

Advancing Automatic Recognition Through Digital Transformation: Balancing Automation with a Human-Centric Approach

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| Abstract

The digital transformation (DT) of academic credential recognition aims to contribute to the policy goal of Automatic Recognition (AR), a long-standing commitment established through normative frameworks like the Lisbon Recognition Convention (LRC), the European Higher Education Area (EHEA) and the Council Recommendation on promoting automatic mutual recognition of qualifications and learning periods abroad. While DT provides key opportunities for efficiency, transparency, and consistency, AR itself - defined primarily as a reduction of separate recognition procedures - must be explicitly differentiated from full technological automation, a risk arising from over-reliance on digitalization.

This article first reconstructs the history of AR policies and subsequently analyzes the binding (inter) national regulations governing DT and Artificial Intelligence (AI), specifically noting that the EU AI Act classifies AI systems used in education and qualification evaluation as high-risk.

The research question addresses how DT can successfully support AR's procedural streamlining without escalating into total automation that bypasses the principles of human-centric evaluation and the mandatory requirement for human oversight imposed by international frameworks (EU, Council of Europe, UNESCO). Adopting normative document analysis and utilizing the case study of CIMEA (the Italian ENIC-NARIC center), the study identifies crucial pillars for a compliant DT strategy that effectively supports AR: Human Oversight and Accountability, Human-Centric Design, Ethics-by-Design and Quality-by-Design, Robust Data Governance and Privacy, Transparency and Explainability, and AI Literacy/Upskilling for staff.

Keywords: Digital Transformation, Automatic Recognition of qualifications, Artificial Intelligence, Academic Mobility, Internationalisation of higher education, Organizational Management.

1. Automatic Recognition, Digital Transformation and the Risk of Automation

In recent years, Automatic Recognition (AR) and digital transformation (DT) have increasingly converged within European higher education policy debates. While both are commonly associated with procedural efficiency and mobility facilitation, their interaction raises conceptual and governance questions that extend beyond technical implementation. This article examines that intersection by focusing on how digital transformation may support AR without eroding the human-centred principles on which recognition systems are built.

1.1 Automatic Recognition as a Policy Objective

Over the past decades, the rapid growth of international student mobility has progressively transformed the recognition of foreign qualifications into a central policy concern. According to recent UNESCO data, global enrolment in higher education has more than doubled since the beginning of the century – from approximately 100 million students in 2000 to around 264 million in 2025. Over the same period, international student mobility has expanded at an even faster pace, with the number of internationally mobile students tripling from about 2 million to over 6.9 million¹. As academic mobility expanded in scale and complexity, policy dialogue and cooperation were simultaneously pushing for increased transparency and comparability of qualifications, to support fast and fair recognition. In the early 2010s, the concept of AR began to emerge in Europe as a policy-oriented response aimed at reducing unnecessary procedural barriers while preserving the core principles of recognition. This trajectory found explicit institutional expression in the 2018 *Council Recommendation on promoting automatic mutual recognition of qualifications and learning periods abroad*².

This development did not occur in isolation. From the late 1980s onwards, broader geopolitical and institutional transformations in Europe contributed to framing academic mobility as a strategic dimension of European integration rather than a marginal administrative issue. Political changes across the continent, combined with the strengthening of European cooperation, intensified cross-border mobility and highlighted the need for more coherent and predictable recognition mechanisms. Early policy reflections, such as those contained in the 1985 Adonnino Report³, already emphasized academic mobility and university cooperation as essential elements of a shared European space, moving beyond a narrowly economic conception of integration.

This evolving vision was progressively consolidated through a series of landmark instruments. *The Magna Charta Universitatum* (1988)⁴ laid important normative foundations, while the *Convention on the Recognition of Qualifications concerning Higher Education in the European Region* – commonly

¹ UNESCO Institute for Statistics, *Total outbound internationally mobile tertiary students studying abroad, all countries, both sexes, 2025*. <https://data.uis.unesco.org/> [last accessed 11 February 2026].

² Council of the European Union, *Council Recommendation of the 26 November 2018 on promoting automatic mutual recognition of qualifications and learning periods abroad*, "Official Journal of the European Union", C 444/1, 2018. [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H1210\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H1210(01)) [last accessed 11 February 2026].

³ European Parliament, *The "Adonnino Report" - Report to the European Council by the ad hoc committee "On a People's Europe"*, A 10.04 COM 85, SN/2536/3/85, 1985. <https://www.ombudsman.europa.eu/en/historical/en/4659> [last accessed 11 February 2026].

⁴ Observatory Magna Charta Universitatum, *Magna Charta Universitatum*, 1988. <https://www.magna-charta.org/magna-charta-universitatum/mcu-1988> [last accessed 11 February 2026].

known as the Lisbon Recognition Convention, or LRC (1997)⁵ – established a common framework for the fair evaluation and recognition of foreign qualifications. In parallel, the *Sorbonne Declaration* (1998)⁶ and the *Bologna Declaration* (1999)⁷ initiated a process aimed at enhancing the comparability and compatibility of higher education systems across Europe.

Although these initiatives pursue distinct objectives, they are closely interconnected. The LRC primarily focuses on establishing the principles for fair recognition, streamlining procedures and safeguarding fair assessment, whereas the Bologna Process addresses the structural and programmatic reforms of higher education systems. Together, they created the policy and implementation conditions for reducing procedural complexity and strengthening mutual trust among national systems.

Within this policy trajectory, Automatic Recognition as defined in the 2018 Council Recommendation can be understood as the outcome of a long-term effort to reconcile growing mobility with the need for efficiency, fairness, and more predictability in qualification recognition. Rather than eliminating evaluation, it reflects a shift toward minimizing procedural intervention where no substantial differences exist.

Academic literature has not extensively addressed Automatic Recognition as a distinct concept. More broadly, however, scholarship on qualification recognition has examined several related dimensions, highlighting in particular the growing globalisation of recognition frameworks, particularly in relation to UNESCO's Global Convention on the Recognition of Qualifications concerning Higher Education⁸ and its implications for the interaction between national interests and international cooperation⁹.

1.2 Digital Transformation in Qualification Recognition

A further central dimension of contemporary education policies is digital transformation. International organizations active in the education sector have increasingly framed DT as a systemic process affecting governance, infrastructure, pedagogical practices, organizational culture, and the use of data. UNESCO has articulated a comprehensive framework for the digital transformation of education structured around six interrelated pillars¹⁰. At European Union level, the *Digital Education Action Plan 2021–2027*¹¹

⁵ Council of Europe, *Convention on the Recognition of Qualifications concerning Higher Education in the European Region*, "European Treaty Series", no. 165, 1997. <https://rm.coe.int/168007f2c7> [last accessed 11 February 2026].

⁶ EHEA, *Sorbonne Joint Declaration. Joint declaration on harmonisation of the architecture of the European higher education system by the four Ministers in charge for France, Germany, Italy and the United Kingdom*, Paris 1998. https://www.ehea.info/media/ehea.info/file/1998_Sorbonne/61/2/1998_Sorbonne_Declaration_English_552612.pdf [last accessed 11 February 2026].

⁷ EHEA, *The Bologna Declaration of 19 June 1999. Joint declaration of the European Ministers of Education*, 1999. https://ehea.info/Upload/document/ministerial_declarations/1999_Bologna_Declaration_English_553028.pdf [last accessed 11 February 2026].

⁸ Pedró, F., *The Recognition of Higher Education Qualifications – The Role of Quality Assurance Systems. How Quality Assurance Systems Can Promote, and Benefit from, The Recognition of Higher Education Qualifications*, in Karakhanyan, S., Kinser, K., *II Global Trends in Tertiary Education QA. Challenges and Opportunities in Internal and External QA*, "Global Perspectives on Higher Education", 2026, pp. 81-105. https://doi.org/10.1163/9789004752115_005 [last accessed 6 May 2026].

⁹ Li, X., Turner, D., *National interests in an international organisation: an analysis of UNESCO's global convention on the recognition of qualifications concerning higher education*, "Compare: A Journal of Comparative and International Education", 2025, pp. 1-15. <https://doi.org/10.1080/03057925.2025.2602562> [last accessed 6 May 2026].

¹⁰ UNESCO, *Six pillars for the digital transformation of education. A common framework*, Paris 202. <https://unesdoc.unesco.org/ark:/48223/pf0000391299> [last accessed 11 February 2026].

¹¹ European Commission, *Digital education action plan 2021-2027. Resetting education and training for the digital age*, "Education and Training", 2020. https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf [last accessed 11 February 2026].

has positioned DT as a strategic priority, promoting the development of high-performing digital education ecosystems and undergoing a comprehensive reassessment to assess its implementation and impact. The Council of Europe has adopted the *Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law*¹², and is working on a compass for AI in education. Other organizations, such as the OECD, have extensively explored the pedagogical and organizational implications of DT in higher education, emphasizing that digital maturity and the use of advanced technologies, including generative AI,¹³ require systemic alignment with institutional capacities and professional competences rather than purely technological adoption¹⁴. Parallely, a growing body of academic literature has investigated DT across multiple dimensions of the education sector.

Within this broader context, DT has progressively assumed a more explicit role also in the field of qualification recognition. Several international and European policy instruments have highlighted the potential of digital tools to support the integrity, efficiency and interoperability of recognition processes. The Council of Europe *Recommendation on Countering Education Fraud* (2022)¹⁵ explicitly calls for the use of secure digital instruments to address fraudulent qualifications. At the same time, European initiatives promoting digital credentials¹⁶ and micro-credentials¹⁷ reflect a wider effort to improve portability, transparency and trust in qualifications through interoperable digital infrastructures. This approach is supported also in the EHEA, with the latest Tirana Communiqué signed by the 46 Ministers in charge of higher education asking to counter fraudulent practices and to consider the wider and longer-term impact of the digital transition on higher education in the EHEA, including AI.¹⁸ These developments unfold in an increasingly global recognition landscape, as reflected in the entry into force of UNESCO's *Global Convention on the Recognition of Qualifications concerning Higher Education*¹⁹, which encourages the use of contemporary digital technologies and networking activities to facilitate recognition across borders. More recently, policy debates have extended to the possible application of AI within academic and administrative processes, including recognition. *The EU Artificial Intelligence Act*²⁰ classifies AI systems used for determining access to higher education

¹² Council of Europe, *Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law*, "Council of Europe Treaty Series", no. 225, 2024. <https://rm.coe.int/1680afae3c> [last accessed 11 February 2026].

¹³ OECD, *OECD Digital Education Outlook 2026. Exploring Effective Uses of Generative AI in Education*, "OECD Publishing", Paris 2026. <https://doi.org/10.1787/062a7394-en> [last accessed 11 February 2026].

¹⁴ For further reference, please visit the OECD Higher Education Publications website at the following link: https://www.oecd.org/en/publications/higher-education_26169177.html [last accessed 12 February 2026].

¹⁵ Council of Europe, *Recommendation CM/Rec(2022)18 on countering education fraud. Recommendation CM/Rec(2022)18 and explanatory memorandum*, Strasbourg 2022. <https://rm.coe.int/ok-prems-137222-gbr-2512-cmrec-2022-18-et-expose-motifs-a5-web-1-/1680a96147> [last accessed 11 February 2026].

¹⁶ Europass, *European Digital Credentials for Learning*. Available on the website of the European Union: <https://europass.europa.eu/en/european-digital-credentials-learning> [last accessed 11 February 2026].

¹⁷ Council of the European Union, *COUNCIL RECOMMENDATION of 16 June 2022 on a European approach to micro-credentials for lifelong learning and employability*, "Official Journal of the European Union", C 243/02, 2022. Available on the EUR-Lex website of the European Union: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627\(02\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(02)) [last accessed 11 February 2026].

¹⁸ EHEA, *Tirana Communiqué*, 2024. Available on the EHEA website: <https://ehea.info/Immagini/Tirana-Communique.pdf> [last accessed 11 February 2026].

¹⁹ UNESCO, *Global Convention on the Recognition of Qualifications concerning Higher Education*, Paris 1919. <https://unesdoc.unesco.org/ark:/48223/pf0000373602/PDF/373602eng.pdf.multi.page=3> [last accessed 11 February 2026].

²⁰ European Parliament and Council of the European Union, *REGULATION (EU) 2024/1689 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828 (Artificial Intelligence Act)*, "Official Journal of the European Union", L series, 2024. Available on the EUR-Lex website of the European Union: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32024R1689> [last accessed 11 February 2026].

as high-risk (since they may determine the educational and professional course of a person's life and therefore may affect that person's ability to secure a livelihood, can reproduce pattern of discrimination and violate the right to education), while complementary initiatives at both European and global level have introduced governance frameworks, ethical principles and competence frameworks aimed at guiding the responsible use of AI in education. Finally, these reflections have also been taken up within the ENIC-NARIC networks²¹ and national recognition centres, where DT is increasingly discussed both as an organizational process²² and as a potential enabler for recognition-related workflows²³, including exploratory considerations regarding AI-based solutions.²⁴

1.3 The Risk of Automation

While DT is increasingly presented as an enabling factor for more efficient recognition procedures, its growing role also raises broader questions regarding the modalities through which such technologies are deployed. Beyond a simplified narrative that equates DT with efficiency gains, a substantial body of literature has highlighted how DT is characterized by structural dynamics that shape organizational processes in non-neutral ways²⁵.

In particular, DT has been shown to promote standardization and scalability as inherent drivers of organizational change. Process standardization is frequently identified as a prerequisite for successful DT, enabling internal consistency, centralized control²⁶ and scalable operations²⁷. While these features support efficiency and interoperability, they also tend to reduce bespoke human intervention and discretionary decision-making, as standardized process architectures increasingly replace context-sensitive practices. Such dynamics are not accidental, but stem from what has been described as a "standardization pathway"²⁸, whereby digital systems privilege uniformity and automation²⁹ as conditions for large-scale deployment.

At the same time, DT is closely associated with a growing reliance on data-driven and automated decision-making. Similar concerns have also been explored within the literature on algorithmic governance in

²¹ The network of 56 National information Centres on academic recognition in the European Region. The network's website can be accessed at: <https://www.enic-naric.net/> [last accessed 11 February 2026].

²² CIMEA, *Digital Transformation and Artificial Intelligence in the Recognition of Qualifications: Perspectives from CIMEA's Experience*, "DOC CIMEA", no. 144, 2025. https://www.cimea.it/Upload/Documenti/Digital_transformation_and_AI_2025.pdf [last accessed 11 February 2026].

²³ NUFFIC, *Digitalisation of credential evaluation workflows: Practical guidelines for the ENIC-NARIC Networks*, 2023. Available on the NUFFIC website: <https://www.nuffic.nl/sites/default/files/2023-09/digitalisation-of-credential-evaluation-workflows.pdf> [last accessed 11 February 2026].

²⁴ Guèye, L., Seow-Ganesan, D., Lantero, L., et al., *AI use in qualifications recognition: five key factors*, "University World News", 2025. <https://www.universityworldnews.com/post.php?story=20250109122353833> [last accessed 11 February 2026].

Lantero, L., Ferranti, L., Finocchietti, C., et al., *Artificial Intelligence and Recognition of Qualifications: Opportunities and Risks from an ENIC-NARIC Perspective*, "DOC CIMEA", no. 141, 2023. https://www.cimea.it/Upload/Documenti/Artificial_Intelligence_and_Recognition_of_Qualifications.pdf [last accessed 11 February 2026].

²⁵ Floridi, L., *On Good and Evil, the Mistaken Idea That Technology Is Ever Neutral, and the Importance of the Double-Charge Thesis*. "Philos. Technol." 36, no. 60, 2023. <https://doi.org/10.1007/s13347-023-00661-4> [last accessed 11 February 2026].

²⁶ Kirchmer, M., *Realizing Appropriate Process Standardization – Basis for Effective Digital Transformation*, in Shishkov, B. (eds) *Business Modeling and Software Design*, Springer, Cham 2023, pp. 18-31. https://doi.org/10.1007/978-3-031-36757-1_2 [last accessed 11 February 2026].

²⁷ Vendrell-Herrero, F., Para-González, L., Mascaraque-Ramírez, C., et al., *The order of the factors matters: How digital transformation and servitization integrate more efficiently*, "International Journal of Production Economics", 271, 2024. <https://www.sciencedirect.com/science/article/pii/S0925527324000859> [last accessed 11 February 2026].

²⁸ Ibid.

²⁹ Defined as "the performance by a machine (usually a computer) of a function previously performed by a human". Parasuraman, R., Sheridan, T. B., & Wickens, C. D. *A model for types and levels of human interaction with automation*, "IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans", no. 3, pp. 286-297, 2000. <https://ieeexplore.ieee.org/document/844354> [last accessed 6 May 2026].

education, which has examined the implications of AI-driven systems for institutional governance³⁰, teaching and learning³¹, as well as the related ethical challenges³². The use of large datasets and algorithmic systems can enhance speed and consistency, yet it also introduces well-documented risks related to transparency, accountability and bias. Empirical and theoretical studies have emphasized how automated decision-making systems may reproduce or amplify existing inequalities, generate discriminatory outcomes and obscure the allocation of responsibility³³. Data-intensive systems further raise concerns regarding privacy, data protection and trust, particularly in contexts where decisions affect individual rights and opportunities³⁴. Without robust data governance frameworks, the scalability and data dependence of digital solutions may result in systemic risks, including unauthorized data use, reputational damage and diminished institutional legitimacy³⁵.

In response to these challenges, the literature increasingly converges on the importance of meaningful human oversight. Rather than accesseding human involvement as a symbolic element, research highlights the role of human-in-the-loop mechanisms as a functional necessity for ensuring accountability, decision quality and ethical compliance³⁶. At the same time, studies caution that human oversight may be weakened by automation-induced reductions in professional discretion or by feedback loops in which biased algorithmic outputs shape subsequent human judgments³⁷.

1.4 Research Question

Taken together, these dynamics suggest that DT embodies structural tendencies – towards standardization, data reliance and automation – that require careful governance, particularly in domains where fairness, transparency and individual assessment are essential. These features are intrinsic characteristics of digital solutions, largely independent of the specific sector in which they are applied. At the same time, DT is increasingly advocated by international and European institutions as a key enabler for academic mobility, cross-border cooperation and the effective realization of the right to education.

Against this background, and with specific reference to AR, a critical question emerges. If DT is to support the procedural streamlining envisaged by AR, it must do so without undermining the human-centric principles on which recognition is founded. The challenge, therefore, is not whether DT should be applied to qualification recognition, but how it can be implemented in a way that remains sustainable,

³⁰ Wang, Y., *Algorithmic decisions in education governance: implications and challenges*, "Discov Educ", no. 3, 2024. <https://doi.org/10.1007/s44217-024-00337-x> [last accessed 7 May 2026].

³¹ Enăchescu, V., *Algorithmic Governance in Education: A Bibliometric and Critical Analysis of Artificial Intelligence Integration in Teaching and Learning Systems*, "International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society", no. 6, pp. 48-64, 2026. <https://doi.org/10.65222/VIRAL.2026.3.21.41> [last accessed 7 May 2026].

³² Madleňák, R., Madleňáková, L., Cvacho, V., et al., *Ethical Challenges of Artificial Intelligence in Higher Education: A Four-Pillar Student-Activity Framework for Institutional Governance*. "Educ. Sci" 555, no. 16, 2026. <https://doi.org/10.3390/educsci16040555> [last accessed 7 May 2026].

³³ Giacomini, C., Aprilis, C., *Digital Discrimination. The Challenge of Bias and Transparency in AI*, "Lessico di etica pubblica", no. 1, 2024: https://www.eticapubblica.it/wp-content/uploads/2025/02/04_-LEPI-24_Giacomini-e-Aprilis.pdf [last accessed 11 February 2026].

³⁴ Mirmiran, F., *Data Privacy Concerns: How AI Is Changing the Landscape of Personal Information*, Zenodo, 2024. <https://doi.org/10.5281/zenodo.13822481> [last accessed 11 February 2026].

³⁵ Vital Bernardo, B.M., São Mamede, H., Pereira Barroso, J.M., et al., *Data governance & quality management—Innovation and breakthroughs across different fields*, "Journal of Innovation & Knowledge" 9, no. 4, 2024. <https://doi.org/10.1016/j.jik.2024.100598> [last accessed 11 February 2026].

³⁶ European Parliament, *Digitalisation, artificial intelligence and algorithmic management in the workplace: Shaping the future of work*, "European Parliamentary Research Service", PE 774.670, 2025. [https://www.europarl.europa.eu/RegData/etudes/STUD/2025/774670/EPRS_STU\(2025\)774670_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2025/774670/EPRS_STU(2025)774670_EN.pdf) [last accessed 11 February 2026].

³⁷ Huang, B., Niyomsilp, E., *The impact of artificial intelligence on organizational decision-making processes*, "Edelweiss Applied Science and Technology" 9, no. 4, 2025. <https://doi.org/10.55214/25768484.v9i4.6081> [last accessed 11 February 2026].

fair and aligned with the fundamental objectives of recognition policies.

This article addresses this challenge by investigating the following research question: How can digital transformation successfully support AR's procedural streamlining without escalating into total automation?

In so doing, the article aims to contribute a conceptual framework for understanding how efficiency-oriented digital solutions can be reconciled with human-centric recognition practices.

2. Methodological Approach

This study adopts a qualitative, normative-oriented methodological approach, combining policy document analysis with empirical grounding derived from institutional practice. The analysis is designed to reconstruct the evolution of AR as a policy objective and to examine how contemporary regulatory frameworks governing DT and AI shape its implementation.

2.1 Normative and Policy Document Analysis

The core of the analysis is based on a desk reaccessed of primary normative and policy documents that constitute the foundation of AR and of regulatory approaches to DT in education. The study relies on official texts, including conventions, ministerial declarations, communiqués and legally binding or policy-guiding instruments adopted at European and international level.

With regard to AR, five foundational sources have been selected. These include the *Sorbonne Declaration* and the *Bologna Declaration*, which laid the groundwork for the creation of the European Higher Education Area (EHEA) and articulated the central role of European integration and cooperation in higher education. The EHEA ministerial communiqués, which punctuate and operationalize the Bologna Process in its more than 25 years of existence, have been analyzed to trace the progressive consolidation of recognition-related policy objectives. In addition, the LRC has been examined as the primary legal framework governing fair recognition across Europe. The Council of the European Union's Recommendation on Automatic Recognition has also been considered as a key policy instrument.

With regard to DT and AI, the analysis draws on a selection of foundational regulatory and policy documents at both European Union and international level. At EU level, the *General Data Protection Regulation (GDPR)*³⁸, the *Cybersecurity Act*³⁹, the *Interoperable Europe Act*⁴⁰ and the *EU AI Act* have

³⁸ European Parliament and Council of the European Union, *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)*, "Official Journal of the European Union", L 119/1, 2016. <https://eur-lex.europa.eu/eli/reg/2016/679/oj/eng> [last accessed 11 February 2026].

³⁹ European Parliament and Council of the European Union, *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)*, L 151/15, 2019. <https://eur-lex.europa.eu/eli/reg/2019/881/oj/eng> [last accessed 11 February 2026].

⁴⁰ European Parliament and Council of the European Union, *Regulation (EU) 2024/903 of the European Parliament and of the Council of 13 March 2024 laying down measures for a high level of public sector interoperability across the Union (Interoperable Europe Act)*, L series, 2024. <https://eur-lex.europa.eu/eli/reg/2024/903/oj/eng> [last accessed 11 February 2026].

been examined as core instruments shaping the legal and governance conditions under which digital public services – including recognition processes – may operate.

At international level, the analysis considers the UN Sustainable Development Goals (in particular SDG 4 on quality education), UNESCO's *Six Pillars for the Digital Transformation of Education*, UNESCO's *Guidance for Generative AI in Education and Research*, and the Council of Europe's *Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law*. These documents have been selected as they articulate systemic, human-centred and rights-based approaches to DT and AI governance in education.

The analysis proceeds by putting into relation the intrinsic features of DT identified in Section 1.3 with the defining elements of AR reconstructed in Section 3. This relational step is not intended to assess empirical implementation outcomes, but to identify structural tensions and points of friction that emerge when efficiency-oriented digital logics intersect with rights-based recognition principles. Lastly, the European and international regulatory frameworks analysed in Section 4 are used as a normative lens to assess how these tensions are currently framed, constrained and governed at policy level.

2.2 Role of the CIMEA Case as Empirical Grounding

In addition to normative analysis, the study draws on selected references to the experience of CIMEA, the Italian ENIC-NARIC centre. CIMEA was selected due to its experience in both researching and applying digital solutions within qualification recognition workflows. However, CIMEA is not treated as a standalone case study, nor as an object of evaluative analysis. Rather, its role is to provide empirical grounding for selected dynamics, challenges and principles emerging from the normative framework. In particular, references to CIMEA are used to illustrate concrete examples of how human and technological components may interact in support of Automatic Recognition processes, including in contexts where digital streamlining coexists with case-by-case assessment, human oversight and institutional dialogue.

3. Automatic Recognition: Policy Evolution and Underlying Principles

This section reconstructs how AR has progressively emerged as a policy objective within the broader European architecture for academic mobility. The aim is to identify the core elements that have shaped AR over time so as to clarify what AR is intended to achieve and which principles it presupposes.

3.1 From the Lisbon Recognition Convention to the Council Recommendation

The policy trajectory leading to AR builds on two intertwined developments: the consolidation of fair recognition principles through the LRC and the gradual harmonization and transparency tools promoted through the Bologna Process and the EHEA.

Adopted in 1997, the LRC provided the central legal and normative framework for fair recognition of qualifications across the European region. Rather than introducing entirely new principles, the LRC codified procedural guarantees: the right to access recognition procedures, non-discrimination, transparency and consistency of assessment, and the idea that recognition may be refused only where

a substantial difference can be demonstrated (with the burden of proof on the recognition authority). The Convention also emphasized the role of reliable information for decision-making and promoted supporting instruments such as the Diploma Supplement, while establishing national information centres (ENICs) to facilitate system transparency and cross-border cooperation. Over time, the ENIC-NARIC networks and the LRC Committee (and its subsidiary texts) reinforced a shared professional and policy space around recognition, including guidance and implementation instruments and practice on specific contexts.

In parallel, the Bologna Process – initiated by the Sorbonne Declaration and the Bologna Declaration – pursued the comparability and compatibility of higher education systems as a structural condition for mobility. The progressive consolidation of Bologna “key commitments” (three-cycle structure, ECTS, national and overarching qualifications frameworks, learning outcomes, recognition of qualifications in line with the LRC, and quality assurance standards through the ESG) strengthened transparency and mutual trust, thereby reducing uncertainty and procedural frictions in recognition. The establishment of the EHEA in 2010⁴¹ marked a turning point by foregrounding procedural streamlining in recognition as a specific policy priority.

The concept of Automatic Recognition entered the EHEA agenda explicitly in the Bucharest Communiqué (2012)⁴², which committed countries to work “towards the automatic recognition of comparable academic degrees” as a long-term goal, explicitly “building on the tools of the Bologna framework” and reaffirming compliance with LRC principles. Because “automatic recognition” was not yet defined, an EHEA Pathfinder Group was tasked with clarifying its meaning and possible pathways. Its subsequent work contributed a first shared formulation of AR as a level-based entitlement related to access to the next cycle of studies, and stressed that recognition procedures across the EHEA were often still burdensome and unevenly aligned with LRC principles⁴³. The Yerevan Communiqué (2015)⁴⁴ further consolidated AR as a policy commitment and framed it more explicitly as recognition “at the same level” as domestic qualifications, while later communiqués reiterated the goal and anchored it to Bologna instruments (including ECTS implementation, and recalling recognition guidance such as the EAR Manual and quality assurance and transparency tools such as the DEQAR database)⁴⁵.

A decisive institutional step followed in 2018 at EU level with the Council of the European Union’s *Recommendation on promoting automatic mutual recognition of qualifications and learning periods abroad*. The Recommendation provided the most explicit and comprehensive policy definition of AR to date and extended the scope beyond higher education degrees to include upper secondary

⁴¹ EHEA, *Budapest-Vienna Declaration on the European Higher Education Area*, 2010. Available on the EHEA website: https://ehea.info/media.ehea.info/file/2010_Budapest_Vienna/64/0/Budapest-Vienna_Declaration_598640.pdf [last accessed 11 February 2026].

⁴² EHEA, *Making the Most of Our Potential: Consolidating the European Higher Education Area. Bucharest Communiqué*, 2010. Available on the EHEA website: https://www.ehea.info/Upload/document/ministerial_declarations/Bucharest_Communique_2012_610673.pdf [last accessed 11 February 2026].

⁴³ EHEA, *Report by the EHEA Pathfinder Group on Automatic Recognition. To present to Ministers of the European Area of Higher Education for the Bologna Ministerial Conference 14-15 May 2015 in Yerevan, Armenia*, 2015. Available on the EHEA website: https://www.ehea.info/media.ehea.info/file/2015_Yerevan/72/3/EHEA_Pathfinder_Group_on_Automatic_Recognition_January_2015_613723.pdf [last accessed 11 February 2026].

⁴⁴ EHEA, *Yerevan Communiqué*. Available on the EHEA website: https://www.ehea.info/media.ehea.info/file/2015_Yerevan/70/7/YerevanCommuniquéFinal_613707.pdf [last accessed 11 February 2026].

⁴⁵ NUFFIC, *EAR Manual 2023*, 2023. Available on the NUFFIC website https://www.nuffic.nl/sites/default/files/2023-08/1.%20EAR%20Manual%202023_2nd%20edition.pdf [last accessed 11 February 2026].

qualifications (for access to higher education) and learning periods abroad⁴⁶. Subsequent EHEA communiqués continued to reaffirm AR, increasingly linking it to enabling conditions such as quality assurance information and to the integrity dimension of recognition, including authenticity verification. By the time of the Tirana Communiqué (2024) and as of the time of writing, AR remains a reiterated objective alongside renewed emphasis on LRC implementation and the continued development and use of EHEA recognition tools.

3.2 Automatic Recognition as Procedural Streamlining

Across its policy evolution, AR is best understood as a form of procedural streamlining rather than as the elimination of evaluation. Its meaning emerges at the intersection of structural conditions that enable comparability and the rights-based recognition principles laid down in the LRC.

From a structural perspective, AR is level-based, relying on qualifications frameworks and transparency tools to support comparability across systems. The “automatic” dimension refers to the presumption that a qualification at a given level should be treated as comparable to a domestic qualification at the same level, thereby enabling progression to the next level of studies without the need for a separate recognition procedure. At the same time, AR concerns access rather than admission: holders of foreign qualifications must be considered for entry under the same conditions as domestic candidates, while institutions retain the right to apply programme-specific admission criteria. Moreover, AR explicitly preserves essential integrity safeguards, including authenticity verification and confirmation of access rights in the country of origin, in order to protect system quality and genuine students.

In continuity with the LRC, AR also rests on a rights-based conception of recognition. In this sense, AR reinforces the principle that recognition should be the default outcome in the absence of substantial differences relevant to the purpose of recognition, and aligns with broader policy commitments to widening access to education, including the objectives underpinning SDG 4 (Quality Education)⁴⁷.

Taken together, these elements highlight the dual nature of AR. While it aims to minimise procedural burdens, it necessarily coexists with some procedural requirements – such as authenticity checks, admission decisions and case-by-case assessments in non-standard situations – that cannot be eliminated without undermining fairness and accountability. It is precisely in this context that digital technologies are increasingly presented as a potential means of further streamlining recognition. However, because these steps touch directly upon individual rights and evaluative judgement, the analysis must now turn to the European and international regulatory frameworks governing DT and AI.

⁴⁶ The recommendation defines AR as «the right for holders of a qualification of a certain level that has been issued by one Member State to be considered for entry to a higher education programme in the next level in any other Member State, without having to go through any separate recognition procedure. This shall not prejudice the right of a higher education institution or the competent authorities to set specific evaluation and admission criteria for a specific programme. It does not prejudice the right to check, if the qualification is authentic and, in case of an upper secondary education and training qualification, if it really gives access to higher education in the Member State of issuance or, in duly justified cases, if the granted qualification meets the requirements for accessing a specific higher education programme in the receiving Member State». Council of the European Union, *Council Recommendation of the 26 November 2018...* cit., p. 6.

⁴⁷ The Global Goals, *Quality Education*. Available on The Global Goals website: <https://www.globalgoals.org/goals/4-quality-education/> [last accessed 11 February 2026].

4. Digital Transformation and AI in Qualification Recognition: Regulatory Framework

The regulatory landscape at global and European levels frames DT and AI as potentially enabling, yet subject to strict conditions related to fundamental rights, accountability, transparency, data governance, and human oversight. These frameworks provide the normative constraints within which technology can legitimately support recognition processes.

4.1 The EU Regulatory Framework

At EU level, the regulatory framework relevant to DT in qualification recognition is not defined by a single “digital transformation law”, but by a set of interlocking instruments that regulate the core enabling conditions of digitalised public services: lawful data processing, secure infrastructures, and interoperable cross-border exchanges.

First, the *General Data Protection Regulation (GDPR)* sets the baseline for any DT that relies on personal data. It governs the lawful, fair, and transparent processing of data, requiring purpose limitation, data minimisation, appropriate security measures, and enforceable data subject rights. In recognition contexts, GDPR is directly relevant because streamlining often depends on increasing data reuse and data sharing; these benefits must remain compatible with information duties toward individuals and safeguards around profiling and automated processing.

Second, EU cybersecurity policy – most notably the *Cybersecurity Act* and the certification approach it enables – supports the security and resilience of digital services and infrastructures. This is central for recognition ecosystems that increasingly rely on digital channels for document transmission and verification, and institutional communication. By promoting risk-based certification schemes and strengthening the role of ENISA (the EU Agency for cybersecurity), the framework reinforces trust in the technical layer of DT, which is a prerequisite for scaling secure recognition-related services across borders.

Third, the *Interoperable Europe Act* addresses the organisational and technical reality of cross-border digitalisation: DT in the public sector requires common interoperability practices, shared solutions, and structured cooperation among administrations. By supporting reusable interoperability solutions and introducing mandatory interoperability assessments (under proportionality safeguards), the Act directly aligns with recognition streamlining goals – particularly where procedures depend on cross-border exchange of structured information and on the reuse of trusted digital building blocks. Its coordination with GDPR and the AI Act also signals that interoperability must be achieved within a rights- and risk-governed environment.

The *EU Artificial Intelligence Act* provides a sector-relevant specification where DT involves AI systems with heightened impact on individuals. In education and training, the Act classifies as high-risk several AI uses linked to access/admission, evaluation, and monitoring, and mandates requirements such as risk management, data quality, documentation and traceability, transparency, human oversight, robustness and cybersecurity. Two provisions are particularly consequential for recognition-related workflows where AI may be used: the obligation to conduct fundamental rights impact assessments

prior to deployment of high-risk systems and the requirement to ensure AI literacy among staff involved in operating or overseeing such systems. Together, these instruments make clear that DT in recognition operates within a rights- and risk-governed framework: digital solutions may support streamlining, but only under enforceable constraints relating to data protection, security, interoperability and AI-specific safeguards.

4.2 Normative Framework at the Global Level

Similarly, at global level DT in education is framed primarily as a systemic reform process aimed at improving access, equity and quality. International organisations increasingly converge on the idea that technology can support educational systems only if embedded in coherent governance structures, aligned with human-centred values and with the objectives of SDG 4 (Quality Education for All).

Within this perspective, UNESCO's *Six pillars for the digital transformation of education: A common framework* articulates a comprehensive, human-centred approach structured around six interrelated pillars: coordination and leadership; capacity and culture; cost and sustainability; content and solutions; connectivity and infrastructure; and data and evidence. The framework stresses the need for strategic coordination, sustainable investment, institutional capacity-building and responsible data use as enabling conditions. Emphasis is placed on equity, inclusiveness and the risk of exacerbating existing digital divides if transformation efforts are driven primarily by efficiency or scalability considerations. Data systems and interoperability are recognised as key enablers, but only insofar as they are governed in ways that ensure privacy, security and accountability.

This vision is complemented by UNESCO's *Guidance for generative AI in education and research*⁴⁸, which explicitly situates AI within the broader DT agenda. It acknowledges both the transformative potential of generative AI and the regulatory and institutional unpreparedness that currently characterises many education systems. It therefore advocates a human-centred and ethics-by-design approach, calling for strengthened data protection, clear governance and accountability across actors, transparency and explainability of AI systems, and sustained investment in digital and AI-related competencies. Crucially, the guidance frames AI not as a substitute for human judgement, but as a tool whose deployment must preserve human agency, pedagogical integrity and social interaction, particularly where decisions affect learners' educational trajectories.

The Council of Europe *Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law* provides a binding international reference for the governance of AI systems across sectors, including education. The Convention establishes cross-cutting obligations that are directly relevant to digitally transformed recognition processes: non-discrimination, protection of human dignity, transparency, accountability, risk assessment and mitigation across the AI lifecycle, and the requirement for human oversight. It also mandates independent oversight mechanisms and access to remedies for individuals affected by AI-related harms. Importantly, the Convention frames AI governance as complementary to existing international human rights standards, rather than as a self-contained technical regime.

⁴⁸ UNESCO, *Guidance for generative AI in education and research*, Paris 2023. <https://unesdoc.unesco.org/ark:/48223/pf0000386693> [last accessed 11 February 2026].

5. A Human-Centric Framework for Digital Transformation Supporting Automatic Recognition

Building on this normative and analytical backdrop, the following section brings together the main strands of the argument. Building on the characteristics of AR (Section 3) and on the structural dynamics of DT and its regulatory framing (Sections 1.3 and 4), it identifies a set of conceptual tensions that emerge when digital solutions are mobilised in support of recognition procedures. These tensions do not reflect contradictions between recognition policies and digital regulation, but rather potential misalignments between the objectives of AR and the intrinsic logics of DT. Making these tensions explicit provides the basis for outlining a set of design pillars aimed at supporting AR in a sustainable and human-centric manner.

5.1 Conceptual Tensions in the Digital Transformation of Automatic Recognition

A first area of tension concerns the relationship between procedural streamlining and the persistence of case-by-case assessment. AR seeks to minimise recognition procedures where qualifications are comparable and no substantial differences exist, relying on transparency tools or databases⁴⁹, qualifications frameworks and shared trust among systems. DT appears, at first glance, to align seamlessly with this objective, as standardised digital infrastructures can support level-based presumptions and reduce repetitive administrative steps. In practice, however, recognition systems continue to encounter categories of cases that cannot be fully resolved through standardisation alone, such as non-linear learning pathways, as well as, in some cases, pre-Bologna qualifications or qualifications originating from structurally different education systems. In these situations, individual assessment remains necessary to preserve fairness and coherence with recognition principles. Digital tools may support this process by improving access to information, but they do not eliminate the need for contextual judgement. Rather than replacing case-by-case evaluation, DT tends to redraw its boundaries, concentrating discretionary assessment within a narrower – but still essential – set of cases.

A related tension emerges with regard to decision-making authority and accountability. While AR aims to simplify procedures, it does not alter the allocation of responsibility for recognition decisions, which remains anchored in legal and institutional frameworks. In academic recognition, final decisions typically rest with higher education institutions, reflecting both legal mandates and the autonomy of institutions in defining admission criteria. Digital systems can streamline workflows, support evaluative processes and facilitate communication between actors, yet they cannot assume responsibility for decisions that have direct legal and educational consequences for individuals. If not carefully governed, such developments risk blurring the distinction between procedural support and substantive decision-making, potentially weakening accountability. At the same time, empirical practice shows that even highly digitalised recognition processes continue to embed mechanisms for human judgement, dialogue and appeal, underscoring that streamlining does not equate to delegating final decisions to technical systems⁵⁰.

⁴⁹ See for example the Automatic Recognition Database Italia (ARDI), available at: <https://ardi.cimea.it/en>

⁵⁰ A practical illustration of this approach can be found in the ongoing interaction between national recognition centres and HEIs. In the Italian context, CIMEA combines the development of digital tools and databases aimed at supporting recognition procedures with continuous human-mediated interaction with HEIs. Alongside digital infrastructures designed to streamline access to information and orientation, structured channels of communication and dialogue are maintained to support institutions in individual recognition cases and admission decisions. This combination reflects an understanding of digital transformation as an enabling layer rather than as a substitute for human judgement in recognition processes.

A third tension relates to the growing reliance on data as a foundation for efficiency, trust and interoperability. DT in recognition increasingly depends on structured data, shared databases and digital platforms to support comparability and verification. This data-centric approach can enhance transparency and reduce duplication, particularly where public and system-level information is concerned. However, recognition processes also involve the handling of sensitive personal data, including educational histories and identity-related information, which directly engage individual rights to privacy and data protection. The deeper digital tools intervene in individual recognition cases, the more stringent become the requirements for lawful processing, governance and trust. Distinctions therefore emerge between digital infrastructures that operate on publicly available information to support orientation and presumption, and platforms that process personal data to enable individual evaluations.

Considered together, these tensions highlight the conditions under which DT can meaningfully support AR. They show that streamlining cannot be pursued in isolation from the legal, procedural and rights-based features that structure recognition practices.

5.2 *The Design Pillars of a Sustainable Approach to Automatic Recognition*

In response to these tensions, this section formulates six design pillars that translate existing regulatory principles into operational orientations for digitally supported recognition. These design pillars do not prescribe particular technologies, but establish the conditions under which digital tools may be coherently integrated into recognition processes.

A first design pillar concerns human-centric design, which responds directly to the tension between procedural standardisation and case-by-case fairness. Regulatory and policy frameworks consistently acknowledge that digital systems may rely on standardised logics, but must retain the capacity to accommodate non-standard cases. Human-centric design therefore requires that digitally supported recognition processes remain adaptable, allowing exceptions, contextual interpretation and individualized assessment where qualifications do not fit predefined patterns. This pillar aligns with the LRC's emphasis on individual entitlement to fair assessment and with human-centred approach to DT.

Closely connected is the design pillar of human oversight and accountability, which addresses the tension between procedural streamlining and accountable judgement. Across both EU and international frameworks, a consistent boundary is drawn between technical support and decision-making authority. The AI Act, the Council of Europe AI Convention and UNESCO guidance all stress that decisions affecting educational access and progression must remain attributable to human actors and subject to responsibility, reassessed and redress. Applied to AR, this pillar reinforces that digital systems may support evaluation and orientation, but cannot replace institutional or legally competent decision-makers.

Within this same tension, transparency and explainability emerge as a distinct yet complementary design pillar. Transparency concerns the intelligibility of procedures, criteria and data use, while explainability relates to the ability to understand how specific outcomes are produced. Together, they ensure that digitally supported recognition decisions remain justifiable and contestable, enabling dialogue, appeal and institutional trust. This pillar reflects AI Act transparency requirements and broader human rights standards that safeguard the right to an effective remedy. In recognition contexts,

transparency and explainability are essential to prevent digital streamlining from obscuring evaluative reasoning or weakening procedural guarantees.

Meaningful human oversight, however, presupposes adequate institutional capacity too. For this reason, AI literacy and upskilling for staff constitute a further design pillar, particularly relevant where advanced digital tools are introduced. Regulatory frameworks increasingly recognise that human involvement risks becoming nominal if staff lack the competencies needed to understand, question and intervene in technologically mediated processes. The AI Act's explicit reference to AI literacy, together with UNESCO's emphasis on capacity-building, highlights that professional expertise must evolve alongside digital systems. In the field of recognition, this pillar supports informed discretion and prevents automation bias from reshaping human judgement in unexamined ways.

A separate but equally central design concern is robust data governance and privacy, which responds to the tension between data-driven efficiency and rights, privacy and trust. Recognition processes necessarily rely on sensitive personal and educational data, and DT often amplifies data reuse, interoperability and verification. GDPR, cybersecurity frameworks and UNESCO's guidance for generative AI in education and research converge in requiring that such data practices remain purpose-limited, secure and transparent, with clear safeguards against misuse.

Finally, ethics-by-design and quality-by-design operate as transversal design pillars, underpinning all the dimensions discussed above. Rather than constituting a standalone requirement, they embed fairness, proportionality, reliability and accountability across the entire lifecycle of digitally supported recognition processes. This transversal role reflects both UNESCO's ethics-by-design approach and the Council of Europe's framing of AI governance as complementary to existing human rights obligations. In the context of AR, ethics- and quality-by-design ensure coherence between procedural streamlining and the substantive values that recognition policies are intended to uphold.

Table 1 - Conceptual Tensions in Digital Transformation and Corresponding Design Pillars for Automatic Recognition

Conceptual tension	Design pillar	Function
A. Procedural standardisation vs case-by-case fairness	Human-Centric Design	Preserves contextual evaluation and the handling of non-standard cases within streamlined recognition procedures
B. Streamlining vs accountable human judgement	Human Oversight and Accountability	Ensures that recognition decisions remain imputable to human authorities and subject to responsibility and reaccessed
B. Streamlining vs accountable human judgement	Transparency and Explainability	Makes decision-making pathways intelligible, justifiable and contestable, enabling appeal, reaccessed and accountability
B. Streamlining vs accountable human judgement	AI Literacy and Upskilling for Staff	Enables informed and meaningful human oversight, preventing symbolic or nominal human involvement in automated workflows
C. Data-driven efficiency vs rights, privacy and trust	Robust Data Governance and Privacy	Aligns data-intensive recognition processes with data protection, purpose limitation and trust-based institutional safeguards
All (A, B, and C)	Ethics-by-Design and Quality-by-Design	Embeds fairness, proportionality, reliability and accountability across all stages of digitally supported recognition processes

6. Conclusion

The analysis suggests that the risk of automation does not stem from technology per se, but from interpretative shortcuts that conflate streamlining with automation and correspondence with uniformity. As articulated in European policy, AR is neither a purely technical nor a fully automated process: it presupposes trust between systems, a presumption of level correspondence, and the persistence of residual procedures that safeguard fairness and integrity.

Against this backdrop, the six design pillars proposed in this article translate existing regulatory and policy constraints into practical orientations for digitally supported recognition. They do not introduce new normative obligations, but systematise requirements already embedded in European and international frameworks on data protection, AI, interoperability and human rights, outlining a model of DT that is enabling rather than substitutive: technology supports recognition processes while responsibility, judgement and accountability remain human.

Finally, this study also presents limitations and avenues for further research. Firstly, the analysis is primarily conceptual and normative, and does not assess specific technological implementations in a systematic way. Future research could therefore examine how the identified tensions and design pillars materialise in concrete recognition workflows, including the use of databases, digital infrastructures and AI-assisted tools. Secondly, it addresses the recognition of final qualifications, and it does not explore the role of DT in the recognition of partial qualifications, periods of study, skills, prior learning and non-formal and informal learning. The possibility to streamline forms of scalability of recognition in this context, while preserving a rights-based and a case-by-case approach, represents a vast and interesting area for further research. Moreover, while the focus on AR justifies a European scope, further work could explore how similar tensions emerge in non-European recognition contexts.

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