

AUTONOMOUS MOBILITY TESTING SANDBOX INTEGRATION FRAMEWORK

WORKSHOP # 3 SUMMARY & INSIGHT REPORT || DATE: JUNE 6th, 2024.

1. Overview & Introduction

The proposed framework integrates objectives from the Transport General Authority (TGA)'s regulatory sandbox with the MoTLS testing sandbox (Testing Ground). The framework focuses on three key elements:

- **Link:** Eligibility & Readiness
- **Align:** Preparation & Testing
- **Scale:** Exit & Post Testing

2. Stakeholder Presentations

2.1. Transport General Authority

Omar Hussain presented the progress in autonomous vehicle (AV) regulation, covering key regulatory areas such as policies in AV applications, systems, vehicle registration, and operator licenses. He explained the application lifecycle, including the permit application process, the requirements for applications, and the dedicated website for submitting these applications.

2.1.1 Discussion

- Commercial AV Rules: Testing procedures and integration with marine mobility.
- License Limitations: Driver and license required until advanced testing.
- Accident Handling: Data storage and analytics for cause determination.
- Standards Management: Alignment with SASO and connectivity dependence.

2.2. Ministry of Transport and Logistics Services

Abdulaziz Aldakkan introduced the MoTLS product and the National Transport and Logistic Strategy (NTLS). He detailed the “sandbox initiative”, focusing on the regulatory framework, infrastructure support, delivery support, private sector participation, and knowledge enablement. Additionally, he discussed the development of the smart mobility physical sandbox, its use cases, the KAUST collaboration.

2.2.1 Discussion

- Regulatory vs. Testing Sandboxes: Key differences outlined.
- Enrolment Process: Specialized procedures for participation.
- Adoption and Acceptance: Framework aiding regulators and enabling testing sandboxes.

3. Workshop Sessions

3.1. Session 1—Initiating the Sandbox: Defining Trigger Questions and Thresholds

This session focused on linking between TGA's regulatory sandbox for autonomous systems and proving grounds provided by the public and private sectors and academic institutions. This involves developing a focus on test cases intended to be examined within testing sandboxes (proving grounds) and a consistent set of inquiries for evaluating the suitability and relevance of subjects, influencing the shaping of new regulations, and accelerating adoption.

3.1.1 Discussion

Participants discussed key regulatory sandboxes triggering process and threshold questions with a focus on:

- Criteria for linking Regulatory sandboxes to proving grounds: Complex and fragmented regulatory environments; safety and liability concerns; data, privacy and security concerns; technology readiness; public trust.
- Identifying key questions that determine testing readiness and eligibility.

3.2. Session 2—Navigating Testing Ground Design: Setting Design Elements and Success and Failure Measures

The session focused on aligning the development and deployment of the main design elements across different proving grounds, ensuring that the resulting insights are efficient, transparent, actionable, and comparable. Additionally, to develop metrics that shape the insights gained from sandbox testing, guiding precise decision-making.

3.2.1 Discussion

The participants engaged in discussions on defining the process and metrics for successfully navigating the proving grounds focusing on:

- Identifying specific challenges for each of the sandbox triggers.
- Identifying the impact of challenges on future scalability.
- Identifying solutions and potential opportunities for successful outcomes.

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3.3. Session 3—Transitioning Phases: Understanding Exit and Post-Testing Components

This session focused on using testing phase insights to define scalability and transition processes for autonomous mobility solutions, incorporating lessons learned into viable considerations when shaping new regulations for autonomous systems, and generating feedback for continuous framework enhancement.

3.3.1 Discussion

Participants discussed key themes including:

- Identifying metrics to evaluate scalability, impact, and efficiency of sandboxes
- leveraging proving grounds insights for broader applications and continuous improvement of the regulatory

3.4. Session 4—Collaborative Governance: Stakeholder Roles and Responsibilities

Discussions centered on defining core stakeholders responsible for participation decisions and regulation development, active participants supplying services and influencing decision-making, occasional participants supporting eligibility criteria, and the surrounding ground of passive observers.

3.4.1 Discussion

Participants discussed key themes including:

- Clarifying the roles of various stakeholders.
- Responsibilities during each phase of the framework.
- Targeted Applicants and procedure for testing within proving grounds

4. Key Session Insights

Theme	Sub-theme	Key Insights
Regulatory and Legal Frameworks	Cross-Authority Coordination	Harmonize regulations across TGA, MoTLS, and other authorities.
	Standards Management	Collaborate with SASO and align with international best practices.
	Regulatory Compliance	Ensure local and international regulatory alignment.
Safety and Security	Safety Standards	Establish safety assessments, protocols, and emergency procedures.
	Cybersecurity	Develop frameworks to protect against cyber threats and ensure data privacy.
	Incident Handling & Reporting	Use data analytics to determine accident causes and implement mitigation strategies by establishing a framework for incident recording (e.g., airplane black box) and reporting (e.g., Najm).
Technological Readiness and Infrastructure	Digital Infrastructure	Assess and enhance the readiness of digital infrastructure (e.g. data management, ATS)
	Connectivity	Explore satellite and advanced connectivity solutions.
	Testing Challenges	Address challenges in crowded and high-speed scenarios, develop contingency plans.
Public Trust and Engagement	Transparency	Implement recording indicators to address public concerns.
	Trust Building	Regularly publish performance and safety data to keep the public informed.
Collaboration and Stakeholder Integration	Multi-Stakeholder Participation	Encourage involvement from private, academic, and government entities.
	International Collaboration	Leverage global partnerships to enhance testing frameworks.
	Private Sector Role	Highlight contributions of private sector participants.
Framework Development and Evaluation	Scalability and Success Measures	Define criteria for success and failure in AV testing.
	Continuous Improvement	Use feedback to refine the sandbox framework.
	Exit Strategies	Design clear post-testing transition plans.
Future Mobility Integration	Transportation Integration	Connect AV technology with other transportation modes, including marine.
	Innovative Testing	Use digital twins and advanced tools for comprehensive testing.
Educational and Knowledge Dissemination	Staff Knowledge sharing	Provide guidelines and best practices for sandbox staff.
	Public Education	Develop plans to educate and raise public awareness about AV technology.

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5. Conclusion

The workshop provided crucial insights into the harmonization of regulations, the establishment of safety protocols, and the development of cybersecurity frameworks. It highlighted the importance of public engagement, multi-stakeholder collaboration, and continuous improvement of testing frameworks. The need for advanced connectivity solutions and innovative testing methods was emphasized, alongside the necessity of clear post-testing transition plans and comprehensive public education.

5.1 Key Difference between Regulatory sandbox and testing sandbox

5.1.1 TGA Regulatory Sandbox

The TGA Regulatory Sandbox allows businesses and organizations to test their autonomous system solutions, services, or business models under regulatory oversight. The purpose is to provide a space and guidelines for approved applicants to test in a closed proving ground environment or on open roads where regulations can be adjusted or relaxed for specific time windows to accommodate new technologies and approaches that might not fit within the current regulatory framework. This helps regulators understand how new autonomous vehicles work and what adjustments may be needed in existing laws to facilitate their safe and effective integration into the market.

5.1.2 Testing Sandbox or Proving Grounds

This refers to a physical or virtual environment where new technologies and use cases are tested in real-world scenarios. These environments can be similar to the **Testing Sandbox** operated by **MOTLS** in collaboration with **KAUST**, where test cases are designed to provide insights that can shape new regulations for innovative mobility solutions including AVs or accelerate their development and enablement. They can operate similarly to those run by private sector or academic institutions, where focused test cases are examined in a controlled environment for various purposes.

5.2 Key Recommendations

5.2.1 Unified Regulatory Framework

Integrating regulatory sandboxes with proving grounds across authorities, private sectors, and academia creates a consistent regulatory environment, reduces redundancy, and enhances insight. This approach ensures all initiatives follow the same standards, facilitating stakeholder coordination. It enables adaptive regulations based on real-world data, accelerates innovation by lowering market entry barriers, and fosters cross-sector collaboration. Additionally, it encourages broader participation, aligns with national strategies, and accelerates autonomous mobility enablement.

5.2.2 Safety and Privacy Measures

Implement robust safety protocols, including comprehensive assessments, emergency procedures, and incident handling frameworks. Address privacy concerns by developing cybersecurity measures to protect against threats, leading to more public confidence.

5.2.1 Public Trust Enhancements

Enhance public trust through transparent communication about AV technology's benefits and safety measures. Establish a clear incident reporting framework, similar to aviation's black box, to build credibility. Engage the public with educational campaigns and awareness programs to promote a positive perception of autonomous mobility.

5.3 Future Outlook

Focus will be on integrating autonomous mobility solutions into Saudi Arabia's transport ecosystem, guided by a unified framework. Continued collaboration among private, academic, and government entities will be essential. The implementation of advanced digital infrastructure and connectivity solutions will support the scaling of autonomous technologies. Public trust will be built through ongoing education and transparency efforts, paving the way for a seamless transition to future mobility.



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Community Member	Entity name
Abdulaziz Aldakkan	MoTLS
Abdulmajeed Serajuddin	KAUST
Abdulmalik Algarayis	SAFCSP
Abdulrahman Alhashemi	Jahez
Abdulrahman Habib	SDAIA
Ahmed Walid Hariri	MoTLS
Aziz Azougagh	Imtidadat
Basma Alduaiji	STC
Ghada M. AlQahtani	SPL
Haitham Aljahdali	KAUST
Khaled abusalem	ARAMCO
Mohammad Alosbha	STC
Mohammed Ahmed Rajih	SANS
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