

Beyond Compliance: Operationalising the Social Licence to Operate for Sustainable, Human-Centric, and Socially Relevant Connectivity in Europe

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Abstract

This chapter examines the societal and governance dimensions of sixth-generation (6G) mobile network development in Europe, proposing the Social Licence to Operate (SLO) as a framework to bridge the gap between ethical aspiration and regulatory compliance. While 6G promises to merge physical, digital, and human worlds through the convergence of connectivity, computation, and sensing, its long-term viability depends not only on technical performance or legal conformity but on continuously earning societal legitimacy, trust, and value alignment. Through a mapping of the EU's evolving digital regulatory landscape, encompassing the AI Act, the Gigabit Infrastructure Act, and the European Sustainability Reporting Standards, the chapter identifies critical governance gaps and proposes specific mechanisms to address them: hierarchical AI oversight architectures to resolve the tension between autonomous network management and human oversight requirements; community benefit agreements and participatory electromagnetic field monitoring to reconcile deployment speed with local democratic consent; and the alignment of Key Value Indicators with Societal Readiness Levels to ensure that societal impact is measured alongside technical performance throughout the 6G development lifecycle. Together, these mechanisms operationalise SLO as a practical governance roadmap for a sustainable, inclusive, and socially legitimate European 6G ecosystem.

Keywords: Social Licence to Operate; 6G governance; responsible innovation; EU AI Act; human-centric connectivity; Key Value Indicators; socio-technical systems

1. Introduction

The architecture of human connectivity stands at a decisive inflexion point. As the deployment of 5G reaches maturity, the research community and industrial ecosystem have pivoted toward the development of the sixth generation (6G) of mobile networks. Rather than a mere incremental upgrade, this transition is widely conceived as a fundamental paradigm shift in human connectivity - one that remains, at this stage, as much an ambition as a trajectory. This technological leap promises to enable applications ranging from holographic telepresence and immersive extended reality (XR) to precision healthcare and autonomous industrial systems.¹

However, this profound integration of digital infrastructure into the fabric of daily life and critical societal functions carries unprecedented risks to privacy, autonomy, exclusion, and

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This is the pre-typeset (author) version. The latest full version of this paper is available in Jędrzej Górski, Geoff Wood & Gökçe Mete (eds), *Palgrave Handbook of Social License to Operate and Energy Transitions* (living edn, Palgrave, online 11 Oct 2022), at: <<https://link.springer.com/referencework/10.1007/978-3-030-74725-1>>.

¹ Generally *see*, SNS JU Technical Board, '6G for Media & Entertainment (M&E)' (Nov 2025) White Pap pp 99 <<https://doi.org/10.5281/zenodo.17607663>>.

environmental sustainability. 6G must therefore be conceptualised through a *socio-technical* lens - envisioned not merely as a conduit for data but as the foundational infrastructure for a 'cyber-physical-social system' capable of addressing grand societal and environmental challenges.²

Unlike previous mobile network generations, which primarily focused on increasing data throughput and reducing communication latency, 6G is conceived as an enabler of what the Hexa-X flagship project calls a *cyber-physical continuum* - a merging of the human, physical, and digital worlds through the convergence of connectivity, computation, and sensing.³ This vision is further codified at the international level in Recommendation ITU-R M.2160, which introduces new usage scenarios for 6G, including Integrated Sensing and Communication and AI-native networking, which go well beyond the scope of previous IMT generations.⁴

Building on this premise, the prospective transition from 5G to 6G presents an opportunity and increasingly, an obligation to break from an established pattern in digital innovation: that of prioritising technical performance objectives while addressing societal implications only retrospectively.⁵ This approach is no longer tenable. In the European Union (EU), a confluence of regulatory commitment, civil society pressure, and evolving standards of accountability has fundamentally raised the bar for responsible technological investment.⁶ The European Declaration on Digital Rights and Principles (2023) emblematises this shift, articulating a binding political commitment to ensuring that digital transformation puts people at the centre, upholds fundamental rights, and guarantees transparency and human oversight throughout.⁷ 6G must therefore be designed with these demands embedded from the outset.

This chapter provides a comprehensive critique and an enhancement strategy for a possible European 6G trajectory that would be socially relevant and responsible, moving from a statement of ethical intent to a practical roadmap for policy and regulatory alignment. In general, this paper aims to evaluate 6G's capability to address contemporary grand societal challenges and to assess the alignment of the broader socio-technical context with the burgeoning regulatory landscape of the EU. More specifically, it will look at moving from general calls for inclusion or sustainability to specific mechanisms - exemplified by the *social license to operate* (SLO), as the latter aims to ensure that a human-centric 6G becomes a tangible reality.

Therefore, the main hypothesis of this paper is that, because 6G will function as deeply embedded, life-shaping critical infrastructure that fuses human, digital, and physical worlds - while carrying systemic risks to privacy, autonomy, inclusion, and environmental sustainability

² Alliance for Telecommunications Industry Solutions (ATIS), 'Beyond Speed: Promoting Social and Economic Opportunities through 6G and Beyond - Next G Alliance' (ATIS 2023) pp 49 <https://nextgalliance.org/white_papers/beyond-speed-promoting-social-economic-opportunities-6g-beyond/>.

³ M. A. Uusitalo et al., '6G Vision, Value, Use Cases and Technologies from European 6G Flagship Project Hexa-X' (2022) *IEEE Access*, <<https://www.researchgate.net/publication/356481083>>.

⁴ ITU, Recommendation ITU-R M.2160 (ITU 2023) pp 21 <https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.2160-0-202311-I!!PDF-E.pdf>.

⁵ M. Jirotko, B. Grimpe, B. Stahl, G. Eden & M. Hartswood, 'Responsible Research and Innovation in the Digital Age' (2017) 60(5) *Communications of the ACM*, pp 62–68 <<https://cacm.acm.org/research/responsible-research-and-innovation-in-the-digital-age/>>.

⁶ Monique Calisti, Anna Aseeva & Daniel Onwude, '6G Sustainability: Prospective Business Models,' in *Proceedings of the 2025 International Conference on Information Technology for Social Good (GoodIT '25)*. (Assoc Comput Mach 2025, ACM Press 2025) 420-427.

⁷ European Declaration on Digital Rights and Principles for the Digital Decade 2023/C 23/01, PUB/2023/89 (23 Jan 2023) OJ C 23.

- its long-term viability in Europe depends not only on technical performance or legal compliance but on continuously earning societal legitimacy, trust, acceptance, and value alignment, which is precisely what SLO is designed to secure.

A further motivation for choosing SLO as a conceptual basis is that there is scholarly research on the broad concept of SLO, including how it is defined, critiqued, and measured, but it appears that there are currently no scientific papers that explicitly connect SLO with 6G in the same way the concept has been studied and deployed in mining, energy, infrastructure, or technology governance more generally.

This gap presents a unique opportunity to build a research foundation on SLO and connect it to 6G by extrapolating from research on technology acceptance, key values, legitimacy, stakeholder engagement, sustainability, and governance, which are relevant to future network deployments.

The main question of this chapter is: How can the concept of SLO be adapted, operationalised, and maybe even deepened to guide the development and governance of a human-centric, sustainable, and socially legitimate European 6G ecosystem?

The main objectives are the following.

To build a research foundation connecting existing SLO scholarship - largely developed in sectors such as mining, energy, and infrastructure - with the emerging field of 6G governance, technology acceptance, and responsible innovation. To then identify the key societal risks and value tensions associated with 6G and analyse how current innovation practices and policy approaches influence, and/or how they may fall short in addressing them. Finally, to reconceptualise 6G as a socio-technical system and critical societal infrastructure, and to position SLO as a governance framework linking social acceptance, sustainability, legitimacy, and value alignment. To this end, it is important to move from abstract ethical principles (e.g., inclusion, sustainability, human-centricity) to concrete governance mechanisms by exploring how SLO can inform policy alignment, regulatory design, stakeholder engagement, and impact assessment in the EU 6G landscape.

This chapter proceeds as follows. Section 2 offers a state-of-the-art for SLO necessary for building a foundation that connects existing SLO scholarship with the emerging field of 6G governance, technology acceptance, and responsible innovation. Section 3 complements the research state-of-the-art with a legal and regulatory one. Sections 4 and 5 identify the key societal risks and value tensions associated with 6G and offer different scenarios for reconceptualising 6G as a socio-technical system and critical societal infrastructure, and position SLO as a governance framework linking social acceptance, sustainability, legitimacy, and value alignment in the European context. Section 6 summarises and concludes the chapter.

2. State-of-the-art for SLO

To understand how the European 6G trajectory might become socially relevant and responsible, it is essential to ground it in established definitions of SLO. At a very high level, SLO is a construct that usually refers to the ongoing societal acceptance of business operations.⁸

⁸ For a compilation of sector-specific definitions of SLO, see Jędrzej Górski & Christine Trenorden, 'Social License to Operate (SLO) in the Shale Sector: A Contextual Study of the European Union' (2020) 18(1) OGEL 1-121, Appendix IV at 114-115; Jędrzej Górski & Christine Trenorden, 'Regulatory Framework on Environmental Impacts and

The term was first introduced by Jim Cooney in 1997 as a 'point of reference for pragmatic political risk management.'⁹ Originally rooted in the mining and extractive sectors during the 1990s, SLO is widely understood as the 'ongoing acceptance and approval' of a project or business operation by local communities and stakeholders in the areas of operation before or after all set legal obligations are met.¹⁰

Gendron conceptualises SLO as a 'collective judgment' regarding a project's legitimacy and relevance, underscoring its evolving character and its distinction from individual-level acceptance.¹¹ Syn explains that the social licence represents an intangible and continuously renewed form of community approval, which may be revoked at any time and remains fundamentally distinct from formal legal or regulatory authorisation granted by public authorities.¹² Richert, Rogers, and Burton describe SLO as an implicit contract between stakeholders that mitigates the risk of sociopolitical opposition to a company's activities.¹³

Ferrer-Romero and Baba add the following precisions:

'...SLO aims to ensure projects are accepted by society at large, considering their social, environmental, and economic impacts and serves as a lever for more equitable and transparent decision-making, actively involving stakeholders in the decision-making process.'¹⁴

To sum up the above definitions, unlike a formal legal licence granted by a government, a SLO is an intangible, unwritten, and informal approval that must be earned and maintained through continuous dialogue and accountability, and can be withdrawn at any time. Importantly, SLO ensures projects are accepted by society at large, which is crucial for 6G, as we will see in more detail in the following sections.

Belinga and Marque, in unison with Syn, above, also distinguished the 'earned' nature of social licence from the 'issued' nature of legal licences.¹⁵ Boutilier and Thomson elaborated the framework for managing sociopolitical risk through legitimacy, credibility, and trust,¹⁶ while Wüstenhagen et al. identified three dimensions: socio-political, market, and community

Community Acceptance of Shale Gas' (European Commission, 24 May 2018) Ref Ares(2018)2685780 pp 111, Appendix IV at 103-105.

⁹ Fritz Brugger, 'How the Energy Transition Redefines the Social License to Operate' in Jędrzej Górski, Geoff Wood & Gökçe Mete (eds), *Palgrave Handbook of Social License to Operate and Energy Transitions* (living edn, Palgrave, online 11 Oct 2022).

¹⁰ Smith I Azubuike, Susan Nakanwagi & Samuel C. Dike, 'Utilizing Sustainability Assessment Framework to Obtain a Social License to Operate in Renewable Energy Projects: The Case of Murchison Hydropower Project in Uganda' in Górski et al (n 9) online 4 March 2023.

¹¹ Corinne Gendron, 'Penser l'acceptabilité sociale : au-delà de l'intérêt, les valeurs' (2014) 11 *Revue internationale de communication sociale et publique*, 117-129.

¹² Juliette Syn, 'The Social License: Empowering Communities and a Better Way Forward' (2014) 28(3-4), *Social Epistemology*, 318-339.

¹³ Claire Richert, Abbie Rogers & Michael Burton, 'Measuring the extent of a Social License to Operate: The influence of marine biodiversity offsets in the oil and gas sector in Western Australia' (2015) 43 *Resources Policy*, 121-129.

¹⁴ Edwin Ferrer-Romero & Latifa Baba, 'Data Consolidation and Visualization in Hydraulic Fracturing: Enhancing Transparency and Accountability' in Górski et al (n 9) online 11 June 2024.

¹⁵ John Belinga & Etienne Marque, 'The "Social License to Operate" in the OHADA Zone: The Imperative of Further Substantiating an Emerging and Elusive Concept in a Post-COVID-19 Pandemic World' in Górski et al (n 9) online 31 Dec 2022.

¹⁶ Robert G Boutilier & Ian Thomson, 'The Role of Historical and International Movements in Determining the Social Licence' in Górski et al (n 9) online 24 March 2023.

acceptance.¹⁷ Lawyers also highlight that SLO serves as a mechanism to address power imbalances between business and society.¹⁸ It encapsulates the extent to which an organisation meets societal expectations to avoid activities deemed unacceptable, regardless of whether those expectations are codified in law.

In the context of telecommunications, connectivity, and media, the concept of SLO is particularly relevant, as it might also refer to approval granted by the broader citizenry rather than just a localised community.¹⁹ However, at the time of writing, there are few, if any, works on the interface between 6G and SLO.

Given the above deployments of SLO, the most pertinent considerations for a sustainable, socially-relevant and accepted 6G might include legitimacy, credibility, trust, community acceptance, and overall approval from the broader citizenry rather than just a localised community. Hence, the questions that arise concern the following aspects: criteria for local acceptance beyond regulatory permits; more precisely, trust in, security, and social acceptance of 6G; legitimacy and 6G governance (e.g., through incorporating SLO frameworks into governance and ethical deployment of 6G); and social impact indicators for 6G.

In the remainder of the chapter, we will therefore first map SLO-relevant policy and regulatory permits for 6G - in order to see whether and, if so, where we can use the existing policy and regulatory frameworks, and where we need to move beyond them (Section 3). We then address the 6G governance, including trust, security, and social acceptance, as well as social impact indicators for 6G against the mapped regulatory and policy framework - in order to fill the gap between SLO and 6G and pave the groundwork for a sustainable, socially-relevant and accepted 6G (Sections 4 and 5).

3. European Policy and Regulatory Mapping for 6G

The pandemic has intensified the impact of digital transformation, as the traditional extractive economy is gradually being complemented (and increasingly superseded in some domains) by a new economic space - the digital economy. This shift challenges the very foundations of the role and purpose of law, particularly its function in regulating societal relations.²⁰

The development of 6G in Europe does not occur in a regulatory vacuum. A rapidly evolving suite of EU legislative instruments - spanning network deployment, artificial intelligence (AI), data governance, cybersecurity, and corporate sustainability reporting - will directly constrain and shape how 6G is designed, built, and governed.

The central question of this section is therefore not whether a legal framework for 6G exists, but whether existing legal norms, concepts, and instruments provide a sufficient foundation for

¹⁷ Ferrer-Romero & Baba (n 14).

¹⁸ Maria M Barnes, 'Some Broad Remarks Concerning the Genesis and Evolution of Legal Concepts: The Case of the Social License to Operate' in Górski et al (n 9) online 17 May 2024.

¹⁹ '[...T]he SLO is a concept that is more often encountered in the sphere of social sciences, rather than the law. We also know that the SLO is an ambiguous concept which is likely to escape precise definition, but we can safely assume it to encapsulate the extent to which a company is "constrained to meet societal expectations and avoid those activities that societies (or influential elements within them) deem unacceptable, whether or not those expectations are embodied in law.' See Barnes (n 18).

²⁰ Anna Aseeva, 'Liable and Sustainable by Design: A Toolbox for a Regulatory Compliant and Sustainable Tech' (2023) 16(1) Sustainability art 228 pp 27.

building European 6G technology that is not only compliant but - crucially - ethical and socially sustainable by design, and where they do not, what additional mechanisms are required.

This question arises against a broader backdrop of concern about the relationship between digital innovation and societal harm. The often unsustainable development of technology, including connectivity, is revealing increasingly harmful societal consequences. Namely, many of the technologies shaping today's economies and public debate were developed under conditions of minimal regulatory oversight and limited adherence to shared ethical standards.²¹ As a result, digital technologies - while generating significant economic value - have also demonstrably undermined trust, spread misinformation, exacerbated social polarisation, and widened existing inequalities or created new ones.²² The digital economy has not replaced the traditional economy, but it has introduced a new and expanding domain of societal relations that existing legal frameworks were not designed to govern. It is now increasingly clear that the technologies mediating socio-economic life must align not only with applicable legal requirements but with shared norms, values, and the expectations of the communities they affect.

The rollout of 5G has already illustrated this dynamic: technical feasibility alone did not capture the full story of innovation.²³ Issues of health, privacy, disinformation, infrastructure siting, and the growing influence of large platforms on culture and democracy all entered public debate, demonstrating that the integration of technology into society is never solely a matter of engineering performance.²⁴ Something becoming technically mainstream does not eliminate societal concern about its impacts. On the contrary, the more deeply technologies shape everyday experience, the more they become subjects of political contestation, regulation, and societal and ethical scrutiny.

With 6G - which promises to operate at a far greater depth of societal integration than its predecessor - these dynamics are likely to intensify. For example, immersive communication technologies and AI, including AI-generated content and services, will directly engage with values such as authenticity, inclusivity, fair representation, privacy, and well-being, raising pressing questions about how people learn, develop, and participate in a shared culture.²⁵ At the same time, societal expectations of - and demands on - technology are themselves evolving.

In Europe in particular, debates surrounding sustainability, digital rights, and responsible innovation have established a clear normative expectation: technical feasibility and user adoption are no longer sufficient measures of success. What matters is not only whether innovations are adopted, but whether they are *acceptable* and *trusted* - whether they align with ethical expectations, reflect shared values, and contribute to rather than undermine the society they serve. It is against this backdrop that this section maps the EU's current policy and regulatory landscape for 6G, identifying the instruments that are directly relevant to a SLO-based governance framework and assessing where they provide adequate grounding and where significant gaps remain.

More precisely, Europe's strategic approach to 6G development is embedded within a multifaceted ecosystem of funding, governance, and normative frameworks. The Smart

²¹ Ibid.

²² Ibid.

²³ Eg see Ravi Aluvala & A Suryanarayana, 'Monumental Transition From 5G To 6G: Skill Development Needs And Workforce Evolution Imperative' (2024) 30(5) Educ. Adm. Theory Pract. 13699-3706.

²⁴ SNS JU Technical Board (n 1).

²⁵ Ibid.

Networks and Services Joint Undertaking (SNS JU),²⁶ supported by the European Commission, Member States, and industry, funds a broad portfolio of 6G research, trials, and innovation activities, including the 6G4Society project that explicitly addresses the societal impacts of prospective 6G deployments.²⁷ Complementing these efforts, the European Electronic Communications Code,²⁸ together with the Gigabit Infrastructure Act (GIA)²⁹ and coordinated radio-spectrum policy, establish a regulatory foundation for streamlined deployment, cross-border interoperability, and access to critical frequencies - particularly the upper 6 GHz band, which EU telecom operators consider essential for enabling high-throughput immersive services and strengthening Europe's competitiveness in the emerging 6G market and research landscape.

To ensure that evolving 6G services - including media-rich, AI-enhanced immersive platforms - are inclusive, transparent, safe, trustworthy, and sustainable, providers must navigate an ethically responsible and socially aware regulatory landscape comprising the Radio Equipment Directive (covering safety and spectrum use),³⁰ the Data Act (data sharing and governance),³¹ the AI Act (ethical use of AI),³² and the Cybersecurity Act (certification of critical systems).³³

The Corporate Sustainability Reporting Directive (CSRD)³⁴ - and its compatibility with the engineering realities of standardisation bodies like 3GPP and ETSI - is also relevant. Moreover, for an SLO-6G framework not to operate in a *soft law* vacuum, it should also integrate the mandatory *hard law* requirements of the European Sustainability Reporting Standards (ESRS)³⁵ in order to avoid the marginalisation of its indicators as voluntary corporate social responsibility (CSR) metrics rather than core business drivers.

To summarise this section, there are already legal fields, concepts, and tools that can help to lay comprehensive groundwork for a sustainable, ethical, socially relevant and responsible 6G. Indeed, there is a number of legal concepts, ethical standards, and policies from the fields that pre-exist the 6G and can be adapted to pave the way for its socially-relevant regulation.

²⁶ SNS JU website: <<https://smart-networks.europa.eu/>>.

²⁷ 6G4Society project website: <<https://6g4society.eu/>>.

²⁸ Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 Dec 2018 establishing the European Electronic Communications Code (Recast) (17 Dec 2018) OJ L 321 pp 36-214.

²⁹ Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (Gigabit Infrastructure Act) (8 May 2024) OJ L 1309 ('GIA').

³⁰ Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (Radio Equipment Directive) (22 May 2014) OJ L 153 pp 62-106.

³¹ Regulation (EU) 2023/2854 of the European Parliament and of the Council of 13 Dec 2023 on harmonised rules on fair access to and use of data and amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act) (22 Dec 2023) OJ L 2854.

³² Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) (12 July 2024) OJ L 1689 ('EU AI ACT').

³³ Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act) (7 June 2019) OJ L 151 pp 15-69.

³⁴ Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 Dec 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting (Corporate Sustainability Reporting Directive) (16 Dec 2022) OJ L 322 pp 15-80.

³⁵ The European Sustainability Reporting Standards (ESRS) *adopted by* Commission Delegated Regulation (EU) 2023/2772 of 31 July 2023 supplementing Directive 2013/34/EU as regards sustainability reporting standards, published in the Official Journal (22 Dec 2023) OJ L 2772. These standards, adopted under CSRD, constitute the ESRS framework.

4. 6G Governance

Historically, telecommunications engineering has been guided by Claude Shannon's information theory, which optimises the transmission of bits over a noisy channel.³⁶ Success was binary: the message arrived, or it did not. Speed was the proxy for value. However, the 6G vision articulated by the SNS JU transcends this bit-pipe model. It posits that the network must serve 'European values' such as inclusivity, sustainability, or trustworthiness.³⁷ This might represent an epistemological puzzle for a considerable part of the players of the industry: to wit, engineers accustomed to measuring decibels and hertz are now asked to measure 'trust' and 'well-being.'

The 6G4Society D1.2 Policy Brief, titled *Towards a Socially Accepted and Sustainable 6G*, serves as a crucial foundational document in this landscape.³⁸ Produced by the 6G4Society consortium, a Coordination and Support Action (CSA) funded by the SNS JU, the brief articulates the necessity of embedding societal values into the technological development lifecycle from the outset. It correctly diagnoses a prevailing 'techno-economic logic' within the industry that prioritises performance metrics (KPIs) over societal well-being and accurately identifies the risks of a widening digital divide, the erosion of user agency, and the fragility of technological sovereignty. By distinguishing between 'social acceptance' (the passive reception of technology by the public) and 'acceptability' (the active alignment of technology with ethical conditions), the document establishes a vital normative framework for 'anticipatory governance.'

The analysis starts from the premise that technologies are more likely to be accepted when they reflect values important to users and communities, and that in Europe, sustainability is a multidimensional concept integrating environmental, social, and economic pillars. It therefore treats social acceptance and sustainability as formative dimensions that shape 6G from the earliest stages, rather than downstream outcomes. Based on citizen surveys, participatory workshops, and expert interviews of policymakers, advisors, and the SNS JU community, it shows that societal concerns are already emerging despite 6G's low maturity, signalling gaps in current R&I practices, governance, and policy in anticipating impacts, embedding values, and securing legitimacy. A key contribution is clarifying that social acceptance (an evolving process in everyday use), acceptability (an early-stage ethical filter in low-TRL innovation), impact, and sustainability are all value-dependent. The analysis focuses on two overarching concerns: (i) weaknesses in 6G R&I governance, culture, and practices that may undermine trust and value integration; and (ii) risks to key societal values and rights, such as privacy and inclusion, among others, where governance gaps may widen the divide between public expectations and institutional pathways.

³⁶ C E Shannon, 'A Mathematical Theory of Communication' (1948) 27(3) BSTJ 379-423.

³⁷ Eg *see*, K Petersen, 'Key Sustainability Indicators for 6G Technology' (*6G4Society*, 17 Jan 2026) Position Paper deliv D3.3 pp 131 < https://6g4society.eu/wp-content/uploads/sites/118/2026/02/6G4Society_D3.3_Position_Paper_Key_Sustainability_Indicators_for_6G_Technology_V1.0_17.01.2026.pdf>. Also *see* M Bezzi, L Pereira Carwile, L Briguglio, C Occhipinti & K Petersen, 'Societal Aspects in 6G Technology: Concerns, Acceptance Models and Sustainability Indicators' (*6G4Society*, 15 Nov 2024) deliv D1.1 Doi: 10.5281/zenodo.14592217 pp 163.

³⁸ C Occhipinti, L Pereira Carwile, M Bezzi & T Vasylieva, 'Towards a Socially Accepted and Sustainable 6G' (*6G4Society*, 15 Jan 2026) deliv D1.2 pp 104 < https://6g4society.eu/wp-content/uploads/sites/118/2026/02/6G4Society_D1.2_Towards_a_Socially_Accepted_and_Sustainable_6G_Policy_Brief_V2.2_16.01.2026.pdf>.

D1.2 concludes that socially accepted, sustainable 6G is primarily a governance - not technical - challenge, requiring value operationalisation, broader participation, reflexivity, and alignment of legal, policy, and R&I systems to ensure legitimacy, trust, resilience, and ethically grounded European leadership in next-generation connectivity.

In this respect, our rigorous and exhaustive analysis of the current European regulatory landscape (Section 3 above) reveals significant opportunities to strengthen the document's utility for researchers, policymakers, and industry stakeholders. D1.2 excels in establishing the ethical 'why.' The next level of efficiency would be a deeper integration with the specific legal mechanisms, technical standards, and geopolitical realities that constitute the 'how.'

To wit, the EU has recently enacted a suite of powerful digital regulations - most notably the AI Act and the GIA, outlined in Section 3, as well as the Cyber Resilience Act (CRA),³⁹ - that will fundamentally constrain and shape how 6G is built and deployed. These legislative instruments are not merely background context. They are binding frameworks that create specific compliance obligations and strategic opportunities.

The analysis in this section identifies two specific 'governance gaps': (i) trust and security that could be addressed further to allow an operationalising of the EU AI Act disciplines; and (ii) social acceptance and legitimacy that could specifically be addressed through incorporating SLO frameworks into governance and ethical deployment of 6G. By operationalising these recommendations - moving from general calls for 'inclusion' to specific mechanisms like SLO - we can ensure that a vision of a human-centric, sustainable, socially accepted and relevant 6G becomes a tangible reality.

The remainder of this section details these two focus areas, providing granular analysis of the regulatory texts, technical implications, and strategic policy options necessary to close the gap between societal values and industrial implementation, and, hence, between SLO and 6G.

4.1. The AI-Native Paradox: Enhancing Trust and Security

A defining characteristic of 6G architecture is its 'AI-native' nature. To manage the extreme complexity of 6G networks - which will operate in sub-terahertz (THz) frequencies, utilise massive MIMO antenna arrays, and coordinate billions of devices - the telecommunications industry is moving toward zero-touch network & service management (ZSM).⁴⁰ This envisions networks that are self-optimising, self-healing, and self-configuring, utilising artificial intelligence and machine learning (AI-ML) to make millisecond-level decisions on resource allocation, spectrum management, and security responses without human intervention.

The D1.2 Policy Brief correctly identifies 'safeguarding privacy' and regulating 'AI-driven profiling' as critical priorities.⁴¹ It warns of the risks of opaque algorithmic decision-making and proposes policy options to 'regulate AI-driven profiling and automated decisions' to protect

³⁹ Regulation (EU) 2024/2847 of the European Parliament and of the Council of 23 October 2024 on horizontal cybersecurity requirements for products with digital elements and amending Regulations (EU) No 168/2013 and (EU) No 2019/1020 and Directive (EU) 2020/1828 (Cyber Resilience Act) (17 Dec 2024). OJ L 327.

⁴⁰ Enrico Alberti, Giada Landi, Louis Cailliot, Alberto García Pérez, José María Jorquera Valero, Manuel Gil Pérez, Charilaos C Zarakovitis, Chihyang Pee, Weichuen Yau, Marios Kountouris, Ioannis Pitsiorlas, Nikolaos Pappas, Eunjeong Jeong, 'Security Automation for 6G' (*Robust-6G*, 25 Dec 2024) deliv D4.1 pp 80 <https://robust-6g.eu/wp-content/uploads/2025/01/ROBUST-6G-D4.1_Security-Automation-for-6G_v1.0.pdf>.

⁴¹ Occhipinti et al (n 38).

fundamental rights.⁴² However, the document's analysis treats AI regulation largely as a future ethical desideratum rather than an immediate compliance challenge posed by the EU AI Act.

The AI Act classifies AI systems based on a risk-based approach. Crucially, under Annex III, AI systems intended to be used as 'safety components in the management and operation of critical digital infrastructure' (which includes telecommunications networks) are classified as high-risk AI Systems.⁴³ This classification triggers a set of stringent obligations for providers, most notably regarding human oversight (Article 14).⁴⁴

Article 14 mandates that high-risk AI systems must be designed and developed in such a way that they can be effectively overseen by natural persons during the period in which the AI system is in use. This includes the requirement that human overseers must be able to correctly interpret the system's outputs and have the authority to decide not to use the system or to interrupt its operation (a 'stop button').

This creates a fundamental paradox for 6G development:

1. *The technical imperative*: the physics of 6G (e.g., THz beamforming) requires decision loops that are too fast for human cognition. ZSM is predicated on removing the human from the loop to achieve efficiency and latency targets.⁴⁵
2. *The legal mandate*: the AI Act requires keeping the human *in* or *on* the loop for critical infrastructure to ensure accountability and safety.⁴⁶

Furthermore, the emergence of general-purpose AI (GPAI) models, such as large language models (LLMs) fine-tuned for telecom (often referred to as 'NetGPT'), introduces another layer of regulation. The AI Act imposes specific obligations on providers of GPAI models, particularly those with systemic risks, including adversarial testing, cybersecurity protections, and energy efficiency reporting.⁴⁷ The AI Office remains in the process of drafting Codes of Practice for these models, creating a window of opportunity for the telecom sector to influence the interpretation of these rules.⁴⁸

If current and upcoming SNS JU research projects, and the EU policymakers, do not address this 'zero-touch vs. human oversight' conflict, there is a risk for a sustainable and societally-(as well as legally-)relevant European 6G of being theoretically sound but practically unimplementable.

The SLO for European 6G would therefore include the following:

⁴² Ibid.

⁴³ EU AI Act (n 32) Annex III: High-Risk AI Systems referred to in art 6(2).

⁴⁴ Ibid art.14.

⁴⁵ Alberti et al (n 406).

⁴⁶ See AI Act (n 32) art 14. Also see Eur Comm, 'AI Act' (*Digital-strategy.ec.europa.eu*) <<https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>>.

⁴⁷ Jimmy Farrell & Tekla Emborg, 'An Introduction to the Code of Practice for General-Purpose AI' (*EU Artificial Intelligence Act*, 3 Jul 2024, last upd 14 Aug 2025) <<https://artificialintelligenceact.eu/introduction-to-code-of-practice/>>.

⁴⁸ Ibid.

➤ *Reframing Privacy to a 'Systemic AI Governance'*

Here, the shift must be from individual data rights (which are important but insufficient) to *systemic network safety and accountability*.

The current research, including the documents cited in this chapter, somehow lacks a discussion on how 'human oversight' can be technically implemented in a real-time 6G network without degrading performance. Our assertion is that the SNS JU projects must explicitly reference Article 14 of the AI Act and propose research pathways for 'meaningful human control' in autonomous networks. This involves recommending:

- *Hierarchical oversight architectures*: developing governance frameworks where humans supervise high-level 'intent' and policy constraints (intent-based networking), while the AI executes low-level optimisation within those pre-approved bounds. This satisfies the legal requirement for oversight without injecting human latency into microsecond decisions.
- *Explainable AI (XAI) for telecom*: funding specific R&I into XAI techniques that allow network operators to understand *why* an AI model reconfigured the network, enabling effective post-hoc analysis and accountability.⁴⁹ Without XAI, human oversight is legally impossible as the operator cannot 'correctly interpret' the system's output.

➤ *Addressing General Purpose AI (GPAI) in Networks*

With the rise of generative AI, 6G networks will likely employ GPAI models for tasks ranging from code generation for network slicing to natural language interfaces for network management. A general legal and ethical framework for European 6G does not currently address the specific regulations governing GPAI models, which are distinct from the high-risk classification.

In the context of SLO, it is therefore recommended that all 6G stakeholders actively participate in the drafting of the AI Office's Code of Practice for GPAI. It should advocate for specific provisions that recognise the unique constraints of edge-deployed GPAI models in 6G (e.g., energy constraints on user devices) versus cloud-hosted models. This aligns the 'sustainability' goal with AI regulation.

The table below summarises the main highlights of 6G governance in sub-section 4.1:

Regulatory conflict	6G technical trend	SLO recommendation
AI Act Art. 14 (human oversight)	Zero-touch automation (ZSM)	Recommend R&I into 'human-on-the-loop' interfaces and intent-based networking governance
AI Act Annex III (critical infra)	AI-RAN (radio access network)	Mandate conformity assessments and 'high-risk' compliance in 6G pilot projects

⁴⁹ Estefanía Coronado, Rasoul Behraves, Tejas Subramanya, Adriana Fernández-Fernández, Muhammad S Siddiqui, Xavier Costa-Pérez & Roberto Riggio, 'Zero Touch Management: A Survey of Network Automation Solutions for 5G and 6G Networks' (2022) 24(4) IEEE Commun Surv Tutor 2535-2578.

To summarise the sub-section 4.1, by integrating the specific regulatory touchpoints analysed above, the social licence for 6G transitions from a general warning about 'opaque algorithms' to a specific, actionable guide for navigating the AI Act's compliance landscape. This ensures that the 'value' of human agency is not just an ethical preference but a socio-legally engineered feature of the network.

4.2. *Social Acceptance and Legitimacy: Reconciling Speed and Democracy in 6G*

Ensuring 'Inclusion-by-Design' is a core tenet of the socially-relevant 6G vision. The 6G4Society project, for example, identifies the 'digital divide' and the 'lack of procedural justice in infrastructure decisions' as key risks to social acceptance of 6G.⁵⁰

➤ *Reconciling Legal Rights with Community Trust*

However, the EU policy landscape is currently prioritising deployment speed over local deliberation. The GIA, adopted to accelerate the rollout of very high capacity networks (VHCN), introduces measures to streamline permit-granting procedures.⁵¹ A central, controversial feature of the GIA negotiations has been the concept of 'tacit approval' (or silent approval), where a permit is deemed granted if the competent authority fails to respond within a specified timeframe (e.g., four months).⁵²

While 'tacit approval' is championed by telecom operators (ETNO, GSMA) as a necessary tool to overcome bureaucratic inertia and reduce rollout costs, it is viewed by municipalities and civil society as an erosion of local sovereignty.⁵³ It effectively removes the 'right to say no' through administrative silence, potentially exacerbating the feeling of 'not being heard'.⁵⁴

Therefore, to make the inclusion recommendations robust, we must propose mechanisms that reconcile the GIA's acceleration mandate with the democratic necessity of local consent.⁵⁵ For the SLO-6G interface more precisely, in discussing 'acceptance,' we must create a framework for managing the tension between legal rights (permits) and community trust (licence).

It is therefore recommended that while the GIA streamlines legal permits, 6G operators should voluntarily pursue an SLO strategy. More specifically, a SLO framework for 6G deployment that would incentivise operators to conduct pre-emptive local consultations and community benefit agreements, separate from the statutory GIA timelines.

⁵⁰ Occhipinti et al (n 38).

⁵¹ GIA (n 29).

⁵² Arthur Cox LLP, 'The Gigabit Infrastructure Act: Supporting the Rollout of High-capacity Communications Networks' (*Arthur Cox Knowledge*, 15 Sep 2025) Briefing <<https://www.arthurcox.com/knowledge/the-gigabit-infrastructure-act/>>.

⁵³ Wiggin LLP, 'Introducing the Gigabit Infrastructure Act – Is it Sufficiently 'Stimulating'?' (*Wiggin LLP*, 10 May 2024) <<https://www.wiggin.co.uk/insight/introducing-the-gigabit-infrastructure-act-is-it-sufficiently-stimulating/>>.

⁵⁴ *Ibid.*

⁵⁵ For an overview of main types of a formalised/democratic local consent, including free, prior, and informed Consent (FPIC), see Anna Aseva & Ka Lok YIP, "When Yes means Yes: Free, Prior & Informed Consent in 'One Belt One Road' Projects in the Context of Transnational Investment Law and Arbitration" (2017) 14(3) TDM pp 22.

➤ *Participatory EMF monitoring*

Moreover, trust is often eroded by a lack of transparency regarding the physical effects of infrastructure, particularly electromagnetic fields (EMF). While health concerns are one of the main perception issues of 6G,⁵⁶ there should be a mechanism for verifying safety that involves citizens directly.

Here, the proposed enhancement is to advocate for a 'participatory monitoring' of EMF levels.⁵⁷ It is also recommended to deploy the low-cost, calibrated EMF sensors that allow communities to independently verify radiation levels, building trust through transparency.⁵⁸

These enhancements would thus operationalise 'procedural justice' by giving citizens data agency.⁵⁹

Table 2. Reconciling speed and democracy in 6G

Conflict area	Regulatory driver (GIA)	Societal value	Proposed SLO mechanism
Permitting	Tacit approval (Speed)	Procedural justice (Voice)	Pre-emptive local consultations /community benefit agreements
Safety/EMF	Streamlined assessment	Health/Trust	Participatory EMF monitoring (citizen science)

In sum, by addressing the GIA directly, the SLO transforms from a naive plea for participation into a sophisticated strategy for managing the fallout of aggressive infrastructure legislation. It acknowledges that while the law may allow operators to build fast, *social acceptance* requires them to build *with* communities.

5. Sustainability and Social Impact Indicators for 6G

As already established earlier in this chapter, unlike previous generations, which were predicated almost exclusively on the enhancement of User Experience (UX) metrics and technical Key Performance Indicators (KPIs), such as throughput, latency, and connection density and quality, 6G is being conceptualised through a socio-technical lens. In this context, the 6G4Society project has released *Deliverable D3.3: Position Paper "Key Sustainability Indicators for 6G Technology,"* a document aiming to codify this paradigm shift into a workable framework of Key Value Indicators (KVIs) and Key Sustainability Indicators (KSIs).⁶⁰

The D3.3 framework attempts to bridge this gap by introducing KVIs. The document defines KVIs as distinct from technical KPIs and UX. Where KPIs measure *operation* (efficiency) and UX measures *perception* (satisfaction), KVIs measure *outcome* (impact).⁶¹ This taxonomy

⁵⁶ Occhipinti et al (n 38).

⁵⁷ Observatory of Public Sector Innovation (OPSI), 'IoT-based Management and Monitoring System for 5G Electromagnetic Fields ' (OPSI, 2018) <<https://oecd-opsi.org/innovations/iot-based-management-and-monitoring-system-for-5g-electromagnetic-fields/>>.

⁵⁸ Ibid.

⁵⁹ EG *see* Enforce, 'Enforce at a Glance' <<https://join-enforce.eu/>>.

⁶⁰ Petersen (n 37).

⁶¹ Ibid.

acknowledges that a user might be satisfied with a high-speed connection (high UX) that simultaneously exploits their data (low Trust KVI) or consumes excessive energy (low Sustainability KVI). The framework's insistence that KVIs must be 'reflexive' - asking *why* a technology is built rather than just *what* it does - is a necessary corrective to the technosolutionism that characterised the 5G rollout.

5.1. *Aligning with European Standards*

The D3.3 document proposes a hierarchical evolution of metrics that mirrors the maturity of the technology itself. It distinguishes between immediate value snapshots (KVIs) and long-term systemic assessments (KSIs).

- *KPIs (technical output)*: these are the traditional metrics—latency, jitter, bit error rate. They are deterministic and objective.
- *KVIs (societal outcome)*: these track the direct consequences of the technology on stakeholders. For example, did the deployment of 6G in a rural area actually reduce the digital divide, or did it merely provide infrastructure that remained unaffordable?
- *KSIs (systemic impact)*: these are the most ambitious metrics, attempting to measure the long-term sustainability of the system within planetary and social boundaries.⁶²

The D3.3 framework succeeds in establishing a high-level taxonomy for societal values and provides a valuable heuristic for qualitative value elicitation. To function as a European 6G standard, even more operational rigour and regulatory interoperability might be achieved as follows. A transition from KVI to KSI is not merely temporal; it is structural. A KVI might measure 'number of rural connections,' but a KSI must measure 'long-term economic resilience of the rural community.'

Namely, if the above KVI/KSI framework integrates the mandatory requirements of the ESRS, it will thus ensure its indicators are taken as core business drivers. Furthermore, the CSRD, effective from 2024, mandates that large companies (including the telecom operators who will certainly deploy 6G) report sustainability information with the same rigour as financial information. If the KSIs (social licence) do not align with CSRD (legal permits), this threatens to render the KSIs relatively irrelevant to the very stakeholders they aim to influence. For example, if a major telecom operator is legally mandated to report against the ESRS, they will align their internal KPIs/KVIs with those standards.

It is therefore recommended for the KVI/KSI framework to explicitly align with the ESRS and CSRD, ensuring KVIs and KSIs complement, rather than compete with or add to, mandatory regulatory reporting.⁶³

5.2. *Closing the Societal Readiness Level (SRL) Gap*

In engineering, Technology Readiness Levels (TRL) provide a universal language for maturity. A KVI framework without a corresponding SRL scale is unmoored.

Trust, for example, means something fundamentally different at TRL 3 (proof of concept) versus TRL 9 (commercial deployment). At TRL 3, trust is theoretical - based on design intentions. At TRL 9, trust is empirical - based on failure rates and data breaches. A KVI/KSI

⁶² Ibid.

⁶³ Ibid.

framework's failure to matrix KVIs against TRLs/SRLs limits its utility for researchers and project managers who need to know *when* to measure specific values. A rigorous update to the framework would mandate that specific KVIs are 'gated' by specific SRLs, ensuring that social impact assessments evolve in lockstep with technical development.

In essence, KVIs and SRLs operate as complementary instruments that enable innovators to transcend purely technical metrics and ensure that technology is socially accepted and aligned with societal needs.⁶⁴ Whereas SRLs provide a staged framework for assessing the degree of societal integration, KVIs serve as diagnostic and monitoring mechanisms that generate the evidence required to validate readiness at each level.⁶⁵

Connecting KVIs to SRLs is crucial because strong technical performance (as captured by TRLs) does not ensure success when a solution lacks trustworthiness, accessibility, or relevance for its intended users.⁶⁶ Linking KVIs to SRLs is important because of:⁶⁷

1. *Operationalising maturity milestones*: SRL scales require innovators to assess societal readiness and demonstrate impact as part of advancement.⁶⁸ KVIs translate these expectations from abstract commitments into measurable indicators, supplying the concrete evidence necessary to progress between levels.
2. *Lifecycle-oriented guidance*: KVIs function as a strategic compass that adapts to the project's stage of development. At early SRLs (1–3), they inform foundational design decisions; at advanced SRLs (7–9), they become empirically validated evidence of tangible societal benefit and well-being.⁶⁹
3. *Context-sensitive validation*: societal value is inherently context-dependent, and SRL evaluations demand testing in real or representative environments.⁷⁰ Integrating KVIs at each stage enables innovators to identify socio-technical enablers—such as regulatory alignment or community capacity—necessary for a technical feature to realise its intended societal benefits.
4. *Preventing innovation failure*: projects often achieve TRL 9 (market readiness) while remaining at SRL 1 (isolated idea), producing technically robust solutions that ultimately lack public acceptance, or even rejected by the public (what, to some extent, happened to 5G).⁷¹ KVIs ensure that societal objectives are tracked alongside technical metrics, *reducing the risk of investing in innovations that fail to gain social licence*.

⁶⁴ Monika Büscher & Cronan Cronshaw, *The Little Book of Societal Readiness* (Imagination Lancaster 2022) ISBN 978-1-7397133-2-4 pp 40.

⁶⁵ Petersen (n 37).

⁶⁶ NCP Flanders, 'Societal Readiness Level (SRL) - Will it Replace or Complement TRL?' (*NCPFlanders.be*, 9 Dec 2025) News <<https://ncpflanders.be/news/societal-readiness-level-srl-will-it-replace-or-complement-trl>>.

⁶⁷ The following is based on Petersen (n 37).

⁶⁸ Innovation Fund Denmark, 'Societal Readiness Levels (SRL) Defined According to Innovation Fund Denmark' (*Innovationsfonden.dk*, 2018) <https://innovationsfonden.dk/sites/default/files/2019-03/societal_readiness_levels_-_srl.pdf>. Also see Clean Energy Transition Partnership (CET Partnership), 'Societal Readiness Level (SRL) Assessment Canvas' <<https://research4impact.eu/workshops/societal-readiness-tool/>>.

⁶⁹ Büscher & Cronshaw (n 64).

⁷⁰ Innovation Fund Denmark (n 68).

⁷¹ Ilenia Bruno, Alessandro Donarelli, Valeria Marchetti, Anna Schiavone Panni, Beatrice Valente Covino, Georges Lobo, & Francesco Molinari, 'Technology Readiness Revisited: A Proposal for Extending the Scope of Impact Assessment of European Public Services' in Yannis Charalabidis, Maria A Cunha & Demetrios Sarantis

To summarise, the Table 3 demonstrates the level of KVIs integration into each stage of the SRL scale.

Table 3. KVIs-SRLs interface

SRL Level	SRL Maturity Milestone	Role of KVIs / Interconnection
SRL 1	Identifying the problem and generic societal readiness aspects.	KVIs act as high-level prioritisation criteria . They define the intended 'societal purpose' (e.g., safety, inclusivity) that the project seeks to address.
SRL 2	Formulating the solution and potential impacts.	KVIs are anticipatory proxies . They establish what 'success' looks like for identified stakeholders and set the baseline for future measurement.
SRL 3	Initial testing of proposed solution concepts with stakeholders.	KVIs measure perceived usefulness and gather initial stakeholder feedback to assess if the concept meets user needs in controlled environments.
SRL 4	Problem validation through pilot testing in a relevant environment.	KVIs track practicality and resistance . They provide the evidence needed to substantiate that the solution is ready for a 'relevant environment' rather than just a lab.
SRL 5	Solution validation by relevant stakeholders in the area.	KVIs assess local alignment . They measure whether the solution addresses the specific 'pain points' and diverse perspectives of the community it is entering.
SRL 6	Demonstration in relevant environments and in cooperation with stakeholders.	KVIs collect insights on potential impact . They use mixed-method validation (qualitative and quantitative) to see if the technology disrupts or supports everyday life.
SRL 7	Refinement of the project and/or solution.	KVIs identify unintended consequences or ethical hurdles. They ensure refinements are driven by values like privacy or equity rather than just performance.
SRL 8	Qualified solution and complete plan for societal adaptation.	KVIs validate the plan for societal adaptation . They provide a final evidence base showing the system is ready for adoption and adheres to long-term sustainability goals.
SRL 9	Actual solution proven in the relevant environment.	KVIs measure actual outcomes and long-term impacts . They provide conclusive evidence of value delivery, such as 'lives saved' or 'bridged digital divides.'

Source 6G4S, Petersen (n 37).

6. Conclusion

This chapter has navigated the prospective transition from 5G to 6G not merely as a technical upgrade in data throughput and latency, but as a fundamental paradigm shift toward sustainable and socially responsible innovation. By reconceptualising 6G as the foundational infrastructure for a 'cyber-physical-social system,' one should recognise that its long-term viability in Europe depends on earning societal legitimacy and trust. The preceding sections have bridged the gap between abstract ethical intent and a practical roadmap for governance through the lens of the SLO.

Bridging SLO Scholarship and 6G Governance

The research foundation established in Section 2 demonstrated that the principles of SLO, historically rooted in the mining and extractive industries, are applicable to the telecommunications sector. While in the 1990s, SLO was originally a 'point of reference for pragmatic political risk management,' its evolution into an 'intangible, unwritten, and informal approval' in the 2020s provides a vital framework for 6G. On top of, and sometimes, aside from, formal legal permits, a 6G SLO must be earned through continuous dialogue and accountability, moving beyond 'passive reception' of to 'active alignment' with ethical

(eds) *Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance ICEGOV2020* (23-25 Sep 2020 online conf, ACM Press 2020) 369-380. Also see NCP Flanders (n 66).

conditions. By adapting SLO to the telecommunications landscape, we move toward a governance model where approval is granted by the broader citizenry rather than just a localised community.

Identifying Risks and Addressing Innovation Gaps

Sections 4 and 5 identified key societal risks - such as the erosion of user agency, privacy concerns, and a widening digital divide - that current techno-economic logics often fail to address. The 'AI-native' paradox of 6G presents a significant governance gap. The technical necessity of zero-touch and autonomous networking conflicts with the EU AI Act's legal mandate for meaningful human oversight. Furthermore, while the Gigabit Infrastructure Act prioritises deployment speed through mechanisms like 'tacit approval,' these can undermine local sovereignty and community trust. The analysis in this chapter showed that current policy approaches may fall short if they prioritise administrative efficiency over the democratic necessity of local consent.

Reconceptualising 6G as a Socio-Technical System

To close these gaps, 6G must be positioned as critical societal infrastructure, with SLO serving as a governance framework that links social acceptance, sustainability, and value alignment. This reconceptualisation requires shifting from mere soft law and ethical principles to concrete governance mechanisms:

- Reframing AI governance: implementing hierarchical oversight architectures and explainable AI (XAI) to satisfy legal requirements for societal - namely, human - control without sacrificing network performance.
- Reconciling speed and democracy: encouraging operators to voluntarily pursue SLO strategies, such as community benefit agreements and participatory EMF monitoring, to complement streamlined GIA permits.
- Operationalising sustainability: aligning Key Sustainability Indicators with mandatory CSRD and ESRS reporting to ensure that societal impact becomes a core business driver rather than a completely voluntary metric.

Toward Concrete Governance and Impact

The integration of Key Value Indicators with Societal Readiness Levels provides a universal language for tracking this maturity. By gating KVIs through specific SRLs, innovators can ensure that 6G does not reach technical readiness (TRL 9) while remaining societally isolated.

Ultimately, the European 6G trajectory must be ethical and socially sustainable by design. By operationalising SLO as a guide for navigating the EU's policy and regulatory landscape, we ensure that a human-centric 6G is not just an ethical preference but a socio-legally engineered reality. This chapter's approach calls for *a redefined social contract between the telecommunications industry and the society it serves*, ensuring that 6G delivers its promised societal benefits while maintaining the enduring trust of the European public.

Future Research Directions

Several aspects merit further investigation.

First, the SLO framework proposed here is normative; its empirical validation remains an open task. Pilot applications within active SNS JU 6G trials, testing whether community benefit agreements and participatory EMF monitoring measurably improve social acceptance outcomes, would provide the evidence base needed to move from governance prescription to governance proof.

Second, the KVI/SRL mapping presented in Section 5 requires longitudinal testing: do KVIs measured at SRL 3 predict social acceptance at SRL 9, or do unforeseen value tensions emerge at scale?

Third, the paper focuses on the European context, but SLO is inherently comparative. Given the divergent approaches to 6G governance emerging in the United States, China, and the Global South, cross-jurisdictional analysis would reveal whether SLO is a distinctively European instrument for a socially-relevant 6G or a genuinely global governance framework for next-generation connectivity.

Finally, as 6G standardisation progresses through 3GPP Release 21, the question of how SLO principles can be embedded in technical standards, rather than applied after the fact, represents a crucial and underexplored frontier at the intersection of law, governance, and engineering.