POLICY BRIEF

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CONCURSO DE ESTUDOS DE CIÊNCIA PARA AS POLÍTICAS PÚBLICAS

Gender Equality in the Digital Transformation in Portugal: Advances and Fragilities of Public Policies

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Executive Summary

Digital transformation is a strategic axis of economic, scientific, educational, and democratic development. The underrepresentation of women in ICT and STEM is a structural problem, not merely the result of individual choices. It therefore requires effective public policies aimed at preventing and addressing gender inequalities in the digital domain.

The Women4Digital project analysed both the problem and the public policies developed between 2017 and 2025 to address it. The trajectory of these policies illustrates both the potential and the fragilities of gender mainstreaming in a context of accelerated digital transformation. Four public policy cycles were identified, from the emergence of the agenda – marked by initiatives such as *Engenheiras por Um Dia* – through a peak of policy leverage in 2021, followed by a slowdown and partial deinstitutionalisation by 2025.

The analysis confirms the persistence of an approach centred on "fixing women," whereby gender equality is framed primarily as an issue of women's motivation and skills, rather than as a structural problem of organisations and of the digital system itself. It also identifies significant gaps and critical weaknesses in key areas, including the promotion of digital education and skills, cybersecurity, and the regulation of AI, algorithms, and platforms.

This policy brief synthesises these findings and presents concrete recommendations for funders interested in supporting structural, coherent, and sustainable interventions.

Recommendations

- Make the National Programme *Girls in STEM* fully operational;
- Reinstate stable interministerial governance mechanisms;
- Ensure sustainable funding;
- Scale up interventions with proven results;
- Integrate a gender perspective in critical areas of digital governance.

Target Audience

This policy brief is addressed to public authorities responsible for digital transformation and gender equality, as well as to education and research institutions, civil society organisations, and the technology sector. It is also directed at all individuals and organisations committed to promoting an inclusive digital transformation in Portugal.

Gender Inequalities in the Digital Domain: Rationale and European Framework

Digital Transformation and Gender Inequality: Why This Issue Matters

Digital transformation is not gender-neutral: it is reshaping work, education, science, social relations, and democracy itself, in a context where inequalities between women and men persist and take multiple forms:

→**Educational choices:** Women's participation in digital fields is shaped by gender stereotypes and the persistence of non-inclusive educational practices;
→**Occupational segregation:** Women remain underrepresented in technological professions and decision-making positions, facing barriers to entry, progression, and recognition;
→**Digital literacy and skills:** Inequalities persist in access, use, and levels of digital skills, limiting educational, professional, and economic opportunities;
→**Digital risks and violence:** Women face greater exposure to harassment and other forms of online violence;
→**Impacts of automation:** Many highly feminised sectors are more vulnerable to automation and AI adoption, increasing precarity and unemployment risks;
→**Misogynistic digital cultures:** The expansion of misogynistic communities and discourses (e.g., the "manosphere") fuels disinformation and backlash against women's rights;
→**Masculinised organisational cultures:** The technology sector continues to reproduce discriminatory environments, reinforcing sexism, inequality, and isolation (Lusa, 2025).

European Normative Framework Guiding National Action

The European Union establishes as a central objective that digital transformation should neither reproduce nor deepen gender inequalities, ensuring:
→Balanced participation of women and men in STEM/ICT fields;
→Education systems (primary, secondary, and higher education) that prevent and address gender inequalities in STEM/ICT (EEA, ERA, etc.);
→Accessible digital skills for the entire population;
→The development and use of safe, transparent, and gender-bias-free AI systems (AI Act);
→Safe, diverse, and inclusive digital ecosystems, with strengthened protection against online violence and discrimination, and increased platform accountability (DSA).

Figure 1 – Timeline of Key European Policy Instruments

Source: *own elaboration*.

European Funding Instruments

→Horizon Europe, Digital Europe Programme, NextGenerationEU, Recovery and Resilience Facility;

→Beyond dedicated funding lines, these instruments require the integration of a gender dimension in research content, project teams, and organisational practices.

Monitoring Instruments

→**Women in Digital Scoreboard (WiD)**: internet use, digital skills, and ICT employment;
→**Digital Decade Report and DESI**: assessment of skills, participation, specialisation, and gender gaps in digital employment and wages.

European Targets for 2030 (Digital Decade)

→20 million ICT specialists, with gender balance;
→80% of the population with at least basic digital skills;
→Increased participation of women in STEM/ICT higher education and in digital leadership positions.

National Targets (Portugal)

➔ Female participation in ICT: 20% by 2025 and 30% by 2030 (targets maintained in the 2024 revision of the national roadmap);

➔ Strategic Plan for STEM Education (Portugal)

- **Upper secondary vocational education:** 45% of students in STEM, with at least 1 in 4 being women;
- **Higher education:** 32% of students in STEM, with at least 2 in 5 being women;
- **ICT doctorates:** 5% of doctoral candidates, with at least 1 in 3 being women.

European Commission Recommendations to Portugal

→Strengthen the attraction of ICT specialists, particularly in cybersecurity;
→Increase the attractiveness of ICT studies and careers among women and girls, to meet the 2025 and 2030 targets.

Persistent Fragilities and Implications for Portugal

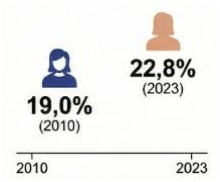
➔ National targets remain less ambitious than European ones (e.g., 7% vs. 10% ICT specialists);
➔ Monitoring continues to focus primarily on numerical participation, neglecting critical dimensions such as power, working conditions, and organisational cultures;
➔ Gaps persist in the development of advanced digital skills and in the inclusion of underrepresented groups;
➔ Portugal requires structural, coherent, and sustained policies to meet European targets and effectively reduce gender inequalities in the digital domain.

Diagnosis: Portugal and the Structural Masculinisation of the Digital Sector

Despite the growth of ICT professions, gender segregation remains persistent (2023):

➔ Women represent **22.8% of ICT occupations**;
➔ Women represent **24.8% in engineering fields**.

The category of **ICT specialists** is the least feminised among all technical and specialised professions.



Women have a **77% lower probability of accessing an ICT profession**.

Source: *own elaboration, Quadros de Pessoal (GEP).*

Sharp Decline in Advanced ICT Education (2013/14-2022/23)

The proportion of women completing PhDs in ICT declined from **29.5% (2013/14)** to **24.4% (2022/23)** (DGEEC).

Extreme Underrepresentation in Cybersecurity (2024)

Only **9% of enrolled students** and **8% of graduates** in higher education cybersecurity programmes were women (184 enrolled; 20 graduates) (CNCS/DGEEC).

Vertical Segregation and the "Digital Glass Ceiling"

Hierarchical structures remain stable:

- Men are concentrated in **managerial and mid-level positions**;
- Women remain predominantly in **technical roles**.

Despite having **7-10 percentage points higher educational attainment** than men, women continue to be excluded from the core of the sector.

Worsening Adjusted Gender Pay Gap (2010-2023)

Table 1 – Adjusted Gender Pay Gap in ICT Occupations

2010	2023
2,4%	10,2%

(Source: Bastos et al., 2025)

Analysis and Key Findings: Conditions for Successful Gender Equality Policies in the Digital Domain

Core Characteristics of Gender Equality Policies in the Digital Domain

Gender equality policies in the digital domain must meet a set of key conditions:
→Promotion of women's access, motivation, and capacity throughout the entire educational and professional pathway (Lagesen et al., 2022);
→Coherence, continuity, and sustainability, ensuring robust mechanisms for implementation, follow-up, and monitoring;
→Clear political commitment, supported by adequate resources, institutional capacity, and the inclusion of relevant stakeholders at all stages of the policy cycle;
→A structural approach, combining targeted measures with gender mainstreaming (Monteiro & Lopes, 2022);
→Multilevel coordination, strategic partnerships, effective communication, and the integration of an intersectional approach;
→Definition of substantive and measurable objectives, aligned with national and European targets (Meier & Celis, 2011);
→Appropriate indicators capable of capturing qualitative and institutional change, beyond merely counting women (McKinnon, 2020).

Policy Cycles of Gender Equality in the Digital Domain in Portugal (2017-2025)

The analysis of the 2017-2025 period reveals four distinct cycles in the integration of gender equality into digital policies:

Table 1 – Policy Cycles of Gender Equality in the Digital Domain in Portugal (2017-2025)

2017-2018	Emergence of the agenda, anchored in addressing horizontal segregation, notably through *Engenheiras por Um Dia*.
2019-2020	Institutional and programatic articulation with the digital sector, higher education, and science.
2021	Political, finantial and institutional leverage driven by the equality tutelage; gender mainstreaming across digital, higher education, and science sectors.
2022-2025	Slowdown in the transversal integration of gender equality in digital policies; increasing externalisation into Project-based approaches.

Gender Equality in the Digital Domain (2017-2025)

The trajectory begins in **2017** with *Engenheiras por Um Dia*, the first major public initiative aimed at increasing women's participation in technology, involving higher education institutions, schools, municipalities, companies, professional associations, and women's networks in the digital sector.
The process reaches maturity in **2021**, under the leadership of the equality portfolio:
→Networks and programmes foreseen in ENIND (2018-2030) and INCoDe.2030 are consolidated;
→Gender equality is integrated as a political and financial requirement in the Recovery and Resilience Plan (RRP) and PT2030.
By **2025**, the National Programme *Girls in STEM* emerges as a partial institutionalisation of the trajectory initiated in 2017, primarily focused on role model initiatives and small-scale funding schemes, framed within the National Digital Strategy (2024) and its Action Plan (2025-2026).

Observed Patterns in Policy Analysis (31 Measures)

The analysis reveals a **gradual decline in the integration of gender equality within digital and science policies since 2022**, with gender equality increasingly relegated to a marginal role relative to technological and innovation priorities.
However, between **2017 and 2022**, there was a period of robust and unprecedented integration, marked by:
→The expansion of *Engenheiras por Um Dia*;
→The creation of the Alliance for Equality in ICT (2021);
→The effective mainstreaming of gender equality within key instruments such as the RRP and PT2030.
This period represents the moment of greatest policy density and impact, supported by:
→The acceleration of digitalisation in the post-pandemic context;
→Strong internal networks linking equality, science, and digital policy domains;
→Opportunities created by European funding frameworks.
These measures were pioneering in ensuring that public investment was mobilised towards gender equality objectives, fostering convergence among strategic actors around shared goals of structural transformation.

Exemplary Practices and Governance Strategies in Promoting Gender Equality in the Digital Domain

Engenheiras por um Dia (2017-2025)

This initiative placed gender equality in the digital domain firmly on the national agenda and fostered a cooperative ecosystem involving schools, higher education institutions (HEIs), technology companies, municipalities, and women's networks in STEM/ICT. It mobilised **104 organisations**, including **25 HEIs**, **15 municipalities**, and **23,000 students**.
Generated hundreds of activities (mentoring, role models, engineering challenges), achieved strong institutional and media mobilisation, and led to the creation of the **Alliance for Equality in ICT (2021)**. The initiative received international recognition, including awards from the OECD and the **European Digital Skills Awards (2025)** in the category *Women in ICT Careers*. In November 2025, public funding for the programme was discontinued.

Thematic Programme for People – Portugal 2030 (ESO4.3, 4.6, 4.7)

This programme integrates gender equality in a transversal manner and establishes clear targets for 2030:

- Halve the gender employment gap;
- Achieve **30% women ICT specialists**;
- Reach **25% women in ICT bachelor's and master's degrees**.

Finances actions aimed at reducing segregation, promoting equality in the labour market, and mitigating the gender pay gap, with specific indicators targeting women and girls (e.g., *Call PESSOAS 2025-27 – Girls in STEM*, December 2025).

Youth Impulse STEAM (RRP)

The equality portfolio encouraged HEIs to incorporate gender equality measures into their applications through an advocacy letter outlining concrete proposals:

- Scholarships for women;
- Additional weighting for projects led by women;
- Creation of "We in STEAM" offices;
- Impact evaluation mechanisms.

By 2022, **15 HEIs** had included specific gender equality measures in their applications.

Public Investment Programme in R&D (2021-2030) – Council of Ministers Resolution No. 186/2021

This programme made the promotion of gender equality mandatory in higher education and R&D, including:

- Gender balance in evaluation panels;
- Integration of a gender perspective in research content and activities.

UPSkill Programme (2021-2025)

Coordinated by the Institute for Employment and Vocational Training (IEFP), this is a flagship reskilling programme for ICT, primarily targeting unemployed individuals with higher education qualifications. It included explicit targets to attract women and applied positive action measures in selection processes.
Women represented **22% of participants** among the 430 trainees in the first edition.

ENIND 2018-2030 (2023-2026)

The National Strategy for Equality and Non-Discrimination maintains relevant objectives for gender equality in the digital domain, including teacher training, combating stereotypes, and integrating gender into AI and data science curricula. However, it is characterised by a **generic formulation**, limited indicators, and a lack of evaluation mechanisms.

INCoDe.2030

Launched in 2017 with targets for women's participation in ICT, INCoDe.2030 brought together initiatives such as *Engenheiras por Um Dia*, the Alliance for Equality in ICT, UPSkill, and MOOCs. Operated with limited resources and relied heavily on dispersed, project-based initiatives. Its discontinuation and the fragmentation of responsibilities have weakened national coordination and monitoring capacity, making gender equality in the digital domain more vulnerable to political cycles.

Currently in Force

National Programme Girls in STEM (2025)
Presented in 2025 within the framework of the National Digital Strategy, this programme revisits the 2017-2022 agenda but lacks concrete actions, robust targets, and implementation mechanisms.
Its measures are primarily promotional and do not address structural or institutional barriers. It also reflects weak interministerial coordination and signals a potential regression compared to the transversal and consolidated approach achieved up to 2022.

Gaps and Critical Issues in the Integration of Gender Perspective in Digital Policies

Education: A Missed Structural Opportunity

The integration of gender equality within the education system remains fragile:

- The Digital School Programme invested heavily in equipment but did not include gender-sensitive teacher training, inclusive educational resources, or sex-disaggregated monitoring;
- Curricula, pedagogical practices, and school cultures continue to present themselves as "neutral", thereby reproducing stereotypes and patterns of segregation in STEM/ICT choices.

Digital Skills: Monitoring Without Gender Integration

The Digital Skills Observatory, a key instrument for alignment with EU frameworks, has limited visibility, low levels of public data production, and weak coordination with equality bodies (CIG/CITE):

- There is a lack of systematic integration of gender indicators;
- Existing monitoring does not translate into public policies aimed at reducing inequalities.

Cybersecurity: Symbolic Measures and Insufficient Responses

This sector is marked by extreme inequality (9% women enrolled and 8% graduates):

- National cybersecurity strategies do not include targets, indicators, or specific gender equality measures;
- Isolated initiatives (e.g., *Bootcamp for Girls*) fail to address the structural causes of exclusion;
- There is a lack of sex-disaggregated monitoring, employability targets, and retention measures.

Artificial Intelligence: Absence of a Gender Perspective

National AI strategies (2019-2025) largely overlook gender inequalities:

- Only 24% of higher education AI programmes integrate gender equality, and often only superficially;
- The Commission for Citizenship and Gender Equality (CIG) was excluded from the national implementation of the AI Act, despite its mandate;
- There are no targets, indicators, or robust oversight mechanisms to detect, prevent, and correct algorithmic discrimination.

Platform Regulation (DSA): Institutional Fragility and Absence of Gender Perspective

The implementation of the Digital Services Act (DSA) in Portugal is delayed and has recentralised responsibilities within ANACOM, diverging from the EU model of coordinated supervision:

- There is a lack of coordination with ERC, CNPD, and equality bodies;
- Systemic risks identified by the DAS – including online gender-based violence, hate speech, and harassment – have not been integrated into national practices;
- The country lacks robust supervisory mechanisms, regulatory independence, and targeted protection measures for women and young people.

Public Policies for Digital Gender Equality: Recommendations

1. Define Clear Targets and Mandatory Indicators

→Establish annual, monitorable targets to increase women's participation in STEM/ICT in both education and the labour market;
→Develop impact indicators beyond activity metrics (e.g., retention, progression, digital literacy, labour market integration);
→Ensure direct linkage to a comprehensive indicator framework.

2. Make the National Programme *Girls in STEM* Fully Operational

→Define concrete measures, timelines, responsibilities, and funding across the programme's three pillars;
→Ensure articulation with education, higher education, science, labour/IEFP, and other relevant policy domains, avoiding a purely promotional approach.

3. Reinstate Stable Interministerial Governance Mechanisms

→Establish a permanent national structure dedicated to gender equality in the digital domain, with a clear mandate, technical team,

and dedicated budget (addressing the gap left by the discontinuation of INCoDe.2030);
→Ensure continuous interministerial coordination to avoid fragmentation of initiatives;
→Involve Education, Digital Affairs, Higher Education, Science, IEFP, ARTE, CIG, and CITE in a shared governance and monitoring structure.

4. Ensure Sustainable Funding

→Guarantee that ESO4.3-01-01 funding supports stable and long-term networks, rather than short-term projects;
→Introduce binding gender equality criteria across all funding streams related to digital, science, and innovation.

5. Scale Up Proven Interventions

→Expand programmes with demonstrated effectiveness: *Engenheiras por Um Dia*, the Alliance for Equality in ICT, and UPSkill with positive action measures;
→Monitor and strengthen the implementation of mandatory gender equality plans in HEIs and consortia;
→Reinforce training for educators and professionals in STEM/ICT on gender equality and inclusion, ensuring systemic impact.

6. Integrate Gender Perspective in Critical Areas of Digital Governance

→Embed gender equality into key domains such as the Digital School Programme, cybersecurity, AI regulation, and the implementation of the DSA.

Conclusion: The Place of Gender Equality in Digital Governance

The persistence of inequalities affecting women in the digital domain demonstrates that public policies remain largely anchored in a "fix the women" logic – focusing on adapting women to organisational contexts and technological systems that remain masculinised and falsely "gender-neutral." This approach undermines the effectiveness of digital transformation.

Recent developments in Portugal confirm a pattern widely criticised in international literature: most initiatives continue to focus on motivating, training, or supporting women, while institutional and epistemological transformations remain largely unaddressed (Schiebinger, 2008; OECD, 2025).

Final Recommendation: From Fixing Women to Transforming Institutions and Knowledge

Public policies should move beyond a narrow focus on "fixing women" and instead target the transformation of the institutions and processes that sustain and reproduce inequalities:

Curricular and pedagogical reform, integrating gender equality, critical digital literacy, and bias analysis in socio-technical systems;
Transformation of organisational cultures in education, research, and the technology sector, ensuring inclusive environments and institutional practices that do not penalise women;
Reform of recruitment, progression, and leadership models, with transparent criteria, accountability mechanisms, and processes that ensure equal opportunities;
Integration of gender analysis in knowledge production and innovation processes, fostering science and technology that are genuinely inclusive and socially responsible.

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