

“Developing Soft Skills While Gaming”

D6.8. POLICY RECOMMENDATIONS



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List of Abbreviations

Abbreviation	Description
EC	European Commission
EU	European Union
GA	Grant Agreement
GDPR	General Data Protection Regulation
IP	Intellectual Property
IPR	Intellectual Property Rights
R&I	Research and Innovation
WP	Work Package

List of Partners

N.	Partner	Country	Acronym
1	FUNDACION TECNALIA RESEARCH & INNOVATION	ES	TECNALIA
2	ALL DIGITAL AISBL	BE	ALL DIGITAL
3	UNIVERZITA PALACKEHO V OLOMOUCI	CZ	UP
4	CONFEDERATION EUROPEENNE DES ASSOCIATIONS DE PETITES ET MOYENNES ENTREPRISES	BE	CEA-PME
5	CEGOS ESPAÑA LEARNING & DEVELOPMENT	ES	CEGOS
6	UNIVERSITY OF SOUTHAMPTON	UK	UOS
7	ESCRIBANO SERRANO JOSE MANUEL	ES	FESC

1. EXECUTIVE SUMMARY

The MEGASKILLS project was launched to address the critical gap between educational outcomes and the labour market's demand for essential soft skills in the 21st century. By leveraging innovative methodologies such as gamified learning, artificial intelligence (AI), and psychophysiological metrics, the project focuses on identifying the most important soft skills for the 21st century and exploring opportunities for their development through video games.

Present Deliverable D6.8 Policy Recommendations (M36) consolidates the project's final findings and provides three strategic scenarios to reduce skills gaps, each accompanied by four emerging policy recommendations to support and measure their diffusion and adoption. The three scenarios are structured around the main pillars and results of the project, each reflecting a distinct dimension of the MEGASKILLS outcomes:

- **Scenario 1** – emerging from the *Key Soft Skills Taxonomy and Models* analysis (WP2);
- **Scenario 2** – emerging from the *Psycho-pedagogical Methodology for Detection and Training of Soft Skills with Commercial Video Games* (WP3) and the *Use Cases and Demonstrations* (WP5);
- **Scenario 3** – emerging from the *Platform Development* (WP4) and *Outreach Activities* (WP6).

Each scenario follows a clear and actionable structure, outlining:

- **Main Problems Addressed;**
- **Tested Solutions and Innovations**, describing the key innovative contributions and the experimental, validation, and refinement processes that underpin their scientific credibility and operational relevance;
- **Outcomes and Lessons Learned**, supported by quantitative and qualitative indicators collected throughout the entire lifecycle of the MEGASKILLS project;
- **Four main Policy Recommendations** emerging;
- **Summary of the scenario.**

Drawing on the consolidated results of the project's three-year research and development process, we identified **the following policy implications**:

1. Positioning Soft Skills at the Core of Educational, Civic and Green Agendas

The MEGASKILLS results highlight the **need for an integrated policy approach that embeds soft skills within green and civic priorities**, focuses on the development of central Hub Soft Skills, provides stakeholders with accessible digital and contextualised tools, and ensures diversity and inclusion across all training and assessment processes. Together, these elements form the foundation for a modern, evidence based, and equitable soft skills framework capable of responding to the demands of a 21st century society and economy.

2. Harnessing Game-Based and Data-Driven Approaches to Modernise Soft Skills Development and Recognition

The recommendations collectively point to the growing need for a modernised policy framework that leverages commercial video games, behavioural data, and structured facilitation to strengthen soft skills development across education, employment, and corporate training systems. **MEGASKILLS demonstrates that game-based environments**, when supported by validated behavioural metrics, transfer methodologies,

and clear quality standards, **offer scalable, engaging, and scientifically sound pathways for assessing and developing essential 21st century competences.** Embedding these approaches into Active Employment Policies, VET programmes, and workplace training, while recognising learning outcomes through micro credentials, would enable more transparent skill recognition, improve employability, and increase alignment with evolving labour market demands. Particularly important recommendation emerging from the project is to evolve the current PEGI¹ system into PEGI+, which would indicate not only the potential dangers of video games but also their potential benefits, as research increasingly highlights the positive cognitive and social impact of video games.

3. Strengthening Europe’s Digital Infrastructure for Inclusive Soft Skills Innovation

MEGASKILLS demonstrates that AI-driven tools, when supported by robust digital infrastructure, standardised evaluation metrics, and adaptive learning technologies, can significantly improve the precision, accessibility, and personalisation of soft skills training across educational and professional environments. Policymakers must therefore invest in digital infrastructure and accessibility, foster public-private partnerships to accelerate innovation, and promote adaptive learning systems that tailor training to individual learners. This system-level shift is crucial for reducing skills mismatches and supporting a competitive, future-ready workforce. To ensure widespread adoption, policymakers should also strengthen EU level dissemination and stakeholder engagement mechanisms, enabling clear communication, shared understanding, and system wide integration of innovative soft skills methodologies.

¹ PEGI (Pan European Game Information) system is widely used to inform parents about age-appropriate content in video games, it currently focuses on identifying potential dangers, such as violent or explicit content.

2. CONTEXT

The MEGASKILLS project was launched to address the growing gap between education, and the rapidly evolving soft skills demands of the 21st century labour market. Over three years, the project has advanced innovative, evidence-based methodologies to better assess and foster key transversal skills. Building on the policy brief developed after the first two years of the research (M24), this final Policy Recommendations Deliverable consolidates the project's complete findings and presents **three strategic scenarios, each supported by four actionable policy recommendations**.

These insights aim to support policymakers, educators, and industry leaders in adopting inclusive, future oriented frameworks that strengthen soft skills training and recognition. By translating MEGASKILLS' methodology, framework, and pilot outcomes into concrete policy directions, the deliverable contributes to Objective 5 (OB5), enabling stakeholders to draw actionable lessons and make informed, evidence-based decisions in education and employment.

Through the promotion of innovative approaches and integrated policy solutions, this document supports the development of a resilient, adaptive, and digitally skilled European workforce, equipped to meet emerging societal and economic challenges. The recommendations align with existing EU policy frameworks, such as **The EU Skills Agenda (2020)**, aiming to improve the quality and relevance of skills development across Europe, **The Council Recommendation on Key Competences for Lifelong Learning (2018)**, highlighting the importance of developing digital and personal competences across all stages of life, the **Digital Education Action Plan (2021-2027)**, focusing on enhancing digital skills to improve education and employment opportunities, **The European Education Area 2025** aiming to promote innovative, competence-based learning models that are inclusive and adaptable.

3. STRATEGIC SCENARIOS AND POLICY RECOMMENDATIONS TO ADDRESS SKILLS GAPS

3.1 First scenario emerging from the Key Soft Skills Taxonomy and Models analysis

Main Problems Addressed

The European Union continues to face **persistent soft skills gaps and mismatches** while the rapid spread of Generative Artificial Intelligence (GAI) is transforming the nature of work, amplifying the need for human-centred skills. Yet educational and professional training systems lack a unified and scientifically grounded framework for defining, assessing, and developing these skills. As a result, **soft-skills initiatives remain fragmented and inconsistently implemented across sectors and countries** (Kubátová et al., 2025a). At the same time, stakeholders differ in their needs and contexts: educators seek academically justified tools, businesses require practical applications, and policymakers focus mainly on societal resilience and inclusion. **Existing initiatives often fail to systematically address diversity, including gender gaps, generational differences, and cross-cultural variations in how soft skills are understood and applied** (Kubátová et al., 2025b). Finally, there is **an urgent need to link soft skills development with EU strategic priorities** - notably green transitions, civic competences, and democratic participation - to ensure that the EU population remains employable, adaptable, ethical, and socially cohesive in the GAI era (Kubátová et al., 2025a).

Tested Solutions and Innovations

The innovation lies in the creation of the Taxonomic-Relational Model of 21st Century Soft Skills (TRM) as a potential standardised yet flexible EU-wide framework for the development, assessment, and policy integration of soft skills (Kubátová et al., 2025b). This model was developed based on academic research and expert discussions with representatives of all key stakeholders from business, education, and policy fields.

This innovation offers:

- **Standardisation:** Unique definitions and rubrics (five dimensions, four levels of manifestation) for **30 key soft skills**, providing clear assessment rubrics for educational and professional settings (Kubátová et al., 2025a; Kubátová et al., 2025b).
- **Targeted Development:** The 21st Century Soft Skills Relationship Map - a part of the TRM - highlights **interconnections of soft skills** and identifies Hub Soft Skills (Adaptability, Empathy, Self-control, Understanding of Social Realities). Policy can prioritise the training of these Hub Skills, maximising their developmental impact across the set of soft skills (Kubátová et al., 2025b).
- **Innovative Training Method:** The TRM represents a basis for an innovative method for the evaluation and training of soft skills through Commercial Off-the-Shelf (COTS) video game interaction and data analysis (Kubátová et al., 2025b).

Outcomes and Lessons Learned

The outcomes have the character of publications. The open-access book currently has over 11,000 accesses and its first citations. An overview of the outcomes, including the primary stakeholders, is presented in table 1.

Table 1-Final outputs of the academic part of the MEGASKILLS project and their main stakeholders

Outcome	Primary Stakeholders
Deliverables: - D2.1 Brown, C. & Luzmore, R. (2024). <i>Soft skills for the 21st century – definitions, taxonomies, models: findings from a systematic literature review and in-depth analysis</i>. (Ref. Ares(2024) 5170110 - 16/07/2024). European Commission. https://cordis.europa.eu/project/id/101094275/results - D2.2 Kubátová, J., Kosina, D., Kročil, O., Müller, M., & Slavíčková, P. (2024). <i>Soft skills for the 21st century: Academic, institutional, professional, and practical approaches. In-depth analysis and comparison. Research report</i> (Ref. Ares(2024)5508130 - 30/07/2024). European Commission. https://cordis.europa.eu/project/id/101094275/results - D2.3 Kubátová, J., Kosina, D., Kročil, O., Müller, M., & Slavíčková, P. (2025b). <i>Soft skills for the 21st century taxonomy and model</i>. [Unpublished deliverable D2.3v3 from MEGASKILLS project, HORIZON-CL2-2022-TRANSFORMATIONS-01, Grant agreement n° 101094275]	Researchers, higher education, policymakers
Open-access book: Kubátová, J., Müller, M., Kosina, D., Kročil, O., & Slavíčková, P. (2025a). <i>Soft Skills for the 21st Century: Defining a Framework for Navigating Human Centered Development in an AI Driven World</i>. Springer Cham. https://doi.org/10.1007/978-3-031-89557-9	Higher education, researchers, trainers
Outcomes with direct practical relevance: - Definition of the term soft skills, 30 unique definitions of soft skills, their categories, and their rubrics - Available in Kubátová et al., 2025a and 2025b - Taxonomic-Relational Model of 21st-Century Soft Skills	Educators, HR managers, trainers, policymakers All stakeholder groups - education, business, policy

The main outcomes presented in the open access book (Kubátová et al., 2025a) and in D2.3 (Kubátová et al., 2025b) are based on **initial reviews of academic and non-academic sources, followed by three development and validation activities:**

1. **Delphi research** - a multi-staged survey combining expert opinion into group consensus - which was conducted over three months (June – August 2023) and consisted of three rounds, each with sub-rounds focusing on different aspects of soft skills. The first round involved proposing and refining a list of important soft skills for the 21st century, along with their definitions. The second round aimed to categorise these skills. The goal of the final round was to develop a model that illustrates the interrelationships among these soft skills. Nine experts in the field participated in the Delphi research, representing diversity in age, gender, nationality, and professional background. After the Delphi research data had been processed by the research team, the first version of the set of key soft skills, their categorisation, and the model was proposed.
2. **Workshop with EU SME representatives** to enhance the soft skills taxonomy and model. The workshop combined structured questionnaire and focus group discussions to collect diverse perspectives. The workshop included 21 representatives of SMEs from seven countries, 13 of whom identified as male and eight as female. The participants were divided into two focus groups, each consisting of four females and seven or six males, respectively. The workshop was held in December 2024, and its outcome was the second version of the soft skills for the 21st century taxonomy and model.
3. **Workshop with experts from the educational, political, and business fields** to triangulate and subsequently refine the preliminary results with the aim of developing the final taxonomy and model of 21st century soft skills. The workshop was held in June 2025. Fourteen experts from six countries and diverse fields participated in the workshop, ten of whom were women. The core components for achieving the planned outputs included a questionnaire, two focus groups, and a final plenary session. Based on the collected feedback, the final version of the unified definition, taxonomy, and model of key soft skills for the 21st century society and economy that is usable as a basis for the development of these soft skills in school education as well as in professional development was developed. It represents a **basis for an innovative method for the evaluation and training of soft skills through Commercial Off-the-Shelf (COTS) video games interaction and data analysis.**

As an activity beyond the scope of the project tasks, the MEGASKILLS research team from Palacký University was invited in February 2025 to take part in an **expert consultation on the alternative structure of the ESCO Skills Pillar** organised by the European Commission. The task involved testing the usability of the proposed skills hierarchy and co-occurrence dataset, evaluating the applied methodology, and assessing their relevance for skills-based job matching, education, and statistical reporting. The research team prepared a written expert report and provided complementary oral feedback during the follow-up workshop held in July 2025. Both the written and oral contributions integrated evidence and insights generated within the MEGASKILLS project, ensuring coherence between project findings and the consultation on the revised ESCO Skills Pillar.

Four Main Policy Recommendations:

The following policy recommendations are based on the core findings and requirements identified during the development of the unified definition, taxonomy, and model of key soft skills for the 21st century society and economy within the MEGASKILLS project (Kubátová et al., 2025a; Kubátová et al., 2025b):

1. **Mandate the Integration of Soft Skills with Green and Civic Agendas:** EU funding and structural programs should explicitly strengthen the links between soft skills and green skills to enable sustainability

transitions and actively connect soft skills with civic skills to reinforce democratic participation and social cohesion (Kubátová et al., 2025a).

2. **Promote Targeted Hub Skill Training:** EU strategies should advocate for training programs, including innovative video game-based methodologies, that prioritise the development of Hub Soft Skills (such as Adaptability, Empathy, Self-control, and Understanding of Social Realities). Focusing on these conceptually central skills maximizes the potential contribution to the development of numerous other skills (Kubátová et al., 2025b).
3. **Develop Contextualised and Digital Tools for Stakeholder Usability:** Support has to be directed toward creating simplified, context-specific adaptations and interactive digital formats of the TRM. These tools should directly link the taxonomic structure and relational map to the comprehensive definitions and assessment rubrics, ensuring accessibility and usability for diverse users, e.g., educators, HR managers, policy analysts (Kubátová et al., 2025b).
4. **Enforce Diversity and Inclusion in Soft Skills Development:** Policy measures must ensure that soft skills development measures systematically address diversity in all dimensions, giving particular attention to mitigating gender gaps and accounting for cross-generational and cross-cultural differences in how skills are perceived, developed, and applied (Kubátová et al., 2025b). This ensures that soft skills development initiatives are inclusive and equitable across all demographic groups.

Summary of the Scenario:

The European Union faces persistent soft skills gaps that are intensified by the rise of Generative AI. However, the education and training systems still lack a unified, evidence-based framework to define, assess, and develop these skills. Stakeholders across sectors have divergent needs, and existing initiatives remain fragmented, insufficiently inclusive, and weakly connected to EU priorities such as green transitions and civic participation. The MEGASKILLS project addresses this by developing the Taxonomic Relational Model (TRM), a standardised but flexible EU wide framework built through systematic research, expert consensus, and multi stakeholder validation. The TRM provides clear definitions, assessment rubrics, and relational maps of soft skills, identifies high leverage Hub Skills for targeted development, and serves as the foundation for innovative evaluation and training methods using commercial video games. The project shows that robust soft skills frameworks can be co-created across sectors when supported by structured dialogue and iterative refinement. Based on these insights, four policy directions emerge: integrate soft skills with green and civic agendas, prioritise Hub Skill development, create accessible digital tools tailored to stakeholder needs, and ensure diversity and inclusion across all soft skills initiatives.

3.2 Second scenario emerging from the Psycho-pedagogical Methodology for Detection and Training of Soft Skills with Commercial Video Games and the Use Cases and Demonstrations

Main Problems Addressed

The lack of scalable and accessible tools to evaluate and train transversal skills (soft skills) is a persistent and urgent issue in both education and employment sectors across Europe. Traditional methods of soft skills assessment and training are often subjective, time-consuming, costly, and not aligned with the evolving demands of the labour market. Moreover, critical challenges persist:

- **70% of European employers** report difficulty finding candidates with suitable transversal skills, affecting the employability of 135 million European workers.
- Traditional training methods (seminars, coaching, dedicated serious games) face fundamental challenges: **low ecological validity** (laboratory assessments do not reliably predict real-world performance), **Hawthorne bias** (participants alter behaviour when observed), and **high development costs** for bespoke serious games.
- Vulnerable groups (such as migrants, unemployed, vocational students) lack accessible, motivating, and scientifically validated tools for developing these skills.
- Despite 20 years of evidence on the **positive neurocognitive effects of video games** (improvements in attention, working memory, fluid reasoning), **no validated methodologies** existed to translate commercial game mechanics into objective soft skill indicators.

The MEGASKILLS project proposes a scientifically grounded methodology that uses commercial video games, data-driven behavioural analytics, and inference models to create an engaging, data-rich environment for evaluating and training soft skills. This scenario demonstrates how the methodology addresses the skills gap by linking game mechanics to evidence-based skill indicators, enabling continuous assessment and personalised learning recommendations, and addresses the need to develop and promote an innovative solution that:

- Automatically evaluates and trains soft skills using commercial video games.
- Supports evidence-based decision-making for both learners and employers through objective behavioural data.
- Reduces barriers to access by ensuring user-friendly design, broad outreach, and reduced costs compared to ad-hoc serious games.
- Offers adaptive learning paths based on user performance and gameplay data, enabling personalized skill development.
- Establishes certification frameworks based on scientifically validated behavioural data.

Tested Solutions and Innovations

The MEGASKILLS platform and methodology represent a novel, scientifically validated approach to soft skills development by:

- **Integrating AI models** to predict and evaluate soft skills based on gameplay data extracted from commercial video games.

- **Leveraging Steam² API** to retrieve user profiles and game data, ensuring accurate and real-time feedback through automatic extraction of 12 behavioural metrics (playtime, achievements, timestamps, strategy changes).
- **Establishing a theoretical-empirical bridge:** Linking standardised psychometric tests (Watson-Glaser Critical Thinking, RTSSPS Problem-Solving, CAMBIOS Adaptability, TMQ Time Management) with game mechanics (achievements, timing, strategy changes, rule adaptation).
- **Designing a modular architecture** that allows customisation for different user groups (VET students, unemployed, migrants, managers, and SMEs).
- **Implementing a web platform** with gamified features (missions, feedback loops, automatic certifications) for administrative monitoring, reporting, and supporting data-driven interventions.
- **Including an adaptive game recommendation system** that suggests video games aligned with the user's learning goals and progress, based on AI-driven analysis of gameplay and skill development.
- **Developing a 4-level implementation methodology:** Introduction (1-2h: self-diagnosis, path selection), Training (5-15h: self-directed gameplay with adapted tutorials), Evolution (ongoing real-time feedback and intermediate certifications), and Mentoring (3-6h: facilitated sessions for workplace transfer).

The innovation lies in integrating three components: Commercial Video Games (COTS) chosen for their alignment with soft-skills rubrics, Psycho-pedagogical design (MEGASKILLS D3.4) using experiential learning, self-determination, and constructivist principles, AI-based inference models that extract behavioural indicators from gameplay (achievements, decision paths, timing patterns), validating them through psychometric pre- and post-testing into a single ecosystem. This combination makes soft-skills assessment scalable, engaging, evidence-based, and applicable across sectors.

Activities carried out to test, validate, and refine the methodology:

The platform and methodology were tested through rigorous experimental and pilot activities:

Experimental Phase (n=120):

- Controlled pre-post design with four experimental groups (one game per soft skill) plus control group.
- Participants: ages 18-50, 62.5% male, 80% under 35 years, 84% higher education.
- Intervention: minimum 15 hours of gameplay over 2 months with automatic data collection via Steam API.
- Analysis: paired t-tests, ANOVA, bivariate correlations using objective and subjective psychometric instruments.

Pilot Use Cases (n=135+):

² **Steam** is a leading digital gaming platform compatible with Windows, macOS, and Linux. It allows users to purchase, download, and play a vast library of nearly 30,000 games, including titles like *The Sims* and *Subnautica*. Steam also supports social interaction, game development, and Virtual Reality (VR) gaming. With its extensive features, Steam offers an all-encompassing online gaming experience. <https://store.steampowered.com/>

Across two experimental waves with 521 participants (User profiles: students (42%), managers (38%), migrants/unemployed (20%)) MEGASKILLS performed:

- Real-world deployments of 8 commercial games, including Fallout Shelter, Paladins, Alien Swarm and Minion Masters.
- Behavioural data collection using Steam: achievements, playtime, decision patterns.
- AI modelling (D4.1) using clustering (K-means, DBSCAN) and regression (SVR, Random Forest) to infer skills dynamically.
- Validation through pre- and post-psychometric tests grounded in standardized assessments.
- User experience and feasibility monitoring for usability, onboarding, engagement, and accessibility across profiles. Feedback loops from users and stakeholders to refine platform features and usability.
- Statistical analysis of weekly soft-skill evolution over four weeks (valor1–valor4), identifying which game mechanics drive the strongest learning gains.

These elements ensured scientific soundness, ecological validity, and practical relevance for real educational and professional applications.

Outcomes and Lessons Learned

The platform development, experimental research, and outreach activities yielded robust quantitative and qualitative outcomes:

1. Effectiveness of Specific Games:

Analysis of skill specific game triggers shows that different commercial video games stimulate distinct soft skill improvements. For example, Fallout Shelter produced a +0.62 increase in time management following resource management achievements, while Alien Swarm generated a +0.58 improvement in complex problem solving after tactical achievements. Paladins enhanced cognitive flexibility by +0.47 through hero rotation achievements, and Minion Masters increased critical thinking by +0.44 via deck building achievements. Targeted games also demonstrated cross skill effects: Train Valley 2, designed to train complex problem solving, led to significant gains in CPS ($p = .044$), critical thinking subjective ($p = .036$), critical thinking objective ($p = .039$), and flexibility objective ($p = .036$). Similarly, Minion Masters, targeting time management, yielded significant improvements in critical thinking objective ($p = .003$) and flexibility objective ($p = .02$), with time management showing a positive trend ($p = .083$). These results confirm that games vary in effectiveness and that some generate improvements across multiple soft skills, reflecting underlying conceptual overlaps.

2. Magnitude of Improvements:

Users demonstrated an average soft skills improvement of 28 percent in line with the MEGASKILLS methodology, with gains of 40 to 60 percent observed in critical thinking, complex problem solving, and adaptability after just five hours of guided gameplay. Moreover, a strong correlation between subjective measures of complex problem solving and critical thinking ($r = 0.62$) indicates that these transversal competences form an interconnected cluster in which training one skill can positively reinforce the development of others.

3. Equity and Inclusiveness:

The results show no gender differences in post intervention outcomes, with video games even reducing preexisting gaps in flexibility and time management. Improvements were also independent of prior gaming

experience, demonstrating the method's effectiveness for non-gamers, who represent 20 to 30 percent of adults. Notably, older participants achieved greater progress ($z = 2.08$, $p = .038$), challenging the assumption that game-based learning primarily benefits younger users. Furthermore, no significant effects of education level were observed, confirming the universality of the approach across diverse learner profiles.

4. User Engagement:

User feedback was highly positive, with 87 percent rating the experience as interesting or useful, 90 percent appreciating its research focus, and 65 percent expressing willingness to repeat the activity. The self-directed structure of the platform reduced teacher workload and operational costs, while more than 1,500 users registered and actively engaged during the pilot phase. Analysis of the learning curve showed the greatest skill development occurring in the first week, followed by stabilisation over weeks two to four.

5. Institutional Adoption and Organisational Impact:

A proactive initiative by the Palacký University team to integrate a soft skills course into the university curriculum demonstrated the platform's strong potential for institutional adoption. Partnerships with local SMEs and training centres further confirmed its relevance for workforce development, with several companies reporting higher employee engagement compared to traditional training formats. Managers, who accounted for 38 percent of participants, particularly valued the debriefing sessions that linked in-game decisions to real sector cases. The model also proved especially effective for students and professionals engaged in reskilling programmes.

Key Lessons Learned:

- Early gameplay produces the highest learning gains; skills stabilise after week 1–2.
- Game design matters: simulation, strategy, and hero-based games show the best sustained results.
- Non-gamers require improved onboarding, especially adults aged 50+.
- Real-time feedback dashboards are needed to increase perceived value and long-term motivation.
- Game popularity influences engagement, but complex games produce deeper, though less widespread, learning
- The importance of user-centred design to ensure accessibility and usability across diverse groups, with adapted onboarding for non-gamers requiring extended support.
- The need for stakeholder collaboration to align platform features with real-world needs and sector-specific applications.
- The value of data-driven insights in monitoring and improving soft skills development through objective behavioural metrics.
- The potential of adaptive learning systems to enhance engagement and effectiveness in soft skills training.
- **Without facilitator support**, transfer of in-game competencies to the workplace is limited; hybrid methodologies (online gaming + in-person mentoring) balance scalability and depth.
- **Intermediate certifications** (5h, 10h, 15h) significantly reduce dropout rates (from 40-50% to manageable levels).
- Genre matters: simulation games generate the highest sustained gains (2.8-3.0) compared to action/strategy (2.0-2.5).

- User profiles differ students prefer frequent short sessions (30-45 min, 5-7 days/week); managers prefer intensive less frequent sessions (2-3h, 2-3 days/week).

Four Main Policy Recommendations emerging from the Methodology for Evaluating and Training Soft Skills with Commercial Video Games:

Based on the robust outcomes and evidence from the MEGASKILLS project, the following four actionable policy recommendations are proposed:

1. **Integrate commercial video game-based training into Active Employment Policies and Vocational Education.** Public Employment Services (PES) and Vocational Education and Training (VET) centres should incorporate certifiable training modules based on commercial video games into reskilling/upskilling programs, especially in sectors facing skills shortages. This can be implemented through FSE+ co-funded pilots in priority VET sectors (Industry 4.0, health, logistics), with protocols of 5 hours per week, intermediate certifications to reduce dropout, and instructor training in hybrid facilitation. **Expected impact:** increased reintegration rates (+30-50%) for long-term unemployed and improved employability for youth transitioning to work.
2. **Establish a European Micro-Credential Framework based on scientifically validated behavioural data from video games.** Policymakers should develop a European technical specification for certifying soft skills from video games, integrable into Europass Digital Credentials Infrastructure (EDCI). This addresses the gap whereby traditional Europass certifications are less valued (45% requested in pilots), with users preferring practical evidence. Implementation should involve technical standards defined by JRC + DG EMPL (2026-2027) with cross-validation using psychometric test banks, interoperability with national qualifications (MQF/EQF) and employment platforms (EURES), and pilots with 5,000 users in 10 Member States (2028). **Expected impact:** better transparency in skill profiles, reduced employer-candidate information asymmetries, cross-border recognition of informal learning.
3. **Integrate practical transfer methodologies in corporate training policies.** Policies for enterprise continuous training (co-funded by sectoral funds) should include mentoring/coaching modules post-gameplay to ensure transfer to the workplace, as use cases demonstrate that without facilitator support, transfer of in-game competencies is limited. Implementation should involve 3-6 facilitated sessions (90 min each) interspersed with play periods, sector-specific materials developed by business associations (cases in construction, health, advanced manufacturing), and certification for facilitators (train-the-trainer, 20h). **Expected impact:** increased training ROI, reduced staff turnover, improved organisational climate.
4. **Establish a “PEGI+” certification system tagging European commercial video games for their potential educational benefits.** Beyond the current PEGI system that focuses on age-appropriate content and potential negative impacts, policymakers should support the development and adoption of a complementary PEGI+ system that identifies and certifies the educational and skill development potential of commercial video games. This would help educators, employers, and training institutions identify suitable games for formal and informal learning contexts, based on scientifically validated evidence. Implementation should involve collaboration between PEGI, game developers, educational researchers, and certification bodies to establish transparent criteria and validation processes. **Expected impact:** Proliferation of European video games in the international market thanks to their demonstrable

positive values, increased legitimacy of game-based learning, reduced stigma around video games in educational contexts, better information for institutional buyers and policy makers.

Four Main Policy Recommendations emerging from the Use Cases and Demonstrations:

Grounded in project evidence, the following recommendations support EU priorities for skills development, digital inclusion, and future-proof learning ecosystems:

1. Integrate game-based soft skills training into formal education and VET programmes.

Evidence from the MEGASKILLS project demonstrates both the feasibility and effectiveness of incorporating game-based approaches into structured learning pathways. UPOL's initiative to introduce a soft skills course within its curriculum shows that such integration is institutionally achievable, while students participating in the pilots displayed the highest consistency of engagement across all learner profiles. Moreover, an average improvement of 28 percent across assessed skills provides strong validation of the educational impact of this methodology. This recommendation aligns with existing EU policy frameworks, including the Council Recommendation on Key Competences for Lifelong Learning (2018), which emphasises the development of digital and personal competences, and the ambitions of the European Education Area 2025 to promote innovative, competence-based learning models.

2. Recognise behavioural digital traces from games as valid assessment evidence for transversal skills.

The MEGASKILLS project demonstrates that behavioural digital traces generated during gameplay can serve as robust, scientifically grounded indicators of transversal soft skills. AI inference models developed within the project were validated with data from more than 500 users and cross checked through established psychometric tests, confirming their reliability. Strong correlations ($r \geq 0.55$) between in game achievements and soft skills improvements further underscore the validity of this approach, while the weekly assessment structure employed in the pilots produced consistent and replicable measurement results. This recommendation aligns closely with the Europass and the 2022 Micro credentials Framework, both of which encourage the use of innovative and diverse forms of evidence in skills assessment and recognition.

3. Promote accessible, engaging soft skills learning tools for employability and inclusion.

Findings from MEGASKILLS reveal that accessible game-based learning tools can significantly support employability, particularly among groups at risk of labour market exclusion. Migrants and unemployed participants showed meaningful benefits from game mechanics designed to be intuitive and motivating, demonstrating the importance of user centred, inclusive design. Conversely, high dropout rates in more complex games highlight the need to prioritise accessibility and engagement to ensure participation across diverse learner profiles. This recommendation aligns with the European Skills Agenda (2020), which promotes reskilling, upskilling, and inclusive training ecosystems, as well as the Pact for Skills, which encourages scalable, industry relevant training solutions that reach learners of all backgrounds.

4. Support EU wide experimentation with game-based learning through innovation funding.

The MEGASKILLS project has developed a replicable, TRL6 level solution that demonstrates strong potential for wider adoption but requires further large-scale validation across diverse educational and labour market contexts. Pilot activities carried out in the Czech Republic, Spain, France, and Belgium confirm the scalability of the approach and its relevance across different countries and learner groups.

To build on this momentum, continued EU level support for experimentation and piloting is essential. This recommendation aligns with Horizon Europe—particularly Cluster 2, *Culture, Creativity and Inclusive Society*—which promotes the development and testing of innovative learning formats capable of addressing societal and skills related challenges.

Summary of the Scenario:

Europe continues to face a critical shortage of transversal soft skills, as traditional assessment and training methods remain subjective, costly, and poorly aligned with labour market needs. The MEGASKILLS project introduces a scalable, scientifically validated solution that uses commercial video games, AI-driven behavioural analytics, and psychometric validation to automatically evaluate and train soft skills, offering personalised learning pathways, reduced costs, and high accessibility. Experimental and pilot evidence involving more than 500 users shows significant gains: up to 60 percent in key skills such as critical thinking and complex problem solving - across genders, age groups, and levels of gaming experience, with strong user engagement and clear potential for institutional adoption. Lessons learned highlight the importance of early gameplay, appropriate game genre selection, adaptive onboarding, real time feedback, hybrid mentoring to support workplace transfer, and user centred design to ensure inclusiveness and sustained learning. Building on the findings from WP3, methodology for evaluating and training soft skills using commercial video games, and WP5, the use case demonstrations of the soft skills training platform, the project proposes several policy actions that align with the validated project assumptions. These recommendations include: integrating game-based soft skills training into VET and employment programmes; establishing a European micro-credential framework grounded in behavioural data; embedding facilitated transfer modules into corporate training; recognising digital gameplay traces as valid evidence of transversal skills; promoting accessible game based tools for employability and inclusion; supporting EU wide experimentation; and creating a PEGI+ system to certify the educational value of commercial games.

3.3 Third Scenario emerging from the Platform Development and Outreach Activities

Main Problems Addressed

The lack of scalable and accessible tools to evaluate and train soft skills. Moreover, the digital divide and the limited integration of technology in educational and training settings hinder the adoption of innovative solutions, especially among underrepresented groups and SMEs.

Innovative soft skills methodologies **remain often underused** because dissemination is fragmented, stakeholder engagement is limited, and communication strategies are not coordinated. As a result, **research-based tools such as game-based assessments, behavioural analytics, and micro-credentials are not widely understood, trusted, or adopted** across education and employment systems.

This scenario addresses the need to develop and promote an Artificial Intelligence based solution that:

- Automatically evaluates and trains soft skills using commercial video games.
- Supports evidence-based decision-making for both learners and employers.
- Reduces barriers to access by ensuring user-friendly design and broad outreach.
- Offers adaptive learning paths based on user performance and gameplay data, enabling personalised skill development

And stresses the importance of strengthening EU-level dissemination infrastructures to support the uptake of innovative soft skills methodologies.

Tested Solutions and Innovations

The MEGASKILLS platform represents a novel approach to soft skills development.

The platform was tested through two pilot activities involving universities, training institutions, and industry partners, with a focus on:

- **Iterative Design and Modular Architecture:** The creation of the platform followed an iterative process, evolving through several versions based on studies with end-users and feedback from experts and stakeholders. The final architecture is designed as a modular, data-driven web application integrating distinct components, including a frontend interface, the Steam API for data collection, and AI-based models for soft skill analysis.
- **Standardisation via Europass Integration:** To ensure EU-wide recognition and interoperability, the platform adopted Europass Digital Credentials (EDCs) aligned with the European Qualifications Framework (EQF) and ESCO. This standardization effort replaced the initially proposed blockchain solution to ensure the credentials are tamper-evident, verifiable, and compliant with eIDAS regulations and GDPR.
- **Enhanced User Guidance through Video Tutorials:** To improve usability and onboard users effectively, the platform incorporated video tutorials at various critical interaction points. Specific additions include an introductory video on the home page, "How to Play" videos for each game to explain gameplay mechanics, and instructional videos within the FAQ section to help users with technical tasks like setting up Steam accounts.

- **Security and Compliance Improvements:** Significant technical improvements were made to standardize security and privacy compliance. This included updating the password storage schema to use the Argon2id hashing algorithm for secure encryption. Furthermore, the platform standardized its international data transfer protocols by confirming Valve Corporation's certification under the EU–US Data Privacy Framework (DPF), ensuring GDPR compliance when retrieving data from Steam.

Outcomes and Lessons Learned

The platform development and outreach activities yielded quantitative and qualitative outcomes, including:

- The importance of user-centred design to ensure accessibility and usability across diverse groups.
- The importance of standardisation and security compliance: aligning with established European standards and strict privacy regulations is not merely a legal requirement, but a strategic advantage that ensures scalability, interoperability, and user trust.
- Standardization over Novelty (Europass vs. Blockchain): we initially considered using blockchain technology to issue micro-credentials. However, the transition to Europass Digital Credentials (EDCs) proved to be a superior strategy. By adopting EDCs, the platform ensured alignment with existing frameworks like the European Qualifications Framework (EQF) and ESCO, significantly improving interoperability with HR and education systems across Europe. Furthermore, relying on EDCs avoided the complex legal conflicts regarding the "right to erasure" under GDPR that often arise with immutable public blockchains, while still guaranteeing integrity and anti-counterfeiting through digital signatures.
- Rigorous adherence to GDPR principles drove essential architectural changes that enhanced the platform's integrity: Data Minimisation, Robust Security Protocols, and International Compliance.

Four Main Policy Recommendations emerging from the Platform Development:

Based on the outcomes and evidence from the MEGASKILLS project, the following four actionable policy recommendations are proposed:

1. **Promote AI-based and gamified solutions for soft skills development.** Policymakers should support the integration of AI-based and gamified platforms into education, vocational training, and upskilling programs, especially in sectors with skills shortages. This can be enabled through targeted funding, research and pilot projects, partnerships with technology providers, and capacity building for teachers and trainers.
2. **Invest in digital infrastructure and accessibility to reduce the digital divide.** To ensure equitable access to soft skills development tools, governments should expand digital access in schools, training centres, and SMEs, particularly in disadvantaged regions. This includes funding for hardware, internet access, and digital literacy programs.
3. **Encourage the use of standardised metrics and AI-based evaluation for soft skills.** Policymakers should support the adoption of validated and scalable methods for measuring soft skills, such as those developed in the MEGASKILLS project. This includes recognising AI-driven assessments in official certification and workforce development programs.

4. **Foster public-private partnerships to scale soft skills initiatives.** Governments should facilitate collaboration between educational institutions, employers, and technology providers to co-design and implement soft skills development programs. This can help align training with industry needs and promote innovation.

Three Main Policy Recommendations emerging from Outreach Activities:

The MEGASKILLS Communication and Dissemination strategy is built on the principle that information should be accessible to all. From the website to social media and all project publications, the approach has been to maintain a clear and pragmatic tone, using professional, but not unnecessarily scientific, language. This ensures that a wide audience can be reached and that results are communicated effectively.

This approach highlights the importance of considering the broader audience when preparing dissemination materials, particularly when the topics are scientific in nature but intended to influence a non-academic public.

The Ambassador Programme was an initiative launched early in the project to actively involve stakeholders from different sectors of society. While primarily symbolic, the programme has successfully attracted companies already using gamification for upskilling, both in the industry and in the educational sector, and the project itself has generated considerable interest among related organisations. Establishing engagement mechanisms early in the project is therefore crucial to guide stakeholders through a meaningful journey of awareness and participation, allowing for the creation of a best-practice-sharing space, promoting collaboration and mutual learning.

The following three actionable policy recommendations are proposed:

Strengthen EU-level dissemination infrastructures to support the uptake of innovative soft skills methodologies.

Policymakers should invest in long-term, multi-stakeholder communication frameworks that ensure research-based soft skills tools are widely understood, trusted, and integrated into education and employment systems across Member States.

Promote structured multi-stakeholder engagement platforms to accelerate awareness and adoption.

Dissemination results show that the successful integration of MEGASKILLS outputs depends on continuous dialogue among educators, employers, policymakers, and learners. Policies should support communities of practice, training sessions, and accessible knowledge-sharing channels to build adoption capacity and strengthen stakeholder confidence in innovative soft skills approaches.

1. **Develop coordinated communication and outreach strategies to enable system-wide adoption of soft skills innovations.**

Evidence from MEGASKILLS dissemination activities shows the importance of clear narratives, user friendly materials, and cross sector engagement to translate complex research findings into practical, actionable insights. Policymakers should promote communication strategies that mainstream innovative approaches, ensuring their broad, equitable, and long-term uptake across education, employment, and training systems.

Summary of the Scenario:

The third scenario highlights the persistent lack of scalable and accessible tools for soft skills assessment and training, reinforced by digital divides and weak integration of technology in education, training, and SMEs. Innovative methods remain underused due to fragmented dissemination and limited stakeholder engagement. MEGASKILLS addresses these challenges by developing an AI driven platform that evaluates and trains soft skills through commercial video games, supports evidence-based decision making, reduces access barriers, and provides adaptive, personalised learning pathways. Pilots involving universities, SMEs, and training centres demonstrated strong user engagement, broad uptake, and institutional interest, with over 1,500 active users and successful curriculum integration at UPOL. Lessons learned underscore the importance of clear communication, user centred design, and structured multi stakeholder outreach. Building on these findings, the scenario calls for promoting AI-based and gamified learning solutions, investing in digital infrastructure, using standardised AI- driven metrics for soft skills assessment, and fostering public private partnerships. From a dissemination perspective, it recommends strengthening EU level communication infrastructures, creating structured engagement platforms, and coordinating outreach strategies to ensure innovative soft skills methodologies are widely understood, trusted, and adopted across education and employment systems.

4. SYNTHESISED POLICY RECOMMENDATIONS DRAWING ON THREE YEARS OF MEGASKILLS PROJECT RESEARCH

The MEGASKILLS project provides the following actionable policy recommendations for enhancing soft skills development across the EU:

Integrate Soft Skills with Green and Civic Agendas: EU funding and structural programs should explicitly strengthen the links between soft skills and green skills to enable sustainability transitions and actively connect soft skills with civic skills to reinforce democratic participation and social cohesion.

Promote Hub Skill Training: EU strategies should advocate for training programs, including innovative video game-based methodologies, that priorities the development of Hub Soft Skills (such as Adaptability, Empathy, Self-control, and Understanding of Social Realities). Focusing on these conceptually central skills maximizes the potential contribution to the development of numerous other skills.

Develop Contextualised and Digital Tools for Stakeholder Usability: Support has to be directed toward creating simplified, context-specific adaptations and interactive digital formats of the TRM. These tools should directly link the taxonomic structure and relational map to the comprehensive definitions and assessment rubrics, ensuring accessibility and usability for diverse users, e.g., educators, HR managers, policy analysts.

Enforce Diversity and Inclusion in Soft Skills Development: Policy measures must ensure that soft skills development measures systematically address diversity in all dimensions, giving particular attention to mitigating gender gaps and accounting for cross-generational and cross-cultural differences in how skills are perceived, developed, and applied. This ensures that soft skills development initiatives are inclusive and equitable across all demographic groups.

Integrate commercial video game-based training into Active Employment Policies and Vocational Education. Public Employment Services (PES) and Vocational Education and Training (VET) centres should incorporate certifiable training modules based on commercial video games into reskilling/upskilling programs, especially in sectors facing skills shortages. This can be implemented through FSE+ co-funded pilots in priority VET sectors (Industry 4.0, health, logistics), with protocols of 5 hours per week, intermediate certifications to reduce dropout, and instructor training in hybrid facilitation. **Expected impact:** increased reintegration rates (+30-50%) for long-term unemployed and improved employability for youth transitioning to work.

Establish a European Micro-Credential Framework based on scientifically validated behavioural data from video games. Policymakers should develop a European technical specification for certifying soft skills from video games, integrable into Europass Digital Credentials Infrastructure (EDCI). This addresses the gap whereby traditional Europass certifications are less valued (45% requested in pilots), with users preferring practical evidence. Implementation should involve technical standards defined by JRC + DG EMPL (2026-2027) with cross-validation using psychometric test banks, interoperability with national qualifications (MQF/EQF) and employment platforms (EURES), and pilots with 5,000 users in 10 Member States (2028). **Expected impact:** better transparency in skill profiles, reduced employer-candidate information asymmetries, cross-border recognition of informal learning.

Integrate practical transfer methodologies in corporate training policies. Policies for enterprise continuous training (co-funded by sectoral funds) should include mentoring/coaching modules post-gameplay to ensure transfer to the workplace, as use cases demonstrate that without facilitator support, transfer of in-game competencies is limited. Implementation should involve 3-6 facilitated sessions (90 min each) interspersed with play periods, sector-specific materials developed by business associations (cases in construction, health, advanced manufacturing), and certification for facilitators (train-the-trainer, 20h). **Expected impact:** increased training ROI, reduced staff turnover, improved organisational climate.

Establish a “PEGI+” certification system tagging European commercial video games for their potential educational benefits. Beyond the current PEGI system that focuses on age-appropriate content and potential negative impacts, policymakers should support the development and adoption of a complementary PEGI+ system that identifies and certifies the educational and skill development potential of commercial video games. This would help educators, employers, and training institutions identify suitable games for formal and informal learning contexts, based on scientifically validated evidence. Implementation should involve collaboration between PEGI, game developers, educational researchers, and certification bodies to establish transparent criteria and validation processes. **Expected impact:** Proliferation of European video games in the international market thanks to their demonstrable positive values, increased legitimacy of game-based learning, reduced stigma around video games in educational contexts, better information for institutional buyers and policy makers.

Recognise behavioural digital traces from games as valid assessment evidence for transversal skills. The MEGASKILLS project demonstrates that behavioural digital traces generated during gameplay can serve as robust, scientifically grounded indicators of transversal soft skills.

Promote accessible, engaging soft skills learning tools for employability and inclusion. Findings from MEGASKILLS reveal that accessible game-based learning tools can significantly support employability, particularly among groups at risk of labour market exclusion.

Support EU-wide experimentation with game-based learning through innovation funding. The MEGASKILLS project has developed a replicable, TRL6 level solution that demonstrates strong potential for wider adoption but requires further large-scale validation across diverse educational and labour market contexts. Pilot activities carried out in the Czech Republic, Spain, France, and Belgium confirm the scalability of the approach and its relevance across different countries and learner groups. To build on this momentum, continued EU level support for experimentation and piloting is essential.

Invest in AI and Gamified Solutions for Soft Skills Development: Support the integration of AI and gamified platforms in education and vocational training, addressing sectoral skills shortages.

Expand Digital Access and Infrastructure: Governments should invest in digital infrastructure to reduce the digital divide, ensuring equitable access to soft skills development tools.

Foster Public-Private Partnerships for Soft Skills Initiatives: Encourage collaboration between educational institutions, employers, and technology providers to co-design and implement industry-aligned soft skills programs.

Strengthen Dissemination Infrastructures: Promote communication frameworks to ensure innovative soft skills methodologies are widely adopted across EU education and employment systems.



In addition, a separate press release outlining all the final policy recommendations has been published on the website. [\[link\]](#)

5. CONCLUSIONS

As MEGASKILLS concludes its three-year journey, the project has established a robust set of validated methodologies, tools, and evidence-based insights that enhance the assessment and development of soft skills across various learning and professional contexts. The findings highlight the transformative potential of gamified learning, AI-driven assessment, and psychophysiological metrics, demonstrating how innovative game-based approaches can effectively support individuals in strengthening the transversal competences essential for today's labour market.

Throughout the project, stakeholders and target group participants showed strong enthusiasm and commitment, with many expressing a clear intent to continue applying and developing MEGASKILLS' approaches within their institutions. This positive feedback underscores the relevance and value of the project's outcomes.

MEGASKILLS' achievements lay a solid foundation for future work in soft skills innovation, revealing the potential of video games, and offer opportunities for further piloting, cross-sector implementation, and integration into national and European training and innovation strategies. There is significant potential for new collaborations, research initiatives, and experimentation that can amplify the impact of MEGASKILLS across education, employment, and lifelong learning ecosystems. As Europe adapts to evolving societal and economic challenges, the approaches demonstrated by MEGASKILLS can contribute to building a resilient, adaptable, and digitally literate workforce. Continued investment in innovative and inclusive soft skills development will ensure that individuals and organisations are equipped to thrive in an ever-changing world.

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