TECHNICAL GUIDE

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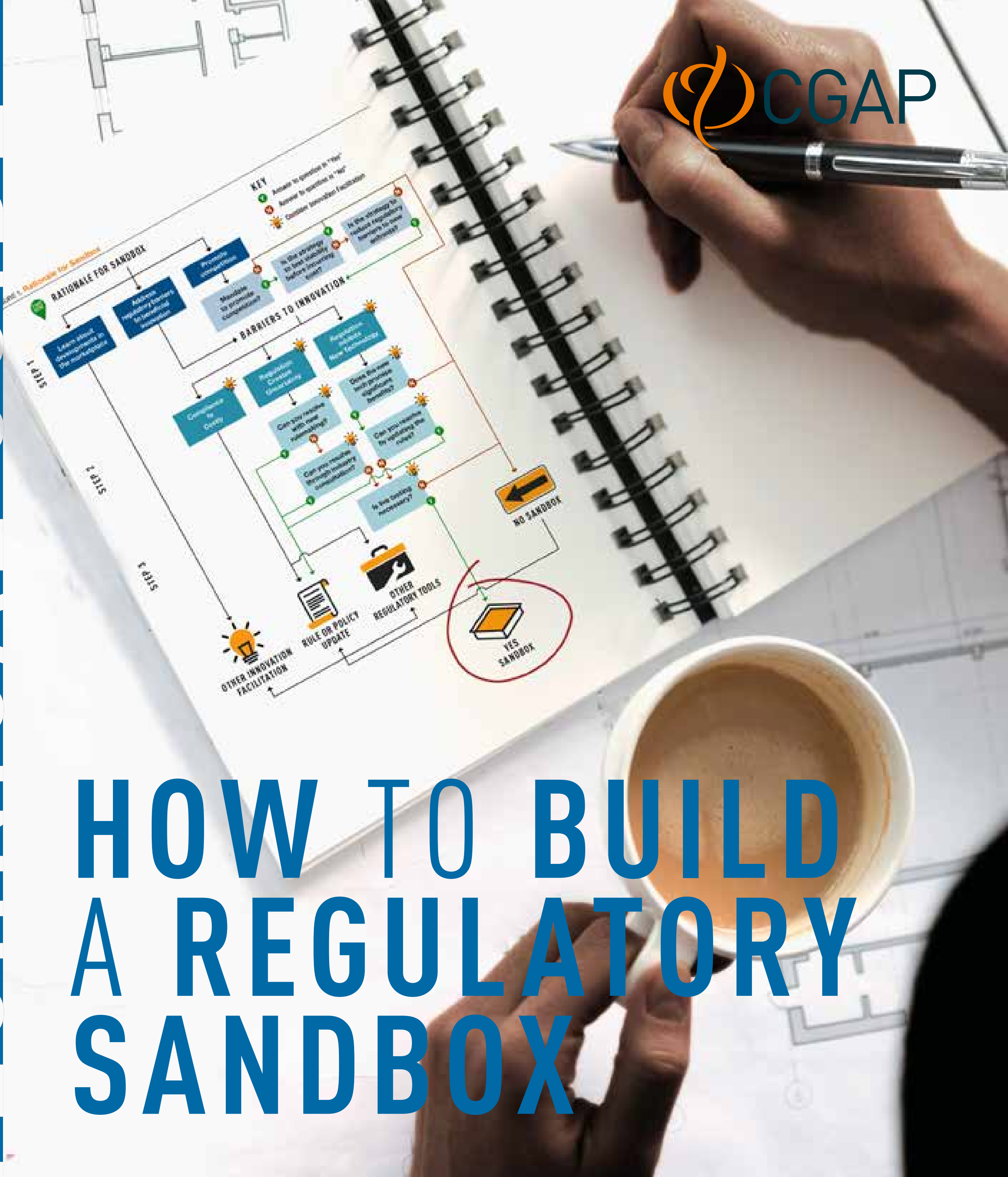

HOW TO BUILD A REGULATORY SANDBOX

A Practical Guide for Policy Makers

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EXECUTIVE SUMMARY

REGULATORY SANDBOXES PROVIDE A controlled environment to live test new products, technology, or business models under the watchful eye of a financial regulator. In many countries around the world, regulatory sandboxes have garnered significant attention for their potential to enable regulators to carefully monitor the opportunities and risks associated with innovations, while allowing firms to bring innovations into the marketplace quickly and with less risk. Sandboxes also have become a trademark program for forward-leaning financial regulators, generating widespread excitement as a way to modernize their oversight of the financial sector in tandem with the rapid pace of technical innovation.

As they gain popularity, however, significant questions arise over whether and under what circumstances sandboxes should be used. This Technical Guide seeks to answer some of those questions. It is intended to help financial regulators through the process of deciding whether a regulatory sandbox is suitable given their regulatory regime, and if so, how to design and implement a successful sandbox. The guide addresses practical questions that regulators face in responding to innovation—it does not focus on theoretical issues or on evaluating the impact of sandboxes.

The Technical Guide is informed by the following perspectives:

- CGAP's review of regulatory sandboxes globally shows considerable potential for sandboxes to foster financial inclusion by enabling firms to experiment in a safe space with new technologies that address some of the persistent barriers to poor people accessing and using financial services.
- Sandboxes can accelerate innovation and generate practical insights into the appropriate regulatory and supervisory framework for promoting innovation in inclusive finance and for mitigating risks. Thematic sandboxes that promote regulatory enablers may be particularly beneficial for financial inclusion.
- However, sandboxes are not appropriate in all circumstances. There are significant limitations to their role, and they should not be automatically viewed as the go-to solution. They require a considerable investment of time and resources to set up and run. As such, they risk distracting regulators that have limited capacity from pursuing more fundamental tasks.
- A range of alternative approaches for managing innovation should be carefully considered, including *ad hoc* test-and-learn approaches, rule changes, and regulatory reforms. As explained in this Guide, depending on the objectives and environment, these might prove more appropriate than a sandbox.

SECTION 1
INTRODUCTION

REGULATORY SANDBOXES BURST ON the global scene in 2015 amid great excitement about their potential to modernize financial regulation at the speed of technical innovation. Pioneered at scale by the United Kingdom's Financial Conduct Authority (FCA), sandboxes offered firms the ability to live test new products, technologies, and business models in a controlled environment. A milestone in the evolution of regulatory tools such as test-and-learn, sandboxes quickly have become a trademark program for forward-leaning financial regulators.

Today, more than 60 jurisdictions around the world have announced regulatory sandboxes, and interest in them shows no sign of waning (Appaya and Gradstein 2020). This rapid adoption prompted initial concern that sandboxes would distract regulators from developing more foundational legal and regulatory frameworks for enabling responsible innovation. In addition, observations from CGAP's fieldwork support the view that some early sandbox programs were not clearly linked to specific regulatory objectives.

To our knowledge, there is no literature expressly directed to regulators wrestling with the practicalities of tailoring sandbox programs to support their local innovation and regulation objectives.[1] This Guide aims to fill that knowledge gap. It focuses on common questions and decision points regulators face at various stages of sandbox evaluation, design, and implementation. It is a practical guide based on real-world insights and supplemented with decision frameworks and templates derived from ongoing sandbox programs.

The Guide is informed by four years of CGAP research that includes:

- Analysis of more than 30 regulatory sandbox frameworks.
- In-depth interviews with financial sector regulators in Bahrain, Brazil, Kenya, Lithuania, South Africa, and Taiwan.
- High-level interviews with more than 100 stakeholders, including regulators, financial services providers, international development experts, academics, and investors.
- A global survey of innovation facilitators conducted jointly with the World Bank (Jeník and Appaya 2019a).
- A global sweep of 134 entities that have tested in 16 different sandboxes.[2]
- In-country design and implementation work with regulators in Kenya, Nigeria, and Uganda (and with less intensity in many other countries).

The analytical tools, examples, and templates herein are grounded in practical experience and designed to help regulators navigate common questions and challenges they face when designing and implementing regulatory sandboxes.

The Guide is organized around three phases of a typical regulatory sandbox design and implementation processes:

1. **Objective setting: Why set up a regulatory sandbox?** Regulators have a range of tools for engaging with and addressing innovation. These include innovation offices or hubs, accelerator programs, and regulatory sandboxes (collectively described as "innovation facilitators" by the Financial Stability Board [2017]), as well as more familiar approaches such as "test-and-learn" and

1 Unless otherwise noted, "regulators" as used in this Guide refers to financial sector regulators, supervisors, or policy makers.

2 "Interactive Map of Regulatory Sandboxes," CGAP, https://www.cgap.org/regulatory-sandbox/interactive-map.

"wait-and-see." These tools can be used on their own or in combination. This Guide introduces a decision process for assessing whether to implement a regulatory sandbox and identifies common interactions between sandboxes and alternative tools, such as innovation hubs and formal rulemaking processes. Among other things, the decision process directs regulators to closely question the need for live testing. When the answer is unclear, regulators should gather additional insights from innovation facilitators that do not use sandboxes and carefully evaluate alternative tools before launching a sandbox.

2. **Design: How can I design a regulatory sandbox to advance the regulatory objective?** No two sandboxes are the same, and regulators face several design choices that ultimately affect cost, perception, and market uptake. This Guide provides a diligence framework for planning a regulatory sandbox, highlighting the key jurisdictional, institutional, and market characteristics that commonly influence sandbox design choices. Rather than recommending a single, optimal design for all circumstances, this variation serves as a practical reminder that sandboxes should be fit for purpose and customized to local conditions.
3. **Implementation: How do I create a successful regulatory sandbox?** This section outlines several operational prerequisites to consider when implementing a sandbox, including organizational design and governance; market engagement; and testing, evaluation, and exit. It is followed by a detailed description of complementary options and alternatives to regulatory sandboxes.

The Annexes provide tools and sample documentation for each stage of the process.

It is important to note that this guide is neither a blueprint for launching a sandbox in any specific jurisdiction nor a recommendation that regulators should adopt sandbox programs in all cases. Rather, it is a summary of common questions and decision points faced by regulators around the world in a wide range of local contexts. To the extent this Guide offers a strong recommendation, it is to encourage regulators to view sandboxes as a specialized tool—best used in conjunction with other innovation facilitators—to enable evidence-based, outcome-oriented regulation.

The impact of sandboxes on innovation generally and financial inclusion specifically has not been proven yet.[3] Our hypothesis is that regulatory sandboxes may help advance financial inclusion by enabling evidence-based, outcome-oriented regulation of new, consumer-friendly innovation that helps advance financial inclusion. To achieve this potential, regulators must implement sandboxes appropriately. They should leverage the unique insights from live-testing environments in close coordination with other complementary tools and programs. We created this Guide in service of that objective.

3 See Jeník and Lauer (2017) and Appaya and Gradstein (2020).

SECTION 2

OBJECTIVE SETTING: WHY SET UP A REGULATORY SANDBOX?

A **REGULATORY SANDBOX IS A TOOL** for developing evidence about how a new product, technology, or business model (innovation) works and the outcomes it produces. Evidence gathering can help assuage (or confirm) regulatory concerns about the impact of innovations, allowing beneficial innovations to reach the marketplace. Consider the following real-life examples:

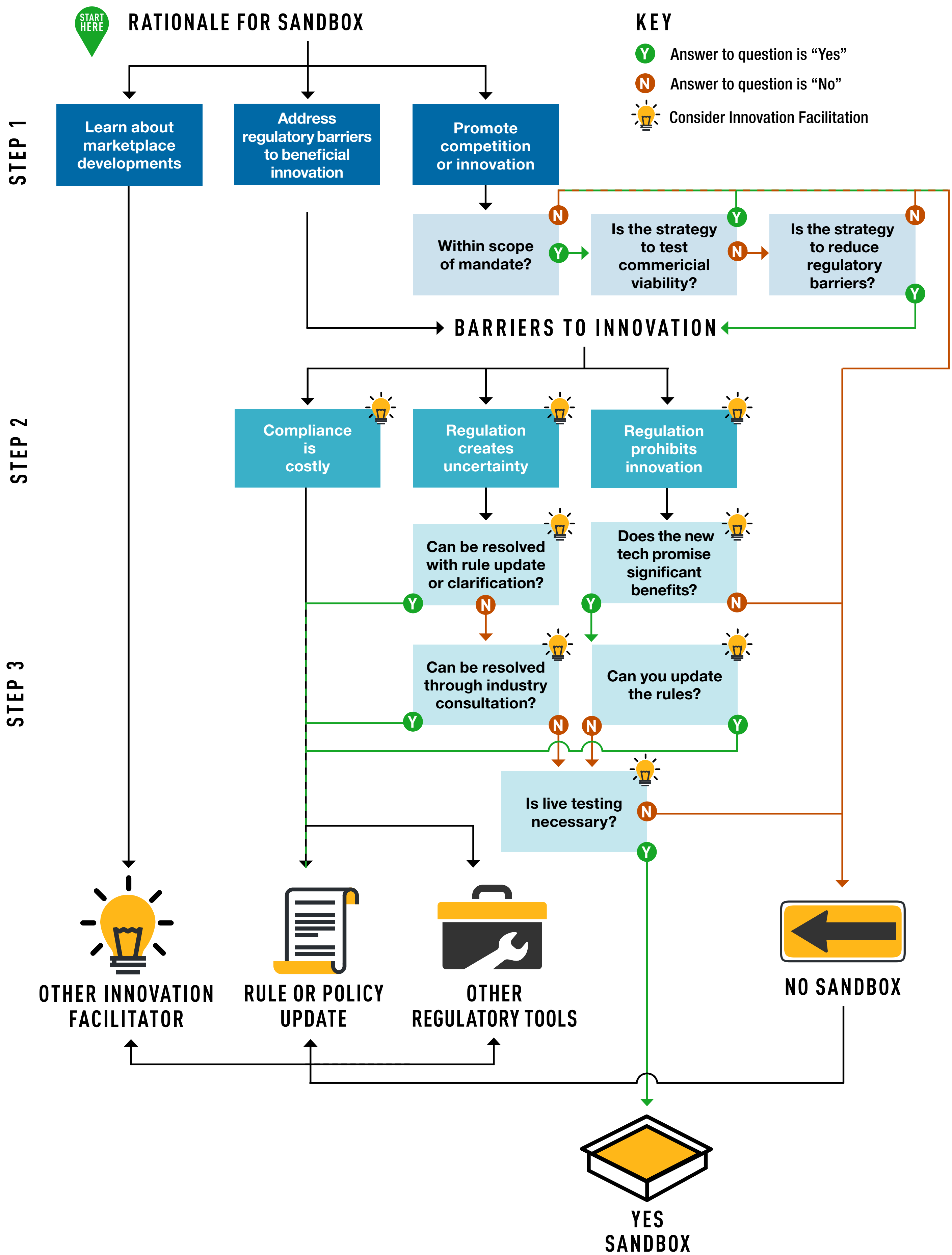
- **Alternative data underwriting.** A fintech lender proposed using alternative data (education and employment history) and machine learning to underwrite consumer credit (CFPB 2017). While acknowledging the potential for expanding access to credit and lowering costs, the regulator worried that the underwriting model would discriminate among borrowers based on race, ethnicity, gender, or age. Using a sandbox test, the regulator determined the technology expanded access to credit and reduced costs relative to a traditional underwriting model, resulting in (i) approval of 27 percent more applicants and 16 percent lower average annual percentage rates overall and (ii) substantially higher approval rates for applicants under age 25 and consumers with incomes under $50,000. Moreover, the test identified no discrimination in approvals.
- **Insurance coverage optimization.** Insurtech start-up PolicyPal offered a tool that used natural language processing (NLP) to assess policy coverage and gaps in consumer insurance policies. The regulator recognized the potential benefits of helping consumers understand and navigate complex insurance policies but also the potential harm if the tool made recommendations that exposed individuals to uncovered risks or liabilities. The regulator therefore used a sandbox to compare the results of NLP recommendations with an in-person review of the same policies by an insurance professional. The sandbox results left the regulator satisfied that NLP identified coverage issues and gaps similar to what the live reviewer identified, and the regulator approved the product for launch in the marketplace.

In both cases, the new technology presented potential risks that were difficult to assess in the abstract—it also identified potential consumer benefits that would be lost if the technology was not allowed to enter the marketplace. Experimenting with live data helped to show that these technologies operated as promised and yielded potential consumer benefits.

Most innovations do not require this level of evidence-based regulatory analysis before launch. Regulators should have a clear understanding of the circumstances that warrant a sandbox test and when other tools and frameworks may suffice because sandboxes are time and resource intensive and generally not available to all market participants (Jeník and Appaya 2019). The sandbox decision process illustrated in Figure 1 can help to facilitate this analysis. This decision process is intended to prompt regulators to closely scrutinize the need to conduct a live test, exploring the underlying hypotheses for adopting a sandbox. When the answer is unclear, regulators should gather additional insights from innovation facilitators that do not use sandboxes and carefully evaluate both complementary and alternative tools.

Although the decision process is highly generalized, it envisions a sandbox test as the final stage of an iterative engagement between the regulator and innovator. As a practical matter, this exchange helps to sharpen the questions that must be resolved by evidence developed in the sandbox testing environment. More broadly, the decision process

FIGURE 1. **Decision process: Overview**



channels questions about the regulatory status of an innovation (i.e., whether it is permitted or prohibited) to either (i) informal resolution through a low(er) cost, broadly accessible innovation facilitator or (ii) a regulatory or licensing process that already is in place.

This process is intended to reduce the risk that the sandbox will inadvertently (i) distort normal market mechanisms (unless that is what the regulator is mandated to do), (ii) act as an imperfect substitute for other regulatory enablers and/or a regulatory change, (iii) create an uneven playing field, or (iv) act as a *de facto* gatekeeper or substitute for interactions with traditional licensing or supervisory processes.[4]

Step One: Determine the sandbox objective

Regulators frequently cite three overarching objectives for their sandbox programs:

1. Promote innovation and/or competition.
2. Address regulatory barriers to innovation.
3. Learn about developments in the marketplace.

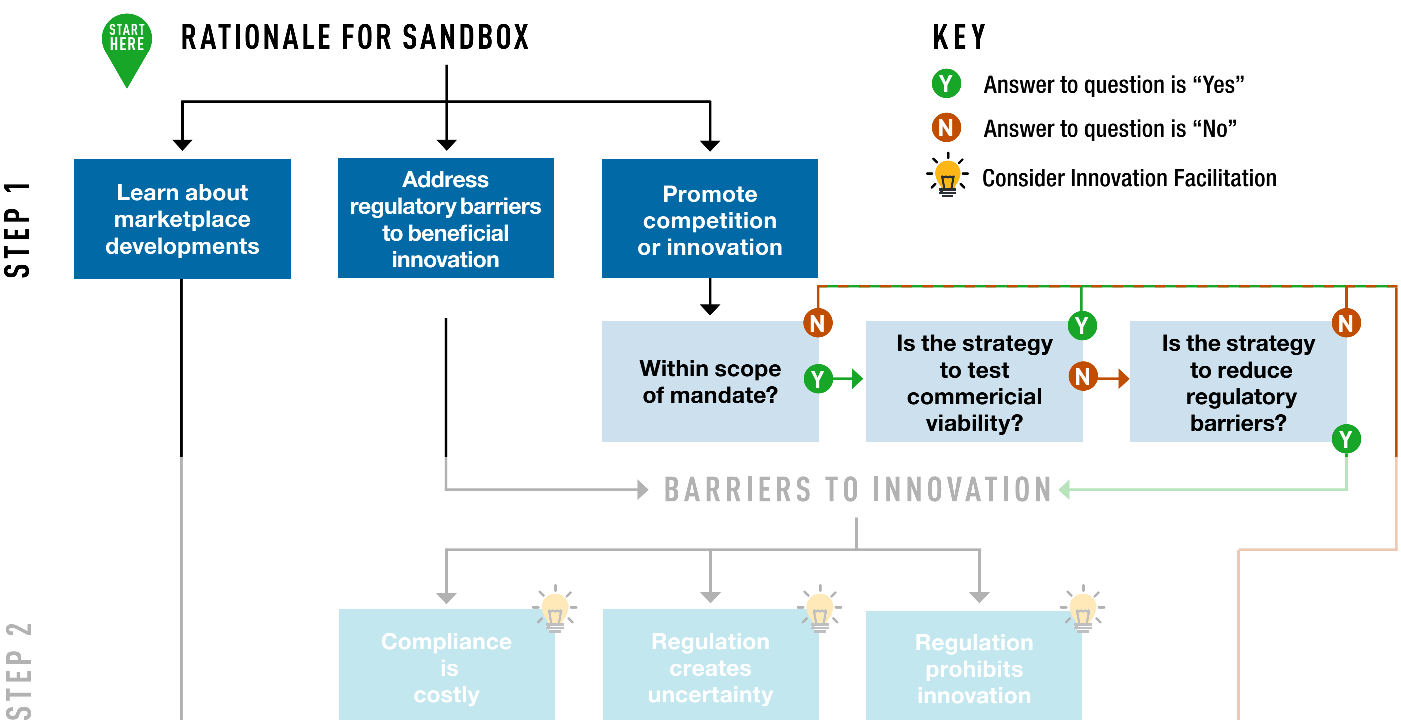
Considering each objective separately can help regulators decide whether a sandbox—or an alternative or complementary approach—is the best strategy for advancing the policy objective. See Figure 2.

PROMOTE INNOVATION AND COMPETITION

Regulators often begin with the assumption that a sandbox should be used to promote innovation and competition by accelerating market entry for new firms or products. To achieve this objective, sandboxes sometimes are positioned as "safe spaces" to defer the up-front time and expense of licensing and registration until after commercial viability of the innovation has been confirmed. While bringing more firms into the market by lowering the *ex ante* cost of regulation may be an important objective, sandboxes are not the best tool to achieve it.

Most financial regulators do not have an express statutory mandate to promote competition or innovation. For the few financial regulators with a competition or innovation mandate, regulatory sandboxes have been used to simultaneously "test" large cohorts of firms with the goal of moving as many as possible into the regulated marketplace.[5] In these cases, the testing activity relates more to assessing

FIGURE 2. **Decision process: Step one**



4 For more details on design elements see Jeník and Lauer (2017).

5 This is one of the key metrics tracked in FCA (2017).

commercial viability—and accelerating time to market—than developing outcomes-based evidence to assess risk or make a regulatory determination. However, the regulator's role in promoting competition and innovation is far more complex and nuanced than helping a handful of early-stage firms gain market traction. A potentially harmful effect of sandboxes is their potential to distract regulators from providing clear guidance on more foundational enablers of innovation, such as cloud computing, data protection, tiered know-your-customer (KYC) requirements, and open data access, which could benefit more firms overall.[6]

ADDRESS REGULATORY BARRIERS TO INNOVATION

Alternatively, the regulator may believe that a sandbox will help lower regulatory barriers to beneficial innovation. This may be the most compelling rationale for a regulatory sandbox and the most critical for understanding the comparative advantage of sandboxes over other regulatory tools. The perceived regulatory barriers to innovation can be varied, but they often include (i) compliance cost, (ii) limited understanding of rules and regulations, (iii) rules or regulations that prohibit an innovation, and (iv) regulatory uncertainty.

At the outset it may be difficult to determine which of these barriers is most pressing. Therefore, the regulator may use an innovation facilitator (other than a sandbox) to gather additional data from the marketplace to determine whether a sandbox is needed. These facilitators—whether dedicated fintech offices, innovation hubs, hotlines, or similar initiatives—can be reliable substitutes for sandboxes by providing a venue for both regulators and innovators to understand how a new technology might fit within a regulatory regime. If the regulator ultimately decides to launch a sandbox, the facilitators can provide an important venue for vetting potential sandbox applications. Many jurisdictions with sandboxes have adopted complementary innovation facilitators to provide informal regulatory engagement channels for market participants (Jeník and Appaya 2019a).

LEARN ABOUT DEVELOPMENTS IN THE MARKETPLACE

A CGAP and World Bank survey of financial regulators showed that 81 percent of respondents said the primary reason for launching an innovation facilitator (including a sandbox) was to learn more about emerging innovations in the marketplace (Jeník and Appaya 2019a). Although this may be a valuable policy objective and help inform the regulator's viewpoint on the risks and benefits of emerging technologies and business models, this type of general learning is better accomplished through a less formal innovation facilitator rather than a sandbox. The regulator can craft a more nimble and broad-reaching learning mechanism outside of the hypothesis-driven, resource-intensive confines of a sandbox. If insights from informal interactions with market participants ultimately point to using a sandbox, the regulator can proceed with a clear understanding of market demand and potential use cases.

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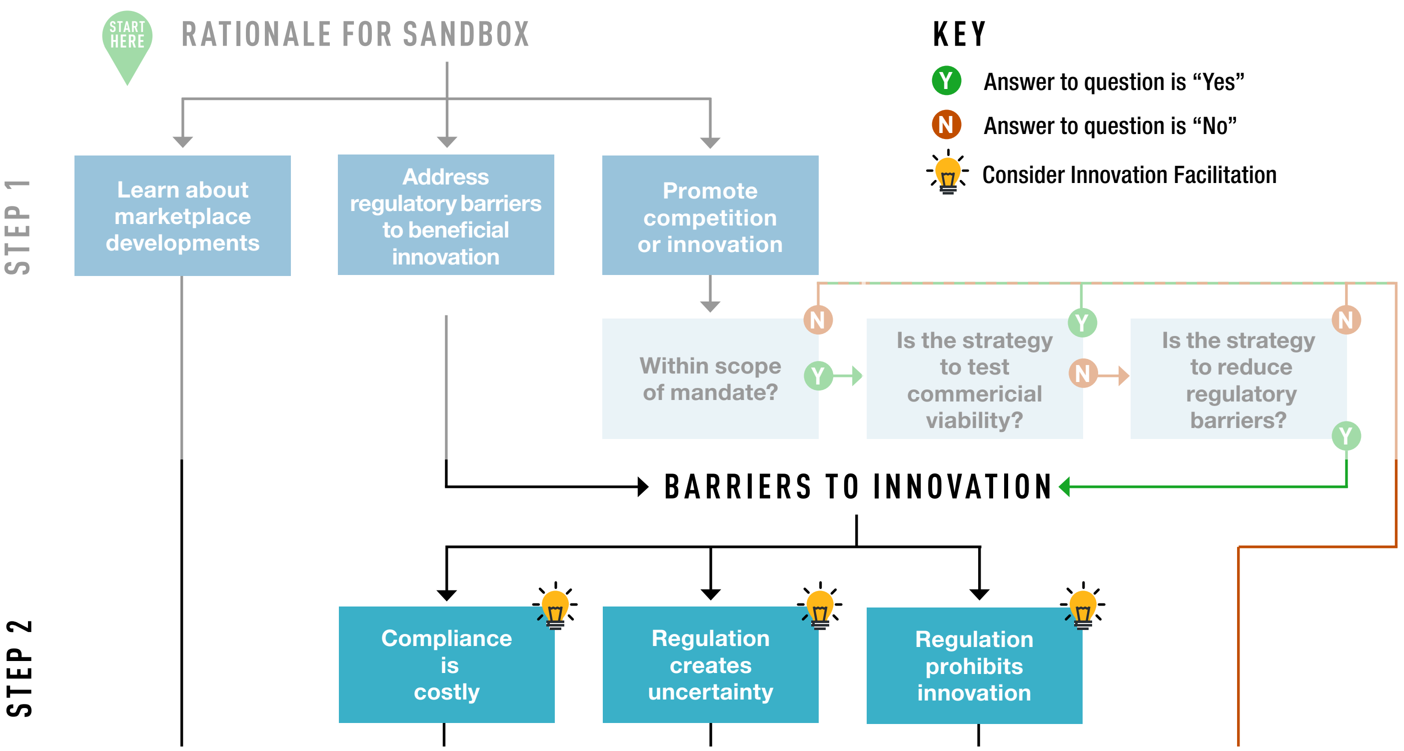
Step Two: Identify regulatory barriers to innovation

If the regulator is seeking to identify and address regulatory barriers to innovation, a sandbox may be an appropriate tool. But several questions remain. Regulators need to understand the different types of barriers that market participants may face when bringing innovation to the marketplace and consider the various possible solutions. Three common barriers to consider are (i) costly compliance, (ii) uncertainty created by regulation, and (iii) innovation prohibited by regulation (see Figure 3).

6 See Jeník and Lauer (2017, 10): "[R]egulators will remain responsible for supporting the creation of an enabling environment for digital financial services based on basic regulatory enablers. A regulatory sandbox should not be a distraction for policy makers."

FIGURE 3. **Decision process: Step two**



COMPLIANCE IS COSTLY

Market participants may perceive the cost of compliance with regulation as a barrier that prevents beneficial innovation from reaching the marketplace. This may be **out-of-pocket costs**, such as licensing fees or capital requirements, or **effective costs**, such as relative complexity of the licensing or application process, number of years in operation, time required to complete the application, and other practical aspects of accessing a regulated marketplace.

In terms of out-of-pocket costs, regulators should consider addressing cost barriers directly, for example, by reducing fee requirements or eliminating fees or streamlining the licensing process for companies operating with only a few customers or assets. This is the case of the restricted authorized deposit-taking institution regime in Australia (APRA 2018) and the sequenced licensing of banks in the United Kingdom (Bank of England 2016).

At times, the sheer complexity of the licensing or registration process creates a barrier to innovation—for example, by requiring new companies to retain expensive legal counsel. In such cases, the regulator should consider adopting an innovation facilitator to help companies navigate basic licensing requirements and expectations. Alternatively, or in addition, the regulator may simplify the presentation and content of publicly available resources so that they can be easily understood by industry newcomers (as is the case in Malaysia [Bank Negara Malaysia 2019] and Lithuania [Bank of Lithuania 2017]) and reduce their legal costs. These approaches can help regulators assess the need and potential use cases for a regulatory sandbox while they also improve the quality of the applications that are ultimately considered for sandbox testing.

REGULATION CREATES UNCERTAINTY

Sometimes the regulator's engagement with the marketplace reveals friction or uncertainty caused by the regulatory environment and felt by many firms across a sector. These insights may arise through the work of the innovation facilitator or through informal conversations with market participants or fellow regulators. Rather than prohibiting a single firm from operating, a significant regulatory uncertainty can reduce the efficiency of the entire marketplace by confusing market participants, deterring investment, or generally slowing the adoption of new digital financial services.

In these circumstances, the regulator should consider the following:

- Can the confusion or uncertainty be resolved using tools that are already available? It may be through formal guidance, such as on the use of electronic know-your-customer (eKYC) regimes for remote account opening or a policy on consumer-permissioned account access. Or it may be through regulation, such as rules for equity crowdfunding. In many cases, the regulator will have sufficient information to adopt a clear framework that resolves the uncertainty without further evidence, based on international standards, emerging practices, peer learning, desk research, or internal deliberations.

- Can the regulator organize an industrywide consultation to provide clear direction on the issue or to inform the design of a new policy? The regulator can collect this market feedback via written commentary, public consultations, or a combination of the two. Hearing from market participants directly can help refine the relevant compliance issues, bring to light unintended consequences and knock-on effects of regulation, and allow the regulator to gauge the intensity of interest and impact of these issues.

REGULATION PROHIBITS INNOVATION

In some cases, the innovation may be prohibited in the absence of a regulatory change or accommodation. This may be because it runs afoul of a rule or otherwise appears to create a significant risk for consumers or investors. In this case, the regulator may wish to use a sandbox test to assess the risks and benefits of allowing the innovation to reach the marketplace.

Step Three: Assess the alternatives

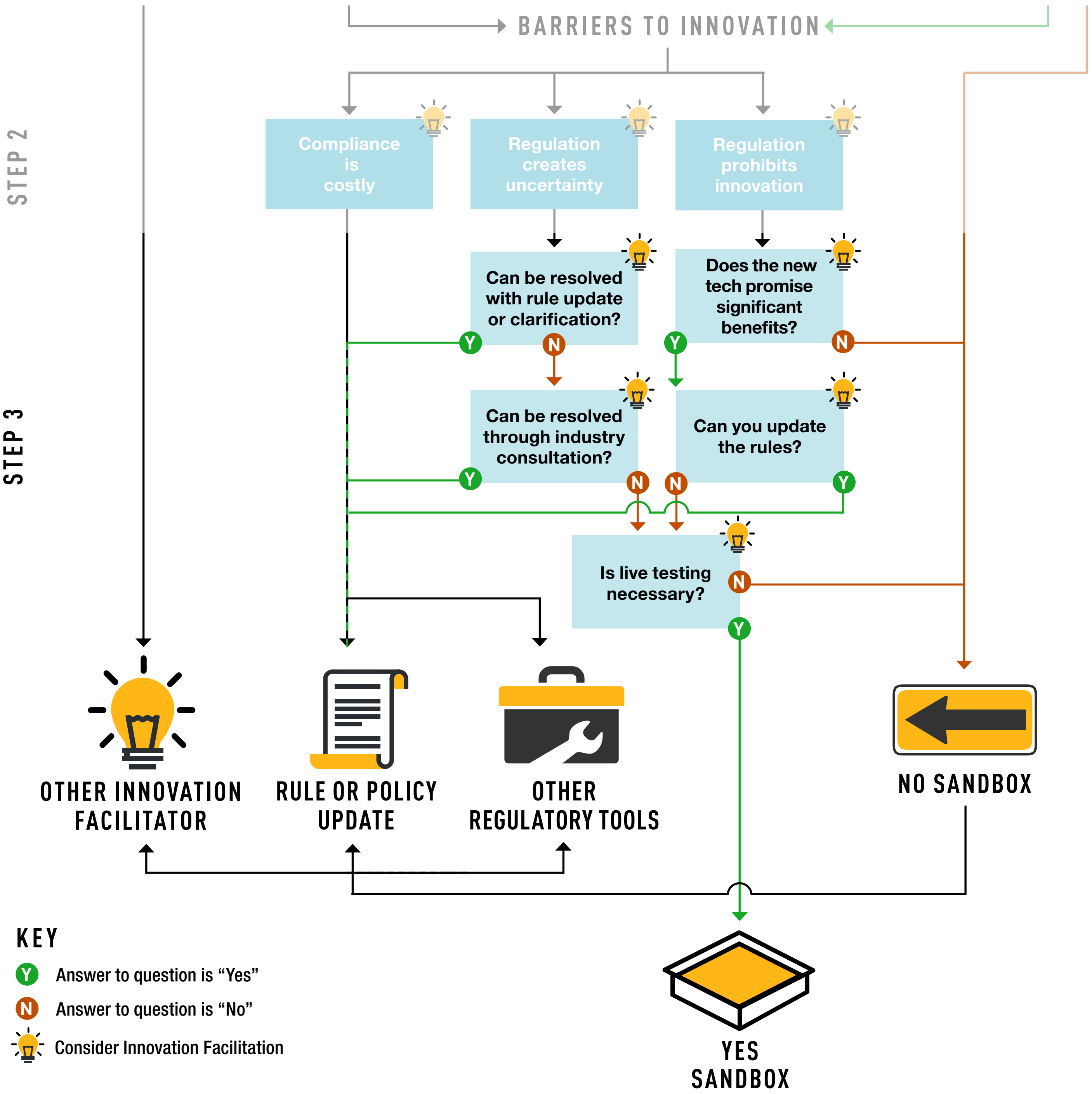
A simple framework for determining whether to proceed with live testing in a sandbox may be useful where regulation blocks innovation or creates uncertainty. Figure 4 illustrates this process and focuses on three threshold questions: (i) Does the innovation promise a significant new benefit to the marketplace? (ii) If so, can the innovation be enabled by a simple rule change? (iii) Is live testing necessary?

- **Does the innovation promise a significant new benefit to the marketplace?** Since most entrepreneurs will claim to have identified a novel solution to an important problem, it may be difficult to assess the actual benefits of the innovation. The regulator will need to make a judgment call and perhaps draw on external advisers to assess the likely validity of the claims. At the same time, the regulator will need to understand the potential harm or risks that may result from the product, technology, or business model if it does not work as intended.
- If it promises a benefit, **can the innovation be enabled by a simple rule change?** This could be in the form of a marketwide intervention (e.g., a regulation amendment, updated guidance, or a changed regulatory practice) or a firm-specific exemption (e.g., such as a no-action letter or a no-objection finding). The actual tools available will differ by jurisdiction so the key determination is whether the regulator already has in place a method to allow a previously prohibited innovation to reach the market in a timely manner. A rule change occasionally may require industry consultation.
- **Is live testing necessary?** The regulator must assess its own comfort level in permitting (or preventing) the innovation without additional factual evidence of its risks and benefits. This is the primary purpose of a sandbox: to develop evidence to support a regulatory determination. At this stage, much is left to the regulator's discretion, and it is difficult to draw a clear line between the circumstances that require a sandbox and those that do not.

If, after going through these steps, the regulator still needs more insights to resolve relevant technical questions or if the policy intervention will benefit from tighter, more collaborative coordination with the marketplace, the regulator should consider a sandbox. (See the example in Box 1.)

As this analytical structure suggests, there are good reasons to view sandboxes as the final stage of a nested regulatory process. Even when the decision process clearly recommends a regulatory sandbox, a regulator still may decide not to implement it if significant constraints, such as a prohibitive legal and regulatory framework or limited resources, prevail (see Section 3).

FIGURE 4. **Decision process: Step three**



Box 1. Bank of Thailand: A regulatory sandbox for shared KYC/CDD utility

The Bank of Thailand is using its regulatory sandbox to test a shared KYC and ID verification utility that relies on the National Digital Identity Platform (NDID) to verify and authenticate identity (BOT 2020). NDID is provided by National Digital ID Company Limited, which has shareholders from 69 companies, including Thai commercial banks, specialized financial institutions, securities companies, fund management companies, life insurance companies, casualty insurance companies, electronic payment service companies, the Stock Exchange of Thailand, and Thailand Post Company.

The test allows six commercial banks to sign up new customers into savings account products using a combination of facial recognition technology and the ID verification information customers previously provided to the bank they already use. The goal of the test, which is limited to opening savings account products during normal business hours, is to foster more convenient and more secure remote account opening for digital financial services. The Bank of Thailand is monitoring the results of the test before making NDID functionality available more broadly to the financial sector.

The test builds on a previous sandbox effort in which 12 commercial banks and payment services providers tested biometrics technology—facial recognition—to verify customer identity through eKYC. The test was conducted to develop further guidance on the use of eKYC regulation to comply with requirements on anti-money laundering and combating the financing of terrorism (AML/CFT).

SECTION 3

HOW TO DESIGN A REGULATORY SANDBOX TO ADVANCE THE REGULATORY OBJECTIVE

SANDBOX DESIGN SHOULD BEGIN with a thorough feasibility assessment that is linked to the overall objectives of the program. (See Annex 2 for tools on feasibility diligence assessments). The assessment helps identify the resources required; align internal and external stakeholders; highlight complementary regulatory programs, such as innovation facilitators; and uncover other potential constraints.

The feasibility assessment should confirm institutional commitment to the sandbox by identifying an executive sponsor and a tentative governance structure. Sandbox programs often cause cultural friction within financial regulators, if for no other reason than the perception that they may encourage excessive risk taking with untested products, technologies, or business models. Clear and unambiguous commitment from the highest levels of the regulator is essential.[7]

TABLE 1. **Regulatory sandbox design elements**

Design Element	Description	Design Choices (examples)
Eligibility	Defines who can participate in the sandbox. Eligibility should be articulated clearly to ensure a level playing field across all market participants.	• Open to incumbents only • Open to newcomers only • Open to nonfinancial services providers (e.g., technology providers, regtech)
Governance	Defines the internal operating structure of the sandbox, roles and responsibilities, and key operational processes.	• Specialized sandbox unit • Hub-and-spoke: a central point of contact coordinating sandbox inquiries with other units of the regulator
Timing	Includes: • Duration of the admission window • Duration of the test	• Periodic admission (cohort-based) • Permanent admission window (on-tap) • Testing periods range from 3 to 36 months
Test restrictions	Limits to the scope, scale, and/or conduct of the sandbox test to minimize potential harm.	• Number of clients • Number of transactions • Volume of transactions • Geographical limits • Consumer protection safeguards • Minimum AML/CFT requirements
Exit	Includes: • Individual test outcomes (graduation, terminated test, etc.) • Program-level key performance indicators (KPIs) • Incorporation of insights and lessons learned into the broader regulatory agenda	• For test outcomes see Section IV • KPIs in terms of the absolute output (number of graduated firms) • KPIs in terms of a regulatory change promoted

7 According to the CGAP/World Bank study, 87 percent of sandboxes surveyed have governor or board-level sponsorship (Jeník and Appaya 2019a).

3.1 Design Elements

Regulatory sandboxes typically include five core design elements that may be combined in various ways to accommodate local objectives and circumstances. (See Table 1.) The design elements are as follows:

- Eligibility
- Governance
- Timing
- Test restrictions
- Exit options

3.2 Threshold Constraints

Sandbox design should reflect local conditions, including (i) applicable legal framework, (ii) market conditions, and (iii) capacity.

LEGAL FRAMEWORK

A sandbox is a formal program that must align with the regulator's statutory mandate and background legal and regulatory requirements. Therefore, threshold legal feasibility analysis is necessary to confirm permissible sandbox objectives (mandate), eligible participants, testing constraints, and regulatory relief available.

- **Statutory mandate.** In some cases, the regulator may be authorized to establish a sandbox (e.g., see Section 12A of the Capital Markets Authority Act in Kenya) or pursue a legislative change to grant such authority (as is the case in Colombia, Lithuania, Mexico, Poland, and Spain). In other cases, the sandbox program may need to be justified as a permissible extension of the regulator's discretion.
- **Eligibility criteria.** Sandbox eligibility is likely to be limited to firms and/or activities that are within the scope of the regulator's mandate. This typically includes the following:

    1. **Licensed or otherwise formally authorized entities.** A regulatory sandbox is open to either authorized entities already operating in the market only, as is the case with the Hong Kong Monetary Authority (HKMA), or to any entity that obtains a formal authorization before launching the test, as is the case with FCA.
    2. **Entities outside the regulatory framework.** A regulatory sandbox is open to entities that experiment with innovation outside the existing legal and regulatory framework (e.g., PolicyPal in Singapore and Pezesha in Kenya).
    3. **Nonfinancial services providers.** Regulators often will condition sandbox admission for nonfinancial services providers, such as regtechs, on a partnership between the sandbox applicant and a regulated entity.

- **Testing restrictions.** Sandbox activities must comply with legally mandated restrictions and requirements that fall outside a regulator's discretion, such as minimum AML/CFT compliance. In addition, many regulators devote particular attention to managing the potential consumer risks caused by sandbox testing, even when it is within the regulator's discretion to relax or modify consumer protection rules and requirements.
- **Exit options.** The regulator should understand its options for "graduating" sandbox participants when an innovation has tested successfully, and the regulator considers it worthwhile for the market. There are three options, but not all of them are available to all regulators:

    1. The sandbox graduate is granted a license or other form of authorization under the legal framework.
    2. The sandbox graduate is allowed to operate in the marketplace because it has obtained a waiver, exemption, or a no-objection letter or has been allowed to operate at the discretion of the regulator. An example of this is Upstart in the United States.
    3. The regulator initiates a regulatory or legislative change to govern the activity of the sandbox graduate—for instance, Pezesha in Kenya.

MARKET CONDITIONS

A vibrant local fintech marketplace is not a prerequisite for a regulatory sandbox—in fact, where there is little or no local innovation activity, a sandbox may be introduced to encourage new market entrants. Nevertheless, it is important to assess local demand to appropriately design the sandbox in anticipation of application and testing volumes. (See Table 2.) A regulator can develop this market intelligence through formal or informal engagement—for example, requests for information and public roundtables. Alternatively, the regulator may choose to engage a third

TABLE 2. **Market conditions and capacity**

	High demand	Low demand
High capacity	• Cohort-based sandbox • Dedicated sandbox team • Subject matter experts available to assess a diverse type of innovation • Operations and governance integrated into core regulatory and supervision functions	• Permanent ("on tap") application • Emphasis on nonsandbox innovation facilitators
Low capacity	• Cohort-based sandbox • Rigorous preapplication vetting • Narrow eligibility requirements • Short testing windows • Hub-and-spoke governance, with shared staffing of sandbox operation	• Nonsandbox innovation facilitators

party to conduct a more specialized market diagnostic to inform the sandbox strategy.

CAPACITY

Every feasibility assessment should include a clear-eyed evaluation of capacity, which mostly is defined in terms of resources that can be committed to the sandbox over several years. An internal capacity review should assess, among other things, the following:

- Whether the sandbox will include dedicated or shared staff.
- Technical skills required for program management, market engagement, application evaluation, technology assessment, test design and administration, and inter- and intra-regulator coordination.
- Interactions with other relevant regulatory programs, such as innovation hubs, licensing processes, and supervision programs.

The resources committed to a sandbox widely differ from a single point of contact (more akin to a fintech office) to more than 30 staff members and from several thousands of dollars to over a million dollars (Jeník and Appaya 2019b). Capacity constraints ultimately may favor lower cost innovation facilitators, such as fintech offices.

SECTION 4

HOW TO SUCCESSFULLY RUN A REGULATORY SANDBOX

4.1 Procedural and Organizational Design

The threshold constraints explained in Section 3.2—legal framework, market conditions, and capacity—will help to determine who should be responsible for implementing a regulatory sandbox, the amount of monetary resources available, who else (from within the organization or externally) should support it, and when and how it functions and for how long.

Key steps to ensure that a sandbox runs well include the following:

- Define who owns the sandbox.
- Line up internal support.
- Allocate sufficient resources.
- Outline the internal process.
- Ensure coordination with external stakeholders.
- Establish formal and informal support channels.

Define who owns the sandbox. The sandbox team may be housed in any department or unit of the organization. Often, if the sandbox is established by a central bank, the team is part of the payment department and reports to the department director. The sandbox team should have a high profile in the organization and be visible to market stakeholders. Its status is more important than what department it is in. The team should be identified and given a clear mandate. Although the number of team members can range from one to 30 (Jeník and Appaya 2019a), in most cases, three to five members are adequate. A sandbox designed to advance financial inclusion should be in a department that focuses on inclusion or it should closely coordinate with that department.

Line up internal support. The sandbox team is unlikely to have all the expertise necessary to run the sandbox. Any sandbox initiative often will require knowledge in licensing, regulation, supervision, information technology, and communication. Moreover, sandbox teams frequently are composed of junior-level staff who are willing to experiment but who may lack in-depth technical knowledge and experience (Dalberg 2019). That is why each department with the relevant expertise should appoint a contact person to support the sandbox team as needed. For example, the Financial Superintendence of Colombia has different "accelerators" in different departments to provide the expertise that is needed.

In instances where the regulator does not have in-house expertise in a specific area (e.g., distributed ledger technology), a process should be in place to seek such expertise from outside, perhaps by establishing an advisory committee or hiring an expert on an as-needed basis. Most sandboxes reviewed by CGAP use a multidepartment body to facilitate implementation.

Allocate sufficient resources. The operating budget must allow for a dedicated sandbox team that can focus on its work and not be distracted by other responsibilities. The average cost of implementation is difficult to assess because the major cost components (such as salaries) are highly context specific (Jeník and Appaya 2019b).

Outline the internal process. The internal process should define responsibilities and response times to ensure the sandbox runs smoothly once it is operational. Note, however, that this step should not be overwrought. There is no need for complex and sophisticated internal manuals. It is enough to have a list of responsible employees and defined expectations of their response times. The key to a well-defined internal process is making sure that it clearly covers all the steps from the beginning (receiving applications) to the end (post-exit evaluation), that everyone understands their role, and that sandbox applicants and participants get clear instructions about what is expected of them.

Ensure coordination with external stakeholders. Coordination with external stakeholders is necessary when several financial sector regulators may be involved. Regardless of the form it takes—whether it be a memorandum of understanding, a joint committee, an informal information exchange, or a simple referral mechanism—there should be a process in place to cover at least the instances where a sandbox applicant or participant falls under the mandate of a different regulator or tests an innovation that is relevant to a different regulator.

Establish formal and informal support channels. Sandboxes frequently generate interest from market participants who contact the regulator to learn more about the process or inquire about their eligibility for sandbox testing. Most of these inquiries do not require sandbox testing, but the regulator should build organizational and reporting structures to take advantage of these interactions to learn more about the marketplace, emerging risks, and perceptions of the regulatory process.

Regulators often face uncertainty and anxiety in the prelaunch phase. They often wonder whether they have done everything they could to prepare for real-life implementation. This uncertainty may delay the launch of a sandbox. In this case, regulators could create a minimum viable sandbox, launch it, and tweak it based on feedback and experience (Duff 2018). Regulators also may want to consider a "sandbox simulation"—basically a sandbox for a sandbox. This tool can help regulators test the sandbox before launching it. See Annex 3 for instructions on how to run a sandbox simulation.

4.2 Consultation and Public Engagement

Stakeholder engagement is an important part of sandbox design and implementation. In crafting a stakeholder engagement plan, regulators should consider addressing market participants, internal stakeholders, and peer regulators. (See an example of an engagement strategy in Box 2.)

First, the regulatory sandbox sponsor should plan to engage directly with market participants. Informal engagement with the marketplace through an innovation facilitator is essential to understand both the nature and scope of innovation activities and the need for regulatory modernization. These interactions will help the regulator frame a clear hypothesis for its regulatory sandbox or, in some cases, refute the need for a sandbox entirely. These conversations also may help identify emerging industry practices that require more focused regulatory attention, as was the case, for example, with early consumer-permissioned data access practices between banks and fintechs.

Apart from engaging market participants on the need for a regulatory sandbox, regulators also may wish to consult the marketplace about sandbox design. In addition to substantive feedback on sandbox design elements, including important features such as application fees and protection of intellectual property shared with the regulator during the test, the consultation process itself helps to raise general awareness of the sandbox initiative and its intended purpose. Market participants sometimes mistakenly believe that regulatory sandboxes are created to provide funding for start-ups,[8] allow participants to operate without regulatory oversight, or provide business advice on the commercial viability of a new product. Clarifying the purpose of the sandbox early on can help improve the quality of the applicant pool and help firms avoid the time and expense of applying to a program that is intended to deliver a regulatory outcome, not capital or commercial advice. In certain jurisdictions, public consultation on a proposed sandbox framework may be required as a matter of administrative law.

Second, the regulator should conduct **internal consultations** with key staff to build alignment and support for the project (see Section 4.1).

8 There are exceptions where regulators have set up a fund to promote innovation, as is the case in Kazakhstan, Sierra Leone, and Singapore.

Box 2. Public engagement: Bank of Sierra Leone

In 2018, the Bank of Sierra Leone (BSL) launched its Regulatory Sandbox Pilot Program to foster local fintech innovation and encourage the development of new products, technologies, and business models designed to improve financial inclusion in Sierra Leone. The sandbox framework was coordinated in conjunction with the Sierra Leone FinTech Challenge supported by FSD Africa and UNCDF. The FinTech Challenge was intended to foster collaboration between regulators, nontraditional market players, licensed financial institutions, and other partners to pilot innovative products, services, or solutions in Sierra Leone's fragile state context. Cash prizes, seed capital, and admission to BSL's sandbox were offered to Challenge winners.

BSL announced the sandbox framework in July 2017 in connection with the FinTech Challenge. A BSL committee drafted the preliminary framework and application process with the help of external advisers. BSL then solicited input on the draft from key stakeholders in Sierra Leone, including incumbent financial institutions and the local fintech association. Based on this feedback, BSL revised the framework and provided written comments explaining its approach to the proposed amendments. The BSL Regulatory Sandbox admitted its first cohort in May 2018.

The sandbox benefited from a combination of high-level executive support, a thorough public consultation process, and a dedicated sandbox team charged with managing all aspects of the project. But the application evaluation, and subsequent design and evaluation of the testing plan, proved to be more onerous and time consuming for the sandbox team than anticipated, particularly because of the large amount of time dedicated to each participating firm.

The sandbox has evolved and matured since and now serves as a primary point of contact for all inquiries on fintech innovation. The sandbox framework, likewise, has evolved into an open admission format that allows firms to apply for testing at any point, rather than in specially designated cohort windows. BSL has been constantly engaging with the industry through road shows, conferences, and even a radio show to raise public awareness, address initial questions, and improve the quality of sandbox applications.

Third, where necessary and appropriate, the regulator should consult with peer regulators that have overlapping or adjacent jurisdiction. Many promising fintech innovations raise issues that cut across traditional regulatory boundaries because they have payment and money transmission services that are common to many new product and service offerings. Financial and telecommunications regulators likewise are under greater market pressure to collaborate, particularly on issues related to mobile network data access and portability. In a complicated regulatory environment, the ability to coordinate a single point of regulatory contact for an aspiring innovator can be a significant enabler. Indeed, some jurisdictions have established formal mechanisms for coordinating sandbox tests across multiple regulators.[9] While such formal mechanisms may not be necessary in all cases, regulators should take care to assess potential areas of jurisdictional overlap with peer regulators early in the process.

4.3 Testing, Evaluation, and Exit

Testing plans typically are proposed by sandbox participants and evaluated by the sandbox team on a case-by-case basis.[10] (See Annex 2 for a testing plan template.) Testing plans should be customized to develop evidence on the regulatory questions presented by the specific innovation. As a basic rule, the regulator must feel comfortable that, once the testing is conducted as planned, the regulator will be able to decide what the next steps will be and choose an exit option (see Figure 5). In reviewing a proposed testing plan, the regulator must confirm the plan is comprehensive and clear. It should do the following:

- Define the overall timeline and budget.
- Identify precisely what is being tested, as well as how and why.

9 For example, HKMA, Securities and Futures Commission, and Insurance Authority coordinate cross-sector sandbox tests, when necessary, on behalf of applicant firms. See HKMA (2016).

10 As a practical matter, many of the observations concerning testing are generalized. This is because testing plans typically are developed under conditions of strict confidentiality between regulators and sandbox participants, and they differ substantially across jurisdictions and even within single sandboxes.

- Define milestones and success criteria.
- Define risks and mitigating measures.
- Identify staff and their responsibilities.
- Establish rules for engaging with and reporting to the regulator throughout the testing period.

See Box 3 to learn how Taiwan's Financial Supervisory Commission (FSC) approaches its sandbox test plan.

The regulator oversees the test as part of its supervision mandate. The sandbox participant should report to the regulator regularly (e.g., weekly or monthly). The regulator should have the right to request additional information at any time, conduct an onsite visit, or discontinue a sandbox test if justified by regulatory concerns. This may happen when the sandbox participant does not comply with applicable rules, does not implement the imposed safeguards properly, fails to follow the agreed-on testing plan, does not share information with the regulator as requested, or raises other concerns. The sandbox participant should not be forced to remain in the sandbox against its will either. At its own discretion, it should be allowed to cease testing and disengage in an orderly manner.

Once testing is over, the final evaluation is facilitated by regular reporting delivered throughout testing and the final report prepared either by the sandbox participant itself (as happens in Kenya) or by an independent auditor (as happens in Bahrain). The final report must be delivered within a prescribed deadline and the regulator should proceed swiftly with the final decision. See Figure 5 for an overview of exit options.

The completed sandbox test may be deemed successful or unsuccessful. A successful test means that the test ran as planned, but it does not mean that the sandbox participant will be allowed to bring the innovation to market. That happens only when the sandbox participant wants to proceed, and the regulator considers the innovation subject to its mandate and market worthy (see Table 3).

Every regulator should carefully map its own regulatory framework against each of the possible outcomes (as shown in Figure 5) to determine whether and how easy it would be to implement each. The regulator should avoid setting up a sandbox without having legal clarity on each of the potential exit options.

Box 3. Sandbox test plan

FSC requires that the sandbox test plan includes the following:

- Description of the source of funds
- Proposed financial business
- Description of innovativeness
- Scope, duration, and scale of the experimentation
- Participant protection measures
- Risk management mechanism (e.g., money laundering and terrorist financing risk, cybersecurity risk)
- Exit mechanism
- Expected benefits
- Benchmarks for measuring the benefits achieved

Based on the nature of responsible innovation, the key performance indicators (KPIs) or other performance indicators of innovative experimentation are set by the applicants.

When a local bank tested the use of an alternative credit scoring system based on mobile phone user data, the monitored metrics for the testing plan included the number of customer applications, the time needed for customer due diligence, the accuracy of credit modeling, the number of approved applications, and the default rate.

Every regulator should carefully map its own regulatory framework against each of the possible outcomes to determine whether and how easy it would be to implement each. The regulator should avoid setting up a sandbox without having legal clarity on each of the potential exit options.

FIGURE 5. **Exit options (all possible scenarios)**

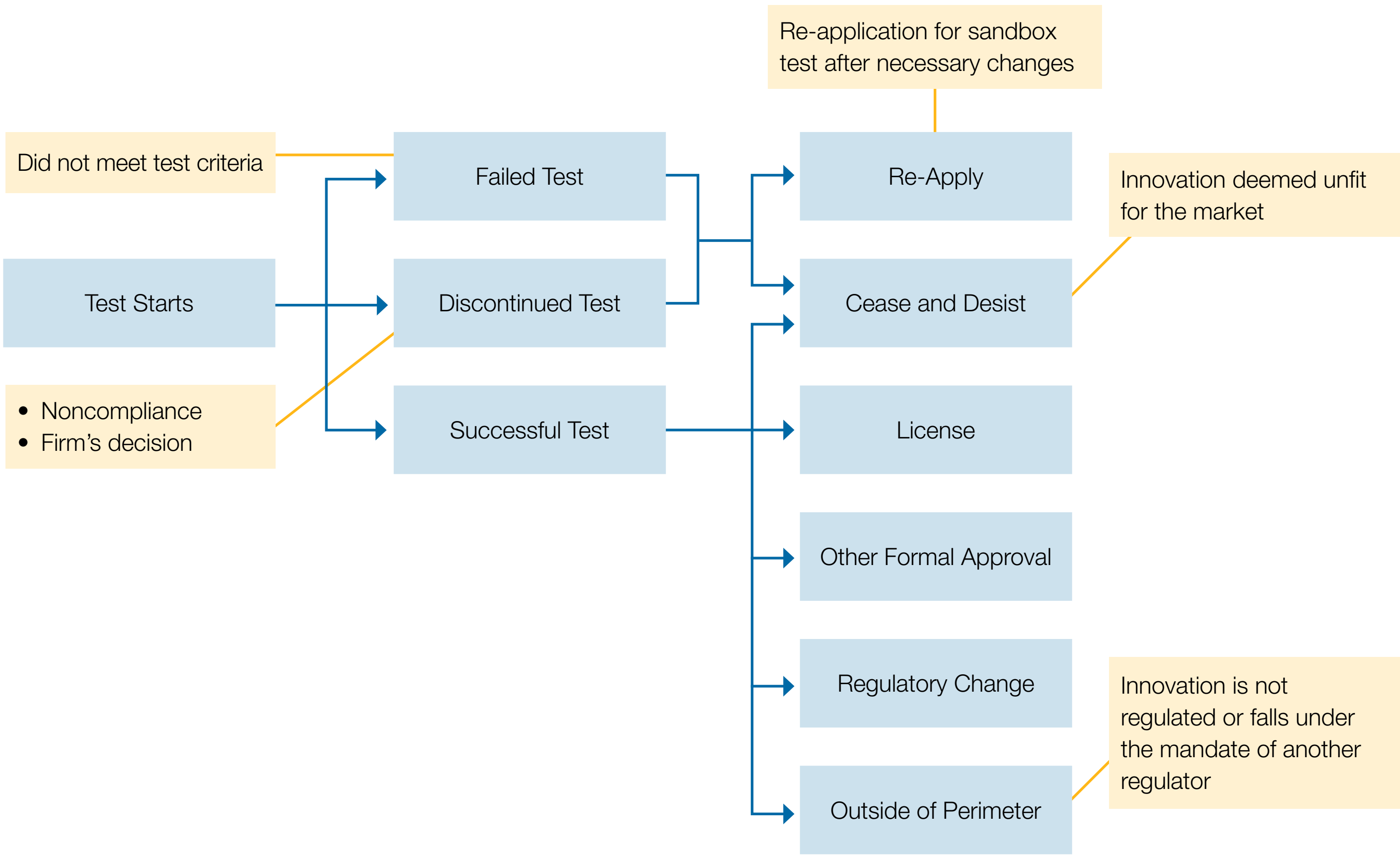


TABLE 3. **Regulatory sandbox exit options in case of successful test**

	Description	Example
License	The sandbox participant can roll out the innovation in the market in compliance with regulatory requirements.	All successful firms graduating from the UK FCA sandbox have been licensed under a licensing regime that was already in place.
Other formal approval	The sandbox participant can roll out the innovation in the market in compliance with regulatory requirements subject to exemptions and/or waivers granted. This also may include a mandatory partnership with a licensed financial institution.	The Capital Markets Authority of Kenya uses the widely defined discretion granted in the Capital Markets Authority Act to authorize temporary operations until an appropriate regulation is adopted.
Regulatory change	The tested solution falls under the regulator's mandate but cannot be permitted without changes in the legal and regulatory framework.	The Central Bank of Brazil has created a sandbox framework that allows testing up to three years, which should provide enough time for regulatory changes should they be needed.

SECTION 5

ALTERNATIVES TO A REGULATORY SANDBOX

A **REGULATORY SANDBOX TAKES** substantial time and resources to create and use. It should be used selectively to advance regulatory or policy objectives. A regulator should have a basic framework for engaging with industry to assess the value and viability of innovations. There are several options that either complement or substitute for a regulatory sandbox.

The closest alternative to a regulatory sandbox is the *ad hoc* test-and-learn approach. Other tools often listed along with a regulatory sandbox serve a different purpose than that of a

TABLE 4. **Alternatives and complements to a regulatory sandbox**

	Description	When applicable	Examples
Wait-and-see/ forbearance	The regulator monitors an innovation before deciding on a regulatory treatment. In case of forbearance, the regulator decides to tolerate certain behavior in the market otherwise deemed noncompliant.	Early-stage innovation where the level of regulatory uncertainty is too high to be overcome through a limited live testing (e.g., the innovation continues evolving, scale needed to make assessment, unclear mandate to regulate).	Person-to-person lending in China (early stages) Cryptocurrencies around the world (early stages)
Test-and-learn	The regulator defines an ad hoc framework for safeguarded live testing of a specific innovation.	The regulator deems a financial innovation potentially beneficial and market worthy but needs more information to resolve uncertainty and doesn't see a need for a more permanent testing framework.	Mobile money in Kenya, the Philippines, Tanzania
Innovation office/hub	The regulator sets a structured and formal framework for regular engagement with the industry on issues concerning innovation (without live testing).	The regulator identifies a reasonable demand for regulatory consultation and guidance from innovators.	France, Uganda, United Kingdom
Regulatory change	The regulator (or other eligible entity) initiates a legislative change, adopts new regulation, or amends the current one or it reconsiders interpretation and application of the current rules within the regulator's purview and discretion.	The regulator has identified gaps or inconsistencies in the legal and regulatory framework or has deemed a changed circumstance requiring a change in the current rules.	Remote customer identification in Malaysia
New license	A special instance of the regulatory change scenario is creation of a new licensing regime for innovative businesses. The license may be permanent or temporary and should come with a set of restrictions to differ from other licenses to avoid regulatory arbitrage.	The regulator has identified a new category of business that requires a distinct treatment. Fintech licenses and class exceptions (applying standardized safeguards that sufficiently mitigate risks from live implementation of the innovation without the need to evaluate them on a case-by-case basis) fits here as well.	Australia Colombia Switzerland

sandbox and, thus, do not constitute a true alternative, but rather a different approach. These tools range from the wait-and-see approach to making regulatory changes.[11]

As Table 4 suggests, some approaches are directly complementary to a sandbox. Innovation facilitators, such as innovation offices and innovation hubs, are less demanding to implement in terms of resources and discretionary powers needed. In addition, they are more scalable because their main purpose is a light-touch engagement with the industry that allows the regulator to offer fee-free guidance to innovators in exchange for the learning opportunity. (For an example of a holistic innovative ecosystem see Box 4).

Box 4. Innovative ecosystem in Taiwan

Initiatives established by FSC to support innovation in the financial sector include the following:

- **Business trial.** A licensed financial institution may apply for a business trial if it seeks to expand its approved business in innovative technological ways. FSC has established separate operating guidelines for business trials for the banking, securities and futures, and insurance industries.
- **FinTechSpace.** In 2018, FSC directed Financial Roundtable (an association that brings together the banking, securities, and insurance associations) to set up FinTechSpace—an incubator and accelerator for fintech start-ups.
- **Crowdfunding platforms.** The Taipei Exchange set up equity-based "Go Incubation Board for Startup and Acceleration Firms" in 2014 to help start-ups raise capital. In 2015, many securities firms set up equity crowdfunding platforms.
- **Consultation points.** FSC also established consultation points such as the Innovation Center and the Regulatory Clinic in FinTechSpace to help start-ups resolve questions about financial regulation.
- **Task forces.** FSC directed financial industry associations to set up task forces to deal with innovative businesses, fintech general issues, open banking, e-payment, blockchain, and robo-advisors.

11 See Jeník and Lauer (2017).

ANNEX 1

SETTING OBJECTIVES FOR A REGULATORY SANDBOX

WHEN BUILDING A REGULATORY sandbox, defining objectives early on is essential. They help inform other design components, get stakeholder buy-in, set expectations, target implementation, measure results, and identify where adjustments may be needed. A sandbox may have more than one objective, but it should be well aligned with the regulatory mandate and priorities. Table A1-1 lists some common objectives and their implications.

TABLE A1-1. **Examples of sandbox objectives**

Objective	Implications	Excerpts from authority statute
Increase customer benefits: To improve convenience, bring new customer services to the market, lower the end-cost, and otherwise improve the customer experience through tech-enabled financial innovation.	This objective connects to the main policy objectives of financial stability, consumer protection, and financial inclusion (where applicable). Such a sandbox likely will attract business-to-consumer innovations. The regulatory expectation is to see financial services already in place improved in areas relevant to customers and/or new services catering to under- and unserved customer segments or needs.	"[The main goals and objectives of the FinTech Sandbox are to e]xpand in innovating and designing services, products, and solutions that effectively: Increase effectiveness and efficiency in DFS, and widens choices for financial consumers so they can choose what's more suitable." Jordan, Central Bank of Jordan (FinTech Regulatory Sandbox Document, https://www.cbj.gov.jo/EchoBusV3.0/SystemAssets/9328fddf-3f3d-40d8-9ed3-d98bb-c89db20.pdf, pp. 2–3). "Article 3 (1) Bank Indonesia decides the testing in the Regulatory Sandbox for Financial Technologies Providers including their products, services, technology, and/or business models. (2) The decision set forth in paragraph (1) is adopted by considering that: … The Financial Technology is beneficial or can provide benefits for consumers and/or the economy. . . ." Indonesia, Bank Indonesia (Regulation of Member of the Board of Governors Number 19/14/PADG/2017 Concerning Regulatory Sandbox [RUANG UJI COBA TERBATAS] for Financial Technologies, 30 November 2017, https://www.bi.go.id/elicensing/helps/PADG%20REGSAND.pdf [in Bahasa only], p. 3).
Promote competition: To increase the number of contenders in the financial market or a segment thereof and/or stimulate competitive behavior among the entities that are already regulated.	The sandbox should facilitate licensing of new entities and approval of new services. The regulatory expectation is to have new entrants and services reach the market.	"1.2.7. The [Central Bank of Eswatini] FinTech Regulatory Sandbox aims to achieve the following objectives:…To promote effective competition and the provision of a wider range of products in the interest of the consumer." Eswatini, Central Bank of Eswatini (Financial Technology Regulatory Sandbox Guidelines, May 2020, https://www.centralbank.org.sz/fintech/sandbox/CBEFINANCIALTECHNOLOGYREGULATORYSANDBOXGUIDELINES.pdf, p. 5). "The [Central Bank of Bahrain] has made a conscious decision to initiate a Sandbox in order to promote effective competition, embrace new technology, encourage financial inclusion and improve customer experience." Bahrain, Central Bank of Bahrain (Regulatory Sandbox Consultation Paper, 28 March 2017, p. 1).
Advance financial inclusion: To widen access to and promote use of formal financial services by under- and unserved customer segments (low-income individuals, MSMEs).	The sandbox combines implications described above. The regulatory expectation (and the corresponding KPIs) is to see more previously excluded and underserved customers using formal financial services to address their needs.	See Regulatory Sandbox Consultation Paper, Central Bank of Bahrain, 28 March 2017, p. 1. "[T]he Sandbox is intended to foster responsible innovation that benefits consumers in Sierra Leone by improving the quality of, and access to, financial products and services." Sierra Leone, Bank of Sierra Leone (Regulatory Sandbox Pilot Program Guidelines and Application Form, April 2018, http://www.bsl.gov.sl/BSL_Sandbox_Program.html, p. 3).

ANNEX 2
TEMPLATES FOR SANDBOX TEAMS

THIS ANNEX INCLUDES FOUR TEMplates that can help sandbox teams draft and implement their regulatory sandbox framework. The templates are not intended to be universal blueprints and always should be adapted to specific circumstances. The templates are for the following:

Regulatory Sandbox Feasibility Assessment. Helps create a structured, high-level project plan for assessing, designing, and implementing a regulatory sandbox. Preparing and announcing a sandbox framework document is relatively straightforward. However, experience in other jurisdictions suggests that the success of sandbox initiatives requires careful initial evaluation of the legal, regulatory, market, and political economy conditions and the regulatory capacity (the threshold restrictions) to help tailor the sandbox and any related initiatives.

Sandbox Project Plan. Helps create a Gantt chart with a detailed step-by-step process, assigned responsibilities, and timeline.

Internal Operating Guidelines. Outlines the sandbox process and summarizes common activities performed at each stage of the process. It can be used to inform the process flow or facilitate drafting of an internal regulatory sandbox manual where needed.

Sandbox Testing Plan. Offers an example of a testing plan. The actual testing plan always must be adapted to the regulatory sandbox framework and the innovation being tested. Regulators should not attempt to create a one-size-fits-all testing plan.

Template 1
Sample regulatory sandbox feasibility assessment plan

Preparing and announcing a sandbox framework document is relatively straightforward. However, the success of sandbox initiatives requires careful initial evaluation of the legal, regulatory, market, and political economy conditions to help tailor the sandbox and any related initiatives. Moreover, it is critical to involve market participants and other stakeholders in an active dialogue early in the process to deepen regulator–marketplace connections, confirm internal alignment, raise industry awareness, and facilitate mutual learning.

A feasibility assessment requires careful attention to and customization for local conditions. Accordingly, the model plan outlined here identifies key outputs in generalized terms on the assumption that the regulator will guide the feasibility assessment and engagement in a manner most appropriate to the context.

Among other things, the feasibility assessment should help the regulator determine the form of sandbox best suited to advancing its objectives, begin the process of market engagement and institutional buy-in, and help identify any alternative initiatives essential to supporting sandbox objectives. Subsequent phases of the project plan will focus on the practicalities of putting the sandbox into operation.

PHASE 1. **Feasibility Assessment (45–90 days)**

Work Stream	Core Topics	Outputs	Project Lead and Due Date
Purpose and Objective	• Rationale for launching a sandbox • Internal alignment on regulatory sandbox initiative	• Consensus among senior regulator leadership on the need for a sandbox, the purpose it will serve, and relation to other regulatory initiatives. • Consensus among senior regulator leadership on the desired form of sandbox, including either: 1. Policy-focused (removing regulatory barriers to innovation) 2. Innovation-focused (lowering the cost of entering the regulated marketplace) 3. Thematic (accelerating adoption of a specific regulation or innovation)	
Legal	• Statutory mandate • Range of regulatory discretion (e.g., tools including no-action letters, licensing requirements, no-objection letters, etc.) • Regulatory and statutory requirements (e.g., AML/CFT, consumer protection, etc.) • Intra/inter-regulatory coordination • Legislative options, if necessary	• Legal memorandum (or equivalent) confirming authority for sandbox initiative. • Identification of permissible scope of initiative, including options for regulatory relief (no-action letters, etc.) and process for regulatory change. • Intra- and inter-regulatory briefing sessions to gather input and ensure a common understanding of the sandbox project.	
Market Conditions	• Market perception regulation/regulator • Need for a regulatory sandbox or related programs	• Preliminary market landscaping (including incumbents and start-ups) that describes market demand for a regulatory sandbox. • Facilitated external consultations and conversations (awareness raising). • Draft concept note for public consultation.	
Regulatory Capacity	• Internal regulatory capacity to implement sandbox and/or related initiatives	• Identify preliminary operational and governance structure, including required institutional capabilities per agreed-upon sandbox objectives.	
Alternatives and Complements	• Assess alternative formal and informal regulatory initiatives that could serve the same purpose as the sandbox more effectively or at lower cost	• A list of programs to complement/support the sandbox initiative, including, e.g., help desk, fintech office, innovation hub, market outreach initiatives, etc. This list should consider the timing of any related programs and potential operational interactions with the sandbox.	
Institutional Champion and Dedicated Resources	• Executive sponsor of sandbox initiative • Internal, cross-functional team responsible for delivering sandbox initiative	• Commitment from senior leader(s) as principal executive sponsor of sandbox initiative. • Designation and approval of core sandbox implementation team (3–5 individuals).	

Template 2
Sample regulatory sandbox project plan

		Owner	Planned Start	Planned Completion	Actual Start	Actual Completion	Percent Complete
			Preapplication Phase				
1	**Create outreach and communication plan** to promote the sandbox program. Plan should include strategies for identifying and reaching all relevant industry and regulatory stakeholders.	Marketing/ communications lead					
2	**Designate a sandbox contact lead** to engage with local fintech and financial inclusion communities.	Sandbox committee					
3	**Design sandbox portal** on regulator website with links to application materials, FAQs, documentation, and a dedicated email address for submitting inquiries on the process.	Technical lead					
4	**Designate a sandbox contact person** to field inquiries from potential applicants, participate in targeted outreach activities, and document key learnings for real-time feedback on the process.	Sandbox committee					
5	**Develop FAQs and guidance** to reduce ineligible or incomplete applications and encourage high-quality (and complete) submissions.	Technical lead					
6	**Develop tracking database** of inbound inquiries. Data may include, e.g., name of person/company, product/ technology type, product stage, contact information, nature of inquiry.	Sandbox contact person					
7	**Review, revise, and approve** communications and engagement plan, sandbox portal, FAQs.	Sandbox committee					
8	**Identify and invite key regulator personnel** (and any external experts) to participate on the review and selection committee.	Sandbox committee					
9	**Develop application eligibility checklist.**	Sandbox committee					
10	**Develop administrative follow-up form letter** for incomplete applications.	Sandbox committee					
			Application Phase				
11	**Publicly announce and launch application period** for sandbox program.	Marketing/ communications lead					
12	**Launch sandbox portal** on regulator website.	Technical lead					
13	**Implement communications and engagement plan.**	All					

		Owner	Planned Start	Planned Completion	Actual Start	Actual Completion	Percent Complete
14	**Hold [weekly/monthly] check-ins** that include sandbox contact lead and sandbox committee to discuss trends, feedback, and observations.	All					
15	**Revise and update publicly available sandbox materials and/or processes,** as necessary, and in consultation with sandbox committee.	Sandbox contact lead; sandbox committee					
16	**Identify and engage internal and external subject matter experts** (e.g., supervision, payments, consumer protection, technology) to resolve targeted regulatory inquiries identified by sandbox contact lead for referral.	Sandbox contact lead; sandbox committee					
		Review Phase					
17	**Review and screen applications.**	Administrative review team					
18	**Contact applicants who have submitted incomplete applications.** Provide opportunity to remediate administrative or technical omissions within a proscribed timeframe (2–3 business days). Maintain and update database of sandbox applicants for future interactions and ongoing market intelligence.	Administrative review team					
19	**Prepare and distribute "board books"** of application materials for review by selection committee. Distribute one week before scheduled review.	Administrative review team					
20	**Convene selection committee** to discuss applicants and identify finalists.	Selection committee					
21	**Contact finalists** for in-person interview with selection committee.	Administrative review team					
22	**Conduct background check** on finalist companies and their respective principals.	Administrative review team					
23	**Conduct interviews with finalists** with selection committee.	Selection committee					
24	**Reconvene selection committee** for final vote and approval of applicants to be offered admissions.	Selection committee					
25	**Draft and send formal notice** of acceptance into sandbox pilot program.	Administrative review team					
26	**Follow up with accepted applicants.** Confirm participation and collect payment of sandbox participation fee, if applicable.	Selection committee; administrative review team					
27	**Publicly announce** names of sandbox participants.	Administrative review team					
28	**Contact finalists not selected** for cohort to explain rationale of the decision, invite into future cohorts, and/or offer informal regulatory counseling.	Selection committee; administrative review team					

		Owner	Planned Start	Planned Completion	Actual Start	Actual Completion	Percent Complete
				Testing Design			
29	**Select and assign supervisory teams to sandbox participants.**	Sandbox committee					
30	**Conduct preliminary meeting with supervisory team** to identify approach to testing and supervision.	Supervisory team and cohort participants					
31	**Draft preliminary testing plan.**	Supervisory team and cohort participants					
32	**Conduct feasibility review** of proposed testing plan with internal and external experts.	Supervisory team					
33	**Identify additional resources** supervisory teams need to conduct test.	Supervisory team					
34	**Review and approve proposed testing plans** by sandbox committee.	Supervisory team; sandbox committee					
				Test Implementation			
35	**Implement testing plan** (logistics and timelines will vary by plan).	Supervisory team					
36	**Conduct checkpoint meeting** between supervisory teams and sandbox committee.	Supervisory team; sandbox committee					
37	**Create interim report to sandbox committee** on instances of breach, early exit, or completion.	Supervisory team; sandbox committee					
				Exit and Review			
38	**Report testing outcomes and recommendations** on regulatory treatment and sandbox exit.	Supervisory team; sandbox committee					
39	**Review and discuss testing outcomes and recommendations.**	Sandbox committee					
40	**Approve exit plans.**	Sandbox committee					
41	**Prepare public report on cohort results.**	Sandbox committee					
				Procedural Review, Documentation, and Assessment			
42	**Review lessons learned** from cohort experience.	Selection committee and supervisory team					
43	**Interview sandbox participants and applicants** on their views of the sandbox process.	Review team					
44	**Draft internal memorandum** that summarizes lessons learned, including observations on specific technologies/companies, trends observed in the applicant pool, procedural insights from the application, selection or supervision process, testing and regulatory outcomes, and recommended revisions to the sandbox program.	Review team; sandbox committee					

		Owner	Planned Start	Planned Completion	Actual Start	Actual Completion	Percent Complete
45	**Initiate regulatory process and/or rule reviews** as necessary based on procedural review of sandbox.	Sandbox committee					
46	**Draft and publish public-facing assessment** of sandbox process, including anticipated timelines for next steps.	Sandbox committee					

Template 3
Sample regulatory sandbox internal operating guidelines

1. OPERATIONAL DESIGN AND APPLICATION PHASE

Once the regulatory sandbox framework is finalized and approved, a sandbox committee will publicly invite firms to apply to participate in the sandbox. In some jurisdictions, informal but active regulatory engagement with the fintech ecosystem at this stage has been critical to driving interest in the sandbox and encouraging high-quality applications from eligible companies. Application phase activities are intended to broadly publicize and promote the sandbox and to help potential applicants understand the types of products, technologies, and business models that are appropriate for the sandbox.

Indicative activities

1.1. Develop digital and in-person marketing/communications plans to promote the sandbox. These outreach events should include public and private sessions with key government, private sector, and development partner stakeholders.

1.2. Designate sandbox "ambassadors" to engage with the local fintech and financial inclusion communities and implement the communications and engagement plan.

1.3. Launch the sandbox portal on the regulator's public website with links to application materials, frequently asked questions (FAQs), documentation, and a dedicated email address for submitting inquiries on the process.

1.4. Designate a sandbox contact person to field inquiries from potential applicants, participate in targeted outreach activities, and document key learnings for real-time feedback on the process. Specific activities may include the following:

- Develop FAQs and guidance to reduce ineligible and incomplete applications and encourage high-quality and complete submissions.
- Develop and maintain a tracking database of inbound inquiries. The information captured in the database may include name of person/company, product/technology type, product stage, contact information, and nature of inquiry.
- Revise and update publicly available sandbox materials and/or processes as necessary and in consultation with the sandbox committee.
- Identify and engage internal and external subject matter experts (e.g., experts on supervision, payments, consumer protection, technology) as necessary to resolve targeted regulatory inquiries identified by the sandbox contact person for referral.

2. SELECTION PHASE

Once the application phase has closed, a selection committee will begin to review applications of eligible firms to participate in the sandbox. The committee should agree and commit to the initial selection criteria before beginning the review process.

Committee staffing and governance considerations

2.1. Identify and invite key internal staff to participate on the review and selection committee.

2.2. Engage internal or external resources necessary to support the committee.

Note: As a practical matter, the need for additional expertise may be evident only after the initial application review has begun (e.g., if an application proposes a technology that uses SIM-card-based identity scoring that requires technical input from telecommunications experts).

Selection process

2.3. Collection and preliminary administrative review of applications

An administrative review team will conduct an initial review of all applications submitted to quickly identify and provide an opportunity to remediate any technical or administrative errors or omissions in the application.

Applicants who have submitted incomplete applications will be contacted and provided the opportunity to remediate administrative or technical omissions, such as failure to attach a business plan, provide proof of citizenship, pay application fee, and so forth, to their applications, within a prescribed timeframe (3–5 days).

The administrative review team will be provided application and eligibility checklists to streamline the application review and a form letter (or email) to notify applicants that have been disqualified based on desktop review.

2.4. Preparation of "board books" for review by selection committee

The designated administrative team will organize all completed applications into an easily reviewable format, which includes a summary document that compares applicants across a variety of metrics. The metrics may include (i) summary of business model, (ii) product type, (iii) product/company stage, (iv) identified partners (if any), and (v) remaining eligibility criteria. The goal of this summary document is to provide a high-level landscaping of the applicant pool for the selection committee.

Board books will be provided to the selection committee 5–7 business days before it convenes to discuss the applicant pool.

2.5. Selection of finalists to be interviewed by selection committee

After individual members have reviewed the application materials, the selection committee will convene in person one or more times to discuss the applications and identify questions that may need further research or diligence. Applicants that are selected to proceed in the process will be vetted for management fitness via background checks before they advance to in-person presentations.

2.6. In-person meetings with finalists

Eligible companies and/or individuals will be invited to meet with the selection committee to discuss their proposal in detail and answer any specific questions that may have arisen during the review.

2.7. Selection and notification of cohort participants (and holdovers)

Following the desktop review, background checks, and in-person interviews, the selection committee will determine the final cohort participants via committee vote.

Eligible applicants will be admitted to the sandbox if the selection committee determines that all of the eligibility criteria have been satisfied.

Approved applicants will be notified and provided with preliminary meeting dates to begin consultations with the sandbox supervisory team on test design and implementation.

At the end of the selection phase, the selection committee will publicly announce the sandbox participants.

Sandbox phase

3.1 Testing design

After participants pay the required sandbox fee, if there is one, they will be assigned to a sandbox supervisory team that will oversee the design, negotiation, and implementation of a testing plan and safeguards. The testing plan will include the following, among other things:

- A statement of the regulatory hypothesis that will be evaluated through the test.
- Testing outcome metrics or KPIs.
- Testing methodology.
- Customer acquisition plan.
- Customer communications, including risk disclosures.
- Agreed-upon safeguards (e.g., limited test duration, security of consumer information, consumer dispute resolution and compensation plans, remediation measures, AML/CFT safeguards).
- Specific regulatory requirements, if any, to be relaxed during the testing period.
- Identification and approval of service partners.
- Plans for exiting or winding down the test in the event of failure or unanticipated risks.
- Reporting timelines and content of reports.

Participants will be asked to commit to the terms of the testing plan and provide written acknowledgment of the various disclaimers set forth in the sandbox framework document. These may include acknowledgment that sandbox participation does not guarantee a license to operate, the option of either party to terminate the test at any time, and so forth.

Supervisory teams will present test plans to the sandbox committee for review, discussion, and approval before the plans are finalized with participants. Among other things, the committee will seek to coordinate testing methodologies and standards across the cohort and ensure that test plans maintain safeguards, consumer protections/disclosures, and remediation plans commensurate with the anticipated level of risk.

3.2 Test implementation

Participants will begin their sandbox tests once the test plans have been finalized. Depending on the number and type of participants in the cohort, testing periods may not run contemporaneously.

Supervisory teams will meet with the committee (i) every month to share progress reports and updates from their respective participant tests and (ii) upon completion or termination of a test.

Incidents of consumer injury, data breach, fraud, or other consumer or financial injuries that occur during the test must be immediately reported to the sandbox committee.

Cohort exit

Upon completion of the sandbox phase and implementation of any changes recommended through the sandbox process, the sandbox participants will either (i) go live in the local market, (ii) continue to develop and modify their solutions off market, or (iii) wind down within the jurisdiction.

Supervisory teams will recommend specific regulatory treatment of the sandbox participants based on testing outcomes and performance against the indicators and metrics specified in the testing plan. Recommendations may include, for example, approval to operate under current licensing regimes or exemption, approval to operate conditioned upon modification of the business model, and prohibition to operate. The sandbox committee will review and approve or modify the recommendations in conjunction with the appropriate supervisory department or agency with jurisdiction.

Procedural review, documentation, and regulatory assessment [60 days]

The sandbox committee, selection committee, and supervisory teams will meet within 30 days after the final participant has exited the sandbox to identify lessons learned from the initial cohort. Before this meeting, an external review team will interview all regulatory contributors and participants to gather their impressions of the process and solicit recommendations for future sandbox cohorts. These observations will be summarized and submitted for review as part of the procedural review and regulatory assessment process.

The procedural review and regulatory assessment process will identify opportunities, if any, for revising or modifying any part of the regulatory sandbox to improve future outcomes. The sandbox committee will then determine whether modifications to the sandbox framework, internal operating procedures, or formal regulatory or licensing requirements are necessary. Public documentation and/or outreach will follow, as appropriate.

Template 4
Sample regulatory sandbox testing plan template

1. **Overview**

1.1 Describe the technology, business model, and use case to be tested.

1.2. Identify the specific regulatory requirements to be relaxed or modified to accommodate the test.

1.3. Identify the specific regulatory requirements to be evaluated during the test.

2. **Testing plan**

2.1 Test objectives and intended outcomes.

2.2 Anticipated test duration.

2.3 Test methodology.

2.4 Key metrics and outcome indicators (KPIs).

2.5 Reporting requirements, including reporting frequency.

2.6 Control boundaries (e.g., client type and number, transaction size, and total exposure limit).

2.7 Client acquisition plan.

2.8 Client communication plan and templates, including sample risk disclosures for the live tests.

2.9 Key milestones and timelines.

2.10 Exit strategy upon completion or discontinuation of the live test.

3. **Control program and safeguards**

3.1 Develop and commit to core controls and safeguards, including:

- Limited test duration
- Data security requirements
- KYC processes
- AML/CFT safeguards

3.2 Develop measures to monitor and ensure compliance with the boundary conditions established for the test.

3.3 Develop measures to mitigate risks to and impact on customers arising from any test failures, including insurance or compensation programs.

3.4 Identify and describe risks that can be managed through other test partners, such as regulated financial institutions.

3.5 Develop and implement measures to handle client inquiries, after-test services, and complaints in a fair and effective manner.

ANNEX 3

SANDBOX SIMULATION GUIDANCE

A SANDBOX SIMULATION IS AN EXERCISE for regulators that are interested in setting up a regulatory sandbox. Through a series of practical case studies based on real or realistic examples, the regulator tests (i) the need for a sandbox, its design, and limits and (ii) the proposed sandbox framework.

In the former case, the simulation helps answer: (i) Do we need a sandbox or do other regulatory tools allow us to cope with innovation? (ii) Can we set up a sandbox that would help address the situations presented in the case studies? (iii) What would the sandbox look like? (iv) Who needs to be involved in setting up the sandbox?

In the latter case, the simulation helps answer: (i) Does the sandbox work or should it be modified? (ii) Are all the processes correctly defined? (iii) Do we have enough capacity to implement the sandbox? (iv) Does the sandbox cover all possible scenarios?

The sandbox simulation can be conducted internally or with the help of an external expert. For example, the World Bank conducts sandbox simulations as part of its technical assistance.

How can a regulator conduct a regulatory sandbox simulation?

Step 1. Draft case studies. Identify real or realistic examples of tech-enabled financial innovation at the fringes of the current legal and regulatory framework. These can be, for example, fintech companies operating in other markets or companies that have approached the regulator with their innovative idea. It is important to identify cases where enough information is known about the innovation (i.e., its nature) to craft a granular enough case study. Three to five case studies should be sufficient. Where the regulator uses the simulation to test the current sandbox framework, the regulator should use the actual templates (e.g., application forms).

Step 2. Organize the simulation. The simulation can be organized as a half-day workshop. The sandbox team should be the primary participant in the simulation. Since other experts (e.g., legal and regulatory, licensing, supervision experts) from within the regulatory authority should support the sandbox implementation, they also should participate.

Step 3. Run the simulation. Present the case studies to the participants, and ask them to evaluate the case studies. Participants can be organized into multiexpert teams. Ideally, participants first receive an incomplete sandbox application and decide whether they accept it, reject it, or seek more information. After that, they receive a full application with detailed information about the innovation and planned live test. Participants then decide whether to accept or reject the application or whether a different action would be more appropriate. For the applications that are accepted, participants draft test plans. Finally, participants receive information about test results and decide on a suitable exit option.

Step 4. Evaluate and tweak. Use the simulation results to draft and/or adapt the sandbox framework.

GLOSSARY

Innovation: A new technology, product, or business model in the financial market. In specific jurisdictions, innovation likely will be defined more narrowly, but the broad definition is used in this guide.

Innovation facilitator: A public sector initiative to engage with the fintech sector, for example, a regulatory sandbox, innovation hub, or innovation accelerator (FSB 2017). In this guide, the term is used to generally describe regulatory engagement with the marketplace to develop a better understanding of practical challenges innovators face when navigating the regulatory environment.

Innovation hub/office: An innovation facilitator set up by a regulator. It provides support, advice, or guidance to regulated or unregulated firms in navigating the regulatory framework or identifying supervisory policy or legal issues and concerns. An innovation hub can take various avatars depending on the appetite and mandate of the regulator. It is most often a central contact point to streamline queries and provide support, advice, and guidance. Support can be direct or indirect via guidance to the market and generally does not include testing of products or services (Appaya and Gradstein 2020).

Regulatory sandbox: A framework set up by a financial sector regulator to allow private firms to live test small-scale innovations in a controlled environment (operating under a special exemption, allowance, or other limited time-bound exception) under the regulator's supervision (Jeník and Lauer 2017).

Sandbox applicant: An entity that has formally applied for testing in a regulatory sandbox.

Sandbox graduate: An entity that has exited from a regulatory sandbox upon successfully accomplishing the test.

Sandbox participant: A sandbox applicant admitted to a regulatory sandbox for testing.

REFERENCES

Appaya, Sharmista Mandepanda, and Helen Luskin Gradstein. 2020. "How Regulators Respond to FinTech: Evaluating the Different Approaches—Sandboxes and Beyond." Washington, D.C.: World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/579101587660589857/how-regulators-respond-to-fin-tech-evaluating-the-different-approaches-sandboxes-and-beyond

APRA (Australian Prudential Regulation Authority). 2018. "Licensing Guidelines for Authorized Deposit-Taking Institutions." Sydney, Australia: APRA. https://www.apra.gov.au/licensing-guidelines-for-authorised-deposit-taking-institutions

Bank Negara Malaysia. 2019. "Application Procedures for New Licenses under Financial Services Act 2013 and Islamic Financial Services Act 2013." Kuala Lumpur, Malaysia: Bank Negara Malaysia, 27 December. BNM/RH/PD 030-4. https://www.bnm.gov.my/index.php?ch=57&pg=137&ac=888&bb=file

Bank of England. 2016. "New Bank Start-Up Unit." London: Bank of England. https://www.bankofengland.co.uk/prudential-regulation/new-bank-start-up-unit

Bank of Lithuania. 2017. "Newcomer Programme." Vilnius, Lithuania: Bank of Lithuania. https://www.lb.lt/en/newcomer-programme

BCBS (Basel Committee for Banking Supervision). 2017. "Sound Practices: Implications of Fintech Developments for Banks and Bank Supervisors." Basel, Switzerland: BCBS. https://www.bis.org/bcbs/publ/d431.htm

BOT (Bank of Thailand). 2020. "The Bank of Thailand Approves Banks to Provide Online Cross-bank Identity Verification for Opening Bank Accounts in the Regulatory Sandbox." Press release, 6 February. https://www.bot.or.th/English/PressandSpeeches/Press/2020/Pages/n0663.aspx

CFPB (U.S. Consumer Financial Protection Bureau). 2017. "No-Action Letter to Upstart." Washington, D.C.: CFPB, 14 September. https://files.consumerfinance.gov/f/documents/201709_cfpb_upstart-no-action-letter.pdf

Dalberg. 2019. "CGAP Insights: How Do Policy Makers Learn and Adapt Today?" Washington, D.C.: FinDev Gateway. https://www.findevgateway.org/paper/2019/06/cgap-insights-how-do-policy-makers-learn-and-adapt-today

di Castri, Simone, and Ariadne Plaitakis. 2018. "Going Beyond Regulatory Sandboxes to Enable FinTech Innovation in Emerging Markets." New York: BFA Global. https://bfaglobal.com/wp-content/uploads/2020/01/GOINGBEYONDREGULATORYSANDBOXESTOENABLEFINTECHINNOVATIONINEMERGINGMARKETS.pdf

Duff, Schan. 2017. "Regulatory Sandboxes: Modernizing Digital Financial Regulation." Washington D.C.: Aspen Institute. https://www.aspeninstitute.org/publications/modernizing-digital-financial-regulation-evolving-role-reglabs-regulatory-stack/

———. 2018. "A Better Way to Create a Regulatory Sandbox." CGAP blog post, 18 December. https://www.cgap.org/blog/better-way-create-regulatory-sandbox

———. 2019. "A Growing Trend in Financial Regulation: Thematic Sandboxes." CGAP blog post, 14 February. https://www.cgap.org/blog/growing-trend-financial-regulation-thematic-sandboxes

FCA (U.K. Financial Conduct Authority). 2017. "Regulatory Sandbox Lessons Learned Report." London: FCA. https://www.fca.org.uk/publications/research/regulatory-sandbox-lessons-learned-report

FSB (Financial Stability Board). 2017. "Financial Stability Implications from FinTech: Supervisory and Regulatory Issues that Merit Authorities Attention." Basel: FSB. https://www.fsb.org/wp-content/uploads/R270617.pdf

He, Dong, Ross Leckow, Vikram Haksar, Tommaso Mancini-Griffoli, Nigel Jenkinson, Mikari Kashima, Tanai Khiaonarong, Céline Rochon, and Harvé Tourpe. 2017. "Fintech and Financial Services: Initial Considerations." Washington, D.C.: International Monetary Fund. https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2017/06/16/Fintech-and-Financial-Services-Initial-Considerations-44985

Herrera, Diego, and Sonia Vadillo. 2018. "Regulatory Sandboxes in Latin America and the Caribbean for the FinTech Ecosystem and the Financial System." Washington, D.C.: Inter-American Development Bank. https://publications.iadb.org/en/regulatory-sandboxes-latin-america-and-caribbean-fintech-ecosystem-and-financial-system

HKMA (Hong Kong Monetary Authority). 2016. "Fintech Supervisory Sandbox (FSS)." Hong Kong: HKMA. https://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech/fintech-supervisory-sandbox-fss/#cross-sector-fintech-services

Jeník, Ivo, and Kate Lauer. 2017. "Regulatory Sandboxes and Financial Inclusion." Washington, D.C.: CGAP. https://www.cgap.org/research/publication/regulatory-sandboxes-and-financial-inclusion

Jeník, Ivo, and Sharmista Mandepanda Appaya. 2019a. "CGAP–World Bank: Regulatory Sandbox Global Survey (2019)." Washington, D.C.: FinDev Gateway. https://www.findevgateway.org/slide-deck/2019/07/cgap-world-bank-regulatory-sandbox-global-survey-2019

———. 2019b. "Running a Sandbox May Cost Over $1M, Survey Shows" CGAP blog post, 1 August. https://www.cgap.org/blog/running-sandbox-may-cost-over-1m-survey-shows

Jeník, Ivo. 2018. "Briefing on Regulatory Sandboxes." New York: UNSGSA. https://www.unsgsa.org/files/1915/3141/8033/Sandbox.pdf

Mueller, Jackson, Dan Murphy, and Michael Piwowar. 2019. "Comment Letter to the Global Financial Innovation Network." Washington, D.C.: Milken Institute. https://milkeninstitute.org/reports/comment-letter-global-financial-innovation-network

Mueller, Jackson. 2017. "FinTech: Considerations on How to Enable a 21st Century Financial Services Ecosystem." Washington, D.C.: Milken Institute. https://milkeninstitute.org/reports/fintech-considerations-how-enable-21st-century-financial-services-ecosystem

Philippon, Thomas. 2017. "The FinTech Opportunity." Basel: Bank for International Settlements. https://www.bis.org/publ/work655.htm

Shah, Shrupti, Rachel Brody, and Nick Olson. 2015. "The Regulator of Tomorrow: Rulemaking and Enforcement in an Era of Exponential Change." New York: Deloitte University Press. https://www2.deloitte.com/tr/en/pages/public-sector/articles/regulatory-agencies-and-technology.html

UNSGSA (United Nations Secretary-General's Special Advocate for Inclusive Finance for Development). 2019. "Early Lessons on Regulatory Innovations to Enable Inclusive FinTech: Innovation Offices, Regulatory Sandboxes, and RegTech." New York: UNSGSA. https://www.unsgsa.org/files/2915/5016/4448/Early_Lessons_on_Regulatory_Innovations_to_Enable_Inclusive_FinTech.pdf

Wechsler, Michael, Leon Perlman, and Nora Gurung. 2018. "The State of Regulatory Sandboxes in Developing Countries." New York: Digital Financial Services Observatory at the Columbia Business School. https://dfsobservatory.com/publication/state-regulatory-sandboxes-developing-countries

Zetzsche, Dirk A., Ross P. Buckley, Douglas W. Arner, and Janos Nathan Barberis. 2017. "Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation." Frankfurt: European Banking Institute. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3018534

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cgap.org