

AI Sandboxes: Global Insights for Regulatory Learning and Adaptive Governance

Prepared by the TUM Think Tank in collaboration with the Global Network of Internet and Society Centers (NoC)
Armando Guio, Markus Siewert, Andras Molnar, Urs Gasser

Executive Summary

As artificial intelligence (AI) systems increasingly shape decision-making in public services, markets, and daily life, regulatory frameworks face growing pressure to become more adaptive, inclusive, and anticipatory. One key innovation is the use of AI sandboxes – controlled, real-world or simulated environments for testing new technologies, governance models, or policy instruments.

Importantly, not all AI sandboxes are regulatory sandboxes. While some focus on evaluating legal compliance, others support operational testing, cross-sector coordination, or even prototyping new forms of public policy. This diversity reflects a broader shift: experimentation is

no longer just a feature of technological innovation – it is now essential to effective governance.

This policy brief offers international insights into the design and function of AI sandboxes across Europe, Asia, Africa, and Latin America. It provides typologies, institutional design recommendations, and actionable guidance for policymakers seeking to develop sandboxes as flexible, rights-based, and context-aware governance tools. It builds upon previous and ongoing research by collaborators, including the Datasphere Initiative¹, as well as insights shared at a side event held at the UNESCO Global Forum on the Ethics of Artificial Intelligence in Bangkok in July 2025 and co-organized by the Global Network of Internet & Society Centers².

Introduction: Beyond the Regulatory Sandbox

AI sandboxes are often misunderstood as compliance-focused tools limited to regulators. In practice, they encompass a wide range of institutional formats for experimentation and learning, enabling governments and stakeholders to

explore how emerging technologies interact with legal frameworks, social systems, and real-world conditions.

[1] See Datasphere Initiative. (2022). Sandbox for data: Creating spaces for agile solutions across borders. <https://www.thedatasphere.org/datasphere-publish/sandboxes-for-data/>. See also Datasphere Initiative. (2025). Sandboxes for AI: Tools for a new frontier. <https://www.thedatasphere.org/wp-content/uploads/2025/02/Report-Sandboxes-for-AI-2025.pdf>, and most recently Datasphere Initiative. (2026). Sandboxes for DPI: Co-creating the blocks of digital trust. <https://www.thedatasphere.org/datasphere-publish/sandboxes-for-dpi/>

[2] Network of Centers. (2025). AI sandboxes: Regulatory learning in action: Summary report of the Global Network of Internet and Society Centers side event, UNESCO Global Forum on the Ethics of Artificial Intelligence. <https://networkofcenters.net/sites/networkofcenters.net/files/AI%20Sandbox%20Thailand%20Event%20Brief.docx.pdf>

Several types of AI sandboxes can be distinguished³:

01 Operational Sandboxes

Used to test technical systems, data flows, and platform interoperability, often outside a formal legal evaluation process.

02 Regulatory Sandboxes

Enable technologies to be trialed under modified or supervised legal conditions, often with time-limited exemptions or tailored oversight.

03 Hybrid Sandboxes

Integrate operational and regulatory elements, allowing technical and legal innovation to inform each other dynamically.

04 Policy Sandboxes

Prototype draft rules, guidelines, or governance procedures in practice before formal legislative adoption⁴.

Recognizing this typological diversity is helpful to building effective sandbox ecosystems that respond to institutional capacity, local priorities, and public needs.

Importantly, the function of a sandbox may evolve over time – not only across types, but also within a given type. For instance, a regulatory sandbox might initially focus on clarifying

definitions, scoping uncertainties, and fostering dialogue between regulators and developers. As the legal framework matures, its role may shift toward testing compliance mechanisms or certifying high-risk applications. This dynamic character makes sandboxes both governance tools and governance builders – allowing institutions to learn, adapt, and grow with the technologies they oversee.

Core Functions of AI Sandboxes

Each sandbox model offers unique governance value. However, across use cases and contexts, four core functions emerge:

- **Adaptive governance through structured experimentation:** Sandboxes enable live or simulated trials of AI systems in a controlled setting. This supports safe iteration, helps refine system performance, and creates evidence for policy and oversight⁵.
- **Regulatory and institutional learning:** Whether the focus is legal compliance, operational design, or user experience, sandboxes generate insights that feed back into standards, procedures, and institutional readiness⁶.

[3] For an (evolving) typology and detailed analysis of sandboxes, see Datasphere Initiative. (2022); Datasphere Initiative. (2025); and Datasphere Initiative. (2026).

[4] Network of Centers. (2025).

[5] OECD. (2025). Regulatory sandbox toolkit: A comprehensive guide for regulators to establish and manage regulatory sandboxes effectively. OECD Publishing. <https://doi.org/10.1787/de36fa62-en>

[6] Gasser, U., & Mayer-Schönberger, V. (2024). On the shoulders of others: The importance of regulatory learning in the age of AI. *Virginia Journal of Law & Technology*, 28(1), <https://static1.squarespace.com/static/5e793709295d7b60295b2d29/t/678a8a5f088d4e6288ea4353/1737132644184/28+Va.+J.L.+%26+Tech+1+%282025%29+Final>

→ **Inclusive innovation and ecosystem building:** Sandboxes lower barriers for participation, particularly for SMEs, public agencies, and underrepresented communities. They can serve as public innovation platforms rather than private testing labs⁷.

→ **Policy prototyping and governance innovation:** Policy sandboxes test regulatory options before formal implementation – reducing risk and enhancing legitimacy by surfacing gaps, conflicts, and practical constraints early⁸.

Global Practice: Diverse Models, Common Goals

International implementations illustrate how sandbox typologies are adapted to different governance settings:

Operational model

The U.S. university-based AI sandboxes, such as Harvard's pilot, prioritize academic experimentation with AI tools, offering a controlled environment to test use cases, evaluate risks, and gather insights on institutional integration before broader deployment⁹.

Hybrid model

Singapore's PETs sandbox merges compliance evaluation with technical experimentation, producing soft standards and public guidance¹¹.

Regulatory model

The EU AI Act mandates sandboxes to help AI providers (especially SMEs) align with legal requirements under regulator supervision¹⁰.

Policy model

Brazil's public sector sandbox for social benefit automation trials policy design choices alongside system validation, blending legal and institutional prototyping¹².

These examples show that sandbox design depends on regulatory culture, institutional maturity, and strategic intent. A one-size-fits-all model is neither realistic nor desirable.

[7] OECD. (2023). Regulatory sandboxes in artificial intelligence (OECD Digital Economy Papers, No. 356). OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/07/regulatory-sandboxes-in-artificial-intelligence_a44aae4f/8f80a0e6-en.pdf

[8] Ibid.

[9] Harvard Medical School IT (2025) Harvard AI Sandbox: Secure generative AI for the Harvard community. Available at: <https://it.hms.harvard.edu/service/harvard-ai-sandbox>

[10] Fetic, L., Niemeyer, D., & Klein, T. (2025). Wie können KI-Reallabore ihr Potenzial in der KI-Verordnung entfalten? Bedingungen für ein wirksames Instrument eines souveränen und lernfähigen KI-Ökosystems in Europa. appliedAI Institute for Europe. <https://www.appliedai-institute.de/assets/files/Policy-Brief-AI-Regulatory-Sandbox.pdf>

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[12] Advocacia-Geral da União. (2025). Regulatory Sandbox: AI for the amicable resolution of administrative conflicts at the Attorney General's Office of Brazil. <https://www.gov.br/agu/pt-br/assuntos-1/labori/publicacoes-1/en-us-sandbox-regulatorio-de-ia-final.pdf>

Design Considerations for Effective Sandboxes

Regardless of type, successful sandboxes require attention to cross-cutting enablers:

01 Differentiate Typological clarity and goal alignment:

Stakeholders must agree on what kind of sandbox is being implemented – and why. A regulatory sandbox without legal flexibility, or a policy sandbox without stakeholder input, will fail to deliver¹³.

03 Interagency and cross-sector coordination:

Especially in hybrid and regulatory sandboxes, coherent oversight depends on coordinated decision-making across sectoral regulators, ministries, and innovation bodies¹⁵.

05 Readiness assessment and contextual adaptation:

Sandbox success depends on fit: institutional capacity, sectoral priority, and regulatory ambition must align. Diagnostic tools and maturity models help ensure right-sized design¹⁷.

02 Multidisciplinary expertise:

Technical, legal, ethical, and policy expertise must be embedded into sandbox governance. This supports credible evaluation and helps bridge language and logic gaps across sectors¹⁴.

04 Stable, dedicated resourcing:

All sandbox types require sustained support for staffing, infrastructure, documentation, and participant engagement. Short-term funding undermines learning and legitimacy¹⁶.

[13] See Datasphere Initiative. (2022); Datasphere Initiative. (2025); Datasphere Initiative. (2026).

[14] Datasphere Initiative. (2022), 20; Datasphere Initiative. (2025), 28, 42

[15] Datasphere Initiative. (2022), 21. Datasphere Initiative. (2025). 7, 25 et seq., 53, 55

[16] OECD. (2025). Regulatory sandbox toolkit: A comprehensive guide for regulators to establish and manage regulatory sandboxes effectively. OECD Publishing. Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/regulatory-sandbox-toolkit_cc8d3e50/de36fa62-en.pdf

[17] Guio, A. (2024). Regulatory sandboxes in developing economies: an innovative governance approach. Comisión Económica para América Latina y el Caribe (CEPAL). Available at: <https://repositorio.cepal.org/handle/11362/80496>

Policy Recommendations

To fully realize the potential of sandboxes as governance infrastructure, we recommend:

01 Differentiate and deploy sandbox typologies strategically

Design sandboxes based on function— regulatory, operational, hybrid, or policy – and ensure their mandates reflect that intent.

02 Treat sandboxes as civic infrastructure, not commercial innovation spaces:

Promote open participation models, clear eligibility criteria, and equitable access – especially for public institutions and underserved communities.

03 Build transparent knowledge systems:

Institutionalize sandbox documentation and public reporting. Develop shared templates, open-access repositories, and cross-border metrics.

04 Use sandboxes to inform lawmaking and oversight:

Integrate learnings into legal interpretation, certification, and enforcement. Policy sandboxes can reduce risk and improve quality before formal rulemaking.

05 Foster international peer learning:

Encourage intergovernmental sandbox collaboration to harmonize design practices, improve interoperability, and advance shared governance goals.

Conclusion

AI sandboxes are diverse by design. They can function as policy labs, legal pilots, innovation accelerators, or public sector testing grounds – but only if their typology and design are fit for purpose.

As governments worldwide move from AI principles to implementation, sandboxes offer an actionable tool for balancing innovation and public accountability. The key is to move beyond the narrow frame of “regulatory sandbox” and build agile, inclusive, and learning-oriented sandbox ecosystems tailored to real-world governance needs.



INSTITUTIONS

TUM Think Tank at the Munich School of Politics and Public Policy | Technical University of Munich

Global Network of Internet and Society Centers (NoC)

AUTHORS

Armando Guio, Markus Siewert, Andras Molnar, Urs Gasser

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CONTACT

tumthinktank@hfp.tum.de
<https://tumthinktank.de>

Further Readings

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