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INSTITUTIONS AS CULTURAL ACTORS IN TRAFFIC SAFETY CULTURE: A CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

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Abstract: Traffic Safety Culture (TSC) is often discussed in relation to road users' attitudes, norms and behaviours. However, these behaviours are shaped within institutional environments that define rules, allocate responsibilities, design infrastructure, enforce regulations, collect data, communicate risk and involve stakeholders.
The paper integrates four international and EU-relevant road safety frameworks with a comparative review of six national institutional in EU, complemented by expert and stakeholder interviews. The analysis identifies three main pathways through which institutions influence TSC: the formal environment, through laws, strategies, standards, enforcement and funding; the operational environment, through implementation capacity, coordination, infrastructure design, data systems and evaluation; and the cultural environment, through public perceptions of risk, responsibility, rule legitimacy and acceptable behaviour.
The paper argues that road safety interventions should not be understood through a linear "measure → safety outcome" logic. Rather, institutional measures influence safety outcomes through their effects on shared cognitions, behavioural expectations, perceived legitimacy and internal compliance. This perspective is aligned with institutional theory, particularly the Richard Scott's distinction between regulative, normative and cultural-cognitive pillars of institutions.
The paper concludes presenting the Roads4All institutional framework, resulting from the interplay of international frameworks and the analysis at EU country level.

Keywords: Traffic Safety Culture; Institutional theory; Rule legitimacy; Internal compliance; Stakeholder engagement

1. INTRODUCTION

Traffic Safety Culture (TSC) is commonly associated with the values, beliefs, attitudes, norms and behaviours of road users. However, road users do not act in an institutional vacuum. Their perceptions of risk, their willingness to comply with traffic rules, and their understanding of what is acceptable or unacceptable on the road are shaped by the broader institutional environment in which mobility takes place. Laws, enforcement practices, infrastructure standards, funding mechanisms, political priorities, public communication, data systems and stakeholder participation all contribute to defining the cultural meaning of road safety.

This paper starts from the assumption that **institutions are not only formal rule-making bodies. They are also cultural actors. They influence how safety is prioritised, how responsibilities are distributed, how rules are interpreted, and whether road users perceive**

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regulations as legitimate, fair and meaningful. From this perspective, TSC is not only the outcome of individual attitudes or behaviours. It is also produced, reinforced or weakened by institutional arrangements and by the way road safety measures are designed, implemented, communicated, monitored and evaluated.

The paper builds on the Roads4All project, which aims to co-create safer Living Roads through a holistic, multi-level and participatory approach to cultural transformation. Within this context, the Roads4All institutional analysis framework examines how governance rules, operational mechanisms, coordination arrangements and policy instruments may influence TSC. Roads4All defines TSC as "the shared values, attitudes, norms, institutional routines, and everyday practices through which safety is prioritised, interpreted, and implemented in mobility systems". It also clarifies that the institutional framework should not be understood simply as a set of formal rules and responsibilities, but as the broader system through which safety priorities are translated into action, monitored over time and embedded in everyday practices.

The central argument of this paper is that road safety interventions should not be interpreted through a direct "intervention → safety outcome" logic. Instead, the relationship between interventions and safety outcomes is mediated by Traffic Safety Culture. Institutional practices influence perceptions, norms, trust, legitimacy and behaviours; these cultural and behavioural dimensions then affect safety outcomes. This interpretation is particularly relevant for policy measures that affect daily mobility habits, such as speed limits, automated enforcement, 30 km/h zones, pedestrianisation, cycling infrastructure, school streets or road-space reallocation.

The paper therefore addresses the following research question:

How do institutional frameworks influence Traffic Safety Culture, and how can this relationship be operationalised through participatory local initiatives such as Living Roads?

To answer this question, the paper combines conceptual analysis, comparative institutional review and policy-oriented synthesis, supported by academic on institutional theory (Scott, 1995). It contributes to the Symposium theme by proposing a framework that connects institutional theory, road safety governance, behavioural mechanisms and local implementation.

2. CONCEPTUAL BACKGROUND: INSTITUTIONS AND TRAFFIC SAFETY CULTURE

The conceptual starting point is that TSC is a multi-level phenomenon. The Roads4All framework (**Fig. 1)** conceptualises TSC as an emergent system of shared cognitions shaped by influences operating at Micro (e.g. individual characteristics as sex, age, etc), Meso (e.g. effects from communities, peer groups. etc), Macro (impacts of broad societal systems, e.g. legislation, etc) and Magna levels (e.g. global influences, international standards, etc). These shared cognitions are reflected in road-user behaviour, which then affects safety outcomes such as near misses, crashes, injuries and fatalities. The framework also recognises feedback loops, meaning that interventions can be designed based on observed outcomes and can modify factors across levels.

Within this framework, institutions are particularly relevant at the Meso, Macro and Magna levels. They provide the formal and organisational environment for safety policies, education, local enforcement, community regulations and infrastructure standards. At national and international levels, institutions define legislation, road regulations, safety standards, strategies, evaluations and policy frameworks. At local level, institutions shape implementation through planning rules, enforcement routines, street design, public communication and stakeholder engagement.

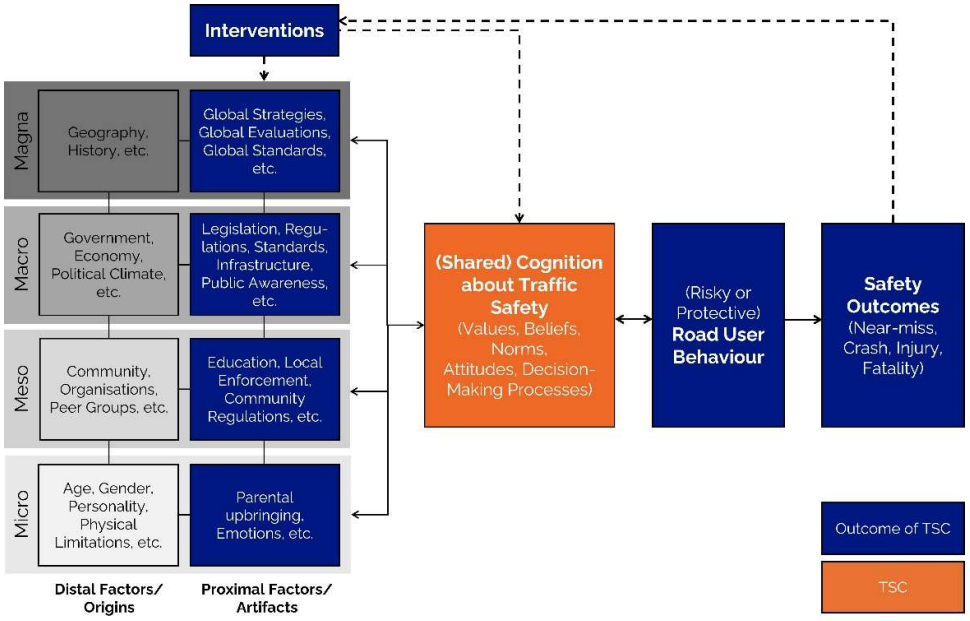


Fig. 1. The Roads4AllRoads4All TSC framework

The paper integrates four international and EU-relevant frameworks that provide complementary lenses for understanding the institutional dimension of TSC: the Social Ecological Model (National Road Safety Strategy 2021-2030), the Safe System Approach (FHWA, 2025), Vision Zero (EU, 2022) and Movement and Place (NSW). **In the Roads4All analysis, these frameworks are not treated as mutually exclusive models. Rather, they are used as analytical lenses to assess how institutions define responsibilities, design and enforce rules, engage local actors and shape shared safety values**.

The Social Ecological Model is particularly useful because it explains how behaviour is shaped by multiple interacting levels: individual, interpersonal, organisational, community, institutional and societal. Applied to transport safety, it helps show that risky or protective behaviour is not only the result of individual choice, but is also shaped by infrastructure, enforcement, social norms, institutional responsibilities, workplace practices, education systems, community expectations and wider regulatory frameworks.

The Safe System Approach provides the operational safety logic. It is based on the idea that human beings make mistakes and have limited physical tolerance to crash forces. Therefore, the transport system must be designed so that mistakes do not result in death or severe injury. This approach shifts part of the responsibility from individual road users to system designers, regulators, infrastructure managers and institutions. It therefore has a strong institutional relevance, because it requires coordinated action across infrastructure, speed management, vehicle safety, enforcement, post-crash care and road-user behaviour.

Vision Zero provides the ethical and political benchmark. It reframes road deaths and serious injuries as preventable outcomes, rather than inevitable consequences of mobility. Its main contribution to TSC lies in its normative force: it changes the moral meaning of road safety by stating that deaths and serious injuries should not be accepted. However, Vision Zero can

remain aspirational if it is not translated into concrete responsibilities, funding, regulatory instruments, implementation capacity and accountability mechanisms.

Movement and Place adds a local and spatial perspective. It recognises that roads and streets are not only movement corridors, but also public spaces where people live, work, walk, access services and interact. This framework is particularly relevant for Roads4All Living Roads because it supports discussion of conflicts between traffic flow, safety, accessibility, liveability and vulnerable road users. It helps translate TSC into concrete questions of street function, road-space allocation and local governance.

Taken together, these four frameworks support an integrated institutional interpretation of TSC. The Social Ecological Model provides the multi-level structure; the Safe System Approach provides the operational safety backbone; Vision Zero provides the normative benchmark; and Movement and Place provides the local participatory and spatial lens.

3. INSTITUTIONAL THEORY AS AN INTERPRETATIVE BRIDGE

The paper also connects the Roads4All institutional analysis with institutional theory, particularly Richard Scott's distinction between **regulative, normative and cultural-cognitive** pillars of institutions (Scott, 1995). This theoretical perspective helps to explain why formal rules alone are not sufficient to transform Traffic Safety Culture.

The regulative pillar refers to formal rules, laws, sanctions, monitoring systems and enforcement mechanisms. In road safety, this includes by the others traffic laws, speed limits, penalties, road standards, vehicle requirements, enforcement protocols and formal responsibilities. These elements shape behaviour through **legal obligation and deterrence**.

The normative pillar refers to values, duties, professional standards and expectations of appropriate behaviour. In road safety, this includes shared responsibility, professional duties of road authorities. For example, the ethical commitment of Vision Zero, with the obligation to protect vulnerable road users, and the idea that deaths and serious injuries are preventable and unacceptable.

The cultural-cognitive pillar refers to shared meanings, assumptions and interpretative frames. In road safety, this includes how people understand risk, whether crashes are perceived as unavoidable "accidents" or preventable events, whether speeding is socially tolerated, whether the car is perceived as an unquestioned right, and whether traffic rules are considered legitimate.

This interpretation helps clarify a key point: TSC **is shaped by the conjoined interactions of all the three institutional pillars**. Laws and enforcement (regulative pillar) matter, but they represent only one component of the institutional environment. A speed limit, for example, belongs to the regulative pillar. The idea that reducing speed protects children and vulnerable users belongs to the normative pillar. The belief that driving slowly in urban areas is normal and responsible belongs to the cultural-cognitive pillar. A safety measure becomes culturally embedded only when these three dimensions reinforce each other.

This is related to the distinction between external and internal compliance. External compliance occurs when people follow rules mainly because they fear sanctions. Internal compliance occurs when they accept rules as meaningful, legitimate and socially expected. **From a TSC perspective, the objective is not only to increase deterrence, but to create the institutional conditions for internal compliance**. These conditions include transparency, fairness, consistency, participation, evidence, communication and coherent design.

4. METHODOLOGICAL APPROACH: THE ROADS4ALL INSTITUTIONAL FRAMEWORK

The paper is based on a mixed conceptual and qualitative methodology. It combines four sources of evidence.

First, it reviews four international and EU-relevant institutional frameworks: the Social Ecological Model, the Safe System Approach, Vision Zero and Movement and Place. Each framework is analysed through three dimensions: governance model, policy instruments and stakeholder participation. This allows the paper to compare how each framework conceptualises the institutional role in shaping road safety and TSC.

Second, it reviews national institutional frameworks in six EU countries: Croatia, Estonia, Germany, Greece, Italy and Serbia[1]. The national review focuses on governance arrangements, policy instruments and stakeholder engagement. It examines whether road safety systems are centrally coordinated or fragmented, whether policy instruments are coherent and evaluated, and whether stakeholder participation is institutionalised or mainly project-based. The Roads4All Deliverable 1.5 highlights that all reviewed countries have formal road safety strategies, regulatory frameworks, enforcement systems and policy instruments broadly aligned with European objectives. However, it also identifies recurrent institutional issues, including fragmentation of responsibilities, uneven local capacity, incomplete data integration, limited systematic evaluation and stakeholder engagement that is often uneven or project-based.

Third, the paper integrates qualitative insights from expert and stakeholder interviews. These interviews enrich the national review by showing how institutional frameworks operate in practice. They highlight the importance of stable funding, scientific and technical support, systematic ex-ante and ex-post evaluation, reliable and timely data, georeferenced information, Safety Performance Indicators, and stronger links between enforcement and education. They also underline the role of language, media narratives, public discourse, victims' associations and civil society perspectives in shaping how road crashes are understood: not as unavoidable accidents, but as preventable outcomes of unsafe behaviours and insufficiently safe systems.

Fourth, the paper uses a SWOT analysis to identify strengths, weaknesses, opportunities and threats in current institutional frameworks. The SWOT combines the international frameworks with the national reviews and interviews, focusing on how institutional systems can enable or constrain the development of a positive TSC.

The synthesis of the international frameworks, national institutional reviews and stakeholder evidence results in the development of an original Roads4All institutional framework for assessing how institutions influence TSC. The framework identifies **three institutional pathways – formal, operational and cultural – through which institutions can influence TSC**, road-user behaviour and safety outcomes:

1. **Formal environment**: laws, strategies, standards, enforcement and funding mechanisms.
2. **Operational environment**: implementation capacity, infrastructure design, coordination, data systems and evaluation practices.
3. **Cultural environment**: public perceptions of risk, rule legitimacy, shared responsibility, stakeholder participation and acceptable behaviour.

[1] Research institutes from the six EU countries examined are partners of ROADS4All. This has made data collection and analysis possible.

The resulting Roads4All institutional framework is presented in **Fig. 2**, showing how international frameworks and national insights inform these three pathways, supported by evidence and stakeholder collaboration.

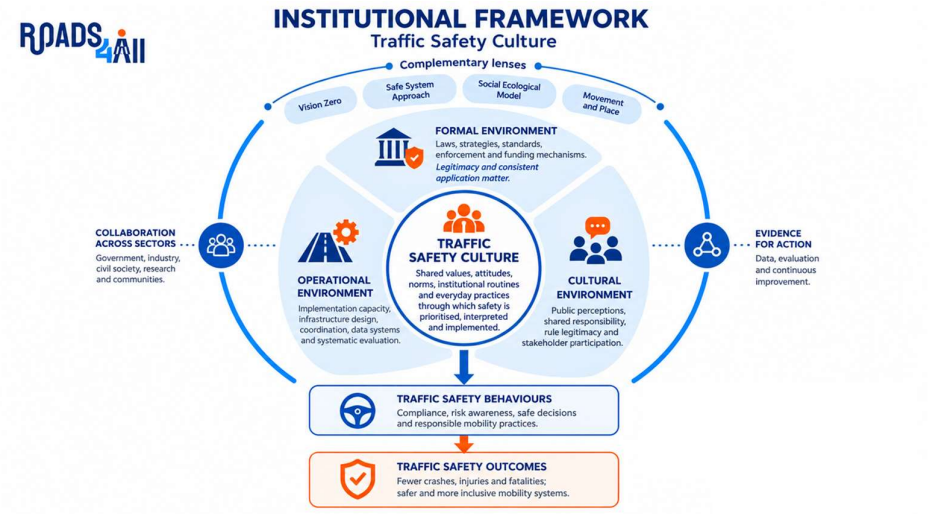


Fig. 2: Roads4All institutional framework

5. KEY FINDINGS: INSTITUTIONS AS MEDIATORS BETWEEN MEASURES AND CULTURE

The analysis shows that institutions influence TSC through at least three main mechanisms.

The first mechanism is formal legitimacy. Institutions define the rules of road safety, but the cultural effect of these rules depends on whether they are perceived as legitimate. A regulation is more likely to be internalised when road users understand its safety rationale, perceive it as fair and proportionate, and see that it is applied consistently across users and territories. Conversely, rules may be resisted when they are perceived as arbitrary, revenue-oriented, poorly explained, inconsistently enforced or disconnected from local conditions.

The Italian controversy concerning the homologation and approval of speed-control devices illustrates this point. The Roads4All Deliverable 1.5 notes that legal uncertainty around approval, homologation and calibration generated administrative disputes, appeals and public contestation. This case shows that enforcement instruments do not influence TSC only through deterrence, but also through the **credibility, transparency and legal robustness** of the institutional framework that supports them. When citizens perceive enforcement tools as legally uncertain or revenue-oriented, compliance is more likely to remain external and contested rather than internalised as part of a shared safety culture.

The second mechanism is implementation capacity. Institutions may adopt ambitious road safety strategies, but their cultural influence depends on whether they can translate those strategies into coherent, funded, locally implemented and evaluated action. The national reviews show that the key issue is not simply the presence or absence of rules and strategies, but the capacity to implement them effectively. Across the reviewed countries, recurring challenges include uneven local capacity, fragmented responsibilities, incomplete data integration and limited systematic evaluation.

Implementation capacity is particularly important because it affects trust. If institutions introduce measures without evaluating them, adapting them or communicating their effects, road users may perceive them as symbolic, arbitrary or politically motivated. A weak evaluation culture also prevents institutional learning. Successful practices may remain isolated, while ineffective measures may be repeated. From a TSC **perspective, evaluation is not only a technical exercise, but an institutional mechanism for building trust, accountability and internal compliance.**

The third mechanism is cultural framing. Institutions shape how road crashes, risk and responsibility are publicly understood. Communication, education, media language, campaigns and stakeholder engagement influence whether crashes are seen as unavoidable accidents or as preventable outcomes of unsafe behaviours and insufficiently safe systems. This has behavioural implications. If **risky behaviours** are culturally normalised, formal regulation may have limited effects. If, instead, safe behaviour is presented as socially expected, morally meaningful and practically supported by the environment, compliance is more likely to become internalised.

These three mechanisms show that institutions are mediators between formal measures and behavioural outcomes. They shape the meaning, legitimacy, coherence and perceived effectiveness of road safety interventions. This is why a purely technical or regulatory approach is insufficient. Road safety policy needs to consider not only what measures are adopted, but also how they are institutionalised and culturally embedded.

6. BEHAVIOURAL CONTRIBUTION: FROM EXTERNAL COMPLIANCE TO INTERNAL COMPLIANCE

The behavioural contribution of the paper concerns the relationship between institutions, perceived legitimacy and internal compliance. Many traffic safety interventions are designed around the expectation that road users will comply with rules because they are legally required to do so. However, TSC research suggests that durable behavioural change requires more than formal compliance. It requires the internalisation of safe behaviour as normal, legitimate and socially expected.

Institutions influence this process in several ways. They can strengthen rule knowledge by communicating clearly why regulations exist. They can strengthen risk perception by explaining the consequences of speeding, distraction, drink-driving or unsafe infrastructure. They can strengthen perceived legitimacy by ensuring that enforcement is fair, transparent and safety-oriented. They can strengthen perceived behavioural control by designing roads and streets that make safe behaviour intuitive and possible. They can strengthen social norms by involving schools, communities, employers, victims' associations, media and civil society in road safety campaigns and local initiatives.

This behavioural interpretation is consistent with the idea that safety measures do not act directly on outcomes. Rather, they affect shared cognitions and behavioural expectations. **A 30 km/h zone, for example, may reduce speeds through enforcement, but its long-term cultural effect depends on whether road users understand the rationale, perceive the street as a place for pedestrians and cyclists as well as cars, accept the protection of vulnerable users as a legitimate priority, and see compliance as part of shared responsibility**. Infrastructure, communication, enforcement and participation therefore need to work together.

This has important implications for policy. Enforcement remains necessary, but it should not be designed only as repression. It should be embedded in a wider strategy of prevention, explanation and legitimacy-building. Education remains necessary, but it should not be limited to information. It should support risk awareness, responsibility and cultural change. Infrastructure remains necessary, but it should not only separate traffic flows. It should

communicate expected behaviour and reduce the possibility that mistakes lead to severe outcomes.

In this sense, the paper proposes that internal compliance should be considered a key behavioural objective of institutional road safety policy. A mature TSC is not one in which road users comply only when monitored. It is one in which safe behaviour is understood, expected, supported and reproduced in everyday mobility practices.

7. POLICY IMPLICATIONS: LIVING ROADS AS INSTITUTIONAL LEARNING LABORATORIES

The policy-oriented contribution of the paper concerns the role of Living Roads. The Roads4All Deliverable 1.5 presents Living Roads as local initiatives that can support dialogue with local stakeholders and identify practical pathways for embedding transport safety culture into local governance and policy implementation.

This paper argues that Living Roads can be understood as institutional learning laboratories. They can make visible the relationship between formal institutions, implementation capacity, stakeholder perceptions and behavioural outcomes. They can help identify whether national strategies are translated into local measures, whether responsibilities are clear, whether stakeholders perceive regulations as legitimate, whether vulnerable road users' needs are adequately considered, and whether local authorities have the capacity and evidence required to implement and evaluate safety measures.

Living Roads can operationalise the three institutional pathways identified in this paper.

First, they can address the formal environment by mapping relevant rules, competences, responsibilities and decision-making procedures. This can help clarify which institutions are responsible for speed management, infrastructure changes, school safety, enforcement, data collection or stakeholder consultation.

Second, they can address the operational environment by identifying implementation barriers and designing coherent intervention packages. These packages may combine street redesign, speed management, enforcement, education, communication, public transport, data collection and evaluation. Living Roads can also support ex-ante and ex-post assessment, using indicators such as speed data, near misses, perceived safety, stakeholder acceptance, rule knowledge and behavioural observations.

Third, they can address the cultural environment by involving local communities, vulnerable users, schools, police, road owners, civil society, victims' associations, media and researchers in co-design and interpretation. This can support the legitimacy of interventions and create shared understanding of road safety problems.

Living Roads are therefore not only local consultation exercises. They can be structured as a policy cycle: diagnosis, stakeholder mapping, co-design, implementation, monitoring, evaluation and replication. This is particularly important for measures that may generate resistance, such as 30 km/h zones, automated enforcement, road-space reallocation or restrictions on car use. By combining evidence, participation and communication, Living Roads can help transform contested measures into locally accepted safety practices.

8. EXPECTED CONTRIBUTION TO RESEARCH AND PRACTICE

The paper contributes to TSC research and practice in four ways.

First, it advances a conceptual understanding of institutions as cultural actors. Institutions do not only regulate behaviour; they shape values, meanings, expectations, trust and

legitimacy. This broadens the traditional view of road safety institutions from rule-makers and enforcement bodies to agents of cultural transformation.

Second, it proposes a methodological framework for analysing institutional influence on TSC through three pathways: formal, operational and cultural. This framework can be used in comparative national analysis, local stakeholder workshops, policy evaluation.

Third, it links institutional analysis to behavioural mechanisms, particularly perceived legitimacy and internal compliance. It shows that road safety culture is strengthened when rules are not only enforced, but also understood, trusted and internalised.

The paper also points to future research needs. More work is needed on how to measure institutional influence on TSC across levels. Crash, injury and fatality data remain essential, but they do not fully capture cultural change. **Future indicators should include perceived legitimacy, rule acceptance, stakeholder participation, institutional coordination, evaluation capacity, risk perception, behavioural norms and trust in enforcement**. Sources such as ESRA3 surveys [1] can complement institutional analysis by providing empirical evidence on road users' attitudes, self-reported behaviours, perceived enforcement, risk perception and support for policy measures.

9. CONCLUSION

This paper shows that institutions influence Traffic Safety Culture not only through laws, regulations and enforcement, but also through the way road safety policies are implemented, communicated, evaluated and perceived. The comparative analysis points to recurrent institutional challenges, including fragmented responsibilities, uneven implementation capacity, incomplete data integration, limited systematic evaluation and uneven stakeholder engagement. At the same time, the analysis highlights the importance of transparency, stable institutional capacity, evidence, participation and communication in strengthening the legitimacy and effectiveness of road safety interventions.

The Roads4All institutional framework brings these findings together through three interconnected pathways – **formal, operational, and cultural** – and proposes a shift from a linear understanding of road safety policy to a mediated understanding:

institutional measures → Traffic Safety Culture → behaviour → safety outcomes.

This shift has important implications. It means that the success of a road safety measure depends not only on its technical design, but also on its institutional and cultural embedding. Laws, strategies, enforcement and infrastructure matter, but their effects depend on whether they are **implemented consistently**, **evaluated systematically**, **communicated clearly and perceived as legitimate**.

The Roads4All institutional framework therefore requires institutions that are coherent, transparent, evidence-based, participatory and capable of learning.

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