the trial results. In other cases, awareness among people that they enter an experimental context should be enhanced by proper communication (Weng *et al.* (2015); Salvini *et al.* (2010). Even though it is not always possible to be fully transparent on every aspect of the experiment, it is at least always possible to inform the public in general terms about the fact that experiments are allowed in a certain sector or context. Moreover, the communication that a permission has been allowed to an identifiable actor in the specific sector is also highly desirable. The British FCA releases the names of the companies that have been granted permission in the separate cohorts, where the Dutch financial regulators have declared that these decisions are subject to their confidentiality obligations (AFM/DNB 2016. p. 7) under the Act on Financial Supervision.

The fifth guideline states that the interests of potential competitors require transparency on the procedure by which the permissions to experiment can be obtained, and on the basis of which criteria interested parties will be selected and what companies are eligible. As a general rule, government agencies should allow as many providers as possible to the experiment. This is a standard approach within EU law toward the division of limited public rights (Buijze 2013; Adriaanse 2016). Granting access to an experiment is similar to offering limited public rights. Guaranteeing transparency in granting limited public rights flows directly from the principle of equal treatment. The EU directive on services in the internal market formulates it as follows (Consideration 62, 2006/23/EC):

> *Where the number of authorisations available for an activity is limited because of scarcity (…), a procedure for selection from among several potential candidates should be adopted with the aim of developing through open competition the quality and conditions for supply of services available to users. Such a procedure should provide guarantees of transparency and impartiality and the authorisation thus granted should not have an excessive duration, be subject to automatic renewal or confer any advantage on the provider whose authorisation has just expired. In particular, the duration of the authorisation granted should be fixed in such a way that it does not restrict or limit free competition beyond what is necessary in order to enable the provider to recoup the cost of investment and to make a fair return on the capital invested.*

This standard could mutatis mutandis be applied to experimental settings. Compliance with this requirement does not only serve legal certainty, but must also guarantee that, over time, competitors can also acquire the same rights and experimenting companies are not improperly favored by the government. Granting all competitors a right of access to the ongoing experiment might be a remedy for inequality, but that is only conceivable for long-term experiments. However, extending the duration of an experiment against the rules of proper and effective testing, just to serve competitors' access, would go against principles of good governance. Of course, this does not alter the fact that, if in any way reasonably possible, it is preferable to offer various providers a share in the experiment. This could take the shape of organizing experiments in different batches. Granting access to an experiment should always be shaped as a separate and discernible decision and that decision should by itself always comply with the standards of transparency. At the end of the day, it must simply be recognized that experiments will often lead to various forms of unequal treatment for the duration of the experiment. This also applies to the possible unequal treatment of competitors. As long as the consequences remain limited and there is no irreversible

advantage of one competitor over the other, that unequal treatment can be justified by the expected positive outcomes of experiments.

Sixth, with regard to the public accountability, the responsible government authority should be clear on any liability for damage caused by the experiment. This could include complete indemnification of the authority and a proper insurance for any liability at their end. Such an arrangement for accidents comes on top of the duty to monitor the experiment as closely as reasonably possible. Proactive thinking and a clear communication from the outset assist in the formulation of concrete conditions attached to the permission for conducting the experiment. That would also help to identify possible incidents that may lead to immediate discontinuation of the experiment and prompts to discussing an exit strategy on the side of the experimenter. On the side, a clear demarcation of responsibilities between the government authority granting permission to experiment and the experimenter is better supported by the format of a public decision/permission and less by the format of a public–private contract. In granting the permission, government agencies should safeguard that the private experimenter also meets certain standards. The experimenter can be expected to provide a concrete description of the experimental product, the research question, the test environment, and clarification of how the main responsibility toward the collection and processing of the data is played out. This includes that the experimenter provides possible exit strategies in advance.

The abovementioned guidelines are summed up in Table 1, as brief commandments distributed across three columns representing a chronology of actions. In the left column of the table, we list the legal principles that offer a basis for specific challenges, as described in Section 5. The commandments serve to foil the attack before it can occur as pre-emptive action to improve the capacity to absorb and sustain. As such, they serve as guidelines for the designing and implementation of a resilient experimentation program. First, we list the guidelines that ought to have impact in the preparatory stage of the experimentation program, and second, the guidelines that instruct the authority for when granting permission in the concrete decision-making stage. The guidelines for follow-up actions to these decisions are listed in the far-right column.

8. Conclusion, discussion, and future research

This article reported on a study of statutory experiments and regulatory sandboxes as diverse appearances to create temporary legal enclaves by government authorities to foster experimentation in real life. We ordered the existing variety of statutory experiments and regulatory sandboxes in a theoretical model. We then confronted the cases in which the government authority allows private parties to conduct experiments with a selected number of legal principles. We arrived at the conclusion that the risks of bypassing existing legal rules can be met by proactive observance of a number of guidelines, to be translated in the particulars of a legal decision in the specific context, be it a temporary regulation, a concrete permission, a policy letter, or any other format.

We have focused on the generic rule-of-law principles that many jurisdictions share. The details are extracted from the English and the Dutch situations. Research on the way in which authorities of other jurisdictions have found a balance in creating space for experiments would help to come to a better understanding of the arrangements for experimentation and their functionality for combining legal resilience with effective promotion of innovation. Whether experimentation in more innovative contexts serves to realize a smoother transition between regulatory stages (as in Howlett, Ramesh & Taeihagh (2019) in this special issue) needs further empirical study. The same holds for the multiple roles we have shown for transparency in various directions. How the nature of our guidelines as elaborations of the concept of legal resilience is conceptually linked with liability issues requires further clarification. As stated by Marchant and Stevens (2017), liability is an important category with which to distribute responsibility and thereby costs. We believe that the merits of our additional concept could be found in the enhanced capacity to reflect real-life uncertainties. Liability might distribute risks but is in essence a binary concept. One is liable or one is not, and one can only anticipate liability for known risks. Following up on the guidelines presented here improves the chances of surviving a legal attack, even for *ex ante* unknown situations (Marchant & Stevens 2017). In addition to that, liability comprises responsibility for damage under private law. Our guidelines extend to legal risks under public law, which upon occurrence may lead to permissions being withdrawn or fines imposed, apart from possible compensation for damage done. To this conclusion, we come

Table 1 Overview guidelines

Timing / challenge	Program opening	Granting permission	Post permission
Legality	Find explicit legal basis. Interpret legal basis restrictively.	Clarify the status of consent and/or optional withdrawal from test.	Publish a definition of the test-objects in concrete project.
Certainty	Announce publicly that in certain policy field experiments (may) take place.	Require clear (time) horizon and provide clear guidance regarding possibility and criteria for extension of test period. Provide in advance criteria for success. Clarify in advance the extent to which success leads to admission of product. Restrict test period to time strictly necessary.	Announce to whom concrete permission has been granted.
Equality	Provide clear admission criteria for experiments. Provide clear and transparent admission procedure. Admit as many experimenters as possible.	*	Publish the identity of actors with permission.
Accountability	Provide (information on) remedies against refusal. Take coverage for liability towards experimenter and others.	Describe in permission the respective responsibilities, especially toward experimenter. Require concrete and comprehensive description of test-product, test-question, test-environment, test-criteria, and data-collection. Require explicit exit strategy. Require warranties for damage compensation. Clarify in advance where damage compensation can be obtained.	Publish (aggregate) reports on concrete experiments and the practice in general.

*This empty cell visualizes that unequal treatment is essential to experiment permissions.

on the basis of combining the literature and our findings, but further research is needed whether this optimism actually holds under concrete challenges.

We have not had the opportunity to put the correlation between the culture in law and the arrangements for testing new technologies under scrutiny. It is not unlikely to find some relation, but we have reservations to relying too much on legal culture as a key variable. The concept, when taken as tradition, is in fact too broad to be helpful in addressing our questions (Glenn 2014). Alternatively, taking culture as the "detailed commons in one jurisdiction" does not add very much to the comprehensive study of institutional relations in states nor to the development of concrete arrangements in any jurisdiction based on generalized knowledge (see van Hoecke & Warrington 1998). Finally, the variation across local jurisdictions may be less informative on the regulatory status quo than the variation over time and in technological context, as suggested by Howlett, Ramesh and Taeihagh (2019 in this special issue).

We obviously defend the continuation of experimentation practices as a valuable tool in formulating and designing regulation for innovative (disruptive) technologies, especially in the early stages of the life cycle of a regulatory regime. However, a number of conditions need to be observed and the relevant public authority must adopt a proactive stance. We disagree with those who argued against experimentation altogether – on the basis that it violates the equality principle (SERV, German BaFin). Our argument is that equality in socioeconomic life,

as understood across jurisdictions (Maduro 2008, p. 33), can always be respected up to a necessary minimum level by applying the guidelines we developed in this study.

Others, like Ranchordas (2018, p. 35), argue that an *ex ante* proportionality test should be decisive for any experiment to be allowed. We agree that proportionality between risk and possible gain should weigh heavily in the decision-making process and have indeed pointed at various *ex ante* considerations. However, we expect that if this is the only tool for assessments, the proportionality test may have a fatally paralyzing effect. So many elements of this risks-versus-gains assessment will in practice be invisible or insecure before the experiment is conducted. As such, a full proportionality judgment as the basis of the permission will be unattainable. A limitation in time, appropriate insurance, exit strategy, and transparency in all stages appear to be better remedies, notwithstanding that in hindsight one might find that the experiment had disproportionate consequences after all. Scientific research on completed cases would be necessary for gathering data on those consequences.

We have argued that allowing real-life experiments under certain conditions is a decision that should be distinguished from the decision to allow the product on the market under the same conditions after the conclusion of the experiment. That decision falls within the discretion of the authority, particularly when that authority has successfully avoided expectations in that direction. This legal distinction – between free exercise of discretion and honoring promises – has a factual dimension, in which two opposing hypotheses can be tested regarding who usually wins after the experiment: disruptor versus incumbents. Our historical recount might give the impression that newcomers used to be on the downside, but Wyman (2017, p. 75) argued the opposite for today. An update of work done by Stout and de Jong (2005) for more recent history will shed more light on the matter.

In a couple of instances, we have pointed at the importance of indemnification and insurance. Such clauses come at a cost and law-and-economics research of the cost and benefit balance on the side of the experimenter is necessary. One could argue that too high a burden of insurance premiums on the side of experimenters effectively rules out experimentation by small start-ups and leaves the field open to strong incumbents, one concrete elaboration of asymmetries pointed at by Leenes *et al.* (2017, p. 36). Whether that is a real risk needs further examination, though Marchant and Stevens (2017, p. 264) take for granted that such internalization of costs will discriminate against small firms.

Our conclusion is that the tailor-made combination of the described measures leads to the most robust experiment decisions, in the legal sense, to experiments that can absorb legal shocks. This does not take away every legal risk, but it provides resilience where that is necessary. Policies without any legal risk would most likely not be appreciated as engaging with innovative industries and companies. Observation of the guidelines increases the legal resilience of the public decision-making and supports the government authorities in their wish to be permissive toward innovative industry.

Endnotes

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[2] Henceforth, the term product refers to both goods and services.

[3] https://www.moh.gov.sg/our-healthcare-system/licensing-experimentation-and-adaptation-programme-(leap)-a-moh-regulatory-sandbox refers to testing of telemedicine in Singapore [Last accessed 12 February 2019]; https://www.thestar.com.my/business/business-news/2018/02/14/mof-implements-national-regulatory-sandbox-initiative/ [Last accessed 12 February 2019] showing the wide application in Malaysia.

[4] https://www.afm.nl/nl-nl/professionals/onderwerpen/innovationhub-maatwerk [Last accessed 12 February 2019].

[5] https://asic.gov.au/for-business/your-business/innovation-hub/regulatory-sandbox/ [Last accessed 12 February 2019].

[6] https://www.fca.org.uk/firms/regulatory-sandbox/sandbox-tools [Last accessed 12 February 2019].

[7] Last search on ECB website 12 February 2019. See ECB board member Sabine Lautenschläger in a speech on March 27, 2017: "Digital na(t)ive? Fintechs and the future of banking", https://www.ecb.europa.eu/press/key/date/2017/html/sp170327_1.en.html [Last accessed 12 February 2019].

[8] https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/02/2019-autonomous-vehicles-readiness-index.pdf

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