



When Infrastructure Is Not Enough: The Emergence of Competence-Based Digital Inequalities in a High-Connectivity Region

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Short abstract (200-400 words)

This paper investigates digital inequalities in Liguria, a north-western Italian region that offers a particularly meaningful regional case within the broader European digital transition. Liguria combines high levels of internet connectivity with distinctive structural characteristics: one of the oldest age structures in Europe, pronounced territorial fragmentation between coastal urban centers and small inland municipalities, and persistent socio-economic disparities across provinces. These features make it an especially relevant context for analyzing how digital divides evolve in regions where infrastructure is largely consolidated but social and demographic vulnerabilities remain significant.

The study integrates Eurostat and ISTAT data with original evidence from the RAISE 2025 survey, allowing us to position Liguria within the national and European landscape while examining **digital access, skills, and attitudes** at the micro level. The analysis focuses primarily on access to the internet and digital tools and on digital competences, while also briefly addressing attitudes toward emerging technologies.

Overall, the Ligurian case highlights a transformation in the nature of digital inequality: the primary divide is no longer infrastructural but competence-based and socially stratified. In a region characterized by high connectivity yet marked demographic ageing and territorial fragmentation, policies aimed at digital inclusion

must move beyond broadband expansion and prioritize lifelong learning, targeted interventions for older and economically vulnerable populations, and place-sensitive strategies for peripheral areas. By focusing on a regional context that is both digitally advanced and structurally fragile, this study contributes to a more nuanced understanding of digital inequalities within contemporary European regions.

Long Abstract

This paper investigates digital inequalities in Liguria, a north-western Italian region that offers a particularly meaningful regional case within the broader European digital transition. Liguria combines high levels of internet connectivity with distinctive structural characteristics: one of the oldest age structures in Europe, pronounced territorial fragmentation between coastal urban centers and small inland municipalities, and persistent socio-economic disparities across provinces. These features make it an especially relevant context for analyzing how digital divides evolve in regions where infrastructure is largely consolidated but social and demographic vulnerabilities remain significant.

The study integrates Eurostat and ISTAT data with original evidence obtained from the RAISE 2025 survey, allowing us to position Liguria within the national and European landscape while examining digital access, skills, and attitudes at the micro level. The analysis focuses primarily on access to the internet and digital tools and on digital competences, while also briefly addressing attitudes toward emerging technologies.

The paper exploits original data, collected with thin intraregional detail, in the context of the project “Urban Technologies for Inclusive Engagement”, included in the PNRR-funded RAISE Ecosystem project (Robotics and AI for Socioeconomic Empowerment). The project adopted a strong user-centered philosophy, and for this reason -alongside the tasks devoted to the technology development and integration- it included task involving the potential final users in two phases: ex-ante for the identification of needs of target communities through living labs (Cruz-perez 2023) , and ex-post for the evaluation of the potential impacts of the technologies on individuals and communities.

Since the development of technologies at the end of the project allowed pilot laboratory tests, but not tests in real-life context, the decision for the task on the evaluation of the impact over territories and communities has been to investigate the individual and contextual factors that could hamper perfectly working technologies to produce impacts on the wellbeing of the population.

This conducted to the implementation of a survey on a representative sample of the Liguria population to obtain evidence on disparities in the access to technologies (namely artificial intelligence and robotics) among communities, social groups and territories.

Over the past decade, Liguria has undergone a substantial catch-up process in terms of connectivity. In 2013, only 67% of households had internet access; by 2024, this figure had reached approximately 96%, slightly above both the Italian and EU averages. The share of households without home internet access (11.8%) is lower than the national average (13.8%) , and recent internet use (84.4%) exceeds the Italian mean. From an infrastructural perspective, Liguria appears to be a high-performing region.

However, the survey evidence reveals that widespread connectivity does not automatically translate into full digital inclusion. Internet access is predominantly mobile-based, while computers and other devices are used less frequently. This mobile-centric pattern ensures broad access but may limit engagement in more complex digital activities requiring advanced tools and skills.

For those lacking home internet access, barriers are mainly economic and cultural rather than technical. In a region with near-universal infrastructure, exclusion increasingly reflects affordability constraints, low perceived relevance, and limited competences. Digital skills represent the core dimension of inequality. Despite high levels of access, strong socio-demographic gradients persist. Education exerts a cumulative effect. Income disparities are equally pronounced, with lower-income groups displaying both weaker skills and higher levels of non-use. Territorial differences further shape the regional landscape. Provinces such as Imperia show markedly lower levels of digital competence and higher shares of non-users compared to Savona and Genova, and smaller or peripheral municipalities are generally more disadvantaged than larger urban centers. Liguria's internal heterogeneity—driven by demographic ageing, service accessibility, and socio-economic composition—mirrors broader structural divides observable at the national level.

Overall, the Ligurian case highlights a transformation in the nature of digital inequality: the primary divide is no longer infrastructural but competence-based and socially stratified. In a region characterized by high connectivity yet marked demographic ageing and territorial fragmentation, policies aimed at digital inclusion must move beyond broadband expansion and prioritize lifelong learning, targeted interventions for older and economically vulnerable populations, and place-sensitive strategies for peripheral areas. By focusing on a regional context that is both digitally advanced and structurally fragile, this study contributes to a more nuanced understanding of digital inequalities within contemporary European regions.

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Statistica annex

Introduction

This annex synthesizes some key statistical findings on digitalization patterns in Liguria, drawing on official European and national statistics alongside data from the RAISE 2025 survey, which have never been presented up to now. This annex can give a synthetic preview of the type of analysis that can be done for the presentation.

The analysis focuses on five key dimensions of digital inclusion: access to digital infrastructure, digital skills, attitudes toward new technologies, perceptions and receptiveness to adopt AI-based solutions in everyday life.

Available evidence shows that Liguria represents a context of high digital access but persistent inequalities in skills and advanced digital engagement across socio-demographic and territorial groups.

Access to Internet and Digital Technologies

Over the last decade, Liguria has experienced substantial progress in digital connectivity, reaching levels comparable to or slightly above national and European averages. Internet access: increased from 67% of households (2013) to 96% (2024), slightly above both Italian and EU averages.

Households without Internet access:

11.8% in Liguria vs 13.8% nationwide, indicating strong infrastructure-level inclusion.

Internet use:

84.4% of individuals used the Internet in the previous three months vs 81.9% nationwide.

Access devices:

- Smartphones: 95% ownership; 75% always use smartphones to access the Internet
- Computers/notebooks: less frequent use (~30–37% reporting frequent use).

Main barriers among non-connected households:

- Connection costs: 27.2%
- Low perceived usefulness: 23.1%
- Lack of digital skills: 15.7%
- Infrastructure limitations: 7%

Digital Skills and Structural Inequalities

Despite widespread connectivity, digital skills remain highly stratified.

Age Gradient

Age represents the strongest determinant:

- Men 18–34 with at least basic skills: 71.8%
- Men 55–74: 41.1%
- Women 18–34: 69.8%
- Women 55–74: 25.5%

Older women show the highest vulnerability, with 30.3% reporting no skills or non-use, compared to 24.3% among men.

Education Gradient

Education strongly protects against digital exclusion:

- Younger adults with low education: 60.7% basic skills
- Younger tertiary-educated: >80%
- Older low-educated (55–74): 23.8%
- Older tertiary-educated: 50.8%

Income Gradient

Economic resources strongly shape digital competence:

- Income < €15,000: 32.5% basic skills, 28.5% offline
- Income > €75,000: 83.4% basic skills

Labour Market Status

- Students: 78.1% basic competences
- Employed: 61.5%
- Unemployed: 39.1%
- Inactive/retired: > 60% insufficient or no skills

Territorial Disparities

Competence distribution varies across provinces:

- Savona: 55% basic competences
- La Spezia: 49.2%
- Genova: 47.7%
- Imperia: 34.2% (with 20.8% non-users)

Overall, results confirm the cumulative nature of digital inequality across demographic, socio-economic, and territorial dimensions.

Technological Attitudes

Attitudes toward digital technologies are overall positive, though socially stratified.

Technology attitude index values:

- Men 18–34: 0.64
- Women 18–34: 0.60
- Oldest groups: 0.52 (men), 0.46 (women)

Income is positively associated with technological confidence:

- < €15,000: 0.54
- Mid-high income: 0.63

In addition, a majority recognizes the positive role of digital technologies in improving quality of life for people with disabilities, with peaks of approximately 57% strong positive evaluations, particularly among middle-aged groups.

These results suggest that cultural resistance is not the main barrier to digital inclusion; rather, structural and competence-related factors dominate.

Perceptions about Artificial Intelligence

Perceptions of AI are generally positive but domain-dependent.

High Confidence Domains

- Healthcare: often >70–80% positive
- Public administration: often >70%
- Transport: frequently >75%

Low Confidence Domains

- Privacy: 33% positive
- Human relationships: generally <40%

Socio-economic gradients are consistent:

Example (AI in work domain, men):

- Low income: 58.8% positive
- High income: 81.5% positive

Territorial effects are relatively weak compared to socio-economic determinants.

Receptiveness to Use AI

Acceptance of AI applications depends strongly on perceived usefulness and risk.

Highest Acceptance

- Driving assistance: 63.3%
- Domestic help: 58.9%
- Elderly care assistance: 48.5%

Lower Acceptance

- Job assistance: 23.4%
- Leisure interaction: 25.6%
- Robotic surgery: 45% overall, declining to 26% among 75+

Gender differences are consistent:

- Robot surgery acceptance: 52.2% men vs 38.1% women

Education strongly predicts acceptance:

- Tertiary education: up to 69% acceptance for automated driving, 66% domestic help.