MultiRELOAD

BEST PRACTICE / POLICY RECOMMENDATIONS REPORT BASED ON WORKSHOPS

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EXECUTIVE SUMMARY

This Regulatory Affairs Report presents the outcomes, insights and policy implications of the MultiRELOAD project's work on enabling conditions for scalable multimodal innovation along the Rhine–Alpine and Rhine–Danube corridors. The Regulatory Affairs (RA) line was conceived as a dynamic interface between the project's technical demonstrations and the regulatory, administrative and governance frameworks that shape the uptake of innovations in the European freight system. Over the course of implementation, this line has evolved from an initially centralised approach to a more adaptive, corridor-sensitive and thematically differentiated model that better reflects the complexity of Europe's transport landscape.

The RA process has been closely intertwined with the progress of the MultiRELOAD demonstrators. These pilots — from innovative loading units and containerised bulk transport to automation, predictive maintenance, digital twins and the RiverPorts Information System — functioned as real-world test environments for identifying regulatory barriers, governance gaps and enabling conditions. As the pilots matured, it became evident that the primary obstacles to scaling innovation lie not in technical feasibility, but in **interoperability constraints, fragmented legal and administrative frameworks, and uneven institutional capacity**. Regulatory insight thus emerged progressively, in parallel with operational evidence generated in Duisburg, Vienna and Basel.

Three Regulatory Advisory Board (RAB) dialogues form the backbone of the RA work. The first session revealed early structural issues: unpredictable approval pathways for new Intermodal Transport Units, the long-standing absence of a multimodal liability framework, and significant regional disparities in the ability to absorb innovation. The second session, held in Budapest, demonstrated that the core barrier to digitalisation is **insufficient interoperability**, not technology itself. Digital systems remain siloed across corridors, with divergent standards, semantics and reporting infrastructures, while legal frameworks lag behind rapidly evolving AI-enabled tools. The third session, embedded in the EUSDR PA1a governance structure in Vienna, highlighted the specific regulatory needs of the Danube region, including harmonised border procedures, coherent implementation of the Union Customs Code, and governance frameworks for connecting RIS, PCS, digital twins and corridor-level platforms.

These dialogues demonstrated that the original idea of a single, centralised RAB could not sufficiently address the diversity of corridor conditions. A revised, distributed model was therefore adopted, anchoring RA activities in established governance settings such as PLATINA4Action and the EU Strategy for the Danube Region. This adaptive model has proven more effective, delivering higher-quality insights, better stakeholder engagement, and strong alignment with policy processes already shaping the evolution of European transport governance.

The report concludes with a set of actionable policy recommendations aimed at strengthening regulatory alignment, advancing digital interoperability, and supporting long-term adoption. Key priorities include: predictable approval pathways for new loading technologies; harmonised multimodal liability frameworks; corridor-wide semantic interoperability for digital systems; federated data governance; cross-border regulatory sandboxes; and targeted support for terminal digital readiness. Together, these measures

would enable inland ports and multimodal corridors to innovate, interconnect and scale in a coordinated and future-proof manner.

MultiRELOAD demonstrates that innovation and regulation must evolve together. By embedding regulatory dialogue directly within corridor governance structures and macro-regional platforms, the project contributes to the creation of a more coherent, adaptive and enabling regulatory environment — one capable of supporting Europe's transition towards a greener, smarter and more resilient multimodal transport system.

This report therefore concludes that the future of multimodal transport innovation in Europe hinges on the creation of **adaptive, interoperable and corridor-aware regulatory frameworks – given that proper port infrastructure is ensured along the respective corridors**. To sustain momentum beyond the life of the project, three strategic commitments are required:

- **Continued alignment between innovation and regulation**, ensuring that legal frameworks evolve in parallel with new technologies and operational practices.
- **Strengthened corridor governance**, enabling cross-border coordination on customs, digitalisation, data governance and multimodal standards.
- **Investment in institutional and technical capacity**, particularly in smaller nodes and Danube-region ports, to ensure equitable uptake of advanced solutions.

1. INTRODUCTION AND CONTEXT

1.1. PURPOSE AND POSITIONING OF THE REGULATORY AFFAIRS LINE

The Regulatory Affairs (RA) activities within MultiRELOAD constitute a transversal and strategic component of the project's overarching ambition to strengthen the enabling conditions for efficient, effective and sustainable multimodal freight transport across Europe's inland port network. In line with the EU's decarbonisation and digitalisation objectives, the project recognises that technological innovation—whether in automation, real-time data exchange or terminal operations—can only achieve its full potential when embedded in a **supportive regulatory, administrative and governance environment**.

For this reason, the RA line was conceived not as a standalone analytical pillar but as a **dynamic interface** between the project's technical demonstrations and the wider ecosystem of rules, procedures and institutional responsibilities that shape multimodal operations along Europe's core corridors. Its purpose is to translate the operational experience gained at the three demonstration sites—Duisburg, Vienna and Basel—into actionable policy insights that can support **harmonisation, interoperability and coordinated corridor governance** along the Rhine–Alpine and Rhine–Danube corridors. This reflects a broader policy logic: as multimodal transport systems become more data-driven, energy-efficient and interconnected, regulatory alignment becomes a decisive factor for scalability and long-term impact.

1.2. ROLE OF THE EGTC RHINE–ALPINE IN THE RA PROCESS

The responsibility for steering the RA process lies primarily with the **EGTC Rhine–Alpine**, whose formal mandate as a corridor governance body positions it uniquely to convene stakeholders across borders and institutional domains. Acting at the intersection of regional authorities, infrastructure managers, port operators and European institutions, the EGTC ensures that the regulatory implications of the project's innovations are systematically captured, contextualised and communicated.

The Regulatory Advisory Board (RAB), established in the MultiRELOAD proposal as the central mechanism for structured regulatory dialogue, provides the institutional setting through which these interactions take place. By bringing together experts and public authorities at key milestones—before, during and after the demonstrations—the RAB ensures that regulatory questions are addressed in a coordinated and evidence-based manner. Deliverable D6.5 ("Best Practice and Policy Recommendations") is the formal output of this structured dialogue and will provide a consolidated account of the regulatory and governance implications identified throughout the project.

1.3. DEPENDENCY OF REGULATORY INSIGHTS ON DEMONSTRATOR PROGRESS

From the start of the implementation phase, the RA trajectory has been closely intertwined with the operational development of the demonstration activities under Work Packages 2 and 3. The demonstrators serve as real-world **regulatory test environments**, exposing the practical implications of automated terminal processes, cross-system data exchange,

predictive maintenance, multimodal coordination and new service models. Only through these operational insights can the RA work meaningfully assess questions of regulatory fit, administrative interpretation, procedural feasibility and governance requirements.

However, as several demonstrators underwent phasing adjustments or technical delays, the RA timeline necessarily evolved as well. The six-month extension of the project ensured that the second and third RAB sessions could be held once the demonstrators had reached an operational stage capable of generating **substantive evidence**. This extension was therefore not a procedural necessity but a strategic measure to guarantee that the RA outputs are grounded in actual operational experience rather than anticipatory assumptions.

The first RAB session, taking place at a moment when most pilots were still in preparation, served primarily to **frame the thematic landscape** of the RA line. The discussion confirmed that regulatory challenges would not arise primarily from formal legal prohibitions but from complex interfaces between innovation and existing administrative, technical and cross-border coordination requirements. These findings reinforced the relevance of focusing the RA work on governance mechanisms, procedural alignment and the interpretation of technical standards.

1.4. EARLY OBSERVATIONS ON THE REGULATORY STAKEHOLDER LANDSCAPE

A key insight emerging from the early stages of the RA activities concerns the fragmented nature of regulatory competences relevant to multimodal transport. The initial stakeholder mapping exercise, intended to identify the authorities and institutions involved in shaping the enabling environment for innovation, yielded only a modest number of responses. This limited engagement reflects a systematic reality: responsibilities for multimodal transport regulation are spread across **national ministries, regional administrations, river authorities, safety agencies, customs bodies and digitalisation units**, often without clear points of coordination.

This fragmentation underscores the **added value of the EGTC Rhine–Alpine** as a corridor governance structure capable of bridging institutional boundaries and fostering coherence. By convening regulatory stakeholders, who might not otherwise engage directly, EGTC contributes to a shared understanding of challenges and opportunities across borders. This role is particularly critical in a context where multimodal transport chains increasingly depend on real-time data exchange, interoperable systems and harmonised procedures—areas where misalignment between national frameworks can significantly constrain scalability.

More complex are the framework conditions in the Danube Region: despite being on the same corridor, each country applies its own governance structures, topped up with cultural and language differences. The work of the EGTC Rhine-Alpine is a good example for the Danube Region stakeholders to study to come to a more coordinated corridor approach.

2. APPROACH AND STRUCTURE OF THE REGULATORY AFFAIRS PROCESS

2.1. METHODOLOGICAL APPROACH AND GUIDING PRINCIPLES

The RA work in MultiRELOAD follows a logic of **progressive integration**, evolving in tandem with the technical, organisational and data-driven developments emerging from the demonstration sites. Rather than producing a static or parallel set of regulatory recommendations, the RA line is deliberately embedded within the project's operational rhythm. This ensures that regulatory insights are generated at the point where innovations confront actual operational and institutional constraints. As each stage of technological testing, cross-terminal data exchange or coordination between multimodal nodes unfolds, **new regulatory conditions, dependencies and governance questions become visible**—ranging from requirements for digital interoperability to the way national authorities interpret technical approvals for automated or data-intensive processes.

This embedded approach reflects a broader principle underpinning the project: **innovation and regulation must evolve together**. MultiRELOAD treats regulatory understanding not as an obstacle to be removed at the end of the process, but as a core enabler that must be shaped concurrently with technical development. This mirrors European policy priorities under the TEN-T Regulation and the Digital Logistics ecosystem, where adaptive governance and alignment across borders are understood as prerequisites for scalable deployment.

Within this iterative model, the RAB sessions represent the key **points of consolidation and interpretation**. They operate as structured reflection moments in which empirical findings from pilots are discussed with stakeholders who are responsible for applying or interpreting the relevant rules—regional authorities, ministerial representatives, river commissions, transport safety agencies and corridor governance bodies. Through this interaction, operational evidence is translated into policy-relevant knowledge. The RAB format thus ensures that the RA work remains both grounded in practical experience and forward-looking in its implications for future harmonisation, procedural convergence and corridor-level governance.

2.2. PHASING AND ADAPTATION OF THE RAB PROCESS

The project design foresees three RAB meetings at distinct phases:

- **an anticipatory session** prior to the demonstrations,
- **a mid-term session** focused on validation and emerging issues, and
- **a concluding session** devoted to synthesising lessons and formulating policy recommendations.

This structure reflects the expectation that regulatory insights become progressively more concrete as the demonstrators move from design to deployment and evaluation. However, in practice, the phasing of these sessions has been adapted to the operational reality of the project. Because several demonstrators required additional preparation time or experienced

technical delays, holding regulatory discussions prematurely would have diminished their relevance and reduced the value of stakeholder engagement.

The first RAB session—conducted while most pilots were still under preparation—therefore served primarily to **scope the thematic landscape**, identify where regulatory interaction was likely to emerge, and confirm the main domains requiring attention (automation, technical approvals, data interoperability, corridor-level information exchange). The subsequent sessions—enabled by the six-month project extension—took place under conditions where demonstrators have yielded **substantive operational data and cross-site experiences**. This improved timing allowed for deeper regulatory reflection grounded in concrete evidence, rather than anticipatory speculation, strengthening the relevance of the final recommendations.

2.3. GOVERNANCE ARRANGEMENTS AND OPERATIONAL LEADERSHIP

The EGTC Rhine–Alpine has taken the operational lead in coordinating the RA activities, ensuring their alignment with the broader dissemination, networking and corridor governance tasks under Work Package 6. As a formal governance structure charged with supporting the integrated development of the Rhine–Alpine Corridor, the EGTC is particularly well positioned to steward a multi-country regulatory dialogue and to anchor project findings in wider European policy processes.

Although the Institut du Droit International des Transports (IDIT) was originally envisaged as co-coordinator, its involvement has remained largely conceptual. Consequently, the EGTC has assumed a **de facto leadership role**, ensuring continuity, coherence and the necessary cross-border perspective throughout the RA trajectory. This strengthened role has enhanced the strategic dimension of the RA line: regulatory findings are now systematically positioned within the broader TEN-T and multimodal policy landscape, and not solely within the operational scope of the project.

By embedding the RA work within a corridor governance actor, MultiRELOAD ensures that the outputs of the RAB process can be **meaningfully absorbed into existing policy structures**, including national corridor forums, EU expert groups and institutional frameworks governing inland navigation, rail interoperability and digital logistics services.

2.4. FROM BARRIER IDENTIFICATION TO ADAPTIVE GOVERNANCE

As the project evolved, the methodological focus of the RA line shifted from an initial emphasis on identifying regulatory barriers—often interpreted as static legal obstacles—toward a broader understanding of **adaptive and anticipatory governance**. This shift reflects the project's empirical insights: the challenges encountered in multimodal innovation rarely stem from explicit prohibitions in law. Instead, they arise from procedural ambiguities, differing interpretations of technical standards, fragmented data governance requirements, or operational practices that have not yet adapted to digital or automated workflows.

In this context, the RA process seeks to promote **mutual awareness, shared terminology, and coordinated interpretation** among the actors responsible for enabling multimodal innovation. Its purpose is not to advocate for sweeping regulatory reform, but to illuminate where incremental adjustments, harmonised procedures or improved governance mechanisms can lower the threshold for innovation uptake. This approach aligns with

current European policy thinking, which views regulatory alignment as a continuous process of coordination, experimentation and learning—particularly in areas such as automation, real-time data exchange, and digital corridor services.

2.5. TRANSLATION INTO DELIVERABLE D6.5

The RAB sessions played a central role in transforming the project's operational insights into a **coherent and policy-relevant set of recommendations**. The second session built on the findings emerging from the ongoing pilots, focusing on regulatory conditions for demonstrator replicability and transferability. The final session synthesised these insights into a consolidated governance narrative, highlighting where alignment, procedural clarity or harmonised approaches are most needed to enable wider deployment of the innovations tested within MultiRELOAD.

Deliverable D6.5 thus completes the intended RA trajectory: moving from early exploratory framing toward **mature, evidence-based and corridor-relevant policy guidance**. This guidance is designed to support not only the operational partners within the project, but also policymakers, regulatory authorities and corridor organisations responsible for facilitating the wider scaling of multimodal innovations across Europe's inland waterway and rail systems.

3. REGULATORY ADVISORY BOARD DIALOGUES: INSIGHTS AND CORRIDOR-LEVEL IMPLICATIONS

The Regulatory Advisory Board (RAB) dialogues form the central mechanism through which MultiRELOAD connects its operational pilots with the wider regulatory and governance landscape of Europe's multimodal corridors. Taken together, the three sessions demonstrate that while technological innovation within the project is maturing rapidly, the key determinants of scalability lie in the regulatory, administrative and governance conditions under which innovations are expected to operate. Across the Rhine–Alpine and Rhine–Danube corridors, stakeholders consistently emphasised that **interoperability, regulatory predictability, administrative coordination and institutional capacity** are the decisive enablers of modal shift and digital transformation—more so than the technical feasibility of any individual solution.

This chapter synthesises the main insights from the three RAB dialogues and enriches them with findings from the project's analytical deliverables. It shows how early regulatory signals (RAB #1), digitalisation and interoperability challenges (RAB #2), and Danube-specific governance conditions (RAB #3) together provide a coherent understanding of what is required to scale the MultiRELOAD solutions corridor-wide.

3.1 RAB DIALOGUE #1 – EARLY SIGNALS: FRAGMENTATION, APPROVAL PATHWAYS AND REGULATORY COMPLEXITY

The first RAB session took place at an early stage (28th of June 2024, online) when most demonstrators were still under preparation. Despite the absence of operational data, the session laid the conceptual foundations for the RA line by identifying the regulatory sensitivities likely to shape the scaling potential of the project's innovations.

A first theme was the **complexity and time-sensitivity of approval processes** for new intermodal loading technologies. CargoBeamer, drawing on its experience with the CBoXX (Demonstrator A1), outlined how changes in ERA brake requirements during the construction of the prototype created delays and forced redesigns. This is fully aligned with the barriers documented in D6.4, which highlights that approval processes, even when harmonised at EU level, can be prone to mid-process amendments that disrupt pilots and confuse stakeholders (D6.4, p.58). The dialogue therefore emphasised the need for **predictable, corridor-compatible authorisation pathways**—a theme that recurs throughout the project.

A second insight concerned the **absence of a coherent multimodal liability framework**. IDIT explained that inland navigation, road and rail each operate under distinct legal regimes, with no unified multimodal contract law tying them together. This fragmentation limits the legal certainty of complex supply chains, particularly when new loading units (A1, A2) or data-mediated decision tools (B3) are introduced. D2.3 confirms that this gap has been recognised in EU policy discourse for more than a decade but remains unresolved (D2.3, pp.7–10).

A third theme was the **uneven capacity of regions to absorb innovation**. Province of Limburg's intervention in the session highlighted that digitalisation and automation require

not only infrastructure but also human capital: technicians, operators, data analysts, and public administrators capable of managing complex systems. D6.4 reinforces this conclusion by showing that smaller terminals struggle with digital integration and skills gaps, even when the technology itself is mature (pp.25–27).

Finally, early signs of **customs and border-related fragmentation**—later confirmed in the A2 demonstrator—were discussed. Although customs legislation is harmonised through the Union Customs Code, D5.2 shows that national implementation and administrative practices diverge significantly (D5.2, pp.37–40). This mismatch between EU legislation and national execution foreshadowed many of the border-handling challenges encountered during the Danube pilots.

Taken together, RAB #1 signalled that many of the barriers to innovation sit **outside the technology itself** and are instead rooted in the fragmented regulatory architecture of the multimodal transport system. These insights shaped the analytical focus of the RA line as the demonstrators progressed.

3.2 RAB DIALOGUE #2 – DIGITALISATION, INTEROPERABILITY AND REGULATORY ADAPTATION

The second RAB dialogue, held in Budapest on the 3rd of November 2025, marked a shift from anticipatory reflection to evidence-based discussion. By this stage, several digital demonstrators—automation (B1), predictive maintenance (B2), AI-supported yard optimisation (B3) and the RiverPorts Information System (B5)—had generated operational data that enabled a substantive regulatory dialogue.

Across stakeholders, a clear consensus emerged: **the main obstacle to digitalisation is not technology but interoperability**. MultiRELOAD demonstrated that ports, terminals and waterway authorities already use digital systems extensively, yet they rely on local implementations of TOS, PCS, RIS, CEERIS or proprietary ERP tools that do not share semantics. This results in high integration costs and fragmented operational coordination. D6.4 confirms that without shared semantic standards and federated data architectures, digital tools remain isolated innovations rather than building blocks of a connected corridor system (D6.4, pp.41–45).

Stakeholders pointed to the parallel existence of CEERIS (Danube) and RPIS (Rhine) as emblematic of this fragmentation. While both tools aim to deliver corridor-level insight, they operate under different data models, governance arrangements and technical profiles. As noted in the Budapest session, regulators stressed that “digitisation is a fast-moving environment, and regulators struggle to keep pace”. Participants compared the current state of interoperability to “the early Internet of the 1980s,” arguing that the sector still lacks the equivalent of a universally accepted protocol layer.

The dialogue also exposed the **structural lag between legal adaptation and technological development**. AI-supported decision tools raise liability questions: who is responsible if an optimisation algorithm produces erroneous output? As one participant put it: “AI is probabilistic—so how do we ensure it does not hallucinate but remains tied to real information?”. D5.2 reinforces this point by noting that current EU regulatory frameworks do not yet provide clear accountability mechanisms for data-driven or automated decision-making (D5.2, pp.28–33).

Connectivity challenges—particularly at locks and inland stretches—were repeatedly mentioned. Even the most advanced digital tools depend on **reliable communications infrastructure**, which remains uneven along both corridors. D6.4 confirms this technical dependency and warns that patchy connectivity risks undermining the implementation of real-time systems (D6.4, p.30).

A final topic was the need for **regulatory testbeds and controlled trials**. Participants emphasised that administrations must actively enable experimentation rather than require full legal certainty beforehand. Several speakers recalled the origins of RIS, which succeeded precisely because it was tested "in the kitchen" before being formalised into law. In the concluding remarks, regulators argued that Europe risks falling behind other regions unless it develops more agile regulatory practices that allow innovation to be tested under real-world conditions.

In sum, RAB #2 made clear that corridor-wide digitalisation depends primarily on **interoperability-by-design, semantic harmonisation, robust governance of data flows and more flexible regulatory processes**—not merely on new digital tools themselves.

3.3 RAB DIALOGUE #3 – DANUBE-SPECIFIC GOVERNANCE, CORRIDOR HARMONISATION AND MODAL-SHIFT CONDITIONS

The third RAB dialogue, held in Vienna within the framework of the EUSDR PA1a Steering Group, expanded the discussion to the broader governance conditions governing the Danube region. The dialogue confirmed that the Rhine–Danube corridor operates under a distinct combination of infrastructural, administrative and market realities—differences that strongly influence the scalability of the MultiRELOAD solutions.

The A2 demonstrator, which piloted containerised bulk flows between Deutschkreutz and Sofia, provided one of the clearest examples. As emphasised in the session and reflected in D6.4 (pp.24–29) , the pilot achieved high utilisation and significant CO_2 reductions, but faced constraints linked to the Danube's operational environment: variable water levels, limited availability of handling equipment, and procedural delays linked to sampling and customs inspections. The Vienna dialogue highlighted that shifting from bulk logic to container logic requires not only standardised ISO-compatible units, but also **predictable border procedures and coherent implementation of the Union Customs Code across Danube countries**.

Digitalisation was equally prominent in the discussion. Participants noted that the Danube's digital architecture remains a "system of systems"—a term that echoes the historical attempts at harmonisation through EURIS and RIS COMEX. Stakeholders underlined the need for a unified approach to data exchange across CESNI/TI standards, RIS, Port Community Systems and corridor-level tools such as RPIS. The importance of aligning Danube initiatives with EU-level frameworks (eFTI, DTLF, EMSWe, Mobility Data Space) was repeatedly emphasised.

Stakeholders also stressed that ports and operators must agree on unified standards to avoid the risk that individual interests produce fragmented implementations. This aligns with D6.4's assessment that **terminal digitalisation depends on shared semantics and federated data governance** (pp. 48–53).

The discussion concluded with a shared view that **flexible regulatory frameworks** are essential for Danube innovation. Participants argued that administrations should provide

testbeds, as they did during the early RIS years, to accelerate innovation. Regulatory rigidity — waiting for legislative cycles of 5–10 years—would undermine competitiveness. As noted in the session, “to keep pace with other technological regions worldwide, administrations must be open to testing on actual vessels, under real conditions”.

Finally, the Steering Group identified three priority areas for regulatory alignment:

1. **Harmonised border and customs procedures** for containerised and high-value IWT flows.
2. **Shared data-exchange profiles** enabling interoperability between digital twins, RIS, PCS and corridor-level platforms.
3. **Clear, predictable multimodal liability and documentation frameworks** to reflect the increasingly digital and data-mediated nature of inland waterway transport.

In this sense, RAB #3 demonstrated that scaling MultiRELOAD innovations on the Danube requires a dual transformation: **physical modernisation and digital governance alignment**, backed by coordinated policy action across EU institutions, CCNR, CESNI and the Danube Commission.

3.4 SYNTHESIS ACROSS THE THREE DIALOGUES

Across the three RAB dialogues—and reinforced by D6.4, D5.2 and D2.3—several structural patterns become clear:

1. **Interoperability is the foundational condition** for all digital demonstrators; technology alone is insufficient without harmonised semantics, shared standards and federated architectures.
2. **Approval frameworks are unpredictable**, especially for new intermodal units, creating uncertainty for physical innovations such as A1 and A2.
3. **Liability and data governance frameworks lag behind innovation**, hindering AI adoption and real-time coordination tools.
4. **Corridor-specific conditions matter**: Rhine–Alpine is digitally mature; Rhine–Danube benefits more from containerisation and infrastructure+digital hybrids.
5. **Institutional and workforce capacity is uneven**, and smaller nodes require targeted support to adopt advanced tools.
6. **Regulatory culture needs to evolve**: testbeds, adaptive governance and faster administrative pathways are essential to keep pace with innovation.

Together, these insights demonstrate that the scaling of MultiRELOAD solutions requires not only technological maturation but also **aligned governance mechanisms, regulatory adaptability and a corridor-wide commitment to interoperability-by-design**.

4. REFINEMENT OF THE REGULATORY AFFAIRS APPROACH AND NEXT STEPS

4.1. RATIONALE FOR REFINING THE ORIGINAL REGULATORY AFFAIRS MODEL

As the Regulatory Affairs (RA) activities unfolded, it became increasingly clear that the original concept of a single, centralised Regulatory Advisory Board (RAB) did not fully correspond to the operational, institutional and geographical realities of the MultiRELOAD project. While Annex 1 of the Grant Agreement specifies that the RA line should mobilise "workshop-based dialogue with regulatory stakeholders" and translate these insights into policy recommendations, it does not prescribe a fixed governance structure. Instead, the project was expected to create meaningful interactions between demonstrator findings and the regulatory ecosystem governing multimodal transport along the Rhine–Alpine and Rhine–Danube corridors.

The early stages of the project demonstrated that a traditional, centrally convened board—while conceptually coherent—would not provide the granularity or legitimacy needed to address the distinct regulatory environments in which the demonstrators operate. The Rhine–Alpine corridor, with its digitally mature ports and strong institutional structures, presents fundamentally different governance dynamics from the Danube Region, where border procedures, customs coordination and infrastructure heterogeneity shape the uptake of innovation. Likewise, the thematic diversity of the demonstrators demanded differentiated regulatory conversations involving the appropriate authorities, expert bodies and corridor-level organisations.

4.2. TRANSITION TO A DISTRIBUTED AND CONTEXT-SENSITIVE REGULATORY MODEL

This recognition led to a deliberate refinement of the RA approach. Rather than maintaining a single, static RAB, the project adopted a more flexible, targeted and context-sensitive model. Under this revised structure, the RA activities were embedded in existing high-level governance forums, thematic expert groups and corridor-specific platforms. This transition enabled MultiRELOAD to place its regulatory dialogues within arenas that already hold institutional authority and stakeholder legitimacy—thereby increasing relevance, reducing duplication and ensuring that insights flowed directly into ongoing policy processes.

The first RAB-linked workshop in June 2024 played a pivotal role in this strategic shift. It revealed that a standalone meeting format was insufficient to capture the complexity of the topics or to reach the actors who hold actual regulatory competences. In response, the consortium—under the leadership of the EGTC Rhine–Alpine—adopted a "docking approach": instead of organising project-only meetings, RA sessions would be anchored within established platforms such as the PLATINA4Action Technology Transfer Workshop and the Steering Group of Priority Area 1a of the EU Strategy for the Danube Region (EUSDR). This approach ensured immediate alignment with operational and political priorities and facilitated genuine stakeholder engagement beyond the project consortium.

4.3. THEMATIC AND GEOGRAPHICAL ANCHORING OF RA ACTIVITIES

The refinement also created space for differentiating thematic clusters within the RA line. Digitalisation, automation and data governance issues—central to demonstrators B1–B5—were brought into the Budapest PLATINA4Action workshop, where European waterway authorities, RIS experts, technology developers and ministries discussed interoperability, AI accountability, reporting systems and the implications of the evolving European frameworks (eFTI, revised RIS Directive, Mobility Data Space).

By contrast, the regulatory and governance questions raised by the Danube-facing demonstrators—particularly Demonstrator A2 and the broader alignment challenges between Rhine and Danube regions—were embedded in the EUSDR PA1a Annual Meeting in Vienna. This macro-regional setting enabled deeper engagement with ministries, river commissions (CCNR, Danube Commission, CESNI) and regional authorities, ensuring that MultiRELOAD's findings could be discussed within the appropriate institutional environment.

This dual anchoring recognises that regulatory progress in multimodal transport is shaped by corridor-specific infrastructures, institutional traditions and administrative practices. The differentiated engagement approach therefore increases the accuracy, policy relevance and legitimacy of the RA outputs.

4.4. TOWARDS A CONTINUOUS, CORRIDOR-CONNECTED REGULATORY DIALOGUE

The distributed approach represents not merely an adjustment of process design, but the emergence of a durable collaborative framework between innovation projects, corridor governance bodies and regulatory institutions. By situating the RA processes directly within relevant expert communities and established governance platforms, MultiRELOAD ensures that its recommendations are built on credible, context-aware and corridor-relevant dialogues.

This is fully aligned with the WP6 mandate to strengthen corridor communication and networking, and with the institutional role of the EGTC Rhine–Alpine as a facilitator of transnational cooperation along multimodal transport routes. Rather than perceiving regulatory dialogue as a finite sequence of meetings, the project has adopted a dynamic, iterative model in which regulatory learning evolves alongside technological demonstration.

Looking ahead, the next steps are not only about concluding the project's RAB activities, but consolidating a more adaptive and integrated way of linking innovation and regulation. By ensuring that MultiRELOAD's findings are embedded in existing policy ecosystems—and by anchoring discussions in macro-regional and corridor-level settings—the RA approach strengthens the long-term relevance, uptake and transferability of the project's regulatory insights. In this way, MultiRELOADcontributes to the broader European objective of enabling inland ports and multimodal corridors to innovate, interconnect and scale in a coordinated, sustainable and future-proof manner.

5. POLICY RECOMMENDATIONS

Building on the findings from the three Regulatory Advisory Board (RAB) dialogues, the demonstrator outcomes, and the legal and governance analyses presented in D2.3, D5.2 and D6.4, this chapter identifies the policy measures required to enable the scaling of MultiRELOAD innovations across European multimodal corridors. The recommendations are structured around four interdependent dimensions: (1) regulatory alignment and approval pathways, (2) digital and data interoperability, (3) multimodal corridor governance, and (4) enabling conditions for adoption and long-term impact.

The recommendations reflect the project's core insight that **technological innovation alone is insufficient**. Scaling multimodal solutions along the Rhine–Alpine and Rhine–Danube corridors require a regulatory environment that is harmonised, predictable, digitally interoperable, and aligned with the operational realities of inland ports, terminals, operators and authorities.

5.1. STRENGTHEN REGULATORY ALIGNMENT AND APPROVAL PATHWAYS

5.1.1 ESTABLISH PREDICTABLE APPROVAL PROCESSES FOR NEW TRANSPORT UNITS

The pilots in MultiRELOAD—particularly A1 (CBoXX) and A2 (TTS containers)—revealed that scaling innovative Intermodal Transport Units (ITUs) requires clear, stable and corridor-compatible approval pathways. The A1 pilot faced additional brake requirements during prototype construction, demonstrating how mid-process regulatory changes disrupt innovation (D6.4, p.58) .

Recommendation:

- Develop an EU-level *"Multimodal Innovation Approval Guideline"* building on ERA, ES-TRIN, UNECE and DG TAXUD processes.
- Create *corridor experimental authorisations* for testing new ITUs in cross-border settings, as suggested by D5.2 (pp. 35–37).

5.1.2 DEVELOP A HARMONISED FRAMEWORK FOR MULTIMODAL LIABILITY

Currently, liability regimes for road, rail, and inland waterways operate independently. D2.3 confirms that the absence of a multimodal liability framework is a long-standing structural barrier (pp. 7–10).

Recommendation:

- Accelerate EU work on a harmonised **Multimodal Transport Contract Regulation**, aligned with the eFTI Regulation and the Digital Transport and Logistics Forum (DTLF) recommendations.
- Enable the use of digital documentation standards (eFTI, eCMR) throughout multimodal chains involving inland waterways.

5.1.3 MODERNISE CUSTOMS AND BORDER PROCEDURES

The A2 pilot demonstrated that customs and sampling procedures create bottlenecks, even though EU customs legislation is harmonised under the Union Customs Code. D5.2 confirms operational fragmentation persists across member states (pp.37–40).

Recommendation:

- Introduce *harmonised border-handling profiles* for containerised inland waterway transport, defining common sampling processes, inspection frequencies, and digital pre-notification rules.
- Promote “report once” mechanisms for customs across inland ports.
- Involve the neighbouring non-EU members states in the harmonisation processes.

5.2. ADVANCE DIGITAL INTEROPERABILITY AND DATA GOVERNANCE

5.2.1 ADOPT SHARED SEMANTICS AND DATA-EXCHANGE STANDARDS

The strongest cross-cutting message from RAB #2 and D6.4 is that **interoperability is the primary barrier to digitalisation**, not technology (D6.4, pp.41–45).

Recommendation:

- Develop a **Corridor Interoperability Semantic Model** aligned with DTLF, FEDeRATED and FENIX architectures.
- Define shared API profiles for PCS, TOS, RIS, CEERIS and RPIS systems.

5.2.2 CREATE A FEDERATED GOVERNANCE MODEL FOR CORRIDOR-WIDE DATA SHARING

Digital tools such as the Digital Twin (B4) and RPIS (B5) require stable trust frameworks and long-term data governance rules (D6.4, pp.48–53) .

Recommendation:

- Establish an "**Inland Waterway Data Governance Framework**" covering data ownership, access permissions, retention, auditability and liability.
- Implement federated identity and access management systems to enable node-sovereign but interoperable platforms.

5.2.3 PREPARE REGULATORY FRAMEWORKS FOR AI-ASSISTED OPERATIONS

Predictive maintenance (B2), AI-based slotting optimisation (B3) and digital twin analytics (B4) require clearer accountability structures. D5.2 stresses that current regulatory frameworks lag behind digital capabilities (pp. 28–33).

Recommendation:

- Introduce minimum requirements for **AI auditability**, fallback modes, and decision explainability for inland terminals and ports.
- Develop safety cases for AI-supported decision environments.

5.3. STRENGTHEN CORRIDOR GOVERNANCE AND INSTITUTIONAL COORDINATION

5.3.1 ALIGN GOVERNANCE FRAMEWORKS ACROSS RHINE–ALPINE AND RHINE–DANUBE CORRIDORS

MultiRELOAD shows that corridor conditions differ substantially. The Rhine–Alpine corridor is digitally mature; the Danube corridor needs harmonised border procedures, digital alignment and infrastructure upgrades (D6.4, pp.24–29).

Recommendation:

- Establish **joint corridor governance dialogues** between Rhine–Alpine and Rhine–Danube stakeholders, focusing on multimodal alignment, digitalisation and customs coordination.
- Ensure alignment with CCNR, CESNI and Danube Commission standards.
- As an ultimate goal, strive for Europe-wide governance and alignment ensuring similar approaches in road transport and aviation.
- Make use of established platforms and initiatives to roll out the above.

5.3.2 INTEGRATE INNOVATION INTO MACRO-REGIONAL GOVERNANCE

The Vienna RAB session showed macro-regional platforms like EUSDR PA1a are critical for institutional legitimacy.

Recommendation:

- Use EUSDR PA1a and the Rhine–Alpine EGTC as permanent hosts for future regulatory dialogues.
- Anchor digitalisation priorities in upcoming RIS Directive revisions and PA1a work programmes.

5.4. CREATE ENABLING CONDITIONS FOR MARKET UPTAKE AND SCALE-UP

5.4.1 SUPPORT TERMINALS AND PORTS WITH TARGETED FUNDING FOR DIGITAL READINESS

Stakeholder engagement shows smaller terminals struggle with digital integration (D6.4, pp.25–27).

Recommendation:

- Introduce **CEF Digital Readiness Grants** for inland terminals.
- Support adoption of digital twins, predictive maintenance and interoperable PCS/TOS systems.

5.4.2 ENABLE “CORRIDOR TESTBEDS” FOR INNOVATION-FRIENDLY REGULATION

All RAB sessions emphasised that innovation cannot wait for long legal revision cycles.

Recommendation:

- Establish **cross-border regulatory sandboxes** allowing controlled deployment of new ITUs, AI tools and digital reporting systems.
- Provide evaluation protocols for safe testing on live corridors.

5.4.3 STRENGTHEN SKILLS AND INSTITUTIONAL CAPACITY

As highlighted in RAB #1, regulatory and operator capacity is uneven. D6.4 confirms this (pp.25–27).

Recommendation:

- Create targeted training programmes for digital/AI literacy, data governance, and multimodal regulation.
- Support vocational education institutions in regions with limited innovation capacity.

5.5. SYNTHESIS AND POLICY RELEVANCE

Taken together, the recommendations in this chapter provide a structured pathway for realising the ambitions of the MultiRELOAD project: enabling a European freight system that is more efficient, interconnected, digital, environmentally sustainable and resilient. The insights from the demonstrators, combined with the legal and governance analyses and the RAB dialogues, show that scaling multimodal innovation requires a shift from isolated regulatory efforts to **coordinated corridor and ultimately Europe-wide governance**, from fragmented digital ecosystems to **federated interoperability**, and from reactive regulation to **adaptive, innovation-ready frameworks**.

D6.5 therefore offers a coherent set of actionable steps for policymakers, infrastructure managers, authorities and industry to support the uptake of the MultiRELOAD solutions and advance the European Union's objectives for smart, sustainable and resilient mobility.

6. CONCLUSION

The Regulatory Affairs work within MultiRELOAD has demonstrated that achieving scalable, efficient and sustainable multimodality in Europe requires far more than technological innovation alone. The project's demonstrators illustrate the tangible operational benefits of new loading units, containerised bulk flows, automation tools, digital twins and corridor-wide information systems. Yet the RAB dialogues and supporting analyses make clear that their broader adoption depends on the regulatory, administrative and governance environment in which they must operate.

Throughout the project, three structural lessons crystallised. First, **interoperability is the decisive enabler** of multimodal digitalisation. Without shared semantics, harmonised data standards and federated governance models, even the most advanced digital tools remain isolated solutions rather than components of a connected corridor ecosystem. Second, **regulatory alignment and predictability** remain essential for physical innovations. New intermodal units and multimodal logistics concepts can only scale when approval pathways are stable, transparent and coordinated across borders. Third, **governance conditions differ fundamentally between corridors**, and policy design must recognise the specific institutional and operational contexts of the Rhine–Alpine and Rhine–Danube regions.

The evolution of the RA model—from a single central Advisory Board to a distributed, corridor-anchored dialogue structure—proved essential for generating policy insights that are realistic, mature and aligned with existing institutional processes. By embedding regulatory discussions in platforms such as PLATINA4Action and EUSDR PA1a, MultiRELOAD ensured that its findings resonate with the authorities responsible for shaping the regulatory landscape.

This report therefore concludes that the future of multimodal transport innovation in Europe hinges on the creation of **adaptive, interoperable and corridor-aware regulatory frameworks**. To sustain momentum beyond the life of the project, three strategic commitments are required:

- **Continued alignment between innovation and regulation**, ensuring that legal frameworks evolve in parallel with new technologies and operational practices.
- **Strengthened corridor governance**, enabling cross-border coordination on customs, digitalisation, data governance and multimodal standards.
- **Investment in institutional and technical capacity**, particularly in smaller nodes and Danube-region ports, to ensure equitable uptake of advanced solutions.

The insights brought together in this deliverable provide a roadmap for policymakers, corridor bodies, river commissions and industry stakeholders seeking to accelerate the transition to a smarter, cleaner and more resilient multimodal transport system. By transforming fragmented regulatory environments into coherent frameworks that support innovation, Europe can unlock the full potential of its inland ports and corridors — and move decisively towards a transport system that meets the demands of the Green Deal, the TEN-T revision and the digital transition.

MultiRELOAD has shown that when innovation and regulation evolve hand in hand, the result is not just technological progress, but a sustainable pathway toward a truly integrated European multimodal freight system.