TOWARDS A SOCIALLY ACCEPTED AND SUSTAINABLE 6G

November 2025

Policy Brief on Ensuring Inclusion-by-Design for 6G

Lucas Pereira Carwile
Carmela Occhipinti

6G4SOCIETY

CyberSocial Lab.

1. Highlights

Inclusion is a core European value and precondition for the legitimacy of sixth-generation (6G) mobile network deployment. As digital connectivity increasingly mediates healthcare, education, work, and civic participation, access and use now determine who can exercise democratic rights and access essential services. 6G's deeper integration with critical infrastructure will amplify these dynamics unless inclusion is embedded from the outset. Findings from the 6G4Society project show 45 percent of surveyed citizens identified inclusion and access as top priorities for future digital development, linking connectivity to social justice and quality of life [1].

Without proactive measures, next-generation networks risk reproducing and amplifying current patterns of exclusion, concentrating opportunity among already advantaged populations while deepening the marginalisation of vulnerable groups.

Project key findings confirm that persistent gaps in current connectivity generations threaten to be replicated or worsened in 6G deployment. Rural and peripheral territories remain underserved, affordability provisions are uneven, and skills gaps persist among older adults, jobseekers, low-income households. Accessibility standards are only partially implemented, while citizens reported limited participation in infrastructure decisions.

Evidence gathered through citizen surveys, expert interviews, and Smart Networks and Services Joint Undertaking (SNS JU) project analysis reveals that inclusion remains a widely articulated public expectation but an underdeveloped dimension of current research and deployment practice [1] [2] [3]. These insights underscore that the success of 6G will depend not only on technical performance but on embedding European values such as fairness, cohesion, and democratic legitimacy into its governance and design [4].

This policy brief examines: **How can Europe ensure that 6G deployment serves all citizens rather than reproducing existing patterns of digital exclusion?** It proposes six main recommendations:

1. Guarantee equitable infrastructure access and affordability
2. Build sustainable local digital-skills ecosystems
3. Implement outcome-focused monitoring and intervention
4. Embed accessibility-by-design across 6G systems and services
5. Strengthen participatory governance and procedural justice
6. Reinforce targeted research and coordinated policy support

2.Context of the Issue

As Europe prepares for 6G, inclusion has become a strategic test of fairness and cohesion. Connectivity is no longer a purely technical or commercial matter but the infrastructure through which individuals participate in modern life. In this context, exclusion from high-quality networks increasingly means exclusion from essential services and democratic processes.

European policy frameworks already acknowledge these challenges. The Digital Decade Policy Programme [5] sets binding targets for gigabit connectivity and digital skills by 2030; the Gigabit Infrastructure Act accelerates deployment [6]; the European Electronic Communications Code provides for universal service and affordability [7]; and the Digital Education Action Plan, the European Accessibility Act, and the Web Accessibility Directive outline pathways for skills and accessibility [8]. Yet implementation remains uneven. Rural regions continue to experience coverage and quality deficits, affordability mechanisms such as social tariffs vary widely, skills initiatives are fragmented. Current accessibility provisions address existing technologies; as 6G introduces new interaction modalities, these standards will need to evolve accordingly to ensure inclusive design from the outset.

Monitoring remains focused on infrastructure deployment rather than on whether connectivity produces tangible benefits. 6G4Society engagement activities indicate **inclusion is among the highest public priorities** for 6G. Surveys and workshops reveal citizens associate connectivity with equality of opportunity and rural community viability. Many expressed frustrations at infrastructure decisions made without consultation and at what they perceive as an urban bias in technological investment. Expert interviews with researchers and project leaders reinforced these concerns, highlighting the neglect of distributive justice (who benefits versus who bears burdens) and procedural justice (whether affected communities have a genuine voice) [2]. Understanding these dynamics requires moving beyond an over-simplified notion of a "digital divide" as merely connected versus unconnected. Two decades of research shows digital inequality unfolds across multiple layers. Even among connected users, differences in skills, literacy, and confidence determine how effectively they benefit, while those with greater social and economic resources consistently derive larger gains.

Scholars including such as Jan Van Dijk, Eszter Hargittai, Ellen Helsper, and Mark Warschauer, reveal that inclusion depends on reinforcing conditions: access, skills, and outcomes must advance together [9], [10], [11], [12], [13]. Within 6G4Society, **inclusion is therefore understood as the set of conditions that enable all individuals and communities to participate meaningfully in digital life.** It encompasses the capability to use technologies safely and autonomously, achievement of equitable outcomes across life domains, universal accessibility regardless of ability, and the exercise of voice in decisions shaping digital infrastructures. Inclusion, in this sense, is not a technical endpoint but a governance principle essential to 6G legitimacy. The transition to 6G will magnify consequences of inaction. Early deployments will likely concentrate in profitable urban corridors and industrial zones, while AI-native architectures and advanced interfaces will demand higher digital literacy. Unless policy treats inclusion as a guiding criterion from the outset, Europe risks a two-speed digital society where some enjoy high-performance connectivity while others remain confined to outdated infrastructure and limited opportunity.

3. Policy Recommendations

Aligning 6G deployment with Europe's social model requires policy action across six mutually reinforcing dimensions: infrastructure access and affordability, sustainable digital skills ecosystems, outcome-focused monitoring and intervention, accessibility by design, and participatory governance.

R1 Guarantee equitable infrastructure access and affordability

Universal access to high-quality 6G infrastructure at affordable prices is fundamental to preventing reproduction of existing digital divides. Without binding deployment obligations and affordability safeguards, 6G rollout will concentrate in profitable urban areas, leaving rural and peripheral communities with outdated infrastructure. Strengthening access and affordability mechanisms prevents geographic location or economic status from determining who benefits from next-generation connectivity. Clear, harmonised requirements for universal service and social tariffs provide legal and operational certainty to telecom operators while fulfilling social obligations.

- Attach **binding rural deployment obligations to spectrum awards,** requiring operators to meet specific deployment milestones with quality-of-service standards in underserved areas.
- Establish **transparent public reporting mechanisms** allowing citizens and local authorities to track infrastructure deployment progress and quality metrics.
- Create a **harmonised European affordability framework** setting common principles for social tariffs and device access schemes across Member States.
- Ensure vulnerable households can obtain **fixed and mobile broadband at sustainable prices** through standardized affordability mechanisms.
- Use Union-level funding instruments (Recovery and Resilience Facility, Connecting Europe Facility) to support **affordability programmes and backhaul infrastructure** in market-failure areas.

R2 Build sustainable local digital-skills ecosystems

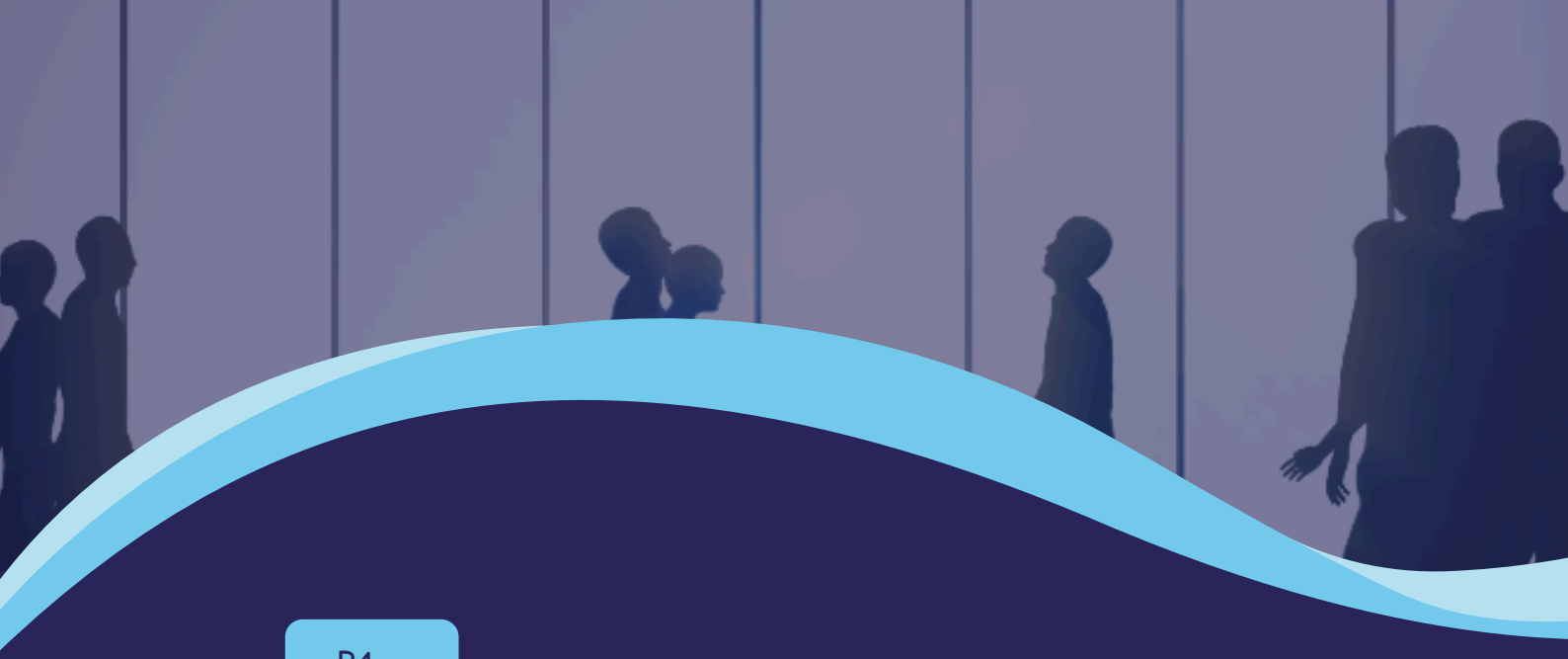
Addressing persistent digital skills gaps requires moving beyond fragmented, short-term training toward sustainable community-based learning ecosystems. As 6G introduces AI-native architectures and advanced interfaces, higher digital literacy will be essential for meaningful participation. Without structured, locally embedded skills initiatives, existing inequalities will widen, leaving older adults, jobseekers, low-income households, and vulnerable groups unable to benefit. Building sustainable skills ecosystems ensures all citizens can use 6G technologies safely, autonomously, and effectively, transforming infrastructure access into genuine capability.

- Develop **community-based digital skills** learning networks offering modular training and recognised micro-credentials across Member States.
- Build on the Digital Education Action Plan with **stronger operational support and dedicated EU co-funding** for local skills initiatives.
- Integrate **digital-skills assistance routinely** into employment and social services, providing tailored support based on individual needs and contexts.
- Design **public digital platforms** for usability by people with basic competencies, reducing barriers to accessing essential services.
- Establish **common indicators** tracking progress in digital skills by age, income, education, and disability, enabling comparison and improvement across the Union.

R3 3.1 Implement outcome-focused monitoring and intervention

Shifting from infrastructure-centric to outcome-focused monitoring is essential to ensure 6G deployment produces tangible improvements in citizens' lives. Current frameworks emphasise network coverage and speeds but rarely assess whether connectivity translates into real improvements in employment, education, health, and civic participation. Without outcome-focused indicators, policymakers lack evidence to identify persistent inequalities or evaluate intervention effectiveness. Strengthening outcome monitoring reveals which groups and regions benefit from 6G and which remain excluded, enablingope targeted interventions addressing root causes.

- Include **outcome-focused indicators** in the Digital Decade framework assessing whether connectivity translates into real improvements in employment, education, health, and civic participation.
- Disaggregate data by region and social group, **reporting publicly** each year to enable tracking of persistent inequalities.
- Require **social-impact assessments** to accompany major 6G deployments, evaluating how benefits and burdens are distributed across different populations.
- Create a **shared data infrastructure for digital-outcome research** helping identify persistent inequalities and inform targeted interventions.
- Support **longitudinal studies** tracking how different population groups use and benefit from 6G over time.



R4 Embed accessibility-by-design across 6G systems and services

Ensuring 6G technologies are accessible to persons with disabilities and older adults from earliest development stages is both a legal obligation and social imperative. Current accessibility provisions designed for existing technologies require updating to address interaction modalities 6G may introduce. Without accessibility by design, next-generation networks will reproduce and amplify existing barriers, preventing millions of Europeans from accessing essential services. Strengthening accessibility requirements ensures 6G serves all citizens regardless of ability. Clear regulatory expectations, co-design requirements, and periodic audits provide legal certainty while ensuring accountability.

- Extend implementation of the European Accessibility Act, Web Accessibility Directive, and harmonised standard EN 301 549 to cover emerging 6G-related applications, from network management and evidence of **co-design with organisations representing persons with disabilities** and older adults in research projects, public procurement, and regulatory approvals.
- Conduct **periodic accessibility audits** by regulators with public reporting and mandatory remediation of identified gaps.
- Create **dedicated innovation sandboxes** for assistive technologies using 6G capabilities (real-time captioning, haptic feedback, AI-based personalisation) to accelerate inclusive innovation.
- Mainstream **accessibility best practices** across the sector through knowledge sharing and technical guidance.

3. Policy Recommendations

R5 Strengthen participatory governance and procedural justice

Ensuring affected communities have meaningful voice in infrastructure decisions is fundamental to democratic legitimacy and social acceptance of 6G deployment. Current consultation processes often occur too late to influence design, use inadequate formats, or fail to reach marginalised populations. Without genuine participatory governance, 6G rollout will be perceived as imposed from above, eroding public trust. The Aarhus Convention establishes the right to public participation in environmental decision-making, applicable to telecommunications infrastructure given its environmental and territorial implications. Strengthening participatory mechanisms ensures infrastructure decisions reflect local needs, values, and concerns.

- Develop **EU and national guidance on public consultation** for telecommunications infrastructure setting minimum standards for early information, accessible documentation, realistic response times, and transparent consideration of public input.
- Create **open digital portals where citizens can access** deployment plans, site proposals, and related assessments, submit comments, and follow how feedback is addressed.
- Provide **technical and financial support to rural and peripheral communities to participate** effectively in infrastructure decisions.
- Establish community-benefit arrangements ensuring that hosting infrastructure translates into **tangible local opportunities** (improved connectivity, literacy programmes, digital-service hubs).
- Require demonstration of **genuine engagement with affected communities as condition** for planning approvals and spectrum awards.

R6 Reinforce targeted research and coordinated policy support

Targeted research and coordinated policy support are needed to address the full set of challenges identified. The next EU research framework should include a dedicated CSA call to equip policymakers, regulators, data protection authorities, and standards bodies with evidence, guidance, and operational frameworks required to act on these recommendations. This CSA should promote:

- Consolidate **evidence and benchmarks on inclusion gaps;** develop **operational guidance** for a 6G inclusion governance model.
- Coordinate **cross-institutional collaboration** between regulators, data-protection authorities, standards bodies, and local administrations, ensuring coherent policy action across the Union.
- Facilitate **participatory methodologies and co-design practices** with citizens, vulnerable groups, and local communities, strengthening procedural justice in 6G-related decision-making.
- Build shared data infrastructure and analytical tools enabling disaggregated monitoring of 6G inclusion outcomes, **supporting regulators and policymakers** with timely, high-quality evidence.

4. Evidence and analysis

Project findings are based on triangulation of quantitative (surveys), qualitative (interviews and workshops), and desk-research methods, ensuring robustness and alignment between citizen, expert, and institutional viewpoints. Survey responses reflect participant perceptions rather than the full EU population, while evidence from SNS JU projects represents early-stage research rather than deployed infrastructures. Nevertheless, the extensive combination of scientific literature, citizen surveys, participatory workshops, interviews with practitioners and experts in acceptance, 6G, green ICT, smart cities and sustainability, consultations with policymakers, and engagement within the SNS JU community provides complementary academic, civic, and institutional perspectives on how societal values are currently represented and operationalised in 6G research and innovation. Citizen surveys showed 45% of respondents viewed **inclusion and access as key priorities for future connectivity.** Participants highlighted persistent **coverage gaps**, particularly in rural and natural-park areas, and expressed concern that advanced mobile generations benefit urban centres while neglecting those in precarious conditions. Workshops linked connectivity directly to social **justice, equality of opportunity, and community sustainability.** Expert interviews emphasised the importance of **distributive and procedural justice,** noting that stakeholder engagement in technological development often occurs too late to influence design. Consultations with research and innovation projects confirmed that while many acknowledge inclusion as relevant, **few operationalise it** beyond basic access metrics.

The evidence converges on a clear conclusion: inclusion remains a widely articulated public expectation but an **underdeveloped dimension** of current research and deployment practice. Treating it as a **governance principle,** integrating access, skills, equitable outcomes, accessibility, and participation from earliest development stages is essential to ensuring 6G delivers on Europe's commitment to fairness, cohesion, and democratic legitimacy.

5. Sources

This policy brief synthetises findings from 6G4Society Deliverables D1.1 [14], and D1.3 [15], as well as related outputs under WP2 and WP3. It draws on EU policy frameworks including the Digital Decade Policy Programme, the Gigabit Infrastructure Act, the European Electronic Communications Code, the Digital Education Action Plan, the European Accessibility Act, the Web Accessibility Directive, and the Aarhus Convention on public participation in environmental matters.

Bibliography

[1] "6G4Society D2.3 Public positions on 6G technology," 2025.
[2] "6G4Society D3.2 Position Paper. Social Acceptance of 6G Technology," 2025.
[3] "6G4Society D3.3 Position Paper. Key Sustainability Indicators for 6G Technology," 2025.
[4] "6G4Society Insight report. The relationship between values and technology.," 2025.
[5] EU, "Decision (EU) 2022/2481 establishing the Digital Decade Policy Programme 2030," 2022.
[6] EU, "Regulation (EU) 2024/1039 (Gigabit Infrastructure Act)," 2024.
[7] EU, "Directive (EU) 2018/1972 establishing the European Electronic Communications Code," 2018.
[8] European Commission, "Digital Education Action Plan (2021–2027): Resetting education and training for the digital age," 2020.
[9] J. v. Dijk, The Deepening Divide: Inequality in the Information Society, Thousand Oaks, CA: Sage Publications, 2005.
[10] J. v. Dijk, The Digital Divide, Polity Press, 2020.
[11] E. Hargittai, "Second-level digital divide: Differences in people's online skills," First Monday, vol. 7, no. 4, 2002.
[12] E. Helsper., "A corresponding fields model for the links between social and digital exclusion," Communication Theory, vol. 22, no. 4, pp. 403–426, 2012.
[13] M. Warschauer., Technology and Social Inclusion: rethinking the Digital Divide, Cambridge, MA: MIT Press, 2003.
[14] 6G4Society, "D1.1: Societal aspects in 6G technology: concerns, acceptance models and sustainability indicators," 2024.
[15] 6G4Society, "D1.3 Towards a Socially Accepted and Sustainable 6G – Operational Brief.," 2025.

Contact

For further information, contact

https://cybersoclab.com/
eu-projects@cybersoclab.com

6G4Society Website
www.6g4society.eu

Project deliverables are publicly available through the **6G4Society Zenodo repository:**
https://zenodo.org/communities/6g4society

This work was supported by the 6G4SOCIETY project (Grant Agreement No. 101139070), which has received funding from the European Union's Horizon Europe research and innovation programme.

CyberSocialLab.