



MEGASKILLS

“Developing Soft Skills While Gaming”

D4.2 MEGASKILLS ASSESSMENT AND ACCREDITATION INTELLIGENT PLATFORM



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List of Abbreviations

Abbreviation	Description
AI	Artificial Intelligence
API	Application Programming Interface
COTS	Commercial Off-The-Shelf
CPS	Complex Problem Solving
CSS	Cascading Style Sheets
CT	Critical Thinking
EC	European Commission
EDCs	Europass Digital Credentials
ESCO	Qualifications and Occupations
EQF	European Qualifications Framework
EU	European Union
FA	Cognitive Flexibility/Adaptability
FAQ	Frequently Asked Questions
FK	Foreign Key
GBR	Gradient Boosting Regressor
GDPR	General Data Protection Regulation
IP	Internet Protocol
JPA	Java Persistence API
HTML	HyperText Markup Language
JSON	JavaScript Object Notation
LR	Linear Regression
MAE	Mean Absolute Error
PC	Personal Computer
PK	Primary Key
STS	Spring Tool Suite
RF	Random Forest
RMSE	Root Mean Squared Error

TM	Time Management
URL	Uniform Resource Locator
VDF	Valve Data Format
WP	Work Package
XML	Extensible Markup Language

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EXECUTIVE SUMMARY

This deliverable, D4.2, presents the final version of the MEGASKILLS Assessment and Accreditation Intelligent Platform, developed within Work Package 4 (WP4) of the MEGASKILLS project, “Developing Soft Skills While Gaming.” The platform provides an innovative digital environment for assessing, monitoring, and accrediting the development of soft skills through video game play, integrating Artificial Intelligence (AI)–based analytics with an engaging user experience.

The MEGASKILLS platform connects with the STEAM gaming platform via its open API (Application Programming Interface) to collect gameplay data, including playtime, achievements, and performance indicators. These data are then mapped to predefined soft skills: Complex Problem Solving (CPS), Critical Thinking (CT), Cognitive Flexibility/Adaptability (FA) and Time Management (TM), according to a framework developed by domain experts. Two AI models process this data: one predicts users’ progress in soft skill development, while the other recommends new games that best match each user’s learning profile and improvement goals.

The platform’s architecture consists of several integrated components, including the user interface, backend infrastructure, data model, and AI modules. The user interface (UI) was designed to ensure accessibility, usability, and responsiveness across devices, offering an intuitive experience that supports self-regulated learning. Key features include a personalized Dashboard, Learning Path, Games Catalogue, Performance Statistics, and Game Recommender. These elements guide users through an interactive learning journey that links gameplay with measurable soft skill enhancement.

From a technical standpoint, the backend ensures secure data collection, storage, and processing, following GDPR principles. The platform uses structured datasets, database schemas, and automated background processes to regularly update gameplay data and generate personalized feedback.

The MEGASKILLS platform demonstrates promising preliminary results in assessing and accrediting soft skills through gamification. Initial model evaluations on the training dataset indicate a high coefficient of determination ($R^2 \approx 0.9$) for skill prediction, reflecting strong alignment between gameplay data and soft skill metrics. However, these results must be interpreted with caution due to methodological limitations. The dataset ($n=70$) is small and heavily augmented, which may introduce redundancy and potential overfitting. Additionally, the current evaluation approach does not include participant-level or temporal splits, raising concerns about data leakage and generalizability. Future work will prioritize robust validation strategies, including participant-level cross-validation and external validation with independent datasets, to ensure the reliability and scalability of the platform’s analytical methods.

The MEGASKILLS platform exemplifies the project’s vision of bridging entertainment and education through gamification and intelligent analytics. It enables users to visualize their growth in essential transversal competences, while providing educators, researchers, and organizations with a scalable tool to assess and foster soft skills in a digital learning context. Future work will focus on expanding the catalogue of games, refining AI models, and implementing additional functionalities identified during user testing and expert evaluation.

1. INTRODUCTION

Soft skills are increasingly recognized as crucial for success in both academic and professional contexts (Cinque, 2016; Kubátová et al., 2025; Labobar & Malatuny, 2022; Schulz, 2008; Sejzi et al., 2013). These skills encompass personal attributes, interpersonal abilities, and social competencies that complement technical knowledge (Marin-Zapata et al., 2022; Vasanthakumari, 2019), and as global competition intensifies, employees must continuously upgrade both their hard and soft skills to remain competitive and adaptable (Tripathy, 2021). They encompass a range of competencies including communication, teamwork, problem-solving, and emotional intelligence, which are essential for effective interaction and collaboration in the workplace and are essential for future career success (Fletcher & Thornton, 2023; Robles, 2012; Schulz, 2008; Tripathy, 2021; 8-10].

In today's rapidly evolving work and educational environments, the relevance of soft skills in enhancing employability is underscored by various studies. Seetha (2014) indicated that employers prioritize soft skills alongside technical competencies, as these skills are often indicative of an employee's ability to adapt, innovate, and thrive in dynamic work settings. This dual emphasis on hard and soft skills reflects a broader understanding of employability, where technical knowledge alone is insufficient for long-term career success (Daly et al., 2022; Ntola et al., 2024). Basir et al. (2022) highlighted that graduates who equip themselves with soft skills significantly improve their employability prospects, aligning with findings from previous research that emphasizes the necessity of these skills for entering the job market and succeeding in self-employment ventures. In this context, institutions are urged to integrate soft skills training into their programs to better prepare students for the demands of the labour market (Touloumakos, 2020). Consequently, educational institutions and job seekers are increasingly focusing on the cultivation and assessment of these skills to ensure a well-rounded and capable workforce (Bhati & Khan, 2022).

However, the development of soft skills faces several significant gaps, primarily related to educational frameworks, assessment methods, and societal perceptions, which often leads to inconsistent development and undervaluation of these essential competencies (Tadimetri, 2014). The lack of standardized definitions or assessment frameworks means these skills are often developed through non-formal education channels, potentially limiting access and effectiveness (Gibb, 2014; Marin-Zapata et al., 2022]. The definition and scope of soft skills vary considerably across both academic literature and professional practice and highlights the multidimensional nature of soft skills and their context-dependent interpretations (Cukier & Hodson, 2015). Furthermore, many educational institutions lack structured programs that effectively integrate soft skills training into their curricula. For instance, Kutz and Stiltner (2021) emphasize the necessity of incorporating soft-skills assessment within clinical education to enhance leadership and clinical practice. Developing reliable measurement tools for soft skills is crucial, as these skills vary across disciplines and organizational contexts (Abulbara & Worley, 2018).

However, emerging opportunities, driven by advances in digital learning, gamification, and personalized coaching, have been implemented to enhance soft skills in response to the evolving demands of modern professional environments (Dondi et al., 2021; Kyllonen, 2013). For example, by integrating traditional training with technological innovations (Snape, 2017) such as, for example, gamification techniques (Altomari et al., 2023), or experiential learning projects such as the use of virtual reality and AI technologies like ChatGPT (Nihal et al., 2023).

In this context and according to a report published by the European Commission, the number of European gamers has increased significantly over the COVID-19 pandemic, and now over half of the European population regularly play video games (European Commission, 2023). This prevalent engagement offers a distinctive opportunity for educational interventions that capitalize on established behavioural patterns to enhance learning and employment outcomes. Notably, video games have been associated with improvements in a range of cognitive abilities and soft skills, further supporting their potential as effective educational tools (Barr, 2017; De Freitas, 2018; Qian & Clark, 2016).

The purpose of this report is to show how video games can be leveraged as an accessible educational tool to develop crucial soft skills and present the final version of the assessment and accreditation intelligent platform designed and developed in WP4. The platform design has followed an iterative process with several versions that have evolved in line with various studies carried out with end users, and with comments and suggestions received from experts and different entities contacted in dissemination and exploitation tasks. The architecture of the solution, its different modules, the relationships between the different modules, as well as the data models used and their main characteristics, are described below.

In addition, we include [at the end of the document](#) a list of new functionalities that have been identified in this process and have been registered for being implemented in the future.

2. MEGASKILLS ASSESSMENT AND ACCREDITATION INTELLIGENT PLATFORM FINAL RELEASE

2.1. Solution architecture

The main parts of architecture of the solution designed at MEGASKILLS to gather user gaming information on the STEAM platform and subsequently process, are:

- Users play pre-selected games on the STEAM gaming platform.
- The automatic task designed within the MEGASKILLS platform launches a series of queries on a daily basis to obtain user game information. These queries call to the open API (application programming interface) provided by Valve Corporation which allows collection of player's information such as their performance in the video games played on STEAM.
- This information is processed and handled on the MEGASKILLS platform to feed the MEGASKILLS database. In this way, information such as minutes played in different games or achievements obtained in different games is updated.
- All this information is complemented by the mapping carried out by experts of the pre-selected games and their respective achievements in terms of soft skills and difficulty levels.
- The information stored in the MEGASKILLS database is used to feed the user's profile on the MEGASKILLS website, where we show information such as the time spent playing each game, the achievements obtained, the level of difficulty and the degree to which each soft skill has been worked on.
- We also have designed two Artificial Intelligence-based models trained with experiments carried out in the first stage of the project. Both models provide an API which allows being invoked from the MEGASKILLS platform.
- Using one of the Artificial Intelligence-based models, we show users an indicator of improvement in each of the pre-selected soft skills.
- Thanks to a second Artificial Intelligence-based model, the MEGASKILLS platform shows users a game recommender where they can choose new games to improve their soft skills with varying degrees of intensity.

In Figure 1 is shown the user gaming information processing funnel described in the previous lines.

User Gaming Information Processing Funnel

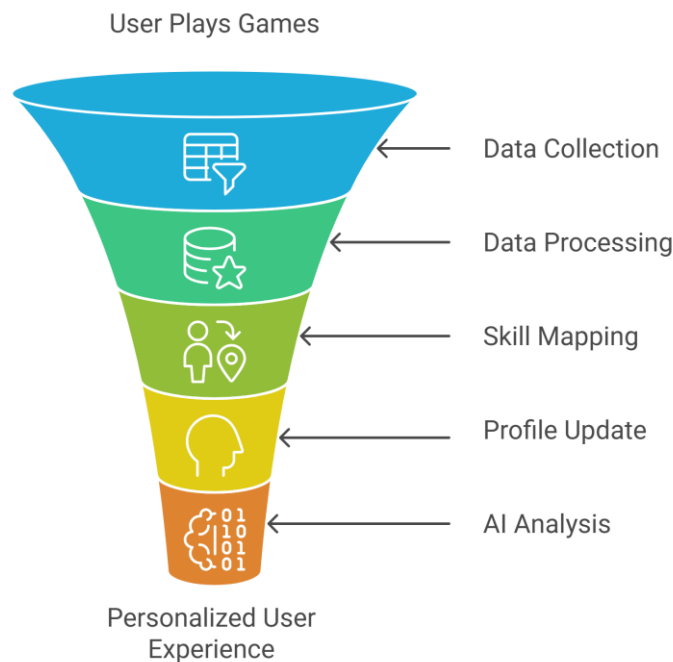


Figure 1: User Gaming Information Processing Funnel

2.2. Integration with the Steam gaming platform

2.2.1 Games selection

Video games encompass two primary categories: serious games, explicitly designed for educational purposes, and commercial off-the-shelf (COTS) games, developed primarily for entertainment (Rüth & Kaspar, 2021).

While serious games are directly aligned with curricular objectives, COTS games, despite their non-educational intent, have been increasingly recognized for their potential to enhance learning through engaging, immersive experiences. Scholars advocate for the integration of popular COTS games into educational settings, either as pedagogical tools or subjects for critical analysis. Rüth and Kaspar (2021) argue that these commercially developed games, when strategically guided by educators, can *'serve as objects of reflection in formal educational contexts,'* fostering skills such as media literacy and cross-disciplinary competencies. For instance, a history-themed COTS game might not only motivate students through its interactive narrative but also encourage critical engagement with historical events and source analysis, aligning with modern educational goals. By positioning students as active participants, games can concretize abstract concepts and overcome traditional learning barriers. This approach leverages the cultural relevance

of COTS games to address diverse topics, from scientific principles to social issues, stimulating discourse and critical thinking about content embedded within gameplay. Consequently, COTS games offer a complementary dimension to conventional pedagogy, bridging entertainment and education while resonating with learners’ contemporary interests and experiences.

Considering the four soft skills selected (CPS, CT, FA, and TM), we analysed the video games available at STEAM¹. STEAM is a digital distribution platform developed by Valve, offering a vast library of video games, integrated community features and cross-platform compatibility. The STEAM platform was selected for three key reasons: (1) its open API, which enables retrieval of player performance data; (2) the inclusion of in-game achievements as milestones that can be mapped to soft skill progression; and (3) its extensive catalogue of commercial off-the-shelf (COTS) games for PC.

To identify video games aligned with the targeted soft skills, the primary criterion was their demonstrable connection to each skill domain. Initially, we analysed the descriptors of the selected soft skills to extract key elements, enabling systematic identification of corresponding features within video games. Subsequently, a targeted search was conducted to generate a pool of candidate games, each exhibiting one or more soft skill indicators. Next, we evaluated the in-game achievements and their mechanics to construct a database of achievement values. This process involved mapping achievements to the predefined soft skills, specifying the level of difficulty required to complete each achievement and the specific skills involved in their attainment. This mapping framework facilitates the correlation of a player’s skill level with their unlocked achievements, thereby establishing a theoretical bridge between the soft skill descriptors and the potential for skill enhancement through gameplay.

Additional criteria, including cost, gender inclusivity, absence of offensive content, low technical requirements, and game duration (minimum 15 hours of play), were also considered. These factors were informed by prior research indicating that 12–15 hours of gameplay are necessary to yield measurable improvements in skill development (Oei & Patterson, 2013). The final selection of games, based on these criteria, is detailed in Table 1.

Table 1 - Video games selected from the STEAM platform

Video game	Steam APPID	Description
Alien Swarm Reactive Drop	563560	Co-operative top-down shooter game available for free. An epic bug hunt featuring a unique blend of co-op play and squad-level tactics.
Fallout Shelter	588430	Puts you in control of a state-of-the-art underground Vault from Vault-Tec. Build the perfect Vault, keep your Dwellers happy, and protect them from the dangers of the Wasteland.

¹ Available at: <https://store.steampowered.com/>

Anomaly Warzone Earth	91200	Lead an armored squad through the perils of this reversed tower defense action-strategy game!
Anomaly 2	236730	A sequel to the critically acclaimed Anomaly Warzone Earth. Maintaining the core elements of the original, Anomaly 2 adds plenty of new features: unit morphing, over million tactical combinations, post-apo world and tower defense vs tower offense multiplayer mode.
Anomaly Defenders	294750	The closing installment of the Anomaly series. The original incarnation of the Tower Defense sub-genre had players controlling humans fighting alien invaders. Now, the tables have turned. The human counterattack is underway, and the alien home world is under threat.
Gravitas	1067310	A short first-person puzzle platforming game that transports you to the Gallery of Refined Gravity. Manipulate gravity to navigate the "Gallery of Refined Gravity"
Minion Masters	489520	An addictive fast-paced hybrid of Card games & Tower-Defense. Play 1v1 - or bring a friend for 2v2 - and engage in epic online multiplayer battles full of innovative strategy and awesome plays! Collect 200+ cards with unique mechanics, all free!
Paladins	444090	The ultimate fantasy team-based shooter experience, with over 50 customizable Champions fighting in 5v5 action across a diverse Realm of modes and maps!

Additionally, participants needed to install the STEAM client on their computers to access and play the selected games.

2.2.2 Integration with STEAM via API

Valve Corporation provides an open API which allows collection of player's information such as their performance in the video games played on STEAM. To systematically collect game data from participants, we implemented an automated data collection task within the MEGASKILLS platform. This task utilized the Steam API to execute daily queries, which updated the platform's database on a daily basis. In Figure 2 it is shown the main endpoints of the API called:



Figure 2: Main API functions called from the MEGASKILLS platform

Table 2 provides a detailed overview of the queries executed and the specific data points retrieved through this process.

Table 2 - Description of the queries provided by the API provided by Valve Corporation

Query	Description
GetPlayerSummaries	Returns basic profile information. Some data associated with a STEAM account may be hidden if the user has their profile visibility set to "Friends Only" or "Private". In that case, only public data will be returned.
GetOwnedGames	Returns a list of games a player owns along with some playtime information.
GetRecentlyPlayedGames	Returns a list of games a player has played in the last two weeks.
GetPlayerAchievements	Returns a list of achievements for this user by app id.
GetGlobalAchievementPercentagesForApp	Returns on global achievements overview of a specific game in percentages.

Every method returned its results in JSON format, which were processed and saved into the platform's database. During the registration, we asked the participants to introduce their STEAM id and to make their profile in STEAM public. This was a necessary requirement in order to access their data via the API.

Below are the details of each method:

GetPlayerSummaries: (Returns basic profile information for a Steam ID):

- **Arguments:** steamids (Steam IDs to return profile information for) and format (Output format. json (default), xml or vdf).
- **Return Value:** (Some data associated with a Steam account may be hidden if the user has their profile visibility set to "Friends Only" or "Private". In that case, only public data will be returned.)
 - **Public Data:**
 - **Steamid:** SteamID of the user.
 - **Personaname:** The player's persona name (display name)
 - **Profileurl:** The full URL of the player's Steam Community profile.
 - **Avatar:** The full URL of the player's 32x32px avatar.
 - **Avatarmedium:** The full URL of the player's 64x64px avatar.
 - **Avatarfull:** The full URL of the player's 184x184px avatar.
 - **Personastate:** The user's current status. 0 - Offline, 1 - Online, 2 - Busy, 3 - Away, 4 - Snooze, 5 - looking to trade, 6 - looking to play. If the player's profile is private, this will always be "0", except is the user has set their status to looking to trade or looking to play, because a bug makes those status appear even if the profile is private.

- **Communityvisibilitystate:** This represents whether the profile is visible or not, and if it is visible, why you are allowed to see it. There are only two possible values returned: 1 - the profile is not visible to you (Private, Friends Only, etc), 3 - the profile is "Public", and the data is visible.
- **Profilestate:** If set, indicates the user has a community profile configured (will be set to '1')
- **Lastlogoff:** The last time the user was online, in unix time.
- **Commentpermission:** If set, indicates the profile allows public comments.
- **Private Data:**
 - **Realname:** The player's "Real Name", if they have set it.
 - **Primaryclanid:** The player's primary group, as configured in their Steam Community profile.
 - **Timecreated:** The time the player's account was created.
 - **Gameid:** If the user is currently in-game, this value will be returned and set to the gameid of that game.
 - **Gameserverip:** The ip and port of the game server the user is currently playing on, if they are playing on-line in a game using Steam matchmaking. Otherwise, will be set to "0.0.0.0:0".
 - **Gameextrainfo:** If the user is currently in-game, this will be the name of the game they are playing. This may be the name of a non-Steam game shortcut.
 - **Cityid:** This value will be removed in a future update (see loccityid)
 - **Loccountrycode:** If set on the user's Steam Community profile, The user's country of residence, 2-character ISO country code
 - **Locstatecode:** If set on the user's Steam Community profile, The user's state of residence
 - **Loccityid:** An internal code indicating the user's city of residence.

GetOwnedGames: returns a list of games a player owns along with some playtime information, if the profile is publicly visible.

- **Arguments:** steamed (The SteamID of the account), include_appinfo (Include game name and logo information in the output), include_played_free_games (By default, free games like Team Fortress 2 are excluded (as technically everyone owns them). If include_played_free_games is set, they will be returned if the player has played them at some point. This is the same behavior as the games list on the Steam Community), format (Output format. json (default), xml or vdf), and appids_filter (You can optionally filter the list to a set of appids).
- **Result layout**
 - **game_count:** the total number of games the user owns (including free games they've played, if include_played_free_games was passed)

- **A games array**, with the following contents (note that if "include_appinfo" was not passed in the request, only appid, playtime_2weeks, and playtime_forever will be returned):
 - **Appid**: Unique identifier for the game.
 - **Name**: The name of the game.
 - **playtime_2weeks**: The total number of minutes played in the last 2 weeks.
 - **playtime_forever**: The total number of minutes played "on record", since Steam began tracking total playtime in early 2009.
 - **img_icon_url, img_logo_url**: these are the filenames of various images for the game.
 - **has_community_visible_stats**: indicates there is a stats page with achievements or other game stats available for this game.

GetRecentlyPlayedGames: returns a list of games a player has played in the last two weeks, if the profile is publicly visible.

- **Arguments**: steamid (The SteamID of the account), count (the number of games a person has played in the last 2 weeks), format (Output format. json (default), xml or vdf).
- **Result layout**:
 - **total_count**: the total number of unique games the user has played in the last two weeks.
 - **A games array**, with the following contents:
 - **Appid**: Unique identifier for the game.
 - **Name**: The name of the game.
 - **playtime_2weeks**: The total number of minutes played in the last 2 weeks.
 - **playtime_forever**: The total number of minutes played "on record", since Steam began tracking total playtime in early 2009.
 - **img_icon_url, img_logo_url**: these are the filenames of various images for the game.

GetPlayerAchievements: Returns a list of achievements for this user by app id.

- **Arguments**: steamid (64 bit Steam ID to return friend list for), appid (The ID for the game you're requesting), l (Optional) (Language. If specified, it will return language data for the requested language).
- **Result data**: A list of achievements.
 - **Apiname**: The API name of the achievement.
 - **Achieved**: Whether or not the achievement has been completed.
 - **Unlocktime**: Date when the achievement was unlocked.

- **name** (optional): Localized achievement name.
- **description** (optional): Localized description of the achievement.

GetGlobalAchievementPercentagesForApp: Returns on global achievements overview of a specific game in percentages.

- **Arguments**: gameid (AppID of the game you want the news of), format (Output format. json (default), xml or vdf).
- **Result data**: A list of achievements.
 - **Achievements**:
 - **Name**: The name of the achievement as an unlocalized token.
 - **Percent**: Percentage of player population that has unlocked the achievement given as a double.

2.3. Integration with AI-based models

In this section, a complete description of the deployed AI models is provided. Descriptions of the tasks completed range from data transformation and embedding construction to model selection and performance evaluation.

2.3.1 AI Methodology

The data collected during the gaming phase was used to train an AI model designed to substitute standardized tests for measuring soft skills. The main idea is that an individual's soft skill level, influenced by past experiences including gaming, can be quantified before and after gameplay to assess progress.

A machine learning model (M1) is trained to take an initial soft skill value and variables representing gaming time within a period and then predict the increase in soft skills. However, since initial levels are often unknown when replacing tests, the model is adapted: the initial soft skill can be set to zero if unknown and trained with such data. Additionally, player features are embedded into numerical vectors representing soft skill tendencies which provide valuable profile information even without prior soft skill data.

To handle unknown initial skills, a second model (M2) is trained to predict the initial soft skill based on the skill increase and playtime, using participant data where the initial level is known. This estimated initial skill then is used as input for the first model, improving its predictions.

The interactions of these two models are depicted in Figure 3.

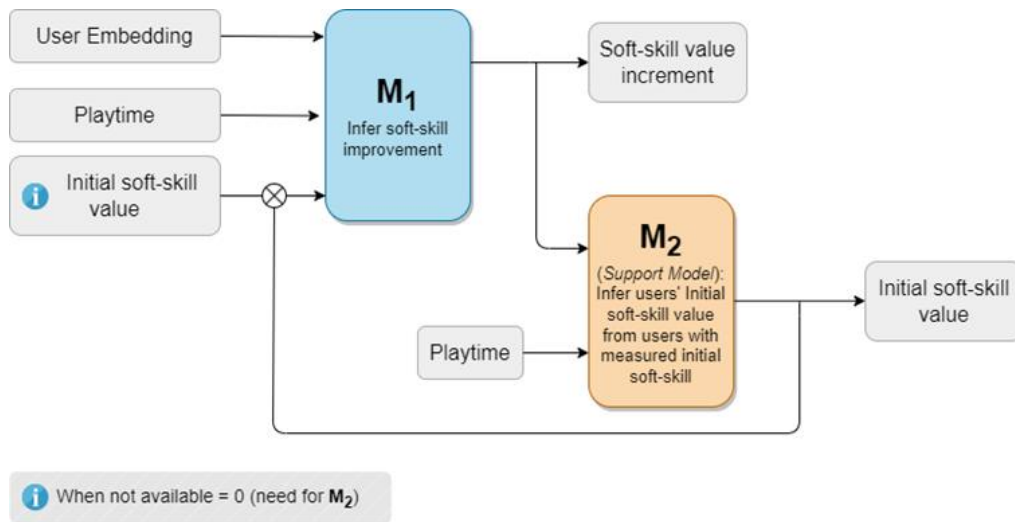


Figure 3: Overall, AI methodology. Model 1 (M1) computes users soft skill's deltas (or increment in soft skill values) and improvement percentage. Model 2 (M2) is used as support for M1 to derive a baseline for users without initial soft skills.

Their training involves experimental data where the initial soft skill, its increment, playtime, and player profiles are known. Data augmentation techniques are employed: first, creating new samples with no initial soft skill (set to zero) to train the model for such cases; second, including noise-based variations of real data to address data scarcity. The process of data collection, embedding creation, and soft skill prediction is visualized in Figure 4.

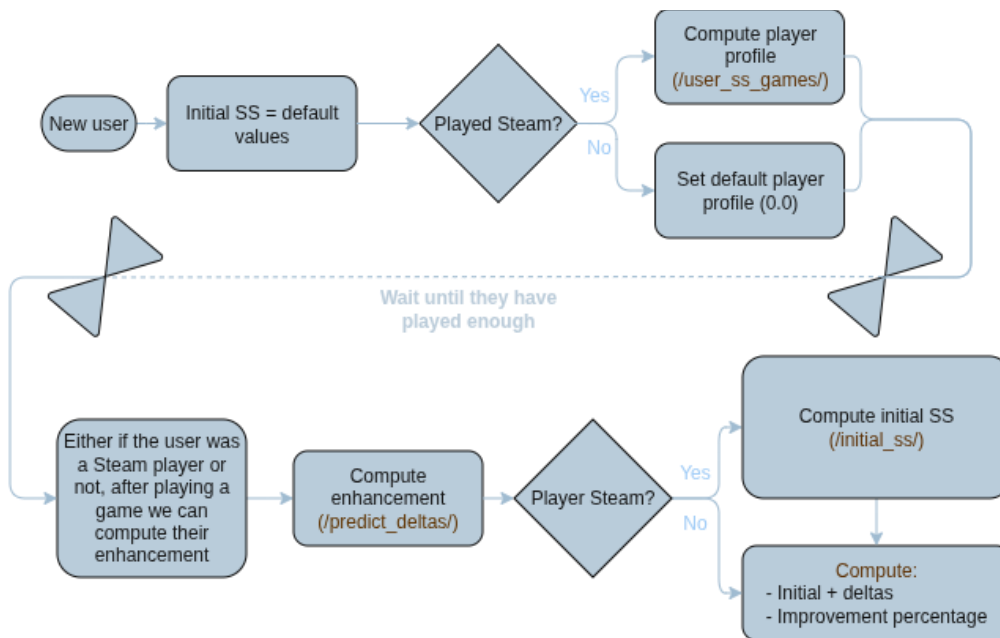


Figure 4: Flowchart of data gathering, embedding creation and soft skill predictions

2.3.2 Datasets

For the design of the AI-based solution, only participants who played videogames were considered, excluding those in the control group. Participants who played for less than ten hours or did not complete either the

pre-test or post-test were also excluded. In total, 70 participants met all the requirements and were included in the study.

Because the number of available samples was limited (around 30 users per game), we applied a data augmentation technique to strengthen the model's performance. This approach consisted of subtracting the "pre_test" values (users' test scores before playing) from both the "post_test" and "pre_test" data, so that the new samples started at zero while keeping the same difference between "post_test" and "pre_test". The method assumes a linear scale of improvement in users' performance when playing a game. While this assumption may not reflect the shape of a typical learning curve, the amount and distribution of available data make it a practical way to generate additional samples.

A deeper analysis of learning curves for each soft skill would allow more accurate modelling once larger datasets are available. Still, the data augmentation method used here, although it shows that a larger number of samples can improve results, also introduces some drawbacks, such as redundancy and potential bias, which should be considered when interpreting the outcomes.

2.3.3 User and Game Embeddings

Table 3 - User Embedding and Game Embedding

Feature	Values
Complex_Problem_Solving	Decimal [0.0, 1.0]
Critical_Thinking	Decimal [0.0, 1.0]
Cognitive_Flexibility_Adaptability	Decimal [0.0, 1.0]
Time_Management	Decimal [0.0, 1.0]

The models described above, in Table 3, rely on the definition of a user embedding (U), which captures the relationship between a player's gaming profile and their associated soft skills. The user embedding is a one-dimensional array with four elements, each representing the value of a specific soft skill for that player.

To generate this embedding, we considered the player's previous gaming experience, as this was the only available information for users who did not complete the soft skill evaluation tests. For each game included in a user's Steam profile, a game embedding (G) was used and weighted according to the time spent playing that game. A minimum of ten hours of gameplay was required for a game to contribute to the user's skill profile. The contributions from all games in a user's profile were then aggregated to obtain the soft skill values composing U . All input features used to create this user profile are summarized in Table 4 - User Profile.

Table 4 - User Profile

Feature	Description	Values
Had_steam	The user had Steam before the experiment began	0 or 1
Steam_level	The Steam user level	Integer

Total_playtime	Total game time registered in Steam	Integer of minutes
Total_achievements	Number of achievements earned by this user	Integer
Experiment_game	The unique official ID of the game	String of game id
Experiment_time	Time played to the “Experiment_game” game	Integer of minutes
Pre_problem_solving	Problem-solving soft skill value before playing “Experiment_game”, measured by test	Decimal
Pre_critical_thinking	Critical-thinking soft skill value before playing “Experiment_game”, measured by test	Decimal
Pre_cambios	Cognitive-Flexibility/Adaptability soft skill value before playing “Experiment_game”, measured by test	Decimal
Pre_time_management	Time-management soft skill value before playing “Experiment_game”, measured by test	Decimal
Complex_Problem_Solving	User embedding (U) value for Complex-problem-solving before playing “Experiment_game”	Decimal
Critical_Thinking	User embedding (U) value for Critical-Thinking before playing “Experiment_game”	Decimal
Cognitibe_Flexibility_Adaptability	User embedding (U) value for Cognitive Flexibility/Adaptability before playing “Experiment_game”	Decimal
Time_Management	User embedding (U) value for Time-management before playing “Experiment_game”	Decimal

Analogous to U , each game embedding (G) is a one-dimensional array with four elements, representing the level of soft skills associated with a game. All G embeddings are combined to form the overall user embedding system. The values are expressed as floating-point numbers between 0 and 1 and are computed from publicly available information, primarily the main tags assigned to each game.

These values are derived from the ten most relevant community-labelled tags of each game, together with their estimated importance for each soft skill based on expert knowledge. For instance, cooperative games are considered relevant for assessing Cognitive Flexibility/Adaptability, as they require players to react to the actions of teammates. Similar reasoning is applied for the other soft skills.

Each Steam game includes a set of developer- and community-assigned tags that describe features such as game mechanics, storytelling, art style, or atmosphere. Since these tags tend to reflect the nature of a game, expert criteria can be used to estimate how strongly a game relates to each soft skill.

The Steam Games Dataset used to compute the preliminary soft skill values per game includes information on more than 100,000 titles. Although the dataset contains a wide range of attributes, from text descriptions to images, the most useful information for this task comes from the tags and the number of community clicks associated with each one. These clicks serve as a proxy for the relevance of a tag to a given game.

For the four soft skills analysed in this project, the mapping between Steam tags and soft skills is shown in Figure 5.

```
SOFT_SKILL_TAGS = {
    "Time Management": [
        "Resource Management", "City Builder", "Time Management",
        "Automation", "Tycoon", "Colony Sim", "Incremental",
        "Farming Sim", "Time Attack", "Base Building",
        "Tower Defense", "Sandbox", "City Planning", "RTS",
        "Simulation", "Cooking"
    ],
    "Flexibility/Adaptability": [
        "Roguelike", "Rogue-lite", "Roguelite",
        "Procedural Generation", "Metroidvania",
        "Souls-like", "Survival", "Bullet Hell",
        "Action Roguelike", "Hack and Slash", "MOBA",
        "PvP", "FPS"
    ],
    "Complex Problem Solving": [
        "Puzzle", "Detective", "Escape Room",
        "Hacking", "Choices Matter", "Point & Click",
        "Logic", "RTS", "Tower Defense"
    ],
    "Critical Thinking": [
        "Strategy", "Tactical", "Turn-Based Strategy",
        "Grand Strategy", "Deckbuilding", "4X", "Chess",
        "Wargame", "Turn-Based Tactics", "RTS", "Card Game",
        "Choices Matter"
    ]
}
```

Figure 5: Assignment of Steam tags to soft skills

To focus on tags that meaningfully contribute to the development of soft skills, the following steps were applied to curate the dataset:

- Games containing tags unrelated to soft skills (e.g., "SEXUAL CONTENT", "NUDITY", "MATURE", "NSFW") were removed.
- Tags belonging to non-relevant groups (e.g., "Uncategorized", "Franchises", "Hardware", "Tools") were excluded.

After this curation process, each game was labelled with an embedding using the following steps:

- If a game has more than ten tags, only the first 10 were considered. A filtering function $F(T)$ was applied to remove and refine the tag set, producing a curated list T' .
- Games with fewer than 200 total tag clicks were penalized. For each tag t in T' , the number of clicks $C(t)$ was computed, and the total click value was determined as $K = \max_{t \in T'}(1 | T' | \sum C(t), 200)$. This ensures that games with very few total clicks are not overrepresented.
- Each tag was weighted according to its position in the list (determined by click count). The weighting for each soft skill was defined as $P(t) = C(t)/K$, where $t \in T'$ and K is the total amount of clicks.
- Finally, a value between 0 and 1 representing the game's contribution to each soft skill was computed. This was done using a weighting function $W(t, ss) | t \in T'$ where $t \in T'$ and $ss \in S$, with $S = \{(u, Lu) | u \in U\}$, U is a list of soft skill and L_u the corresponding tag list.

The final score for each soft skill was obtained as:

$$H_{ss} = \sum W(t, ss) | t \in T' | ss \in S \text{ which is the sum of all the values for each soft skill.}$$

2.3.4 Soft-skill predicting models

The machine learning framework described in Section 2.3.1 (*AI Methodology*) was trained separately for each target soft skill. For instance, one model estimates improvements in Time Management, while another focuses on Critical Thinking.

Once trained, each model is used to estimate the increment in a soft skill value for any new individual, based on their recorded playtime and user embedding profile. These predicted increments serve to quantify the potential impact of gameplay sessions on the development of each soft skill.

2.3.5 Game embedding prediction

Based on the labelling criteria and embeddings described in Section 2.3.3 (User and Game Embedding), a preliminary labelling of games was performed using the available data and a curated database of selected games evaluated by experts, each assigned a level for every soft skill.

A deep learning model was then trained using the complete set of tags for each game, without applying any filtering or weighting, and the expert-assigned soft skill levels were used as target values. This model can now estimate the soft skill levels of games based on their associated tags, generating a game embedding (G) for each title. These embeddings can subsequently be used by the predictive models described above.

This approach also helps illustrate how the model captures the reasoning applied by experts when associating soft skills with games and may assist them in future game selection decisions, since a value for each soft skill is computed automatically.

Table 5 - Contrasting experts' decision with AI-based solution. Numbers in the "AI embedding" column are ordered from most to least representative.

AI embedding	Expert assigned soft skills	Tags (Top 12)	Name
--------------	-----------------------------	---------------	------

CT - 0.2 TM - 0.0 CPS - 0.0 FA - 0.0	CT	Free to play, Strategy, Card Game	Lightseekers
CT - 0.5 TM - 0.3 CPS - 0.2 FA - 0.0	TM	PvE, Trading Card Game, Stylized, Turn-Based Tactics, Free to Play, Multiplayer, Card Battler, Tactical RPG, PvP, Strategy, Deckbuilding, Card Game...	Minion Masters
FA - 0.4 CT - 0.0 TM - 0.0 CPS - 0.0	FA	Looter Shooter, Twin Stick Shooter, Action, Top-Down Shooter, Action Roguelike, Adventure, Co-op, Multiplayer, Free to Play, Bullet Hell, Pixel Graphics, Local Co-Op...	Relic Hunters Zero: Remix
CT - 0.2 TM - 0.2 CPS - 0.1 FA - 0.0	CPS	Quick-Time Events, Multiple Endings, Trains, Relaxing, Simulation, Strategy, Singleplayer, Management, Level Editor, Indie, Building, Puzzle ...	Train Valley 2

2.3.6 Initial soft-skill and increment predicting models

The performance of the AI models was evaluated under different configurations to gain a clearer understanding of each model's advantages, limitations, and generalization capacity. Three models were tested, trained with five different random seeds each. This setup allowed the analysis of how model initialization affects performance and generalization.

The use of different seeds, rather than cross-validation or other resampling techniques, was motivated by the limited amount of available data. After applying the data augmentation procedure described earlier to meet the minimum data requirements, the models were trained using an 80/20 train-test split.

The performance metrics employed for later analysis and validation were:

- **Coefficient of Determination (R^2):** Indicates the proportion of variance in the observed data that is explained by the model, reflecting how good it fits. $1 - \frac{\sum (y_i - \hat{y}_i)^2}{n \sum (y_i - \bar{y})^2}$ where y_i are the observed values, $\hat{y}_i$ are the predicted values, $\bar{y}$ is the mean of the observed values, and n is the number of samples.
- **Root Mean Squared Error (RMSE):** Quantifies the standard deviation of the prediction errors, giving more weight to large deviations and highlighting models with big individual errors. $\sqrt{\frac{1}{n} \sum (y_i - \hat{y}_i)^2}$
- **Mean Absolute Error (MAE):** Measures the average magnitude of the prediction errors, providing guidance of how close the predictions are to the observed values. $\frac{1}{n} \sum |y_i - \hat{y}_i|$ The configuration for each model included 100 estimators for both RF (Random Forest) and GBR (Gradient Boosting

Regressor) which were selected to avoid overfitting as more than 100 estimators could result in more estimators than data samples, which will be highly probable given the limited amount of data available, making overfitting a significant concern. The results of this performance evaluation can be observed in Figure 6.

Complex Problem Solving for Train Valley 2 with hard achievements percentage: 0

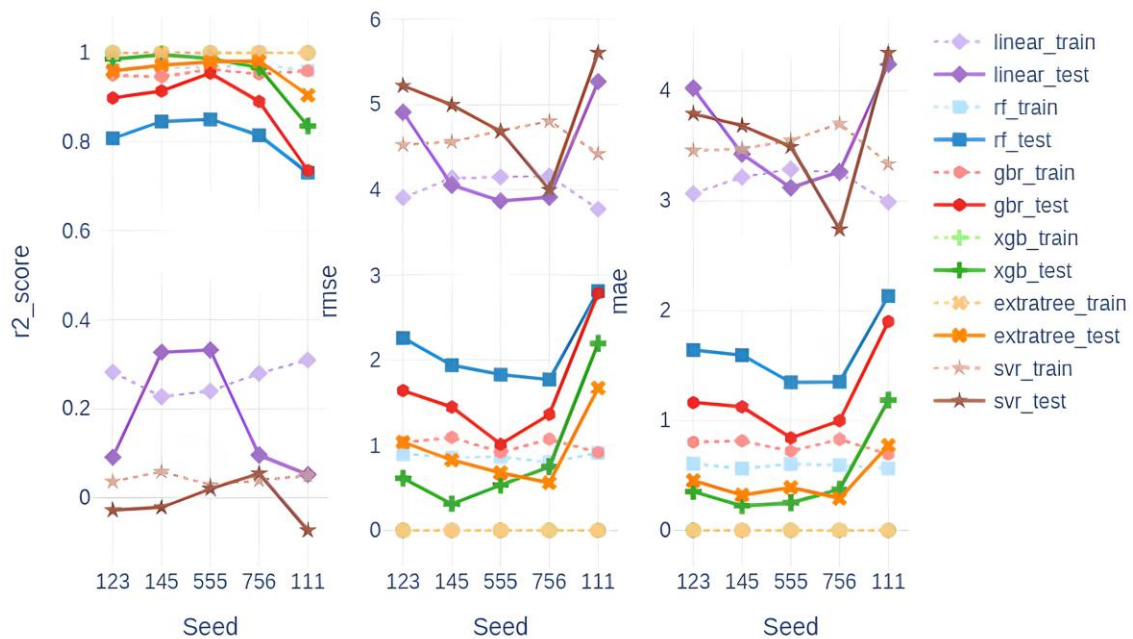


Figure 6: Performance of the model that predicts the improvement of soft skills. Evaluation includes R² score, RMSE and MAE metrics for train, test and different seed

Figure 6 shows the performance of the three models in terms of R², MAE, and RMSE. The R² score reflects how well the models capture the improvement of soft skills based on user profiles, ideally approaching a value close to 1. In contrast, both MAE and RMSE measure the deviation between predicted and actual improvements, expressed in the same scale as the data. While MAE indicates the average prediction error, RMSE highlights cases where the differences between predicted and real values are larger. In both cases, lower values indicate better performance.

From Figure 6, it can be observed that the Linear Regression (LR) model performs poorly, with low R² values and high MAE and RMSE scores. This suggests that the relationship between the features and the target variable cannot be adequately captured through simple linearity, and that a more complex model may be required. This assumption is consistent with the results obtained for the Random Forest (RF), Gradient Boosting Regressor (GBR), XGBoost (XGB), and Extra Trees (EXTRATREE) models, all of which display higher R² values and lower MAE and RMSE errors.

Figure 6 also shows how performance varies with different random initializations. This variation helps to assess each model's generalization ability and its sensitivity to data initialization. For the best-performing models a deviation of approximately 0.1 to 0.2 in R^2 values can be observed, indicating a relatively high dependence on initialization. Such variability reinforces the need for a larger training dataset, as increasing the amount of data would likely reduce these deviations.

To ensure the statistical significance of the models evaluated in this experiment, a new set of tests was conducted using 60 different random seeds. This expanded analysis made it possible to better assess the models' stability and overall performance. Table 6 presents the results of the Wilcoxon statistical test applied to each pair of algorithms.

Table 6 - Wilcoxon metric applied to each algorithm pair. Each cell is divided into four columns, one per soft skill (i.e. CT, FA, CPS and TM). Green ticks represent $p < 0.005$ (significant differences), red crosses $p > 0.005$ (no significant differences)

	RF				GBR				XGB				EXTRATREE				SVR			
	CT	FA	CPS	TM	CT	FA	CPS	TM	CT	FA	PS	TM	CT	FA	CPS	TM	CT	FA	CPS	TM
Linear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RF	-	-	-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GBR	-	-	-	-	-	-	-	-	✓	✓	✓	✓	X	X	X	X	✓	✓	✓	✓

As can be concluded from the analysis of the table, almost every pair of algorithms check the null hypothesis, which make them independent. However, ExtraTree and GBR models did not pass the test, which also showed very similar performances in terms of R^2 . To help to figure out how stable these models are, Table 7 presents the mean R^2 and standard deviation for each algorithm and soft skill.

Table 7 - Mean R^2 and standard deviation for the 60 seeds experiment (i.e. CT, FA, CPS and TM)

	LINEAR	RF	GBR	XGB	EXTRATREE	SVR
CT	0.055 ± 0.12	0.842 ± 0.07	0.914 ± 0.06	0.937 ± 0.08	0.905 ± 0.09	0.002 ± 0.06
FA	0.045 ± 0.13	0.640 ± 0.12	0.778 ± 0.11	0.847 ± 0.14	0.761 ± 0.14	-0.036 ± 0.04
CPS	0.116 ± 0.17	0.770 ± 0.12	0.826 ± 0.14	0.911 ± 0.14	0.901 ± 0.09	-0.002 ± 0.04
TM	-0.066 ± 0.18	0.710 ± 0.14	0.747 ± 0.14	0.851 ± 0.15	0.851 ± 0.13	0.008 ± 0.06

Table 7 reinforces the previous conclusions: Linear and SVR models fail to capture the relationships in the data, whereas the other models do. The small differences among the best-performing models, along with their high R^2 values, suggest low data variability, an expected effect of the data augmentation process. This observation highlights the need for additional, more diverse data to improve the models' generalization capabilities.

Together, Tables 6 and 7 illustrate both the complexity of the problem and the influence of data quality on model performance. Among the top models, Extra Trees (EXTRATREE) and XGBoost (XGB) achieved the best results, with R^2 values around 0.9 and the lowest MAE and RMSE scores, indicating reliable predictive behavior.

2.3.7 Application of the Model in Real User Scenarios

To demonstrate how the developed model can be applied in practice, two illustrative cases are presented. Note that these scenarios follow the flow-chart provided in Figure 3 in Section 2.3.1 (*AI Methodology*).

The first case involves a **beginner user** who had never played on the Steam platform and therefore had no prior gameplay data. After registering on MEGASKILLS, this user played only one of the available games. Table 8 shows the model's output across several weeks, highlighting noticeable improvements in Cognitive Flexibility/Adaptability (FA) and Time Management (TM).

Table 8 - Application of the model to a 'novel' user, i.e., a user without previous data on Steam

TM	FA	CT	CPS	Nº Achievements	Total Playtime (mins)	Game Playtime (mins)	Nº Games	
0	0	0	0	0	0	0	1	Start
57.59	21.89	32.02	44.08	6	726	726	1	Week 1
59.04	23.34	32.02	44.08	9	982	982	1	Week 2

The second case corresponds to an **experienced user** with a pre-existing Steam account, having accumulated more than 1,500 hours of gameplay (Steam level = 11) before engaging with the selected MEGASKILLS game. For this user, baseline gameplay data was available, allowing the model to estimate initial soft skill levels. Table 9 summarizes the model's predictions over several weeks, showing how this user's FA and TM levels evolved and improved over time.

Table 9 - Application of the model to a 'experienced' user, i.e., a user with previous data on Steam

TM	FA	CT	CPS	Nº Achievements	Total Playtime (mins)	Game Playtime (mins)	Nº Games	
55.20	21.43	31.48	40.40	1528	108784	0	9	Start
59.87	26.10	31.48	44.40	1537	109289	605	10	Week 1
62.57	28.81	31.48	44.40	1538	109634	850	10	Week 2
62.71	28.89	31.48	44.40	1538	109705	921	10	Week 3

3. UI DESIGN AND LOOK & FEEL

The user interface (UI) design and overall look and feel of the platform play a crucial role in ensuring a positive and engaging user experience. The platform was developed with a modern, intuitive, and visually appealing design that supports the main goal of the application: to improve users' soft skills through gamification. A clean and consistent visual language was adopted throughout the application to facilitate navigation, encourage user interaction, and maintain a professional yet friendly tone.

The UI was designed with accessibility, usability, and responsiveness in mind, ensuring that the platform works seamlessly across different devices and screen sizes. A cohesive colour scheme, typography, and iconography were chosen to reflect the educational and motivational nature of the platform. Each screen was carefully crafted to guide users through the different functionalities, from onboarding to game-based learning sessions.

In the following sections, we will provide an overview of the UI design for each key functionality of the platform, including screenshots and descriptions of the visual elements and user interactions.

3.1. Home page

The landing page serves as the first point of contact for users visiting the platform (see Figure 7). Designed with a clean and welcoming layout, it introduces the purpose of the application and provides quick access to the registration and login options. Additionally, a short explanatory video is embedded on this page to give users an overview of how the platform works and the benefits it offers.

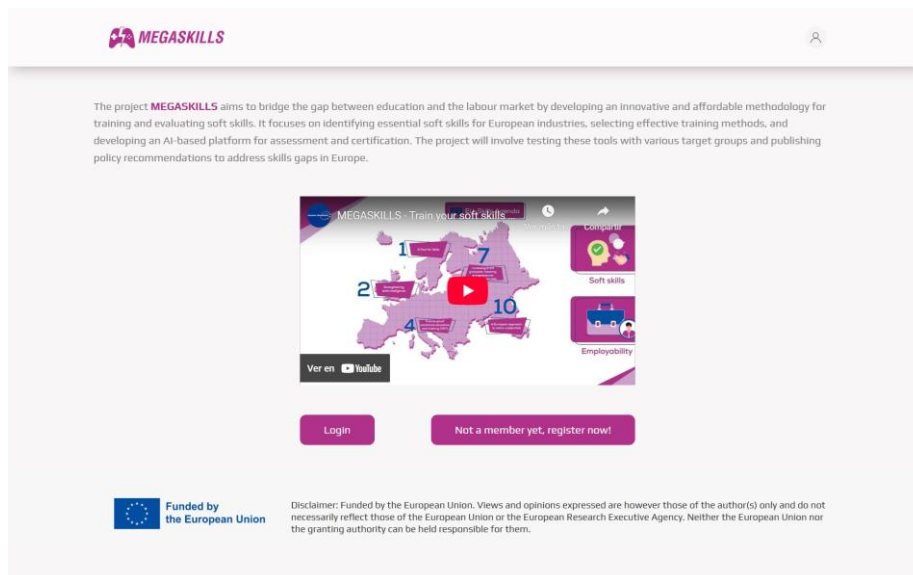


Figure 7: Landing page with video introduction and access to registration and login

3.2. Registration

The registration page is the first step for new users to create an account on the platform. It is designed to collect essential personal and demographic information, as well as to ensure informed consent for

participation in the MEGASKILLS study. The form is structured in a clear, step-by-step layout to reduce cognitive load and encourage completion (see Figure 8).

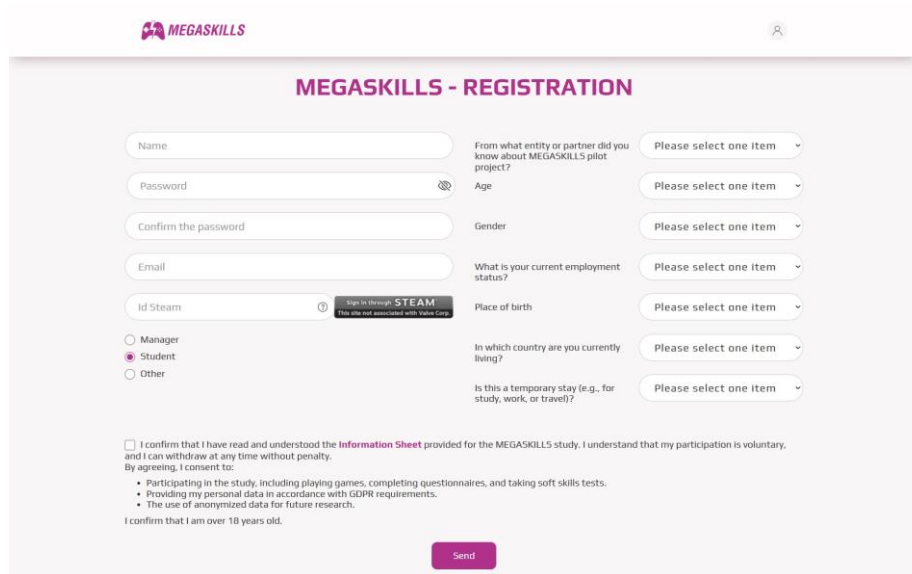


Figure 8: Registration screen with structured form, Steam ID input, and informed consent section

Users are asked to provide the following information:

- **Basic Information:** Name, email address, and password.
- **Steam ID:** This field allows users to enter their Steam ID, which will be needed for future integrations with game-based assessments. Providing this information during registration is optional; however, it will be required once inside the platform in order to fully access its features. A link to the official Steam website is also provided to help users find their Steam ID.
- **Demographic Data:** Age range, gender, country of birth, country of residence, employment status, and whether the user is a student.
- **Recruitment Source:** How the user became aware of the project (e.g., social media, academic institution, etc.).
- **Residency Status:** Whether the user is currently residing in a country different from their country of birth, and if that stay is temporary or permanent.

All demographic data is collected via dropdown menus and multiple-choice options to ensure consistency and ease of data processing.

3.2.1 Informed Consent Section

A crucial part of the registration process is the consent statement, which is presented in a clear and structured format to ensure that users understand the nature of the study and their rights as participants. The consent text reads:

**“I confirm that I have read and understood the Information Sheet provided for the MEGASKILLS study. I understand that my participation is voluntary, and I can withdraw at any time without penalty.*

By agreeing, I consent to:

- *Participating in the study, including playing games, completing questionnaires, and taking soft skills tests.*
- *Providing my personal data in accordance with GDPR requirements.*
- *The use of anonymized data for future research.*

*I confirm that I am over 18 years old.” **

This section is presented in a modal or dedicated section of the form, with a checkbox that must be selected to proceed. The use of a prominent "I Agree" button signals the user's acceptance and commitment to the study.

3.2.2 Email Verification

After submitting the registration form, users receive a confirmation email at the address they provided. This email contains a verification link that they must click to activate their account. This step ensures the validity of the email address and helps maintain the integrity of the user database.

3.3. Login

The login screen serves as the entry point for registered users to access the platform (see Figure 9). It requires users to enter their email address and password, both of which are validated against the system's database. In addition to standard authentication checks, the login process includes an account activation verification step to ensure that only verified users can proceed.

Authentication and Validation Process

Upon submission of the login form, the system performs the following checks:

- **Email and Password Match:** The provided credentials are checked against the database to verify the user's identity.
- **Account Activation Status:** The system confirms whether the user has activated their account via the verification email sent during registration. If the account is not yet activated, the user is presented with a relevant error message.
- **Error Handling:** In case of invalid credentials or an inactivated account, the user receives clear and specific error messages displayed on the same login screen. Examples include:
 - *“The email address is not registered.”*
 - *“The password is incorrect.”*
 - *“Your account is not activated. Please check your email for a verification link.”*

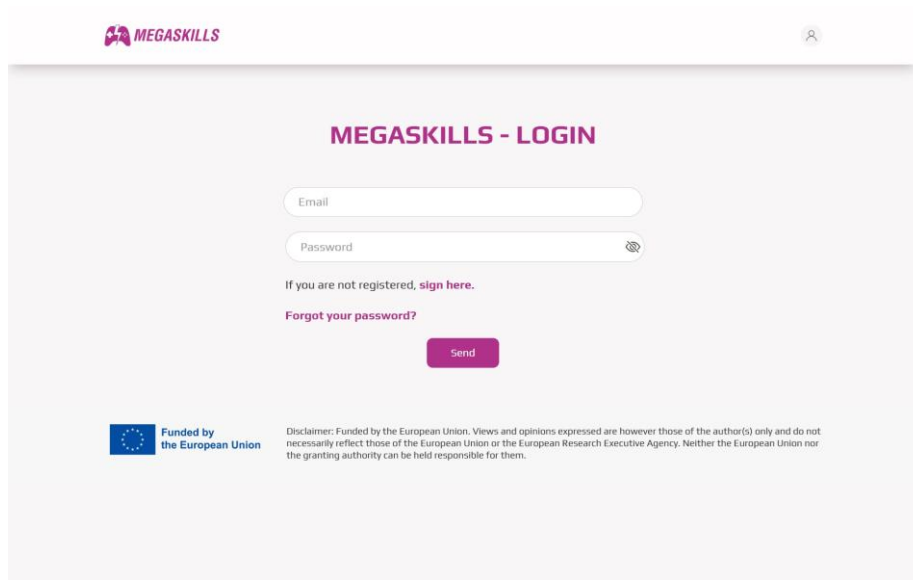


Figure 9: Login screen with input fields

Post-Login Validation (Optional Steam ID Check)

Once the user successfully logs in, the system performs an optional validation of the Steam ID, if provided during registration. This validation includes the following checks:

- **Steam Profile Public Status:** The system verifies whether the user has set their Steam profile to public, as this is a requirement to access certain game-based features.
- **Game Playtime Check:** The system retrieves and logs the total minutes played for the specific games included in the MEGASKILLS project since the user's registration date. This data is used to analyse user engagement and correlate gameplay with soft skills development.
- **Achievements Check:** The system also retrieves and logs the achievements earned by the user in the relevant games. These achievements can be used to assess progress, skill development, and motivation levels in a gamified context.

These checks are performed in the background and do not interrupt the user experience. If any of the optional Steam-related checks fail (e.g., the profile is not public or the user has not played the required games), the system logs the information but does not prevent the user from continuing to use the platform.

All three checks are carried out through calls to the Steam API, as detailed in Section 2.2.2: Integration with Steam via API of this document.

Password Recovery Process

In addition to the standard login functionality, the login screen provides a password recovery option for users who have forgotten or lost access to their account. This process is initiated by clicking the "**Forgot your password?**" link, which redirects the user to a dedicated password recovery screen (see Figure 10).

On this screen, the user is asked to enter the email address associated with their account. If the email is registered in the system, the user receives an email with a password reset link. Clicking the link opens a

secure password reset form, where the user can enter a new password and confirm it. The system enforces password strength requirements to ensure the security of the account.

If the provided email is not registered, the user is shown a generic message to avoid exposing whether an email is registered or not (a security best practice). In either case, the user is encouraged to try again or contact support if needed.

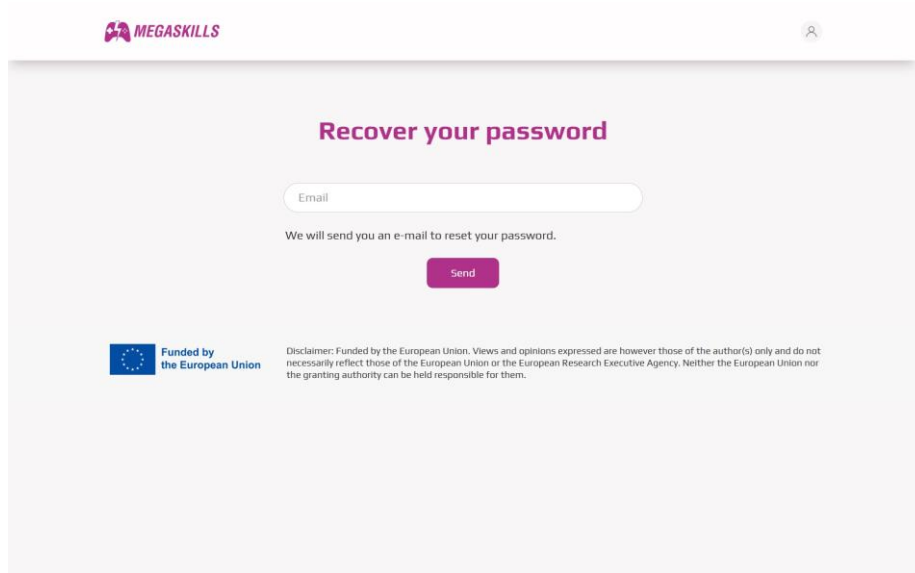


Figure 10: Password recovery screen where users enter their email to reset their password

3.4. Welcome/Progress Overview Screen

After successfully logging in, users are redirected to a welcome screen that acts as an onboarding overview and progress tracker. This screen is designed to reinforce the purpose of the MEGASKILLS project, guide users through the next steps, and provide a clear view of their current status in the platform.

Progress Tracking and Status Indicators

At the top of the screen, a progress overview section is displayed, offering a visual summary of the user's status in the project (see Figure 11). This section includes the following progressive status indicators:

- Linking Steam account. Steam ID Provided? If no, a "Add Steam ID" button is shown, which opens a link to the official Steam website where the user can retrieve and input their ID.
- Set my profile to public. Steam Profile Visibility. Indicates whether the user's profile is public or private.
- Total Playtime (in hours). Displays the amount of time played in the games associated with the MEGASKILLS project since the user's registration.
- Eligibility for Evaluation and Certificate. Shows whether the user has reached the minimum gameplay time required to complete the evaluation questionnaire and be eligible for the participation certificate.

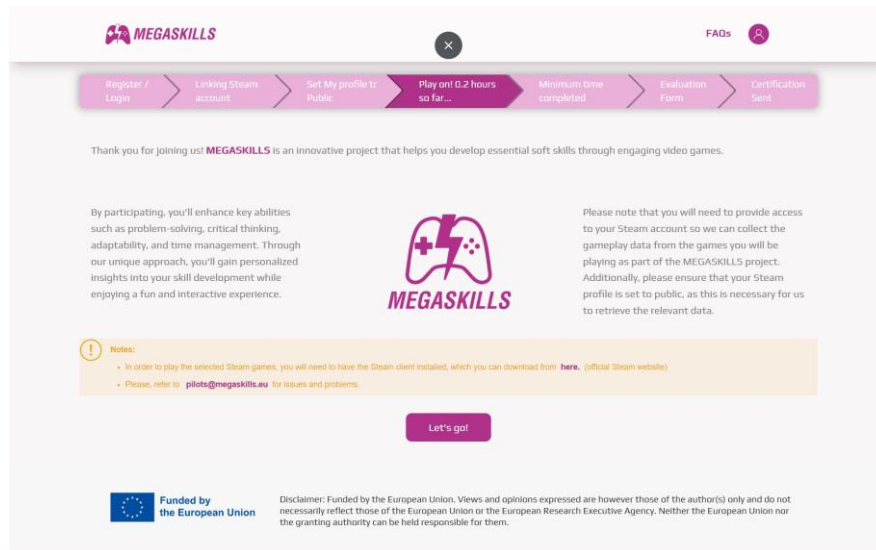


Figure 11: Welcome screen with informational messages and user progress indicators

3.5. Dashboard

The Dashboard is divided into three main sections, each corresponding to a core functionality of the platform (see Figure 12). These sections are presented in a card-based layout, with descriptive titles and short summaries to guide the user.

- **Learning Path.** This section provides a personalized roadmap for the user's skill development. Based on their profile and goals, the system recommends a sequence of games, assessments, and feedback sessions to help them improve specific soft skills. The section includes a progress bar or timeline to show how far the user has advanced in their learning journey.
- **Games.** This section lists the video games selected for the MEGASKILLS project, each designed to enhance specific soft skills such as problem-solving, adaptability, communication, and time management. Users can click on a game to view its description, objectives, and how it contributes to skill development.
- **Performance Statistics.** This section offers a visual and data-driven overview of the user's progress. It includes charts, graphs, and metrics that show how their gameplay translates into real-world skill growth. Users receive regular feedback based on their performance in the games and assessments.

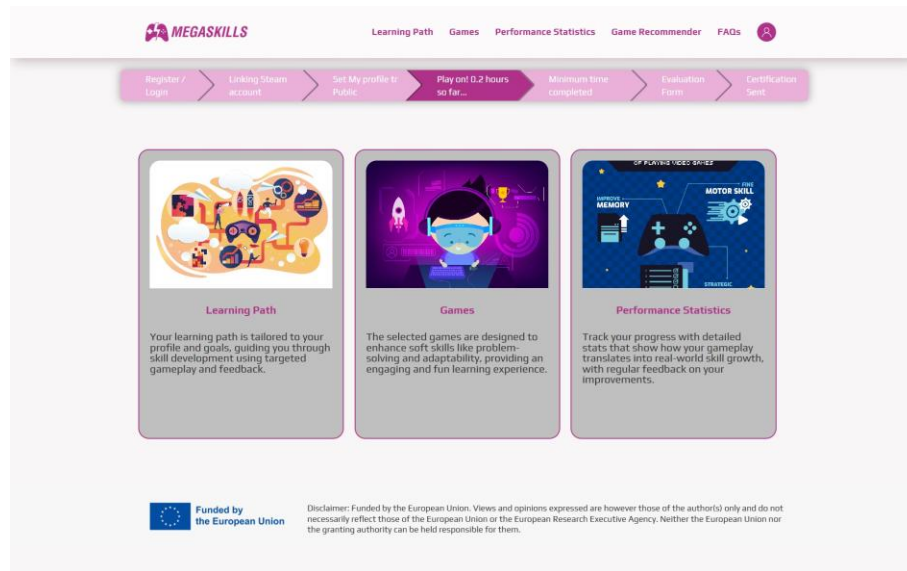


Figure 12: Dashboard

3.6. Learning path

The Learning Path functionality provides users with a structured and personalized approach to developing four key soft skills: CPS, CT, FA, and TM. This section is designed to guide users through a goal-oriented learning journey, combining educational content, gameplay, and feedback mechanisms to support skill development (see Figure 13).

Overview Screen

Upon entering the Learning Path section, users are presented with a central overview screen that features the four target soft skills as distinct modules. is accompanied by a short description and a call-to-action button to explore the associated games.

The descriptions are concise yet informative, providing a clear understanding of what each skill entails. For example:

“Problem-solving refers to the ability to analyse situations, identify and prioritize problems, and develop and implement solutions to overcome constraints and resolve problems. Problem-solving requires critical thinking, creativity, and working collaboratively.”

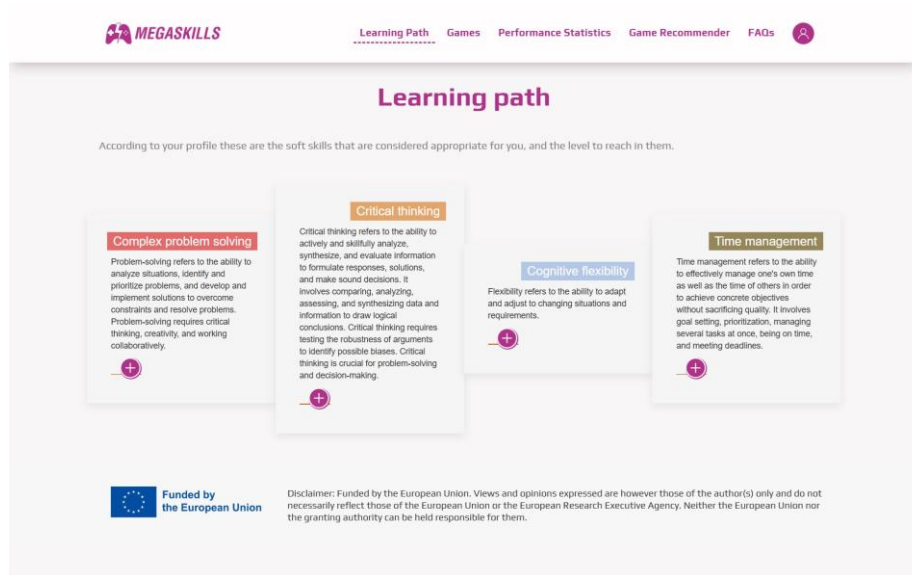


Figure 13: Learning Path screen

Clicking on a skill opens a dedicated screen that lists the selected games from the MEGASKILLS project that are relevant to that skill. For each game, the following information is displayed (see Figure 14):

- Game Title
- Estimated Level of Skill Development (e.g., Beginner, Intermediate, Advanced)
- A short description of how the game supports the development of the skill
- A direct link to the Steam platform where the user can begin playing the game

This allows users to explore and engage with the games in a structured and purposeful way, aligning gameplay with their learning goals.

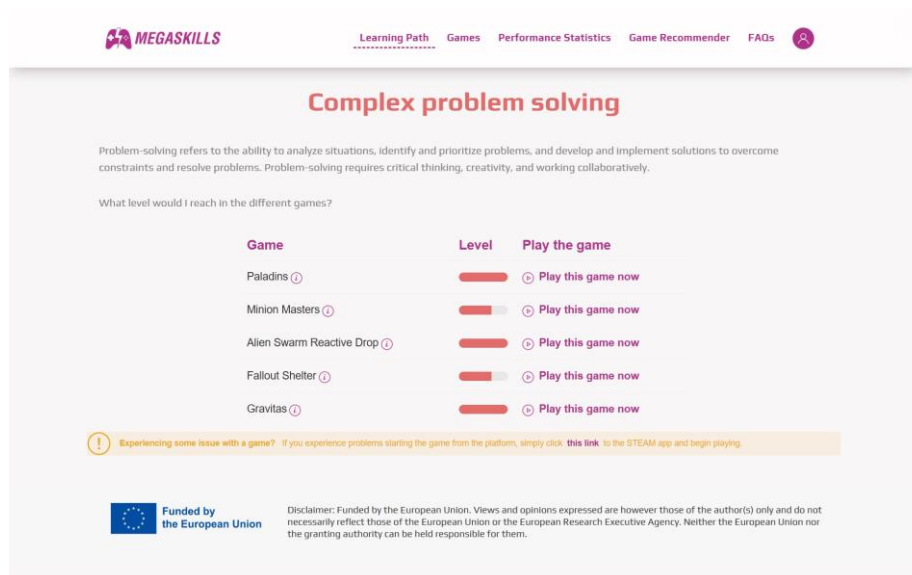


Figure 14: Learning Path screen, access to relevant games

3.7. Games

The Games section provides users with a centralized view of the eight video games selected for the MEGASKILLS project (see Figure 15). Each game is designed to enhance one or more of the four target soft skills: CPS, CT, FA, and TM.

When users select the 'Games' option from the top navigation menu or the dashboard screen, they are directed to an overview screen displaying all eight games in grid or list format. Each game is presented with a thumbnail image, title and summary of how it contributes to soft skill development.

For each game, the platform visually indicates how it supports the four soft skills, using progress bar to highlight the skill areas it addresses. This helps users quickly identify which games are most relevant to their personal development goals.

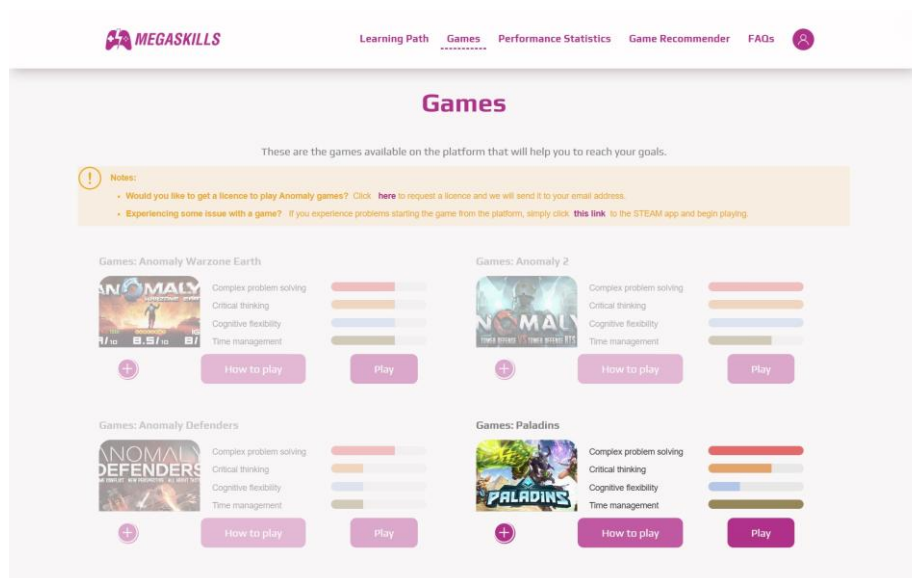


Figure 15: Games screen with eight game cards, each including a description, soft skill indicators, and interactive buttons

Game Interaction Options

Each game card is accompanied by three interactive buttons, which provide different types of support and guidance to the user:

- "How to Play" Button. This button opens a YouTube video that demonstrates the basic gameplay mechanics of the selected game.
- "Play" Button. When clicked, this button triggers a modal window that presents pre-play recommendations to the user. These include:
 - A reminder to register on Steam if they haven't already.
 - Instructions to set their Steam profile to public.
 - Guidance on installing the Steam client and the selected game.

This ensures users are well-prepared and aware of the requirements before starting to play.

- "+" Icon Button. This button leads the user to a detailed information screen about the game, focusing on its relevance to soft skill development.

Game Detail / Skill Development Overview

For each game, the screen includes a visual representation of the potential impact on each soft skill, using a progress bar or rating scale from 0 to 3 (see Figure 16). In addition to the potential skill contribution, the platform also displays the user's current progress for each skill based on their gameplay data and assessments, using a parallel progress bar. This enables users to see how their gameplay translates into real skill development.

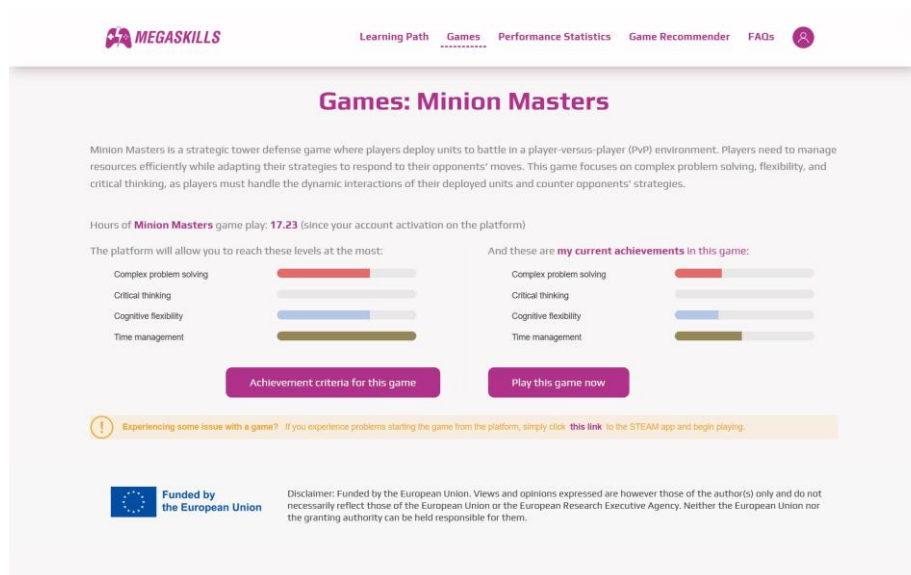


Figure 16: Game detail screen showing skill contribution ratings, user progress, and interactive buttons for achievements and gameplay

The screen includes two main buttons (see Figure 16):

- "Achievement Criteria for This Game". This button opens a dedicated section that lists all achievements available in the game, including: a visual indicator of whether the user has achieved it, the date of completion a brief description of the achievement (see Figure 17).

MEGASKILLS		Learning Path	Games	Performance Statistics	Game Recommender	FAQs	6
Games Minion Masters achievements criteria							
Achievement name	Supernatural						
Achievement description	Get 5 achievements						
Acquisition date	2025-10-20						
Level	Low level of difficulty						
Achievement name	Legendary						
Achievement description	Achieve 15 achievements						
Acquisition date	2025-10-29						
Level	Medium level of difficulty						
Achievement name	Legendary Ringlet						
Achievement description	Achieve 30 achievements						
Acquisition date	2025-10-29						
Level	High level of difficulty						
Achievement name	Friend Challenge						
Achievement description	Play a friendly challenge with 3 different friends						
Acquisition date	2025-10-29						
Level	Unrelated achievement						
Achievement name	Tactics Study						
Achievement description	Watch another player's game						
Acquisition date	2025-10-30						
Level	Unrelated achievement						
Achievement name	The Stone League						
Achievement description	Reach the Stone League						
Acquisition date	2025-11-01						
Level	Low level of difficulty						
Achievement name	The Bronze League						

Figure 17: Achievements

- "Play on Steam". This button provides a direct link to the Steam platform, where the user can launch the selected game and begin playing. It is styled as a primary action button to encourage engagement.

3.8. Performance Statistics

The Performance Statistics section allows users to track their progress in soft skill development through visual data representations (see Figure 18). This section provides a comprehensive overview of the user's gameplay and performance, linking it to the four target soft skills: CPS, CT, FA, and TM.

The section is structured into two primary data visualization components, designed to offer a clear and intuitive view of the user's development.

- Line Chart – Skill Progress Over Time (Last 4 Weeks). The line chart displays the user's progress in each of the four soft skills over the past four weeks. Each skill is represented by a distinct color, making it easy to follow individual progress trends over time.

X-axis: Time (e.g., Week 1 to Week 4)

Y-axis: Skill level (on a scale from 0 to 3)

Color-coded lines: One for each of the four soft skills

- Radar Chart – Current Skill Level Overview. The radar chart provides a visual snapshot of the user's current skill levels across all four soft skills. Each axis of the radar represents one skill, with the distance from the center indicating the current level (from 0 to 3).

By selecting (clicking on) a vertex of the radar chart, an explanatory rubric is displayed, offering a qualitative description of the proficiency level attained for the corresponding soft skill. These rubrics serve to contextualize the numerical scores by linking them to observable behaviors and competencies. A comprehensive description of the rubrics associated with each proficiency level and soft skill is provided in Appendix C of this document.

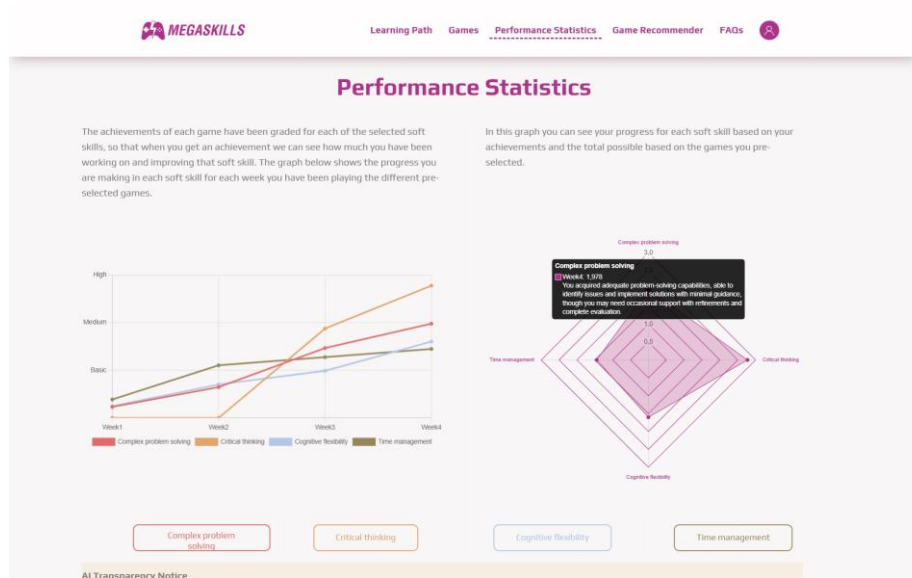


Figure 18: Performance Statistics screen with line chart (4-week progress) and radar chart (current skill level), along with skill-specific navigation buttons

Below the visualizations, the section includes four buttons, each corresponding to one of the four soft skills. When clicked, each button leads to a dedicated sub-section that provides detailed insights into how each game has contributed to the development of that specific skill (see Figure 19).

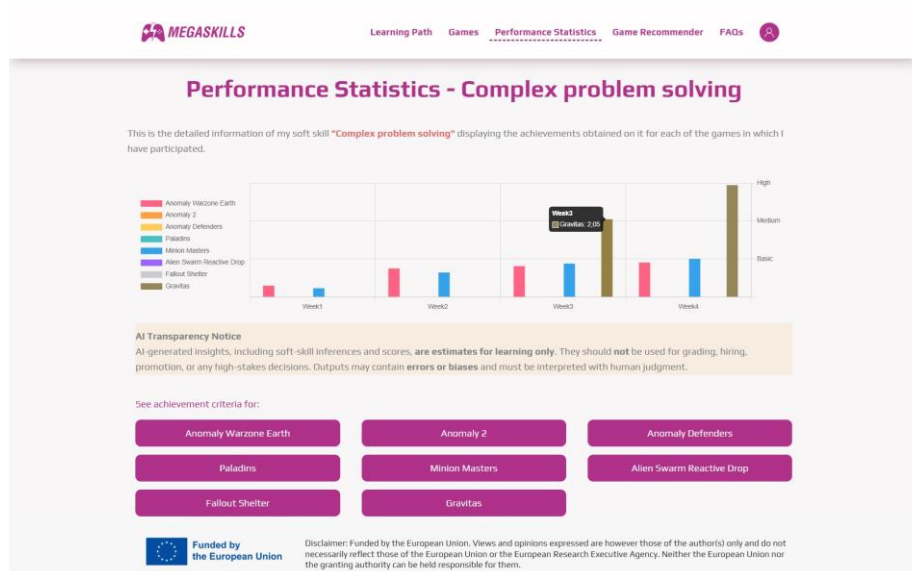


Figure 19: How each game has contributed to the development of that specific skill

3.9. Game recommender

The Game Recommender allows users to select one of the four target soft skills—CPS, CT, FA, and TM—and receive a customized list of games that are most effective in supporting the development of that skill.

This section is designed to help users discover new games, understand their educational value, and make informed decisions about which games to play to improve their chosen skill.

When a user selects a soft skill from the option button list, the system generates a recommended list of up to ten games, following this priority-based logic (see Figure 20):

- **Top 25 Most Popular Games on Steam.** The first ten games in the list are selected from the 25 most popular games on Steam. This ensures that users are recommended games with a high level of engagement and community interest.
- **Skill-Relevant Games (if needed).** If fewer than ten games are available from the top 25, the system includes additional games that best contribute to the selected soft skill, based on a predefined rating scale from 0 to 3.

Each game in the list is displayed in a card-based format, with the following key elements:

- **Game Image:** A thumbnail image of the game, taken from its Steam page.
- **Game Title:** The name of the game, clearly visible and linked to its Steam page.
- **Brief Description:** A short and informative summary of the game, highlighting how it contributes to the selected soft skill.
- **Skill Contribution Indicator:** A progress bar or rating bar from 0 to 3, showing the estimated level of contribution the game provides to the selected skill.

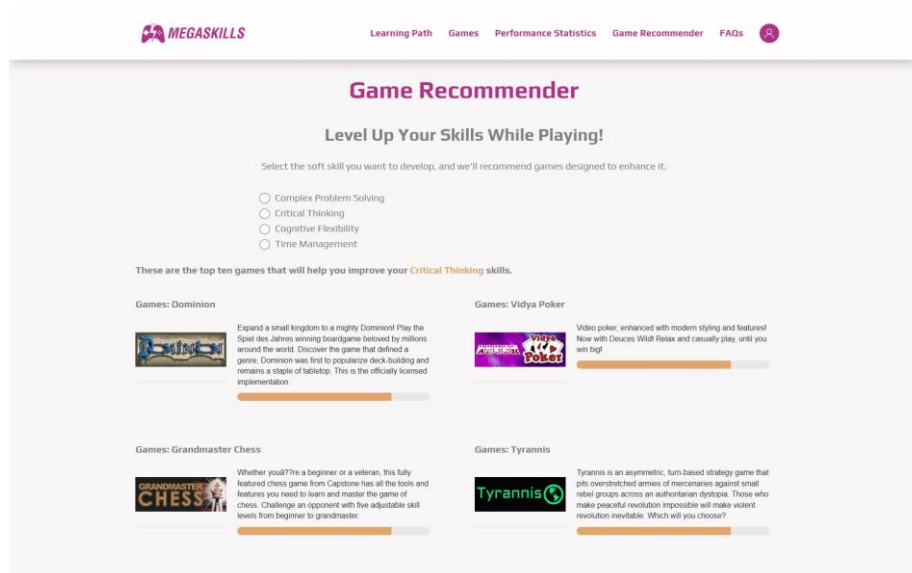


Figure 20: Game Recommender screen showing a list of ten game cards for a selected soft skill, with images, descriptions, and skill contribution indicators

3.10. FAQs

The FAQ section is designed to answer common questions that users may have about the MEGASKILLS platform, the research process, and the technical requirements for participating in the project. It serves as a

self-service support tool, reducing the need for direct assistance and helping users navigate the platform more independently.

The FAQ is organized into clear categories, with each question and answer presented in a collapsible card format to enhance readability and user experience (see Figure 21). The following topics are covered:

- Getting Started:
 - What equipment is needed to participate in the study?
 - How do I create an account?
 - What are the requirements to play the games?
- Steam Account and Setup
 - How do I find my Steam ID?
 - How do I make my Steam profile public?
 - How do I install the Steam client and the selected games?
- Gameplay and Progress Tracking:
 - How can I track my progress in soft skills?
 - What do the skill contribution ratings mean?
 - How often is my progress updated?
- Contact and Support:
 - Who can I contact if I have further questions?
 - How can I report technical issues?

Each question is answered using clear and concise text, and where appropriate, a video is embedded to demonstrate the process.

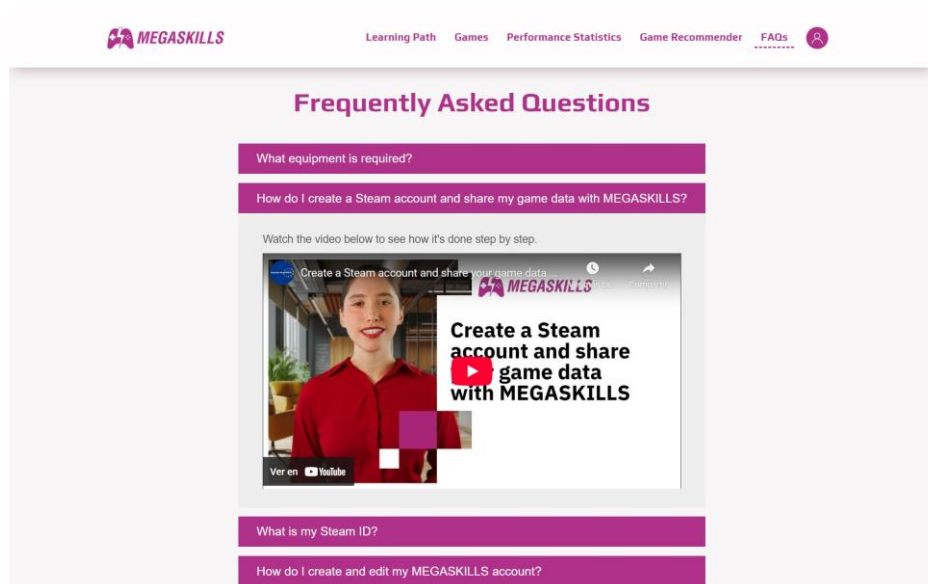


Figure 21: FAQ screen

4. BACKEND DESCRIPTION

The Backend description section aims to provide a structured and detailed overview of the backend architecture of the MEGASKILLS platform. The system is a modular and data-driven web application designed to support the collection, analysis, and visualization of user data from Steam, with a focus on soft skill development through game-based learning

The backend is developed using Java with Spring Boot as the main framework and Spring Tool Suite (STS) as the development environment. The frontend is implemented using static HTML (HyperText Markup Language), CSS (Cascading Style Sheets), and JavaScript, with UIKit as the primary CSS framework for responsive design and styling. The system architecture is designed with scalability, separation of concerns, and secure user authentication in mind, and it integrates with external APIs such as Steam and an AI model for skill prediction and feedback

This chapter also introduces a future development line known as the Backend Web Interface, which aims to enhance supervisory and analytical capabilities. Although this feature is not yet fully implemented, a basic user report is currently available, allowing export of user data filtered by partner. This report serves as a preliminary step toward a more comprehensive administrative dashboard, which will include advanced filtering, alerts, and corrective action tools in the future

In addition, this section includes a description of the IA-BASED MODEL API, which acts as a centralized entry point for all AI-related functionalities. The API is built using Flask and runs in the same Docker container as the AI module, ensuring compatibility and seamless integration

Furthermore, the Data Model section provides an overview of the database schema, including entity relationships and a detailed description of each table

Together, these components form the technical foundation of the MEGASKILLS platform and are essential for understanding the structure, functionality, and scalability of the system.

4.1. System Architecture

The MEGASKILLS platform is a modular and data-driven web application designed to support the collection, analysis, and visualization of user data from Steam, with a focus on soft skill development through game-based learning.

The system is built using Java for the backend, with Spring Boot as the main framework and Spring Tool Suite (STS) as the development environment. The frontend is built using static HTML, CSS, and JavaScript, with UIKit as the primary CSS framework for styling and responsive design.

The architecture is designed to ensure scalability, separation of concerns, secure user authentication, and integration with external APIs such as Steam and an AI model for skill prediction and feedback.

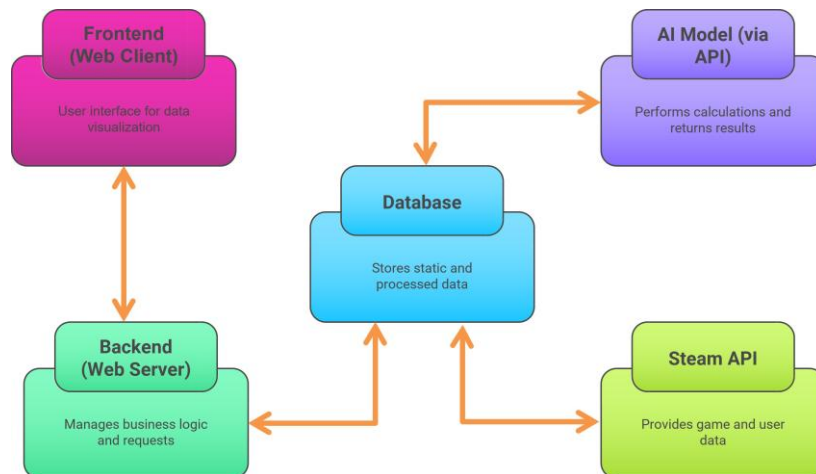


Figure 22: MEGASKILLS platform system architecture

Main Components of the System Architecture (see Figure 22):

- **Frontend** (Web Client – Static HTML, CSS, JavaScript with UIKit)
 - **Description:** The user interface is a static website built using HTML, CSS, and JavaScript, with UIKit as the CSS framework for responsive design and component-based styling. It is suitable for content-driven and form-based interfaces, and is ideal for lightweight, fast-loading pages.
 - **Responsibilities:**
 - Rendering static pages such as the dashboard, game details, progress tracking, FAQ, and user settings,
 - Handling basic user input and navigation.
 - Communicating with the backend.
 - **Technologies:**
 - HTML5
 - CSS3
 - JavaScript
 - UIKit (CSS framework for responsive UI and components)
 - Bootstrap para complementar UIKit
- **Backend** (Web Server – Spring Boot)
 - **Description:** The backend is built using Java and the Spring Boot framework, with Spring Tool Suite (STS) as the development environment.
 - **Responsibilities:**
 - Managing user authentication and session handling.
 - Handling requests from the frontend.
 - Processing user data and gameplay statistics.

- Integrating with external services such as Steam API and AI model API.
- Interacting with the database for data storage and retrieval.
- **Database (MySQL)**
 - **Description:** The centralized database is used to store raw data from Steam, user profiles, gameplay logs, and results from the AI model.
 - **Responsibilities:**
 - Storing user data, including authentication details, game history, and soft skill progress.
 - Supporting secure and efficient querying of data for the backend.
 - **Technologies:**
 - MySQL
 - Spring Data JPA (Java Persistence API)
- **Steam API Integration**
 - **Description:** The system integrates with the Steam Web API to retrieve user data, game metadata, and playtime statistics.
 - **Responsibilities:**
 - Fetching user Steam ID and profile data for validation and progress tracking.
 - Retrieving game library and playtime to calculate skill development.
 - Ensuring data consistency and privacy compliance.
 - **Technologies:**
 - Steam Web API
 - REST Client
- **AI Model (External API)**
 - **Description:** The AI model is hosted as an external API, which the backend consumes to analyse gameplay data and generate skill development insights. It may use machine learning algorithms to predict skill growth or recommend games based on user behaviour.
 - **Responsibilities:** Data analysis, skill prediction, and generating insights for the user interface.
 - **Technologies:**
 - REST API
 - JSON for data exchange

4.2. Steam API

Thanks to the integration with Steam described in point 2.2.2, we were able to obtain the following key variables to feed user profiles with the help of Artificial Intelligence-based models:

- **Time played:** time in minutes spent on each game.

- **Number of achievements:** total number of achievements obtained on each game.
 - Details of each achievement: associated difficulty indicator based on the percentage of users who have played that game and succeeded.
- **Owned games:** Details of the games the user has downloaded to their Steam profile.
- **User profile information:** Basic user information, including their overall Steam level.

In Figure 23 is shown the relationship between the main variables obtained from the integration with the Steam API and the variables obtained from the integration from the IA-based model API described in the following section:

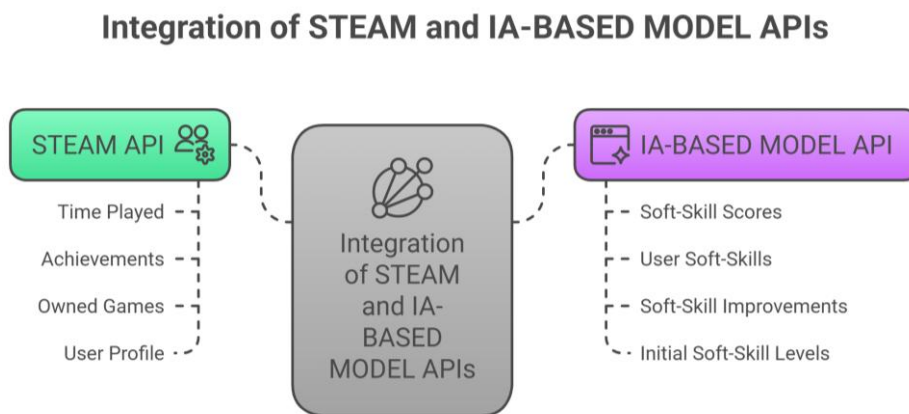


Figure 23: Integration of Steam and IA-based model APIs

4.3. IA-based model API

This section describes the API interface for the AI module, serving as the single entry point for all functionalities described in the AI module section. The API is implemented within the same Docker container as the rest of the AI module and it's built using Flask, ensuring compatibility with the same Python version as the AI module. This shared container and Python environment enable seamless integration with the trained AI models through a unified API interface.

To simplify interaction, a Swagger documentation page is provided, offering a standard and user-friendly overview of all available endpoints, usage requirements and parameters. This facilitates easy testing and integration.

GET/

Purpose: Serves as the homepage and can be used to execute health checks for the Docker container.

Functionality: Verifies that the AI module is deployed without errors and responding to requests.

Example Output: An HTTP 200 OK code to indicate success.

GET/soft-skills/{game_id}

Purpose: This endpoint retrieves predicted soft-skill scores for a game identified by the `game_id` parameter. The scores are calculated by pre-trained AI models that correlates the game's tags to infer its alignment with four specific soft-skills.

Functionality: Fetches the data of the game identified by `game_id`, which is then used by an AI model to predict a decimal score for each skill, ranging from 0.0 (no alignment) to 1.0 (strong alignment).

Example Input: `GET/soft-skills/728880`

Example Output:

```
{"CPS": 0, "CT": 0.1, "FA": 0, "TM": 0.6}
```

POST/user_ss_games/

Purpose: This endpoint predicts the user soft-skills from their played games data.

Functionality: It requires a JSON input containing the user's gameplay data, including the number of games, total playtime, and a list of owned games with their respective playtimes. It then processes the data to feed it to a pre-trained model that can infer the soft-skill scores for CPS, CT, FA, and TM. The result is a JSON object with scores.

Example input:

```
{"params": {  
  "PROFILE": {  
    "num_games": 1,  
    "total_playtime": 1000  
  },  
  "OWNED_GAMES": {  
    "appid": ["728880"],  
    "playtimeforever": [1000]}}
```

The OWNED_GAMES array supports multiple games, with each appid and playtimeforever entry contributing to the final score calculation.

Example output for a player that owns and has played just 1 game (id 728880):

```
{"CPS": 0, "CT": 0.1, "FA": 0, "TM": 0.6}
```

The example output correlates with the `/soft-skills/728880` endpoint, as the user has only played the game with ID 728880. The scores reflect the weighted average based on the single game's soft-skill alignment and the user's total playtime.

POST/predict_deltas/

Purpose: This endpoint predicts a user's soft-skill improvements (raw delta values) based on their Steam gameplay data. It calculates the difference between the user's current skill levels (derived from gameplay) and their baseline (pre-profile).

The output includes raw soft-skill increment and relative increments for each soft-skill. Both values will not include extrapolated predictions below 0. This is because AI models can learn to extrapolate values that are out-of-bounds of the training dataset which, in this scenario, are not considered useful. Therefore, as a security measure, they are clipped to the expected value ranges. Alternatively, an analogous endpoint can be found in /prediction_deltas_nofilter/ which does not clip the values.

Functionality:

A) User Scenarios:

- a. When the user already has a Steam account it is required to first, call /user_ss_games/ to retrieve the user's current soft-skill profile.
- b. When the user is new it is required to set all pre-profile values to their default values as no prior gameplay data is available.

B) Prediction Process:

- a. Both the gameplay data and the user soft-skill predictions are required to be input to this endpoint in a single JSON file. It then feeds the pre-trained AI models with the information and outputs the soft-skill predictions. The response will include the raw delta improvement and the percentage of improvement for each soft skill.

Example input:

```
{ -- These 4 attributes are related to Steam and the user profile
  "had_steam": 1,
  "steam_level": 49,
  "total_playtime": 28764,
  "total_achievements": 55,
  -- These 2 attributes are related to the playing time of the user
  "experiment_game": "602320",
  "experiment_time": 2854,
  -- These 4 attributes are related to the previous soft-skills values: CPS, CT, FA and TM in that order.
  "pre_problem_solving": 0, "pre_critical_thinking": 0,
  "pre_cambios": 0, "pre_time_management": 0,
  -- These 4 attributes are defined by the /user_ss_games/ call
  "Complex_Problem_Solving": 0, "Critical_Thinking": 0,
  "Flexibility_Adaptability": 0.6, "Time_Management": 0}
```

Example output:

```
{"time-management": [0,0], "problem-solving": [0,0], "critical-thinking": [2.030805, 0.006769],  
"adaptability": [0,0]}
```

The first value will be the raw delta improvement, and the second one will be the percentage of improvement.

POST/initial_ss/

Purpose: This endpoint predicts a user's initial soft-skill levels based on their Steam gameplay history. It calculates the baseline soft-skill values before the game that they have played to assess their soft-skills delta.

The output will include a single decimal value for each soft-skill, which will not include extrapolated predictions beyond the expected soft-skill ranges: 14-70 for CPS, 60-360 for CT, 55-275 for FA and 9-27 for TM. This is because AI models can learn to extrapolate values that are out-of-bounds of the training dataset which, in this scenario, are not considered useful. Therefore, as a security measure, they are clipped to the expected value ranges. Alternatively, an analogous endpoint can be found in /initial_ss_nofilter/ which does not clip the values.

Functionality:

- **User Scenarios:**
 - When the user already has a Steam account it is required to get the data provided by both /user_ss_games/ and /predict_deltas/ for that user. Then both information is sent in a single JSON file to predict the initial soft-skills.
 - When the user is new initial soft-skill values should match the lower bound for each soft-skill which are 14, 60, 55, 9 for CPS, CT, FA, and TM respectively.
- **Prediction Process:**
 - Returns soft-skill values that are within the expected ranges.

Example input:

```
{ -- These 4 attributes are related to Steam and the user profile  
  "had_steam": 1,  
  "steam_level": 49,  
  "total_playtime": 28764,  
  "total_achievements": 55,  
  -- These 2 attributes are related to the playing time of the user  
  "experiment_game": "602320",  
  "experiment_time": 2854,  
  -- These 4 attributes are related to the soft-skills delta values: CPS, CT, FA and TM in that order.
```

```
"problem_solving_delta": 0, "critical_thinking_delta": 0,
"campos_delta": 0, "time_management_delta": 0,
-- These 4 attributes are defined by the /user_ss_games/ call
"Complex_Problem_Solving": 0, "Critical_Thinking": 0,
"Flexibility_Adaptability": 0.6, "Time_Management": 0}
```

Example output:

```
{"initial_time_management": 52.93371, "initial_problem_solving": 32.78167, "initial_critical_thinking": 40.44093, "initial_adaptability": 19.51877}
```

4.4. EUROPASS

Europass² is a set of online tools and information from the European Union to help people manage their learning and career by creating a profile to document skills and qualifications. It helps individuals present their skills and experiences clearly for jobs and learning opportunities across Europe, and offers information on learning and working in Europe, personalized job suggestions via EURES, and a CV and cover letter editor.

Originally, we included in the Grant agreement that the accreditation was going to be implemented via micro-credentials "supported by blockchain" to guarantee integrity, anti-counterfeiting, and verifiability by EU employers. However, the usage of Europass micro-credentials meets that target without using blockchain

- **Anti-counterfeiting & verifiability:** Europass Digital Credentials (EDCs) are digitally signed by the issuing institution (TECNALIA). Any third party (e.g., an employer) can verify the signature and status with the official verifier, without needing to trust the issuer.
- **Integrity ("immutability"):** The cryptographic signature makes any alteration detectable (tamper-evident), delivering the practical outcome of immutability without a blockchain.
- **The infrastructure used for issuing the credentials already use TLS in transit and encryption at rest for credentials.**
- **EU recognition & interoperability:** Europass is the official EU standard for digital credentials and aligns with frameworks such as European Qualifications Framework (EQF)/European Skills, Competences, Qualifications and Occupations (ESCO), streamlining HR and education workflows across Europe.
- **Regulatory compliance:** Built on electronic IDentification, Authentication and trust Services (eIDAS) and designed for GDPR compliance; it avoids privacy issues and right-to-erasure conflicts that are harder to manage on public blockchains.

In the initial proposal we considered using blockchain to guarantee the integrity, anti-counterfeiting and verifiability of the emitted micro-credentials. After a technical and interoperability assessment, we adopted

² <https://europass.europa.eu/en/what-europass> (Accessed on 22 October 2026)

EDCs, which provide digitally signed, tamper-evident, and easily verifiable credentials recognized across the EU and aligned with eIDAS/GDPR. This solution achieves our goals of anti-counterfeiting and EU-wide verifiability while reducing operational risk and cost and improving interoperability with European systems.

4.4.1 Credential template

After completing 15h users can ask for a participation certificate. So, we have added a new check “I also would like to receive it in my Europass CV.” For this purpose, we used the platform provided at: <https://europa.eu/europass/digital-credentials/issuer/#> to design our accreditation and issue the accreditations to all the users that mee the defined requirements. Details of the credential template created can be seen in Figure 24.

Edit Credential Template

Please provide details about the learning credential using the data fields below. Hover over the ⓘ icon to see what the expected data/information is.

ES

EN

español

Credential Information

Credential Title*

MEGASKILLS - Train your soft skills while gaming

Description ⓘ

This person has participated in the pilot of the MEGASKILLS project, which implements a game-based methodology for training and evaluating soft skills.

Further details

Valid from ⓘ

01/01/2024 00:00

Expiration date ⓘ

31/12/2035 00:00

Credential Type *

Genérica

Accreditation

Start typing the id of linked accreditation

Click [here](#) to find out more about how to obtain and use your accreditation identifier. Please note that currently this is an experimental feature.

Claims *

Achievements ⓘ

Start typing the title of linked achievement

Create new

Al menos 15 horas de juego

Activities ⓘ

Start typing the title of linked activity

Create new

Participación en el pilotaje de MEGASKILLS - MEGASKILLS_activity

Entitlements ⓘ

Start typing the title of linked entitlement

Create new

Assessments ⓘ

Start typing the title of linked assessment

Create new

Please fill in at least one of the properties in this section

More information

HTML information ⓘ

megaskills_plantilla

Create new

Identifiers ⓘ

Scheme Name

Content

Add

Template UUID: 7c0c9e7e-40d5-4f24-b575-07548f2baac1

Tag ⓘ

megaskills_participation

Cancel

Save

[Work for the European Union](#)

[Legal notice](#)

[Language Policy](#)

[Web Accessibility](#)

Figure 24: MEGASKILLS credential template

“Developing Soft Skills While Gaming”

53

After defining the credential template, we design the graphic template to be used in all credential issuances (see Figure 25).

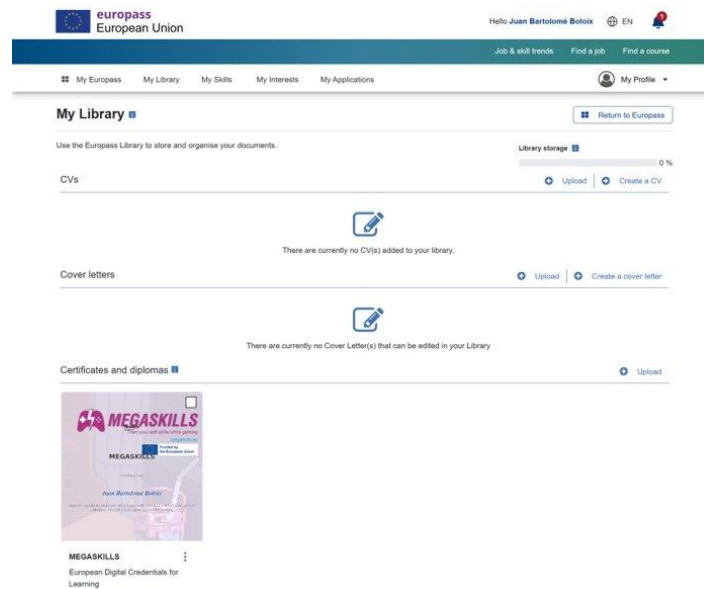


Figure 25: Graphic template used in the issuances

4.4.2 Credential issuance process

The credential issuance process consists of four steps:

1. **Select recipient data:** Introduction of the properties which are different for every recipient (see Figure 26).
2. **Customise:** Before proceeding to Seal, check the accuracy of your credentials by previewing them. On sealing, the credentials will be issued and cannot be modified (see Figure 27).
3. **Seal:** The credential is sealed using the valid seal from Tecnalia (see Figure 28)
4. **Send:** The users receive the credential via email (see Figure 29) and it is imported in their Europass CVs (see Figure 30)



Select recipient Data

Select the properties which are different for every recipient. If you have already entered the data on the previous screen, and the same applies to all recipients, do not select the fields here.

Personal Data	▼
Credential Data	▼
Achievement Data	▼
Activity Data	▼
Assessment Data	▼
Entitlement Data	▼

You can enter the recipient data in the browser, or download an Excel or CSV template to fill in the customisable data. Please note that the Recipient Template is credential specific, so you will have to download a new Excel or CSV file for each of your credentials.

Enter recipient Data in Browser >

Download Excel Template as XLS >

Download Excel Template as CSV >

Once you have completed the Excel or CSV template, upload it here



< Back

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Figure 26: Selection of recipient data



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[About Europass](#)
[Contact us](#)

Juan BARTOLOMÉ
 [Logout](#)

European Digital Credentials for Learning > Review



Review

Before proceeding to **Seal**, check the accuracy of your credentials by previewing them. Click the eye icon under Actions. On sealing, the credentials will be issued and cannot be modified.

[Issue more Credentials](#)

	RECIPIENT	CREDENTIAL TITLE	VALID	SEALED	SENT	ACTIONS
☒	Juan Bartolomé	(ENG) MEGASKILLS - Train your soft skills while gaming	☒			☐ ☐

Download Items per page: 5 Showing 1-1 of 1

☒ I want to download a receipt of the issued credentials (necessary for future revocations)
☐ Include credential within the receipts
☐ I do not want to create temporary wallets associated to the provided email address for the recipients
☐ I am certifying the authenticity of a credential issued by another organisation

[< Previous](#)
[Seal](#)
[Send](#)

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[Web Accessibility](#)

Figure 27: Review of the data

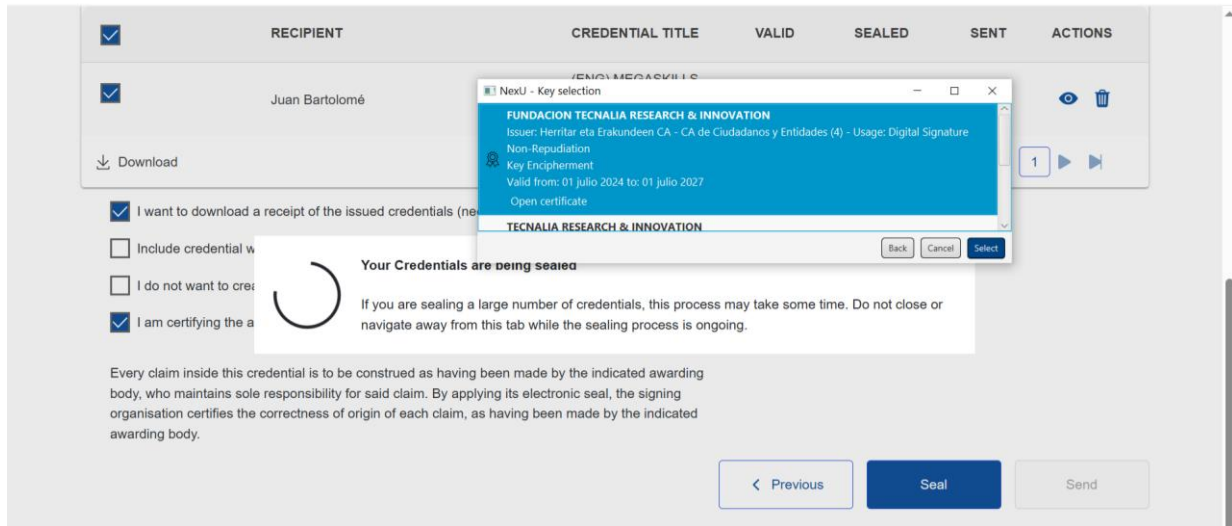


Figure 28: Sealing of credentials

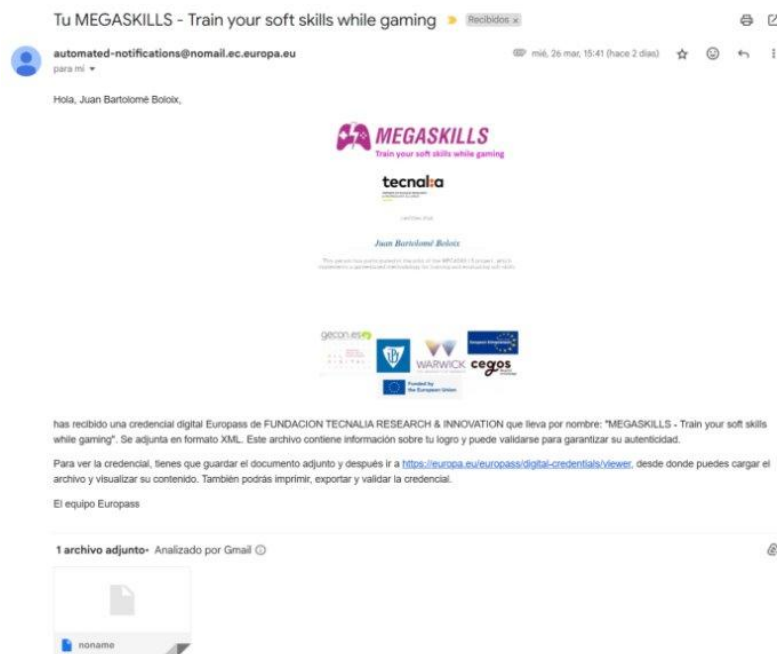


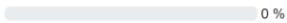
Figure 29: Email received by the users with the accreditation

In the email, the following text was received: “You have received a Europass Digital Credential from FUNDACION TECNALIA RESEARCH & INNOVATION titled: “MEGASKILLS”, please find it enclosed in xml format. This file contains information about your achievement and can be validated to ensure its authenticity. To view your credential, first you have to save the attachment, then visit <https://europa.eu/europass/digital-credentials/viewer> where you can upload the file to visualise its content. From here you will also be able to print, export and validate the credential. If you open a Europass account at <https://europass.europa.eu> with this e-mail address within the next year, the credential will be automatically added to your library. Europass Team.”

My Library

 [Return to Europass](#)

Use the Europass Library to store and organise your documents.

Library storage   0 %

CVs

 [Upload](#) |  [Create a CV](#)



There are currently no CV(s) added to your library.

Cover letters

 [Upload](#) |  [Create a cover letter](#)



There are currently no Cover Letter(s) that can be edited in your Library

Certificates and diplomas 

 [Upload](#)



MEGASKILLS

European Digital Credentials for Learning

Uploads

 [Upload](#)



There are currently no document(s) added to this section.

 [Add new section](#)

Figure 30: Example of the accreditation in the Europass CV of the user

4.5. Data Model

This section provides an overview of the database schema. It includes the relationships between entities. It also includes a detailed description of each table.

The MEGASKILLS database is a relational database implemented using MariaDB 10.5.21, and it is designed to support the core functionalities of the MEGASKILLS platform. The database is structured into three clearly distinct parts:

- **User Data (from Steam APIs):** This section stores information retrieved through calls to the Steam API, including user profiles, game libraries, achievements, and session data.
- **Project-Specific Data:** This section contains data generated and managed by the MEGASKILLS application itself, such as user interactions, game recommendations, user preferences, and other project-specific entities.
- **Steam Games and Soft Skills Integration:** This part of the database focuses on Steam game metadata, including game titles, developers, genres, and release dates. Additionally, it includes achievements associated with each game, as well as the percentage of achievements unlocked by users. This section is closely tied to the soft skills analysis that MEGASKILLS aims to implement.

The database model ensures data integrity, normalization, and efficient querying by maintaining clear relationships between tables.

4.5.1 Database Schema Overview

A diagram of the database schema is provided to illustrate the relationships between the different tables. This diagram shows the entities, their attributes, and the primary and foreign keys that link them. The schema is divided into three main sections:

- **Steam User Data Section** (see Figure 31)

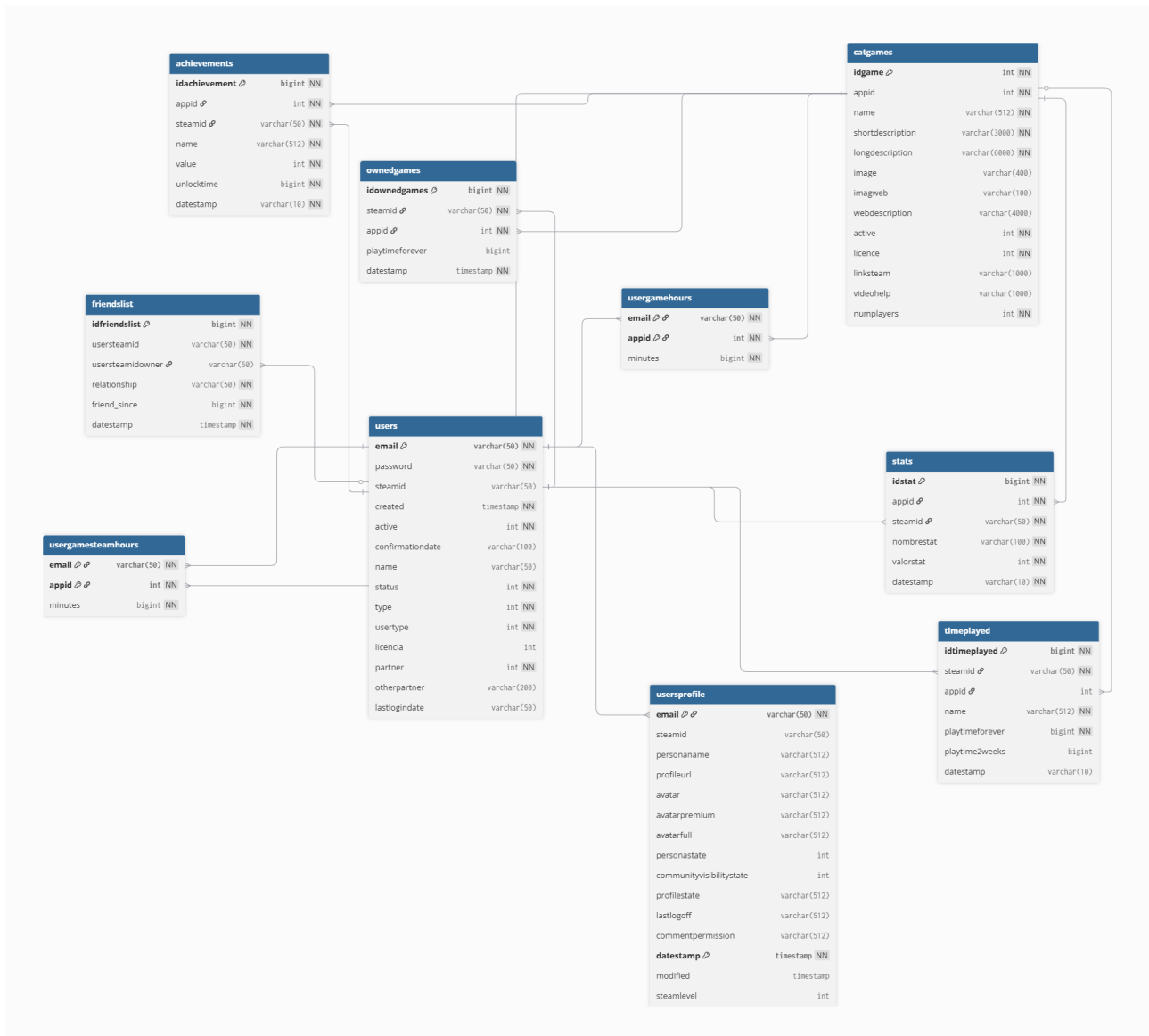


Figure 31: Steam User Data Section

- Project-Specific Data Section (see Figure 32)

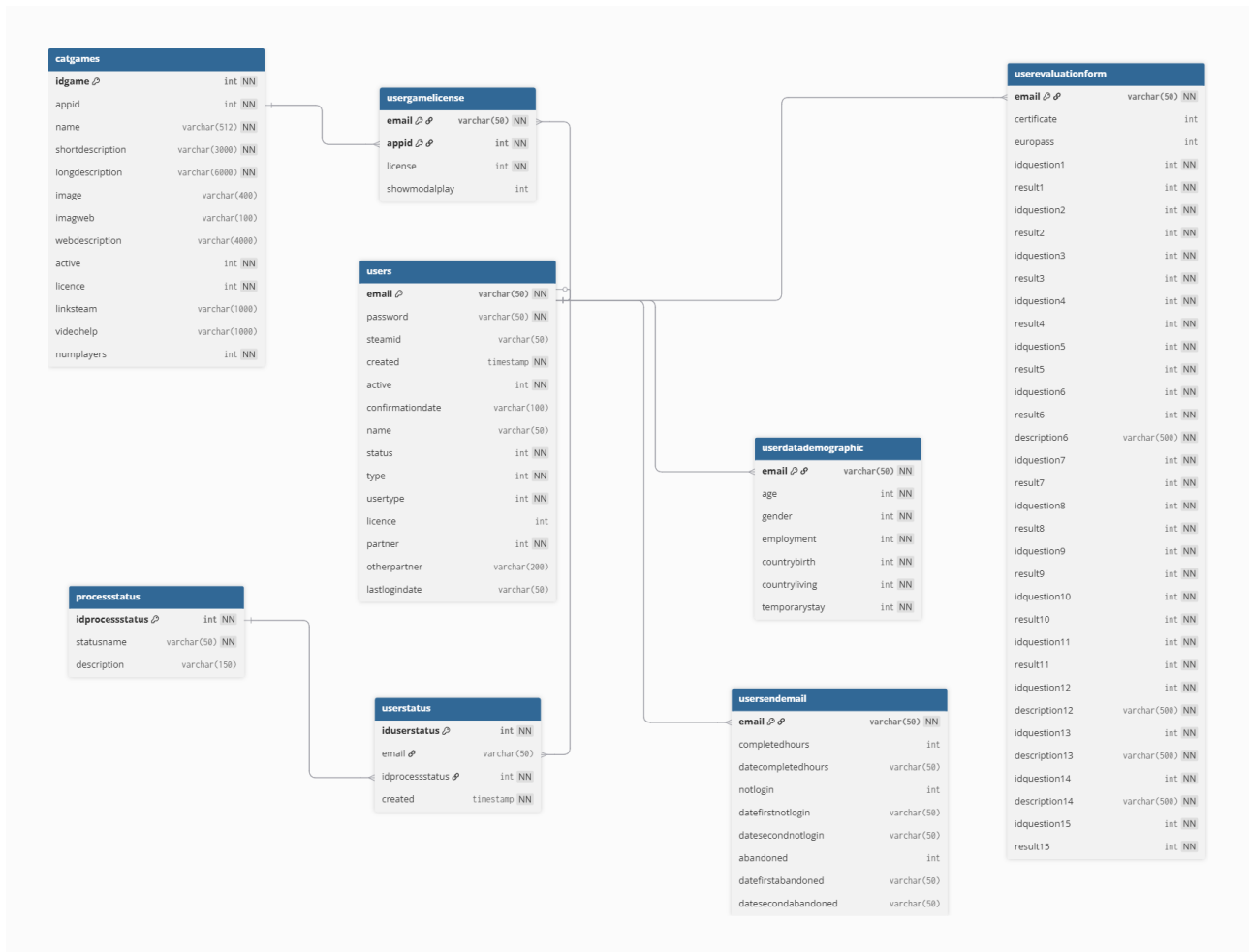


Figure 32: Project-Specific Data Section

- Steam Games and Soft Skills Integration (see Figure 33)

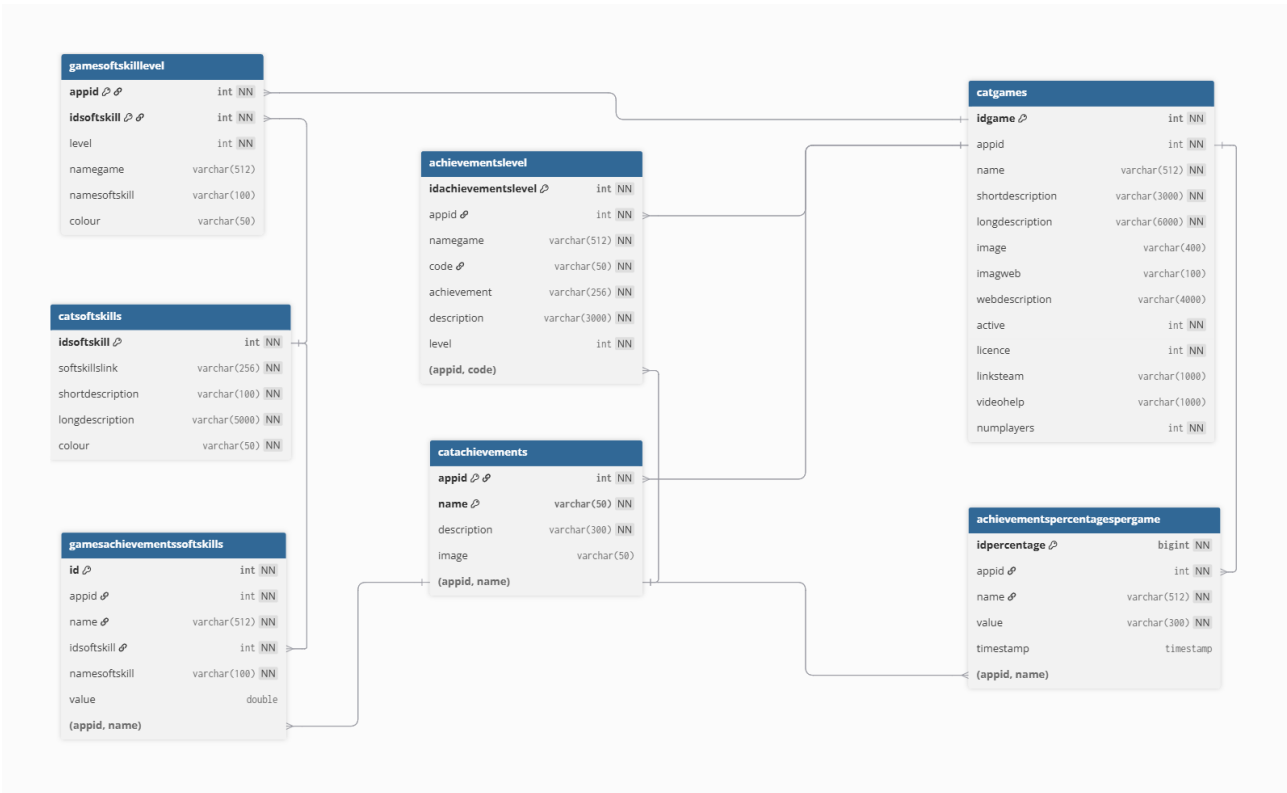


Figure 33: Steam Games and Soft Skills Integration

4.5.2 Table Descriptions

In Appendix D is a description of each table in the MEGASKILLS database, including the purpose of the table, fields, and relationships.

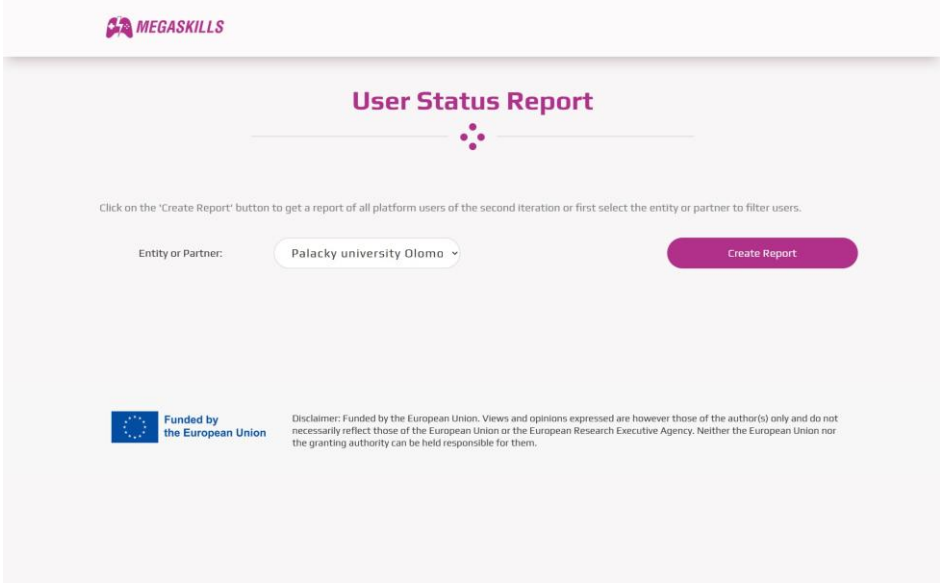
Table 10 – Summary entity overview

Table	Summary
achievements	Stores the individual achievements unlocked by users for specific games. Each record links a user to a particular game achievement, indicating when it was unlocked. Data is primarily retrieved from the Steam API.
achievementspercentagespergame	Contains global completion percentages for each achievement in a game, retrieved via the Steam API (<i>GetGlobalAchievementPercentagesForApp</i>). Used for statistical analysis and benchmarking of player performance.
catalogachievements	Defines the catalog of all possible achievements for each game. This table is populated using the Steam API (<i>GetSchemaForGame</i>) and includes achievement names, descriptions, and images.
cataloggames	Catalog of all games recognized by MEGASKILLS, populated from the Steam API (<i>appdetails</i>). Includes detailed metadata such as descriptions, images, license requirements, and URLs.

catsoftskills	Defines the catalog of transversal (soft) skills considered within MEGASKILLS, including their descriptions and assigned color codes for visual representation and analytical grouping.
ownedgames	Stores the list of games owned by each MEGASKILLS user, including total playtime data retrieved from the Steam GetOwnedGames API.
stats	Stores detailed per-user game statistics obtained from the Steam <i>GetUserStatsForGame</i> API, enabling analysis of gameplay performance and behavioral metrics.
timeplayed	Stores recent and total playtime data for each user–game pair, retrieved via Steam’s GetRecentlyPlayedGames API, allowing tracking of engagement and recency of play.
users	Core table that stores MEGASKILLS user profiles, including login credentials, registration status, and optional Steam account linkage, serving as the main anchor for all user-related data and relationships.
processstatus	Defines the possible process states a user can be in (e.g., during pre/post tests). Referenced by users.status to track user progress.
userdata demographic	Stores demographic information for each user (age, gender, employment, and country data), linked to the users table via email.
usergamehours	Tracks total playtime (in minutes) for each user and active game.
usergamesteamhours	Tracks total playtime (in minutes) for every game owned by a user, as reported by Steam. Includes all games, not just active ones in the platform.
usersprofile	Stores detailed Steam profile information (name, avatar, visibility, state, level) for each user, as retrieved via GetPlayerSummaries.
userstatus	Historical log of all process statuses a user passes through. Complements users.status (latest status) and references processstatus for descriptive labels.
usergame license	Acts as a junction table connecting users and games. It records whether each user holds a valid license for a specific game and manages display settings for the user interface during game launch actions.
userevaluationform	Stores structured and open-ended user feedback through a post-play questionnaire.
usersendemail	Internal email event control system for user engagement management.
gamesoftskilllevel	Helps determine how much gameplay time contributes to soft skill progression
gameachievementsoftskill	Defines the relationship between in-game achievements and soft skills in the MEGASKILLS project.

4.6. Backend web interface

The Backend Web Interface is a future development line aimed at enhancing the supervisory and analytical capabilities of the MEGASKILLS platform. Although not yet fully implemented, a basic user report is currently available, allowing export of user data filtered by partner. This report serves as a preliminary step toward a more comprehensive administrative dashboard, which will include advanced filtering, alerts, and corrective action tools in the future (see Figure 34 and Figure 35).



MEGASKILLS

User Status Report

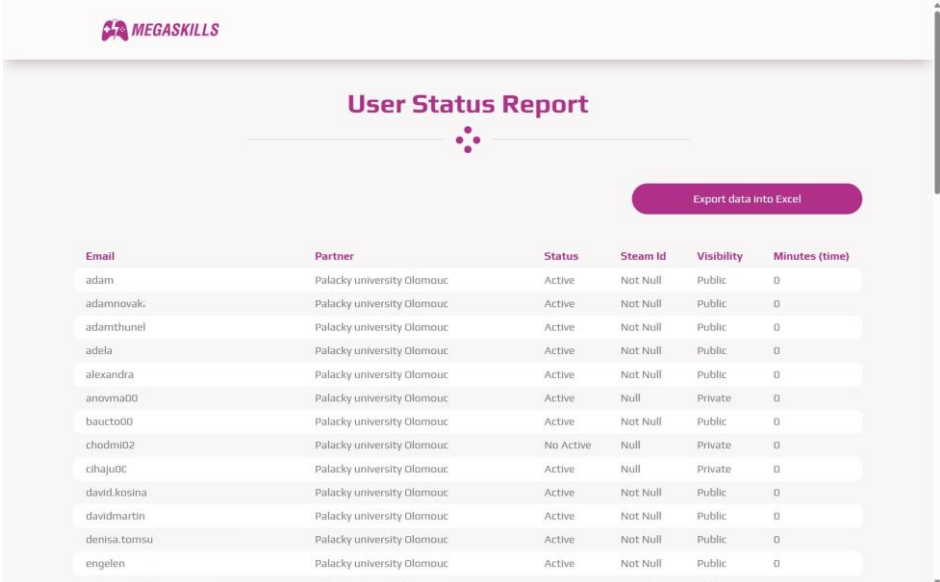
Click on the 'Create Report' button to get a report of all platform users of the second iteration or first select the entity or partner to filter users.

Entity or Partner: Palacky university Olomouc Create Report

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Figure 34: Uses Status Report



MEGASKILLS

User Status Report

Export data into Excel

Email	Partner	Status	Steam Id	Visibility	Minutes (time)
adam	Palacky university Olomouc	Active	Not Null	Public	0
adamnovak	Palacky university Olomouc	Active	Not Null	Public	0
adamthunel	Palacky university Olomouc	Active	Not Null	Public	0
adela	Palacky university Olomouc	Active	Not Null	Public	0
alexandra	Palacky university Olomouc	Active	Not Null	Public	0
anovma00	Palacky university Olomouc	Active	Null	Private	0
baucto00	Palacky university Olomouc	Active	Not Null	Public	0
chodmi02	Palacky university Olomouc	No Active	Null	Private	0
cihaju0C	Palacky university Olomouc	Active	Null	Private	0
david.kosina	Palacky university Olomouc	Active	Not Null	Public	0
davidmartin	Palacky university Olomouc	Active	Not Null	Public	0
denisa.tomsu	Palacky university Olomouc	Active	Not Null	Public	0
engelen	Palacky university Olomouc	Active	Not Null	Public	0

Figure 35: Result Uses Status Report

5. FUTURE LINES OF WORK

After completing each of the different experiments, some users sent us their comments and suggestions, which were analysed. The modifications and new developments that we consider a priority have already been implemented and included in subsequent versions. In addition, we also were in contact with experts and different stakeholders interested in the progress of the project. They also sent us their comments and suggestions, which were analysed. Apart from the already implemented modifications and new developments, some of them were gathered and recorded for being implemented later in future versions of the platform. The new functionalities which have been identified in this process and have been registered for being implemented in the future are:

- Include a new **level indicator bar** for each soft skill in the user profile section. This level indicator bar will follow the same scale as the conventional scales selected in the first stages of the project. In this way, when we call upon the artificial intelligence-based model, we can place the result obtained on the same scale, making it easier for users to understand.
- **Publish an API from our platform** that allows third parties to carry out integrations with our platform. This would enable them to access both raw data collected in our database and certain calls to AI-based models. Which methods to publish and what information to offer must be analysed in detail.
- In other study carried out in the context of the project, we found out that users after a specific number of minutes playing to the video games, reduced their engagement. This resulted in a decrease in subsequent playing time and a significant reduction in the percentage of achievements acquired. In this context, we would like to implement **gamification mechanisms** to avoid/reduce the effect of loss of engagement. We already have something in mind based on the possibility of obtaining coins and gems according to the achievements obtained and their difficulty. Then, users would be able to obtain some kind of privileges such as licenses for playing other video games (This would involve trying to reach agreements with gaming companies interested in the project who would be willing to collaborate by providing licences, etc.).
- Design a **dashboard** in the backend to provide user group tracking information supervised by a responsible person. This allows the responsible to monitor user progress, make comparisons, take corrective action, if necessary, set up alerts, etc.
- **Personalise the learning paths** displayed. Currently, they are the same for everyone. Analyse whether any of the AI-based models could be used to suggest a learning path more suited to each user's profile, considering their strengths and weaknesses.
- **Enhancements to Consent and Age Verification.** The platform will implement a more robust consent process during user registration, including a direct reference to the full privacy notice (<https://www.megaskills.eu/privacy-policy>) to ensure transparency. Additionally, the current 18+ age verification mechanism (a simple checkbox) will be replaced with a more secure method, such as a date-of-birth check, to comply with data protection regulations and ensure user eligibility. These updates are planned for integration in future development cycles to align with evolving compliance requirements and user trust standards.

6. CONCLUSIONS

This deliverable has presented the final version of the MEGASKILLS Assessment and Accreditation Intelligent Platform, integrating all the technical, methodological, and design components developed throughout the project. The platform successfully combines Artificial Intelligence, data analytics, and user-centered design to assess and accredit soft skills developed through video gaming.

The integration with the Steam platform and the deployment of AI-based models have enabled the creation of a robust system capable of collecting, processing, and interpreting gameplay data to estimate users' levels of CPS, CT, FA, and TM. The AI models demonstrated solid predictive performance and provided the foundation for adaptive feedback and personalized recommendations within the platform.

On the user side, the platform offers a complete and intuitive experience, allowing users to register, connect their Steam profiles, monitor their progress, and receive individualized insights about their soft skill development. The backend infrastructure ensures efficient data handling and compliance with GDPR requirements, while the modular architecture supports scalability and future integrations.

The work accomplished in this deliverable confirms the feasibility of assessing transversal competences through gaming in a scientifically grounded and technologically innovative way. The MEGASKILLS platform not only operationalizes this concept but also opens new opportunities for lifelong learning, employability enhancement, and digital education.

Future developments will focus on extending the number of integrated games, refining the AI models through additional data, and implementing new functionalities proposed by users and experts. These improvements will strengthen the platform's potential as a reference solution for the objective assessment and accreditation of soft skills in digital learning environments.

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APPENDIX A: ISSUES IDENTIFIED FOR RESOLUTION PRIOR TO FINAL SUBMISSION

This appendix outlines the key issues identified during the review of the document by Dr. Guido Noto la Diega, Data & Privacy Advisor and member of the Ethics Advisory Board for the MEGASKILLS project.

These issues were raised to ensure alignment with ethical, legal, and technical standards prior to final submission.

Each item listed below includes a description of the issue and the corresponding resolution implemented to address it, demonstrating the project team's commitment to transparency, compliance, and quality.

1. PASSWORD STORAGE APPEARS AS PLAIN TEXT IN SCHEMA

Issue Description:

Table 19 (users) shows password VARCHAR(50) without stating hashing/salting.

Action:

Explicitly state use of a modern password hashing function (e.g., Argon2id or bcrypt with per-user salts), TLS in transit, and encryption at rest for credentials. Update schema section to clarify the column stores a salted hash, not plaintext.

Resolution:

To address this issue, the following actions were implemented:

- Password Hashing and Salting:
 - The system now uses Argon2id, a modern password hashing algorithm, which includes per-user salting by default.
 - Spring Security's native Argon2PasswordEncoder is leveraged to ensure secure hashing with resistance to brute-force attacks.
- Database Schema Update:
 - The password column in the users table was expanded from VARCHAR(50) to VARCHAR(255) to accommodate the longer salted hash output of Argon2id.
 - The column description was updated to: "Encrypted password used for authentication. The system employs Argon2id, a modern password hashing algorithm recommended for secure password storage. Spring Security provides native support for Argon2id through the Argon2PasswordEncoder, which ensures secure hashing with per-user salts and resistance to brute-force attacks."
- Security Protocols Clarification:
 - Added the statement "The infrastructure used for issuing the credentials already uses TLS in transit and encryption at rest for credentials" to Section 4.4 of this deliverable.

- Updated the schema description to clarify that the password field stores a salted hash, not plaintext.

2. LEGAL BASIS, ROLES, AND PRIVACY NOTICE/GDPR DETAIL MISSING

Issue Description:

The deliverable claims “following GDPR principles” but does not identify the controller(s), lawful bases, retention, international transfers, or data subject rights handling.

Action:

Add a short Privacy and Data Protection subsection naming the controller(s) (likely TECNALIA with partners as joint controllers), lawful bases for each purpose, retention schedule, and DSAR processes; include DPO/contact and supervisory authority details. Provide a link to the platform privacy notice.

Resolution:

To address the issue regarding the lack of clarity on GDPR compliance details, the following actions were implemented in the deliverable:

- Identification of Controllers:
 - A dedicated Privacy and Data Protection Compliance subsection was added to the deliverable as Appendix B, explicitly naming the data controllers (TECNALIA, ALL DIGITAL, and UNIVERZITA PALACKEHO V OLOMOUC, European Entrepreneurs CEA-PME, CEGOS ESPANA LEARNING & DEVELOPMENT SA, UNIVERSITY OF SOUTHAMPTON and ESCRIBANO SERRANO JOSE MANUEL) under a joint controllership regime.
 - Contact details for each controller, including addresses and contact emails, were included.
- Lawful Bases for Data Processing:
 - The lawful basis for processing personal data (Article 6(1)(f) of the GDPR – legitimate interests) was clearly stated in Appendix B, aligned with the project’s objectives of assessing and accrediting soft skills.
 - Each data processing activity (e.g., user registration, gameplay data collection) was linked to this lawful basis.
- Data Retention Schedule:
 - A data retention policy was outlined, specifying that personal data will be stored “for as long as necessary to fulfill the purposes for which it was collected and in compliance with legal obligations”.
 - Specific retention periods for gameplay data, user accounts, and micro-credentials were referenced from the MEGASKILLS Privacy Policy.
- Data Subject Rights Handling (DSAR Processes):
 - Procedures for exercising data subject rights (e.g., access, erasure) were described in Appendix B, including:
 - **Contact method:** Users may submit requests via email to the designated contact.

- **Response timeline:** Requests will be handled within 30 days, with a link to the updated MEGASKILLS Privacy Notice provided.
- Data Protection Officer (DPO) and Supervisory Authority:
 - The DPO contact information was included in Appendix B, directing users to the MEGASKILLS Privacy Policy for direct communication.
 - Users were informed of their right to file a complaint with the competent Supervisory Authority.
- Link to Privacy Notice:
 - A direct hyperlink to the MEGASKILLS Privacy Notice (<https://www.megaskills.eu/privacy-policy>) was added to Appendix B, ensuring easy access to detailed policies.

The **Appendix B: Privacy and Data Protection Compliance** is now included in the deliverable, with a brief reference in the main document directing readers to the appendix for detailed GDPR compliance information.

3. FRIEND LIST COLLECTION WITHOUT NECESSITY OR THIRD-PARTY CONSENT

Issue Description:

The “friendlist table” and “GetFriendList API” are included though the platform does not use friendships for any stated feature.

Action:

Remove friend list collection (data minimisation). If you believe there is a justified use, add explicit purpose, lawful basis, user controls, and a clear explanation that third-party friends’ data are processed and on what basis.

Resolution:

To address the issue regarding the inclusion of the “friendlist table” and “GetFriendList API” without a stated functional use, the following actions were implemented:

- Removal of Unused Components:
 - The “friendlist table” and “GetFriendList API” were completely removed from the platform’s data model and API documentation, as they were not utilized in any feature or functionality of the system.
- Data Minimization Compliance:
 - This change aligns with the principle of data minimization under GDPR, ensuring that no unnecessary data is collected, stored, or processed.
- Documentation Updates:

- The database schema description in the deliverable was revised to exclude references to the "friendlist" table.
- The API documentation was updated to remove the "GetFriendList" endpoint and related methods.
- Justification for Removal:
 - No justified use case for social features (e.g., friend interactions) was identified in the platform's scope or user requirements.
 - The removal simplifies the system architecture, reduces maintenance overhead, and avoids potential privacy risks associated with collecting and processing third-party data (e.g., friends' information).

These updates ensure the platform adheres to privacy-by-design principles and eliminates redundant components. The changes are reflected in the **data model section** and **API documentation** of the deliverable.

4. AI PERFORMANCE CLAIMS RISK OVERSTATEMENT

Issue Description:

Executive Summary cites $R^2 \approx 0.9$. The dataset is small ($n=70$) and heavily augmented; the split may leak information (augmented variants of the same pre/post pair in both train and test). There's no participant-level (grouped) holdout or temporal split.

Action:

Rephrase claims conservatively; add a paragraph explaining limitations, data augmentation caveats, and that high R^2 was observed on augmented data; commit to participant-level validation and external validation in future work.

Resolution:

- Rephrased Claims in Executive Summary:
 - The original claim of " $R^2 \approx 0.9$ " was revised to emphasize its preliminary nature and context, acknowledging the dataset's limitations (small size, augmentation, and potential data leakage).
 - Added explicit caveats to avoid overstating the model's performance.

5. CONSENT AND TRANSPARENCY TEXT INCOMPLETE

Issue Description:

Current consent text lacks controller identity, purposes, lawful bases, retention, international transfers (Steam/Valve), automated decision-making transparency, rights, and contact points.

Action:

Replace with the suggested consent wording below or reference a full privacy notice surfaced in the registration flow. Implement an 18+ gate that is more than a simple checkbox (e.g., date of birth check).

Resolution:

While the current version of the platform includes a basic consent process and a simple 18+ checkbox, these have been identified for improvement. The team has decided to address this issue in future updates by:

- Updating the consent wording to explicitly reference the full privacy notice during the registration flow.
- Replacing the 18+ checkbox with a more secure age verification method, such as a date-of-birth check, to prevent underage access.

6. INTERNATIONAL TRANSFERS TO THE US (STEAM/VALVE)

Issue Description:

You send SteamIDs and query Valve/Steam in the US. If Valve is not certified under the EU–US Data Privacy Framework, an alternative transfer mechanism is needed or explicit informed consent for the transfer and risks.

Action:

Document the transfer, mechanism used (DPF certification status check; if not, SCCs or explicit consent under Art. 49(1)(a)), and update the privacy notice and consent text accordingly.

Resolution:

To address the issue regarding the transfer of user data to Valve/Steam, we confirmed that Valve Corporation is certified under the EU–US Data Privacy Framework (DPF). This certification ensures the transfer of personal data (e.g., SteamIDs) complies with GDPR requirements.

Steps Taken:

- Verification of Certification:
 - Checked Valve's status on the EU–US Data Privacy Framework (DPF) portal (<https://www.dataprivacyframework.gov>) and confirmed its inclusion in the list of certified organizations.
 - Reviewed Valve's Steam Privacy Policy (<https://store.steampowered.com/privacy/>) to ensure alignment with DPF standards.
- Documentation Updates:
 - Privacy Notice: Added a section stating that transfers to Valve are governed by the DPF and included a direct link to Valve's DPF profile for user verification. "Data transfers to Valve Corporation (US) are conducted under the EU–US Data Privacy Framework (DPF), a GDPR-compliant mechanism. Valve is certified under the DPF, ensuring adequate data protection. View Valve's DPF profile."
 - Consent Text: Updated the registration flow to explicitly inform users of the transfer and its legal basis: "Your SteamID will be transferred to Valve Corporation (US) via the Steam API to retrieve gameplay data. This transfer is compliant with GDPR through the EU–US Data Privacy Framework (DPF), under which Valve is certified."

7. AUTOMATED INFERENCES AND SAFEGUARDS

Issue Description:

You infer soft skills and display “improvement” scores. These should not be used for high-stakes decisions; users should understand model limitations.

Action:

Add an “AI transparency” box in the UI and deliverable stating that predictions are indicative, for learning and reflection only, not for grading, selection, or employment screening; provide model limitations and error ranges.

Resolution:

To resolve this matter, the following strategy was applied:

- AI Transparency Notice in the UI:
 - A dedicated “AI Transparency Notice” was added to the interface, as described: “AI-generated insights, including soft-skill inferences and scores, are estimates for learning only. They should not be used for grading, hiring, promotion, or any high-stakes decisions. Outputs may contain errors or biases and must be interpreted with human judgment.”
 - This notice is visible in section 3.8 (Performance Statistics) of this document, ensuring users are explicitly informed about the purpose and limitations of AI-driven outputs.

8. DATA RETENTION AND DELETION

Issue Description:

Retention is not specified for Steam-derived data, logs, backups, and Europass issuance records.

Action:

Add a retention schedule (e.g., delete identifiable research/operational data 12 months after project end or user inactivity; immediate deletion on withdrawal; backups aligned), and describe deletion processes.

Resolution:

This issue is resolved as outlined in the “Duration and right to withdraw” section of the MEGASKILLS_Privacy_Policy.docx (Appendix B of this document). According to this section, personal data—including Steam-derived data, logs, backups, and Europass issuance records—will be deleted three years after the end of the project or three years after user inactivity (e.g., no login for 12 months). Data will also be deleted immediately upon user withdrawal. Backups will align with the same retention schedule.

9. INCONSISTENCY: STEAM ID “OPTIONAL” VS “REQUIRED”

Issue Description:

Registration section says “Optional Steam ID”; earlier sections state it was required and that profiles must be public.

Action:

Registration section says “Optional Steam ID”; earlier sections state it was required and that profiles must be public.

Resolution:

The Steam ID field in the registration process has been updated to clarify its status as optional during registration but required for full platform functionality. The revised UI description now states:

“This field allows users to enter their Steam ID, which will be needed for future integrations with game-based assessments. Providing this information during registration is optional; however, it will be required once inside the platform in order to fully access its features. A link to the official Steam website is also provided to help users find their Steam ID.”

This update aligns the UI text with the platform’s requirements:

- **Optional at Registration:** Users are not required to provide a Steam ID during registration.
- **Required for Full Functionality:** Once inside the platform, a Steam ID becomes mandatory to access features such as game-based assessments, personalized skill analytics, and Europass credential generation. This is necessary to retrieve gameplay data via the Steam API for soft-skill estimation.
- **User Guidance:** A direct link to the Steam website is included to assist users in locating their Steam ID.

APPENDIX B: PRIVACY AND DATA PROTECTION COMPLIANCE

1. WEBSITE PRIVACY POLICY

In accordance with current legislation, we inform you this website <https://pilot.megaskills.eu> domain belongs to European Entrepreneurs CEA-PME.

1.1. Intellectual and industrial property rights

The whole content of this website, logotypes, texts, pictures, designs code numbers of products and other items, as well as the structure, design, combinations of colours and the content's presentation manner, is affected by industrial and intellectual property rights owned by MEGASKILLS or by third parties with whom MEGASKILLS has negotiated its use. These rights must be respected by website's users. MEGASKILLS introduces all this information through its website with the aim of advertising its products and activities. MEGASKILLS warns that all these elements and code numbers can only be used for this purpose and quoting its source and identification code number. Its transformation or alteration is not licit, neither public communication nor any other way of exploitation for any technique or procedure without the authorization of MEGASKILLS.

1.2. Contents liability

MEGASKILLS accepts no liability for any type of information contained on other websites that can be accessed via links on this website. The purpose of the links displayed on the website is to highlight the existence of other sources of information related to the topic being discussed on the website of origin. This in no way implies a suggestion or invitation to the user to visit the destination website. MEGASKILLS is no way responsible for the result obtained by using these links, which are not checked or verified by MEGASKILLS.

1.3. Data protection

In accordance with current legislation of Personal Data Protection, MEGASKILLS project informs that all personal data collected from this website will not be registered to any file nor will be object of any sort of data processing but will be only used to attend information applications of individuals who use this means to contact MEGASKILLS. Personal Data only will be added to MEGASKILLS files with the user's previous consent and, in no ways, they will be hand over to a third person without the previous consent.

2. GENERAL TERMS AND CONDITIONS

General Terms and Conditions. Last update: November 21st, 2025

The development of soft skills, which range from communication skills and teamwork to time management and decision-making, is essential. Though not easy to quantify by tests, soft skills are important for the European Skills Agenda. However, high atomisation and the absence of rigorous and affordable training and assessment methods constitute critical gaps between soft skills on one side and the education and the labour market on the other. In this context, the EU-funded MEGASKILLS project (GA 101094275) will fill these gaps by designing an innovative methodology for soft skills taxonomy based on industry and education needs. It

will develop training and evaluation techniques through data from players' interactions with their favourite video games, AI, and machine-learning algorithms.

MEGASKILLS acts according to the Articles 12, 13 and 14 of the European Regulation 2016/679 of the 27th of April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data ("GDPR" in the following, namely General Data Protection Regulation), informs on the following:

2.1. Definitions

Personal data means any information relating to an identified or identifiable natural person (data subject); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person;

Processing means any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction.

2.2. Controller and Data protection officer

Your personal data will be processed, under a joint controllership regime, by the following entities forming part of the aforementioned consortium (hereinafter, the "DATA CONTROLLERS"):

- **FUNDACIÓN TECNALIA RESEARCH & INNOVATION**
Address: Parque Científico y Tecnológico de Bizkaia, Astondo Bidea ed. 700 – E-48160 Derio (Bizkaia) Spain
V.A.T.: ESG48975767
Phone: +34 946 430 850
- **ALL DIGITAL AISBL**
Address: Rue du Commerce 123, 1000 Brussels (Belgium)
V.A.T.: BE0830256454
Phone: +32 2 893 0201
- **UNIVERZITA PALACKÉHO V OLOMOUČI**
Address: Křížkovského 511/8, CZ-779 00 Olomouc (Czech Republic)
V.A.T.: CZ61989592
Phone: +420 585 631 111
- **European Entrepreneurs CEA-PME (CONFEDERATION EUROPEENNE DES ASSOCIATIONS DE PETITES ET MOYENNES ENTREPRISES)**
Address: Avenue de la Renaissance 1, B-1000 Bruxelles (Belgium)
V.A.T.: BE0871016745
Phone: +32 2 739 62 64

- **CEGOS ESPANA LEARNING & DEVELOPMENT SA**
Address: Calle Puerto de Somport, 9 – Planta 1, 28050 Madrid (España)
V.A.T.: A28056604
Phone: +34 91 270 50 00
- **UNIVERSITY OF SOUTHAMPTON**
Address: University Road, Southampton SO17 1BJ (United Kingdom)
V.A.T.: GB568630414
Phone: +44 (0)23 8059 5000
- **ESCRIBANO SERRANO JOSE MANUEL**
Address: multiplayer.education@gmail.com

2.3. Why does MEGASKILLS need to collect data?

MEGASKILLS collects data to enable the functioning of its platform, which includes the integration of users' Steam accounts, the analysis of gameplay behavior, and the estimation of users' transversal soft skills such as CPS, CT, FA, and TM.

Data collection is required to feed Artificial Intelligence models that analyze playtime, achievements, and performance indicators to infer soft-skill development and provide personalized recommendations.

Additionally, the platform uses collected data to issue Europass Digital Credentials, manage user accounts, ensure system security, support administrative processes, and personalize the overall user experience.

These activities are directly linked to the objectives of the MEGASKILLS project.

In addition to the purposes directly related to the operation of the MEGASKILLS platform and the analysis of gameplay data, MEGASKILLS may also process your personal data for communication, administrative, and participation-related purposes associated with the project's activities and engagement mechanisms.

Specifically, your data may be used:

- To communicate with you when you send us an e-mail.
- To send you informative and/or commercial communications by e-mail about the activities, initiatives or programmes of MEGASKILLS.
- To answer your questions, queries, suggestions or request opinion or satisfaction surveys.
- To manage your registration, attendance and contracting to the different initiatives promoted or organised by MEGASKILLS.
- To assess and manage the proposals that you send us within the framework of the different activities, initiatives, programmes and challenges of MEGASKILLS.
- To perform segmentation tasks. We can carry out the segmentation or elaboration of profiles in order to direct our communications and programmes. The analysis of the profiles will not have any significant effect on the user's rights.
- To assess and manage the proposals that you send us within the framework of the different activities, initiatives, programmes and challenges of MEGASKILLS (including among the others, MEGASKILLS survey activities).

2.4. Data collected

MEGASKILLS collects personal, demographic, gameplay-related, system-generated, and technical data in order to support the operation of the platform and provide personalized insights and services.

The collected data categories include:

- Personal data provided by the user: name, email address, password (encrypted), user type, and affiliated organization.
- Demographic data: age, gender (encoded), employment status, country of birth, country of residence, and information about temporary stays in another country.
- Gameplay data retrieved from Steam: SteamID, total playtime, playtime per game, number of achievements, list of games, Steam level, and public profile information depending on profile visibility settings.
- Data generated within MEGASKILLS: estimated initial soft-skill levels, predicted weekly improvements, game recommendations, user process status history, and evaluation form results.
- Technical and system data: account creation date, last login timestamp, internal status codes, and any system interactions required for authentication, monitoring, and platform management.

By providing your data, you ensure us that these are true, accurate, complete and up-to-date, responsible for any direct or indirect damage or loss that may be caused as a result of the breach of such obligation. In case you provide us with third party data, you must have the consent of the same and commit to transferring the information contained in this clause, exempting us from any responsibility in this regard.

2.5. Voluntary participation

Your participation in MEGASKILLS is entirely provided on a voluntary basis. If you choose not to participate in the study, you are free to do so.

2.6. Duration and right to withdraw

You have the right to withdraw from any MEGASKILLS initiative at any time. All personal data, including Steam-derived data, logs, backups, and Europass issuance records, will be deleted three years after the end of the project or three years after user inactivity (e.g., no login for 12 months). Data will also be deleted immediately upon user withdrawal. Backups will be retained for the same period as the primary data. Users may request deletion of their data at any time by contacting. For requesting the deletion of your data, please contact: <mailto:pilots@megaskills.eu>.

2.7. Information sharing and confidentiality

Your information and the acquired data are strictly confidential. Your data and information will be used for research and administrative purposes only by the members of the MEGASKILLS project. In no cases will your data be sold to third parties. The analysis of results might be subject of scientific publications, always respecting the strict confidentiality of participants. In order to do so, any information will be anonymized prior to publication. The experimenter and project managers are strictly bound by professional secrecy when using your data and when managing connections between your data and you.

2.8. Your rights regarding your personal data

At any time during the duration of the study you can rely on the following rights over your personal data:

- Right to access the personal data we may hold about you and the purposes for which we are using them (Art.15);
- Right to modify any personal data which is incorrect or requires updating (Art.16);
- Right to delete any personal information pertaining to you (Art.17).

By flagging the Privacy Policy disclaimer, which asks for your consent for processing and using your data, you agree with this MEGASKILLS policy.

You may exercise your rights and/or withdraw your consent by sending an email to david.kosina@upol.cz. Your requests in this regard will be handled in a coordinated manner and on behalf of all the DATA CONTROLLERS by MEGASKILLS consortium. Notwithstanding the foregoing, you will retain the ability to exercise your rights against any of the DATA CONTROLLERS; for these purposes, you may contact them at the postal addresses indicated in Section Controller and Data protection officer. Finally, we must inform you that you may lodge a complaint with the competent Supervisory Authority, particularly where you have not obtained satisfaction in the exercise of your rights.

2.9. Data processing and security measures

MEGASKILLS partners involved in the open calls process lawfully the data described above according to the legitimate interests pursued by them (see Article 6, paragraph 1, letter f of the GDPR). These legitimate interests are the performance of the MEGASKILLS's activities.

2.10. Automated profiling

MEGASKILLS partners don't use process personal data by means of tools for automated profiling.

2.11. Personal data storing tools

MEGASKILLS partners can use data storing tools located both in the company (file server installed in the headquarter) and in the cloud, these latter managed by European or US companies. Whilst European companies must be compliant with the GDPR, US companies must ensure an adequate level of protection according to the agreement (UE).

Data transfers to Valve Corporation (US):

The MEGASKILLS platform transfers SteamIDs to Valve Corporation (US) via the Steam API to retrieve gameplay data (e.g., playtime, achievements). This transfer is conducted under the EU-US Data Privacy Framework (DPF), a GDPR-compliant mechanism. Valve Corporation is certified under the DPF, ensuring adequate data protection. [View Valve's DPF profile](#) for further details.

2.12. Acceptance and consent

MEGASKILLS partners involved in the open calls process lawfully the data described above according to the legitimate interests pursued by them (see Article 6, paragraph 1, letter f of the GDPR). These legitimate interests are the performance of the MEGASKILLS's activities.

2.13. Modifications in the privacy policy

The MEGASKILLS project’s consortium reserves the right to modify this policy to adapt it to legislative or jurisprudential changes, as well as to industry practices. When we carry out these changes, we will announce them before their implementation.

Likewise, this privacy policy may vary depending on legislative requirements or self-regulation, so we advise you to visit it periodically since this privacy policy is applied as soon as you, as a user, use a contact form of comments, contact, subscription or simple navigation.

APPENDIX C: RUBRICS FOR EVALUATING SOFT SKILLS

Complex Problem Solving

Basic	Proficient	Advanced
You have earned pretty basic problem-solving abilities, still showing struggling to identify issues, consider alternatives, maintain organization, work independently, or evaluate results without substantial guidance and support yet.	You acquired adequate problem-solving capabilities, able to identify issues and implement solutions with minimal guidance, though you may need occasional support with refinements and complete evaluation.	You excel at independent problem-solving, from accurate problem identification through effective execution and evaluation, consistently demonstrating proactive and precise performance throughout the process.

Critical Thinking

Basic	Proficient	Advanced
You have earned basic critical thinking skill, still showing scattered ideas, shallow questioning, and poor pattern recognition. You may make some decisions without thorough analysis and resists considering alternative perspectives yet.	You show solid critical thinking with clear reasoning and relevant questioning. You can identify patterns and make sound decisions, though may occasionally miss subtle connections or perspectives.	You demonstrate exceptional critical thinking through insightful arguments, probing questions, and pattern recognition. You make thorough evaluations while actively integrating diverse perspectives for comprehensive understanding.

Cognitive Flexibility/Adaptability

Basic	Proficient	Advanced
You have earned basic level on adaptability and flexibility, showing yet significant difficulty adapting, resisting new approaches and struggling with behavioural adjustments. You may still require extensive time to accept changes and becomes easily overwhelmed.	You show reasonable adaptability, accepting changes and adjusting behaviour with moderate effort. You manage transitions adequately with some guidance, maintaining generally stable emotional control.	You demonstrate exceptional adaptability, quickly embracing and responding to changes with composure. You also show seamless behavioural adjustment and accurate anticipation of impacts in all situations.

Time Management

Basic	Proficient	Advanced
You have earned basic level on time management, still struggling with task organization and prioritization. Maybe you still lose focus, misses deadlines, and works in inefficient bursts, often needing extensions to complete tasks.	You are able to organize and prioritize tasks well, maintain focus, meet deadlines consistently, but occasionally require adjustments, extension, or misallocate time, leading to uneven pacing.	You effectively plans, organize, and prioritizes tasks, maintaining consistent focus. Meet deadlines with careful planning and maintain an even, efficient pace without rushing or delays.

APPENDIX D: TABLES DESCRIPTION IN DATABASE

Table 11 – Achievements

Purpose	The achievements table stores the achievements that users have unlocked in specific games.	
Column	Type	Description
idachievement	BIGINT (PK)	Unique identifier for each achievement record.
appid	INT (FK)	References the game in the catgames table. Identifies the game associated with the achievement.
steamid	VARCHAR(50) (FK)	The SteamID64 of the MEGASKILLS user who earns the achievement. It acts as a reference to the users table.
name	VARCHAR(512)	The name or title of the achievement as defined by the game.
value	INT	Numerical value or weight assigned to the achievement.
unlocktime	BIGINT	Timestamp (UNIX format) representing when the user unlocked the achievement.
datestamp	VARCHAR(10)	Date string indicating when the record was inserted or last synchronized.
Relationships	Foreign Key: appid → catgames.appid Establishes a many-to-one relationship between achievements and catgames. Each achievement record belongs to a single game.	
	Foreign Key: steamid → users.steamid Establishes a many-to-one relationship between achievements and users. Each user can have multiple achievements across different games.	

Table 12 – achievementspercentagespergame

Purpose	The achievementspercentagespergame table stores the global achievement statistics retrieved from the Steam API endpoint GetGlobalAchievementPercentagesForApp. Each record represents a specific achievement within a game (appid, name) and the percentage of all players who have unlocked it.	
Column	Type	Description
idpercentage	BIGINT (PK)	Unique identifier for each achievement percentage record.
appid	INT (FK)	References the game in the catgames table. Identifies the game associated with the achievement.
name	VARCHAR(512)	Name of the achievement, matching the catachievements.name value.
value	VARCHAR(300)	Percentage value (as a string) representing how many global players have unlocked the achievement.

timestamp	TIMESTAMP	Automatically updated timestamp indicating when the record was last updated or synchronized.
	Foreign Key appid → catgames.appid Establishes a many-to-one relationship between achievementspercentagespergame and catgames. Each achievement record belongs to a single game.	

Table 13 – catachievements

Purpose	The catachievements table stores the catalogue of all possible achievements available within each game.	
Column	Type	Description
appid	INT (FK)	References the game in the catgames table. Identifies the game associated with the achievement.
name	VARCHAR(50)	Name or unique identifier of the achievement within the game.
description	VARCHAR(300)	Textual description of the achievement objective.
image	VARCHAR(50)	Filename of the image associated with the achievement icon.
Relationships	Foreign Key: appid → catgames.appid Establishes a many-to-one relationship between catachievements and catgames. Each game may have multiple achievements, but each achievement belongs to one game only.	

Table 14 – catgames

Purpose	The catgames table stores the catalogue of all games available within the MEGASKILLS platform. It is populated automatically using data retrieved from the Steam Web API (appdetails.appid) endpoint, which provides detailed information about each game.	
Column	Type	Description
idgame	INT (PK)	Unique identifier for each game record.
appid	INT	The Steam application ID (appdetails.appid) used to retrieve the game's official metadata.
name	VARCHAR(512)	The official game name as returned by the Steam API.
shortdescription	VARCHAR(3000)	Short summary or promotional text of the game (maps to short_description in the Steam API).
longdescription	VARCHAR(6000)	Extended game description.
image	VARCHAR(400)	Path to the main image.

imagweb	VARCHAR(100)	Filename of the image associated with the game.
webdescription	VARCHAR(4000)	Web-specific description for presentation the game.
active	INT	Indicates whether the game is active (1) or inactive (0) in MEGASKILLS platform.
licence	INT	Indicates if the game requires a license to play (1 = licensed, 0 = free).
linksteam	VARCHAR(1000)	URL link to the game's official Steam page.
videohelp	VARCHAR(1000)	URL link to a YouTube video providing a tutorial or introduction.
numplayers	INT	Number of players supported by the game.
Relationships		

Table 15 – catsoftskills

Purpose	The catsoftskills table contains the catalogue of the soft skills covered by the MEGASKILLS platform.	
Column	Type	Description
idsoftskill	INT (PK)	Internal unique identifier for each soft skill.
softskillslink	VARCHAR(256)	Name soft skill.
shortdescription	VARCHAR(100)	Short name of the soft skill.
longdescription	VARCHAR(5000)	Detailed description of the soft skill.
colour	VARCHAR(50)	Hexadecimal color code associated with the soft skill (e.g., #FF9900). Used for visual identification and thematic grouping within the MEGASKILLS user interface.
Relationships		

Table 16 – ownedgames

Purpose	The ownedgames table stores the list of games owned by each user registered in the MEGASKILLS platform. This information is retrieved from the Steam Web API endpoint GetOwnedGames, which provides all games associated with a user's Steam account along with playtime statistics.	
Column	Type	Description
idownedgames	BIGINT (PK)	Internal unique identifier for each ownership record.

steamid	VARCHAR(50) (FK)	The SteamID64 of the user who owns the game. Links to the users table.
appid	INT (FK)	The unique Steam App ID of the owned game. Links to the catgames table.
playtimeforever	BIGINT	Total playtime in minutes (as reported by the Steam API) representing the cumulative time the user has spent playing this game.
datestamp	TIMESTAMP	Date and time when the record was created or last updated in the MEGASKILLS database. Managed automatically.
Relationships	Foreign Key: steamid → users.steamid Links each record to the corresponding MEGASKILLS user.	
	Foreign Key: appid → catgames.appid Links each record to the corresponding game in the catalogue.	

Table 17 - stats

Purpose	The stats table stores game-specific statistical data for individual users within the MEGASKILLS platform. It is populated using the Steam Web API endpoint GetUserStatsForGame, which returns a set of key-value pairs representing a player's in-game statistics (e.g., total kills, levels completed, accuracy rate).	
Column	Type	Description
idstat	BIGINT (PK)	Internal unique identifier for each statistic record.
appid	INT (FK)	The unique Steam App ID of the game to which the statistic belongs. Links to the catgames table.
steamid	VARCHAR(50) (FK)	The SteamID64 of the user whose statistic is being recorded. Links to the users table.
nombrestat	VARCHAR(100)	The name or key of the statistic as defined by the game developer in Steam.
valorstat	INT	The numeric value associated with the statistic. Represents the user's measured performance for the specified metric.
datestamp	VARCHAR(10)	Timestamp or date string indicating when the data was retrieved or last updated.
Relationships	Foreign Key: appid → catgames.appid Associates the statistic with the relevant game in the catalogue.	

Foreign Key: steamid → users.steamid
Links each record to the corresponding MEGASKILLS user.

Table 18 – timeplayed

Purpose	The timeplayed table stores information about the games a user has recently played, as well as their cumulative playtime. It is populated using the Steam Web API endpoint <code>GetRecentlyPlayedGames</code> which provides data on the titles a Steam user has played in the last two weeks and their total recorded playtime.	
Column	Type	Description
idtimeplayed	BIGINT (PK)	Internal unique identifier for each record.
steamid	VARCHAR(50) (FK)	The SteamID64 of the user whose playtime data is being recorded. Links to the users table.
appid	INT (FK)	Steam App ID of the game. References the catgames catalogue.
name	VARCHAR(512)	The name of the game as reported by the Steam API.
playtimeforever	BIGINT	The total cumulative playtime (in minutes) that the user has spent in this game.
playtime2weeks	BIGINT	The total playtime (in minutes) within the last two weeks.
datestamp	VARCHAR(10)	Date when the record was last updated or retrieved from the Steam API.
Relationships	Foreign Key: steamid → users.steamid Links playtime data with a specific MEGASKILLS user.	
	Foreign Key: appid → catgames.appid. Links each record to the corresponding game in the catalogue.	

Table 19 – users

Purpose	The users table stores the user information for the MEGASKILLS platform, including authentication data, registration status, and optional linkage to the user's Steam account. Each record represents a single registered user and may be connected to external data retrieved from the Steam API via the steamid field.	
Column	Type	Description
email	VARCHAR(50) (PK)	The user's unique email address. Used as the primary key and main login identifier within the MEGASKILLS platform.

password	VARCHAR(255)	Encrypted password used for authentication. The system employs Argon2id, a modern password hashing algorithm recommended for secure password storage. Spring Security provides native support for Argon2id through the Argon2PasswordEncoder, which ensures secure hashing with per-user salts and resistance to brute-force attacks
steamid	VARCHAR(50)	The SteamID64 associated with the user. Enables data synchronization with the Steam Web API.
created	TIMESTAMP	Timestamp when the user account was created in the system.
active	INT	Account activation status: 0 = registered but not confirmed; 1 = confirmed email.
name	VARCHAR(50)	Name of the user.
status	INT (FK)	Current process status of the user.
type	INT	User role within the platform: 1 = Administrator, 0 = Standard user.
usertype	INT	User category: 0 = Student, 1 = Manager, 2 = Other.
licence	INT	License information: -1 indicates no license; otherwise, stores the game code (from catgames) associated with the license.
partner	INT	Reference to an institutional or project partner linked to the user account.
otherpartner	VARCHAR(200)	Optional free-text field describing an external partner not listed in predefined categories.
lastlogindate	VARCHAR(50)	Date and time of the user's last successful login.
Relationships	Foreign Key: status → processtatus.idprocesstatus	

Table 20 – processtatus

Purpose	The processtatus table defines the different statuses that a user can have during specific processes in the MEGASKILLS platform. Each record represents a status type, which can be referenced by users to indicate their current stage in a process.	
Column	Type	Description
idprocesstatus	INT (PK)	Unique identifier for each process status.
statusname	VARCHAR(50)	Name of the status.

description	VARCHAR(150)	Optional detailed description of the status.
Relationships		

Table 21 – userdatademographic

Purpose	The userdatademographic table stores demographic data collected from users during registration on the MEGASKILLS platform. It provides valuable contextual information—such as age, gender, employment status, and country of origin	
Column	Type	Description
email	VARCHAR(50) (PK, FK)	The email address of the user, referencing users.email.
age	INT	The user’s age at registration.
gender	INT	Encoded value representing the user’s gender.
employment	INT	Encoded value indicating the user’s employment status.
countrybirth	INT	Encoded country identifier where the user was born.
countryliving	INT	Encoded country identifier where the user currently resides.
temporarystay	INT	Encoded value representing whether the user is temporarily staying in another country.
Relationships	Foreign Key: email → users.email Links demographic data directly to the corresponding registered user.	

Table 22 – usergamehours

Purpose	The usergamehours table records the total amount of time each user has spent playing active games within the MEGASKILLS platform. It serves as a persistent summary of playtime per user and game, regularly updated through a scheduled background process (automatic task) that retrieves data via the Steam GetOwnedGames API. Unlike the ownedgames table, which stores all games owned by a user, usergamehours focuses exclusively on games that are active within the MEGASKILLS catalogue.	
Column	Type	Description
email	VARCHAR(50) (PK,FK)	The email address of the user, referencing users.email.
appid	INT (PK, FK)	Unique Steam APP ID game identifier, referencing catgames.appid.

minutes	BIGINT	The total time played (in minutes) by the user for this game, as reported by Steam.
Relationships	Foreign Key: email → users.email Links user game data directly to the corresponding registered user.	
	Foreign Key: appid → catgames.appid Links each record to the corresponding game in the catalogue.	

Table 23 – usergamesteamhours

Purpose	The usergamesteamhours table stores the total accumulated playtime (in minutes) for every game owned by a user, based on data retrieved from the Steam GetOwnedGames API. Unlike usergamehours, which only includes active games within the MEGASKILLS platform, this table maintains records for all games linked to a user's Steam account — providing a complete overview of their gaming activity.	
Column	Type	Description
email	VARCHAR(50) (PK,FK)	The email address of the user, referencing users.email.
appid	INT (PK, FK)	Unique Steam APP ID game identifier, referencing catgames.appid.
minutes	BIGINT	The total time played (in minutes) by the user for this game, as reported by Steam.
Relationships	Foreign Key: email → users.email Links user game data directly to the corresponding registered user.	
	Foreign Key: appid → catgames.appid Links each record to the corresponding game in the catalogue.	

Table 24 – usersprofile

Purpose	The usersprofile table stores detailed information about each user's Steam community profile, as returned by the Steam Web API endpoint GetPlayerSummaries. It includes identifiers, visibility state, profile metadata, avatar images, and connection status.	
Column	Type	Description
email	VARCHAR(50) (PK, FK)	The email address of the user, referencing users.email.
steamid	VARCHAR(50) (FK)	The unique SteamID64 identifier of the user.
personaname	VARCHAR(512)	The user's current display name on Steam.
profileurl	VARCHAR(512)	Public Steam community profile URL.

avatar	VARCHAR(512)	URL to the user's small avatar image.
avatarpremium	VARCHAR(512)	URL to the medium-sized avatar image.
avatarfull	VARCHAR(512)	URL to the user's full-size avatar image.
personastate	INT	The user's current online state: 0 = Offline, 1 = Online, 2 = Busy, 3 = Away, 4 = Snooze, 5 = Looking to trade, 6 = Looking to play.
communityvisibilitystate	INT	Visibility status of the Steam profile: 1 = Private / Friends only, 3 = Public.
profilestate	VARCHAR(512)	Indicates if the user has a community profile (1 = configured).
lastlogoff	VARCHAR(512)	Unix timestamp of the last time the user was online.
commentpermission	VARCHAR(512)	Indicates whether public comments are allowed.
datestamp	TIMESTAMP	Record timestamp — automatically updated when the entry is inserted or modified.
modified	TIMESTAMP	Last modification timestamp.
steamlevel	INT	User's current Steam level.
Relationships	Foreign Key: email → users.email Links user data directly to the corresponding registered user.	

Table 25 – usertatus

Purpose	The userstatus table logs the chronological history of process status that each user passes through within the MEGASKILLS platform. While the users table only stores the current status (via status field), this table provides a complete historical record of all previous states.	
Column	Type	Description
iduserstatus	INT (PK)	Unique identifier for each user status record.
email	VARCHAR(50)(FK)	Email address of the user whose status is being recorded. References users.email.
idprocessstatus	INT	Identifier of the process status associated with this record. References processstatus.idprocessstatus.
created	TIMESTAMP	Date and time when this status record was created. Automatically set to the current timestamp.
Relationships	Foreign Key: email → users.email Links user status data directly to the corresponding registered user.	

Foreign Key: idprocessstatus → processstatus.idprocessstatus

Table 26 – usergamelicense

Purpose	The usergamelicense is used to determine game access permissions and control UI behaviour when a user attempts to launch a game.	
Column	Type	Description
Email	VARCHAR (50) (PK) (FK)	The email address of the user, referencing users.email.
Appid	INT (PK) (FK)	Unique Steam game identifier, referencing catgames.appid.
License	INT	Indicates whether the user has a valid game license: 1 = licensed, 0 = no license. Determines if the user can access the game.
showmodalplay	INT	Internal flag controlling whether to display a modal window when the user clicks <i>Play</i> : 0 = show modal, 1 = skip modal.
Relationships	Foreign Key: email → users.email	
	Foreign Key: appid → catgames.appid	

Table 27 – userevaluationform

Purpose	The userevaluation table stores the results of the user evaluation form, which each player fills out after completing a minimum number of gameplay hours. The purpose of this form is to gather feedback about the gaming experience, usability, motivation, and overall satisfaction of the MEGASKILLS platform. Additionally, it captures requests for certificates and Europass documents related to the user's participation and achievements.	
Column	Type	Description
Email	VARCHAR (50) (PK, FK)	The email address of the user, referencing users.email.
Certificate	INT	Indicates if the user has requested or received a participation certificate: 1 = requested, 2 = sent.
Europass	INT	Indicates if the user has requested or received the Europass certificate: 1 = requested, 2 = sent.
idquestion1 – idquestion15	INT	Identifiers of each question answered in the evaluation form. These reference conceptual question definitions from userquestion.
result1 – result11, result15	INT	Stores the user's selected answer for each question where multiple-choice responses are defined (from 1–5 or 1–2).

description6	VARCHAR (500)	Free-text field used only if question 6 (technical issues) is answered with “Yes”. The user may describe encountered problems.
description12	VARCHAR (500)	User’s answer to “What did you like most about the game?”
description13	VARCHAR (500)	User’s answer to “What did you like the least on the platform?”
description14	VARCHAR (500)	User’s suggestions for improvement.
Relationships	Foreign Key: email → users.email Links the evaluation form to the corresponding registered user.	
Questions and Answer Mapping		
1	How would you rate your overall experience of the game?	Very Poor / Poor / Average / Good / Very Good
2	How engaged did you feel while playing the game?	Not at all / Slightly / Moderately / Very / Extremely
3	How easy was it to navigate the game?	Very Difficult / Difficult / Neutral / Easy / Very Easy
4	How clear and helpful was the tutorial/onboard process?	Very Unclear / Unclear / Neutral / Clear / Very Clear
5	How well did you understand the gameplay mechanics?	Very Poorly / Poorly / Neutral / Well / Very Well
6	Did you experience any technical issues?	Yes / No — If yes, description6 captures details
7	How motivating were in-game feedback and rewards?	Not at all / Slightly / Moderately / Very / Extremely
8	How would you describe the difficulty level of the game?	Very Easy / Easy / Just Right / Hard / Very Hard
9	How appealing were the graphics and sounds of the game?	Very Poor / Poor / Neutral / Good / Very Good
10	How satisfied were you after completing the game?	Very Dissatisfied / Dissatisfied / Neutral / Satisfied / Very Satisfied
11	Do you think it is a good tool for evaluating and developing soft skills?	Yes / No (Optional comment)
12	What did you like most about the game?	Open text — stored in description12
13	What did you like the least on the platform?	Open text — stored in description13
14	Do you have any suggestions for improvement?	Open text — stored in description14
15	How likely is it that you recommend this application?	Scale from 1 (lowest) to 5 (highest)

Table 28 – usersendemail

Purpose	The usersendemail table is used to track the sending of automated notification emails to users, based on different behavioural or progress events within the MEGASKILLS platform. It ensures that specific messages (such as reminders or completion notices) are only sent once or a limited number of times, avoiding duplicate communications.			
Column	Type	Description		
email	VARCHAR(50) (PK, FK)	The email address of the user, referencing users.email.		
completedhours	INT	Event: user_completed_hours → 0 = email not sent, 1 = email sent.		
datecompletedhours	VARCHAR (50)	Date when the “hours completed” email was sent.		
notlogin	INT	Event: user_not_login → 0 = email not sent, 1 = first reminder sent, 2 = second reminder sent.		
datefirstnotlogin	VARCHAR (50)	Date of the first “not logged in” email.		
datesecondnotlogin	VARCHAR (50)	Date of the second “not logged in” email.		
abandoned	INT	Event: user_abandoned → 0 = email not sent, 1 = first email sent, 2 = second email sent.		
datefirstabandoned	VARCHAR (50)	Date of the first “abandoned” email.		
datesecondabandoned	VARCHAR (50)	Date of the second “abandoned” email.		
Relationships	Foreign Key: email → users.email Links each record to the user it tracks email notifications for.			
Behavioural Logic Summary				
Event Type	Trigger	Email Send Rules	Max Send	Related Fields
user_completed_hours	This occurs when the user has reached a defined number of playing hours.	Sends a congratulatory email.	1	completedhours, datecompletedhours
user_not_login	When user hasn’t logged in for > 7 days.	Sends up to two reminders at set intervals.	2	notlogin, datefirstnotlogin, datesecondnotlogin
user_abandoned	When no gameplay time increase is detected after a certain period.	Sends up to two motivational/re-engagement emails.	2	abandoned, datefirstabandoned, datesecondabandoned

Table 29 – gamesoftskilllevel

Purpose	The gamesoftskilllevel table is used to map each active game in the platform to the maximum contribution it can provide to a given soft skill. The contribution is expressed on a scale from 0 to 3, where higher values indicate a greater potential impact on developing the specific soft skill. Only active games and soft skills relevant to the project are included.	
Column	Type	Description
appid	INT (PK)	Unique Steam game identifier, referencing catgames.appid.
idsoftskill	INT (PK)	Identifier for the soft skill, referencing to catsoftskills.idsoftskill.
level	INT	Maximum level (0–3) a game can contribute to the development of the soft skill.
namegame	VARCHAR(512)	Name of the game
namesoftskill	VARCHAR (100)	Name of the soft skill.
colour	VARCHAR (50)	Hexadecimal colour associated with this soft skill in the web UI.
Relationships	Foreign Key: appid → catgames.appid Links each record to the corresponding game in the catalogue.	
	Foreign Key: idsoftskill → catsoftskills.idsoftskill Links each record to the corresponding soft skill	

Table 30 – gameachievementsoftskills

Purpose	The gameachievementsoftskills table defines the relationship between in-game achievements and soft skills in the MEGASKILLS project. Each record represents how much a specific achievement from a game contributes to improving a particular soft skill, quantified through an experience value (XP points). This mapping allows the platform to translate player achievements into measurable skill development indicators.	
Column	Type	Description
id	INT(PK)	Auto-incremented primary key for the table.
appid	INT(FK)	Unique Steam game identifier, referencing catgames.appid.
name	VARCHAR(512) (FK)	Name of the achievement within the game.

idsoftskill	INT (FK)	Identifier of the soft skill associated with this achievement, referencing to catsoftskills.idsoftskill.
namesoftskill	VARCHAR (100)	Name of the soft skill.
value	DOUBLE	Experience points (XP) indicating the contribution level of this achievement to the soft skill.
Relationships	Foreign Key: (appid, name) → catachievements (appid, name) Links each record to the corresponding game-achievement.	
	Foreign Key: idsoftskill → catsoftskills.idsoftskill Links the achievement's contribution to a specific soft skill.	