TRAILS

Enabling Data Analytics for Actions Tackling Skills Shortages & Mismatch

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INTEGRATE II: TRAILS portal

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ACRONYMS

Acronym	Explanation
AES	Adult Education Survey
API	Application Programming Interface
CEDEFOP	Centre for the Development of Vocational Training
ECB	European Central Bank
ESJS	European Skills and Jobs Survey
EU-LFS	European Union Labour Force Survey
EU-SILC	European Union Statistics on Income and Living Conditions
FR	Functional Requirements
FT	Full-Time Employed
HFCS	Household Finance and Consumption Survey
JSON	JavaScript Object Notation

NFR	Non-Functional Requirements
PT	Part-Time Employed
RBAC	Role-Based Access Control
SaaS	Software as a Service
UC	Use Case
UR	User Role
VET	Vocational Education and Training

EXECUTIVE SUMMARY

This deliverable presents the development of the TRAILS portal (https://portal.trails-project.eu), highlighting its implemented features, technical components, and interactive dashboards. As a Software as a Service (SaaS) platform, the TRAILS portal brings together diverse datasets, interactive visualizations, and API-based data extraction services to support evidence-based policymaking in the areas of employment, skills dynamics and education.

Building upon the design and architecture outlined in Deliverable D7.1 "INTEGRATE I: TRAILS portal architecture, design and integration documentation", this document details the technical implementation and current functionality of the TRAILS portal. It describes the system's infrastructure, entity-relationship model, containerized deployment setup, and role-based access control. Special focus is also given to the portal's user navigation, including descriptions of generic pages, profile settings, and access to available datasets.

The deliverable also showcases the dashboards that have been developed for five core datasets (EU-LFS, ESJS, AES, HFCS, SILC) and the skills mismatch indicators. These dashboards offer cross-country comparisons, demographic filters, and dynamic visualisations tailored to users' needs.

In addition, the document introduces the TRAILS data extraction mechanisms, including the structured download options and the programmatic access through the publicly documented API. The deliverable covers also the mobile application, with its role in ensuring cross-platform accessibility and seamless integration with the web portal. Finally, it outlines the integration milestones achieved so far and sets the stage for the validation procedures to be completed in the next phase (D7.3 "INTEGRATE III: Validation Report for final version of TRAILS portal").

1. PURPOSE OF THE DELIVERABLE

This deliverable documents the implementation of the TRAILS portal, representing a key milestone in the transition from system design to an operational portal. Building upon the architectural and design specifications defined in D7.1, this report presents the TRAILS portal as a functional software-as-a-service solution that integrates data and visualization tools to support evidence-based policymaking in the fields of skills match, education, and labour market dynamics.

The TRAILS portal has been developed to provide a unified endpoint for the project's resources, and insights, enabling structured access to core datasets and analytical outputs produced across the project's work packages. Through interactive dashboards, a role-based access control, and data extraction mechanisms, the portal supports the exploration of skills mismatches, labour market dynamics, vocational education and training (VET) outcomes, and broader socioeconomic indicators at European, national, and demographic levels. The portal is designed to serve policymakers, researchers, stakeholders, and the general public, ensuring accessibility while maintaining data integrity and security.

This deliverable focuses on the technical implementation of the TRAILS portal, detailing its system architecture, containerized deployment, entity relationship structure, and user navigation flows. It further describes the implemented dashboards, data access mechanisms (downloadable datasets and Application Programming Interface (APIs)) and the integration milestones achieved during the project lifecycle. In line with Task 7.2, the report also addresses system verification activities, demonstrating that the implemented functionalities satisfy mostly the functional and requirements defined earlier. Finally, this document presents the complementary smartphone application developed to extend the portal's accessibility and ensure continuous service delivery across devices.

1.1 RELATION WITH OTHER DELIVERABLES AND TASKS

This deliverable builds directly upon the architectural specifications presented in Deliverable D7.1 and marks the transition from planning to implementation. While D7.1 outlined the system blueprint and integration roadmap, D7.2 "INTEGRATE II: TRAILS portal" focuses on the development of the TRAILS portal, documenting its current capabilities, technical features, and navigation structure.

The work under Task 7.2 remains closely aligned with the results and outputs of Work Packages 1 to 6, as these continue to inform the content, functionality, and visualisation logic of the portal. Thus, the datasets, research findings, and analytical frameworks developed across the technical work packages are progressively integrated into the portal, shaping both the dashboards and the data extraction functionalities.

2. OVERVIEW OF THE TRAILS PORTAL

This section provides a recap of the proposed portal's architecture, components, user roles, use cases, and requirements previously discussed in D7.1.

2.1 SYSTEM ARCHITECTURE

The TRAILS portal architecture consists of four main components: (a) Data Storage, (b) Data Visualization, (c) Data Extraction, and (d) Users and Roles. Each component is responsible for a distinct set of functionalities related to data management, data presentation, data dissemination, and user interactions, respectively.

Figure 1 illustrates these four components and their interconnections (blue arrows), highlighting how data flows among them. In addition, Figure 2 presents the technologies used in each component. Together, these figures provide the reader with a clear overall picture of the portal's architecture and the technology stack employed.

The Data Storage component serves as the entry point for all information required by the TRAILS portal. It hosts both external data collected or generated by TRAILS partners, and internal data related to the portal itself (e.g., users, dashboards). Data imported into this component is made available to all other components.

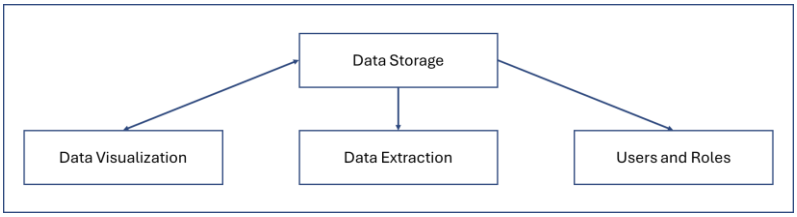

Figure 1: Conceptual architecture of the TRAILS portal

The Data Visualization component receives the stored data to generate the visualization widgets and present information through interactive dashboards. These dashboards, prepared by TRAILS partners as part of various tasks/work packages, are designed to automatically adapt when new data become available.

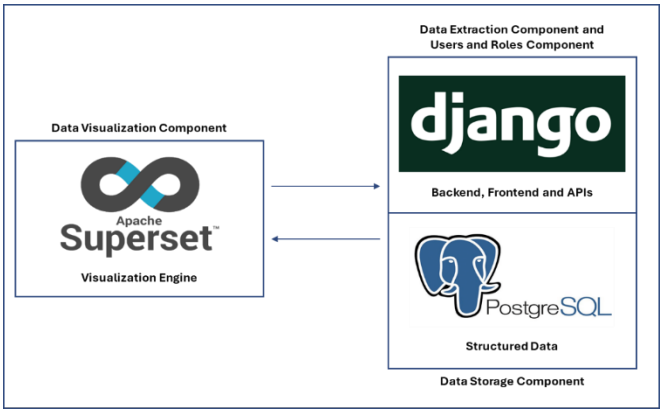

Figure 2: TRAILS's portal conceptual components with the proposed technologies

The Data Extraction component is responsible for disseminating data to researchers or third-party services. It offers two delivery formats: a human-readable form (e.g., Excel files) and a machine-readable format (e.g., JSON).

Finally, the Users and Roles component manages user permissions within the portal. It implements a role-based access control (RBAC) mechanism to ensure that each user has access to the functionalities appropriate to their role.

2.2 USER ROLES, USE CASES AND SYSTEM REQUIREMENTS

The TRAILS portal implements a RBAC system with three user roles (UR): Visitor, Administrator, and Super Administrator. Visitors can browse the portal, interact with dashboards, and download datasets after registration. Administrators are responsible for uploading data and creating dashboards, while Super Administrators, members of the development team, have extended privileges to oversee the portal's overall functionality, monitor the system, and resolve issues. A detailed table with all capabilities per user role is provided in Deliverable D7.1.

Regarding the use cases (UC), which describe the specific actions each user role can perform on the portal, a total of twenty-eight use cases have been identified across five categories. Table 1 presents the number of use cases in each category, while a complete list is available in D7.1.

Table 1: TRAILS's portal use cases (in categories)

Category	Number of use cases
User access and interaction	11
Data interaction	4
Dashboard interaction	5
Data extraction	6
Support and feedback	2

Finally, forty system requirements were defined in total: twenty-seven functional requirements (FR) and thirteen non-functional requirements (NFR). Functional requirements describe what a system must do. They define the specific features and interactions that the system must support in order to meet user needs, such as data processing, user authentication, report generation, or dashboard visualization. Non-functional requirements, on the other hand, describe how well the system must perform its functions. They capture quality attributes and constraints like performance, reliability, scalability, security, usability, and maintainability, ensuring that the system operates effectively and delivers a consistent user experience beyond its basic functionality.

3. TECHNICAL DETAILS OF THE TRAILS PORTAL

This section presents the technical details of the TRAILS portal, such as the entity relationship diagram (ERD) which provides an overview on how the portal organises its data, and the containerization principles that explain how the different services of the system are integrated to implement a solid and robust solution.

3.1 ENTITY RELATIONSHIP DIAGRAM

The ERD of the TRAILS portal is a critical component in understanding the database structure and the relationships between key entities. It provides a simplified representation of the core database structure behind the TRAILS portal. It also outlines how different components, such as users, their preferences, demographic information, and available datasets, are related to one another. The aim of this section is to present a high-level, understandable view of how the portal manages user data and dataset access, without exposing internal complexities.

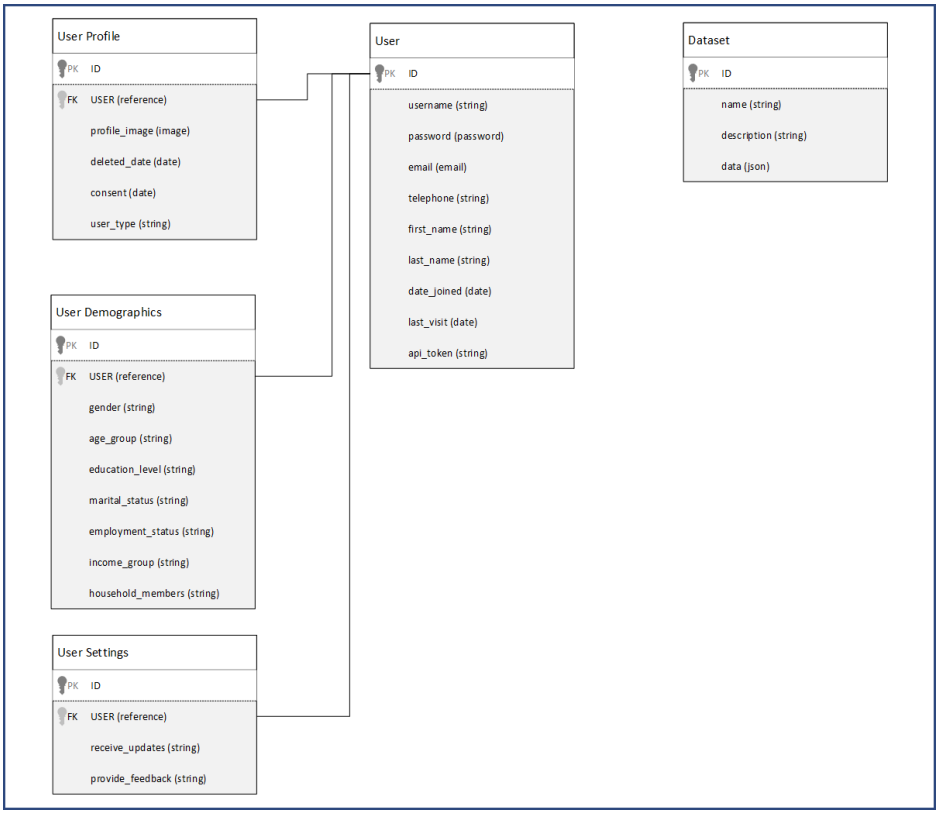

Figure 3 presents the TRAILS portal ERD, while Table 2 summarizes the purpose and the structure of each entity in the TRAILS portal database and how they are interconnected, providing a user-centered view of data management.

Figure 3: TRAILS portal Entity Relationship Diagram

Table 2: Description of the TRAILS portal ERD

Entity	Description	Relationship
User	Represents each registered user on the portal. Stores core account and contact information, including username, email, and the API token.	Linked to User Profile, User Demographics, and User Settings (1:1).
User Profile	Contains additional account details such as profile image, consent date, deleted status, and user type (e.g., admin, visitor).	Each profile is linked to one User.
User Demographics	Stores demographic attributes like gender, age group, education level, employment status, income group, and household members.	Each record is linked to one User.
User Settings	Captures user preferences related to receiving updates or providing feedback.	Each record is linked to one User.
Dataset	Contains metadata and content of datasets available in the portal, including name, description, and data (in JSON format).	Independent of user-specific data, but access is managed via user roles.

3.2 CONTAINERIZATION: SEAMLESS OPERATION

To ensure a consistent, portable, and easily maintainable deployment environment, the TRAILS portal adopts a container-based approach using Docker. Containerization enables the encapsulation of application components together with their dependencies, runtime, and configuration settings, while this approach eliminates system-level incompatibilities, simplifies deployment workflows, and ensures that the portal behaves identically across development, testing, and production environments.

The use of Docker is particularly suitable for multi-service architectures such as the TRAILS portal, where several interconnected components (web application, database, visualization service, reverse proxy, and caching layer) must coexist and communicate reliably. By leveraging Docker Compose, the portal achieves the orchestration of all required services in a reproducible, automated, and scalable manner.

Docker was selected as the deployment solution for the TRAILS portal due to its ability to provide a portable, consistent environment across local machines, on-premises servers, and cloud infrastructures without requiring system-specific adjustments. Each service runs in its own isolated container, preventing dependency conflicts and ensuring clean separation between components. The portal can be scaled easily by adding new services with minimal configuration changes, while maintenance becomes simpler since updates or replacements to individual services do not impact the rest of the system. Additionally, Docker compose enables automation of the entire deployment

process, allowing the portal to be launched with a single command and reducing manual configuration and operational risks. The tightly controlled and fully documented environment further ensures reproducibility across all installations.

3.2.1 Docker compose architecture overview

The TRAILS deployment uses a multi-container architecture defined through a docker-compose YAML file. This configuration orchestrates five core services: A Django Web Application (Django Software Foundation), a PostgreSQL Database, Apache Superset (Apache Software Foundation), Redis, and Nginx Reverse Proxy, all interconnected through a shared Docker network. The architecture diagram is shown in Figure 4.

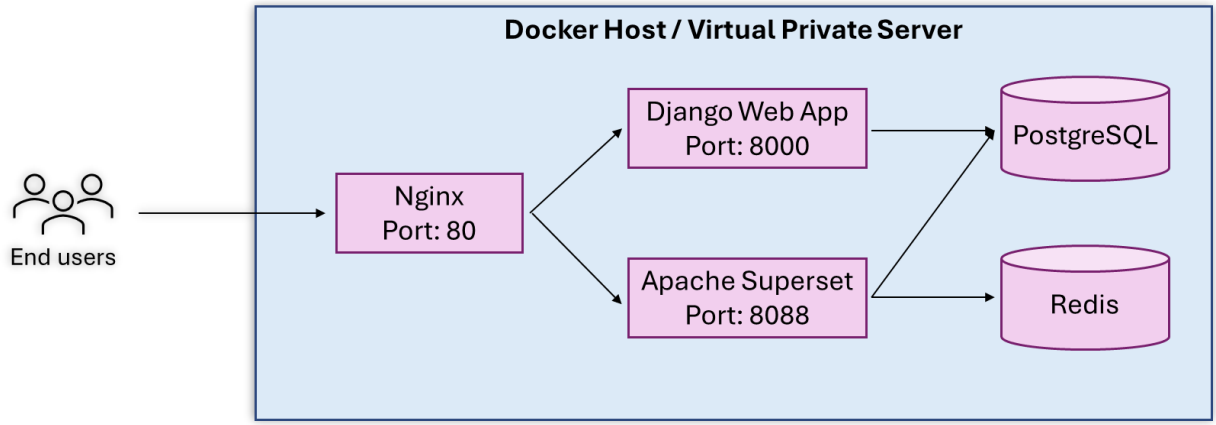

Figure 4: Docker-based deployment architecture of the TRAILS portal

To provide a concise overview of the TRAILS portal's container-based architecture, Table 3 summarizes the six core components (five services and one network) defined in the Docker compose configuration. Each entry highlights the purpose of the service, key functionalities, and essential configuration aspects, offering the reader a clear and unified view of how the portal's services interact within the Docker environment.

Table 3: Summary of docker compose services

Service	Relative TRAILS component	Description
Web Application (Django)	Users and Roles	Hosts the main TRAILS web application, built from local source code. It serves as the backend logic, manages static and media files, loads environment variables, exposes port 8000, and depends on the PostgreSQL database for data storage.
PostgreSQL Database	Data Storage	Provides persistent data storage for the portal, using PostgreSQL. Data is stored in mounted volumes, and the service is accessed internally by both Django and Superset.

Apache Superset	Data Visualization	Offers visualization capabilities. Uses PostgreSQL and Redis, loads configuration through volumes and exposes port 8088.
Redis Cache	Data Visualization	Functions as an in-memory caching and message-brokering system required by Superset.
Nginx Reverse Proxy	-	Acts as the entrypoint for external traffic, routing requests to the Django application or Superset. Serves static/media files, maintains logs, and exposes port 80 (http) and 443 (https).
Networking & Volumes	-	Defines the shared Docker network enabling communication among services, and multiple volumes ensuring persistent storage for logs, database files, static assets, Superset data, and Nginx logs.

4. USER NAVIGATION

This section provides an overview of the user interface and navigation experience of the TRAILS portal (https://portal.trails-project.eu). It starts with the TRAILS portal sitemap and continues to presentation of each page.

Through a series of screenshots, it demonstrates how visitors and registered users interact with the portal's main features, access datasets, explore interactive dashboards, and manage their account preferences. The design prioritizes clarity and accessibility to ensure a smooth and intuitive user experience across devices.

The sitemap of the TRAILS portal is presented in Figure 5. The portal is organized into three different menus: the main menu, the secondary menu and the footer menu.

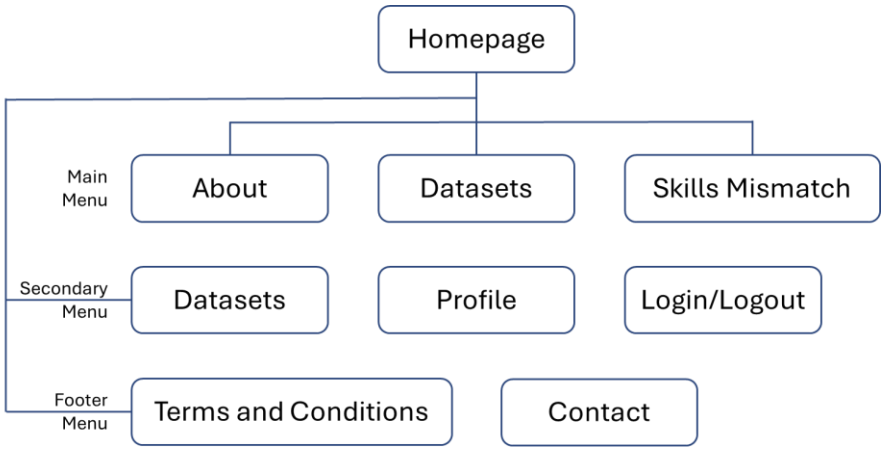

Figure 5: TRAILS portal sitemap

The following subsections present the generic pages of the portal (e.g. homepage, profile page, etc) and the various dashboards, respectively.

4.1 GENERIC PAGES

Upon visiting the TRAILS portal homepage, depicted in Figure 6, users are welcomed with a clean and modern layout that highlights the purpose and functionality of the portal. The hero section at the top introduces the TRAILS mission, key features of the portal, and entry points to explore data.

Below the hero section, users will find information of the portal's core offerings, such as dynamic dashboards, data access, and information about the TRAILS project. The homepage serves as a gateway to the portal's content, promoting both discovery and engagement.

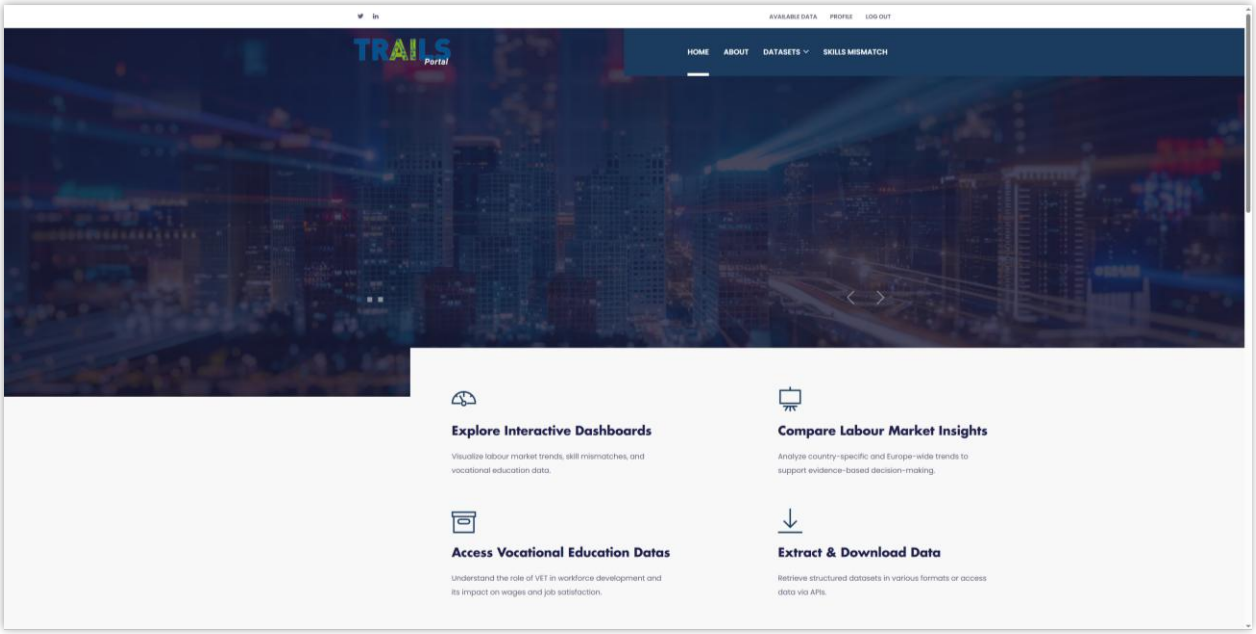

Figure 6: TRAILS portal Homepage

The footer of the TRAILS portal, presented in Figure 7, provides visitors with quick access to essential information and resources. It includes navigational links to key pages such as the homepage, about section, available data, and contact page. Additionally, it features the TRAILS project's logo, links to the official website, and legal disclaimers including the privacy policy and terms of use.

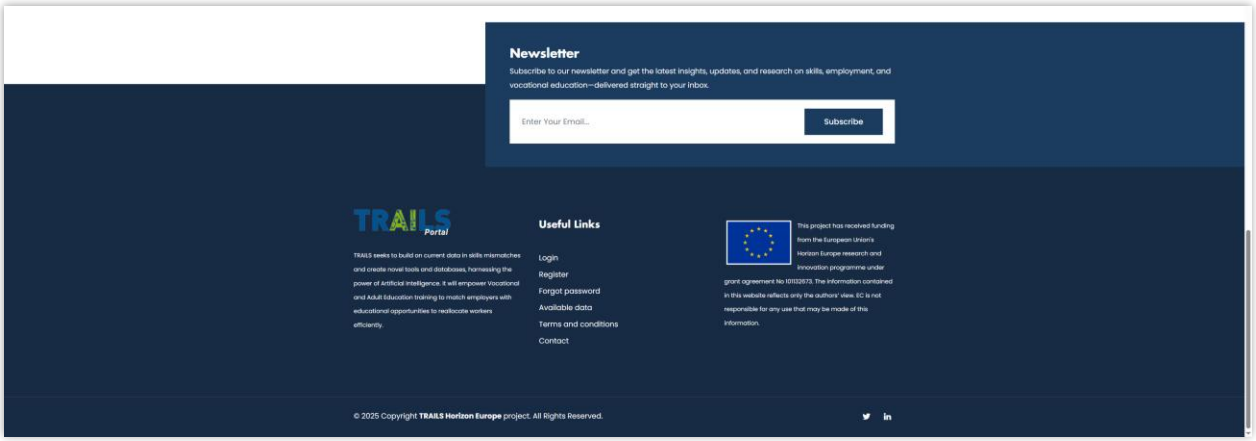

Figure 7: TRAILS portal Footer section

The About page of the TRAILS portal, presented in Figure 8, offers visitors an introduction to the purpose, vision, and scope of the TRAILS project. It outlines how the portal supports the broader goals of addressing skills mismatches and improving vocational education and labour market outcomes across Europe. The page also highlights the key functionalities of the portal, such as interactive dashboards and data access, while emphasizing the role of innovation and data accessibility. Specifically, it provides access to aggregate secondary data from European surveys

(e.g. EU-SILC, ESJS, and EU-LFS, TRAILS EU surveys), including the request form for the original survey microdata collected within the TRAILS project.

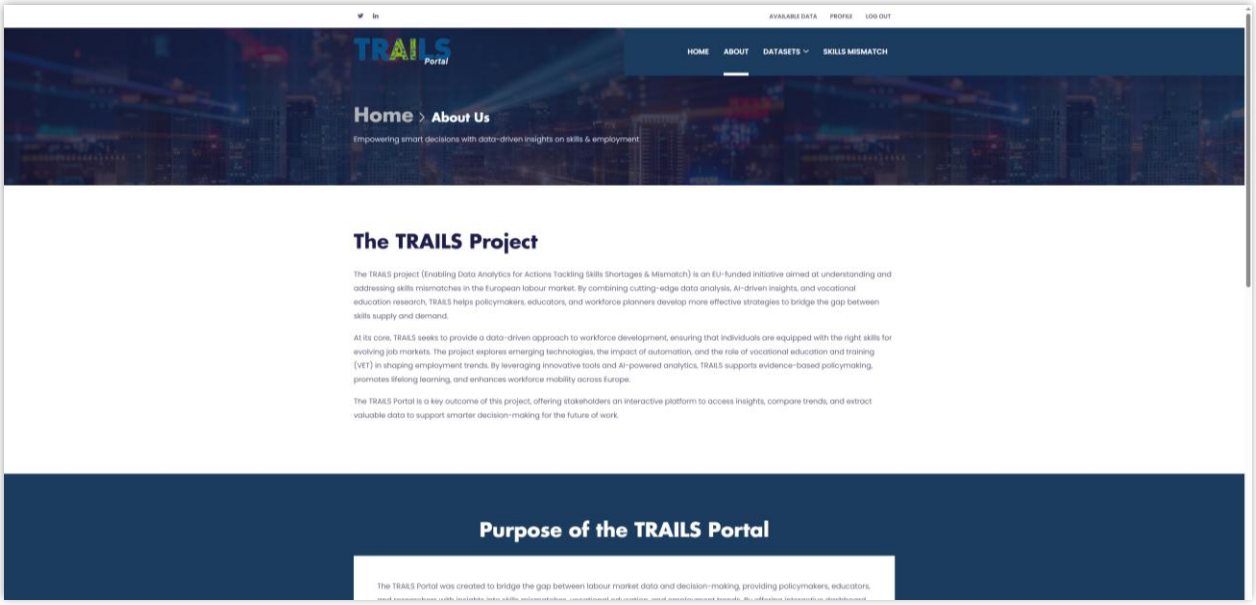

Figure 8: TRAILS portal About page

Figure 9 shows the general layout of a user's profile page on the TRAILS Portal. This section displays the user's profile picture, name, registration date, and contact information. Below, the user can edit basic profile information, including first and last name, nickname, and profile image. The layout is user-friendly and responsive, allowing quick profile updates by clicking the Update Profile button.

Figure 10 presents the Profile tab where users can modify their personal identification information, while Figure 11 shows the Demographics tab where users can provide their background information. This includes gender, age group, education level, marital status, employment status, income group, and household size. This information supports research and statistical purposes while remaining optional. In addition, Figure 12 displays the Settings tab, where users can manage communication preferences. They can opt-in to receive updates about new features, portal improvements, and research findings. Additionally, users can consent to be contacted for voluntary surveys aimed at portal improvement. Both options are optional and can be updated at any time. Figure 13 captures the Email change tab which enables users to update their registered email address associated with their TRAILS account, while Figure 14 illustrates the Password reset tab, providing users with guidance on how to securely reset their password. Finally, Figure 15 presents the API token tab. This section allows users to retrieve their unique personal API token, which grants access to data through the TRAILS API. The API Token can also be retrieved through a successful login using the TRAILS API[1].

[1] More details in section 5.2

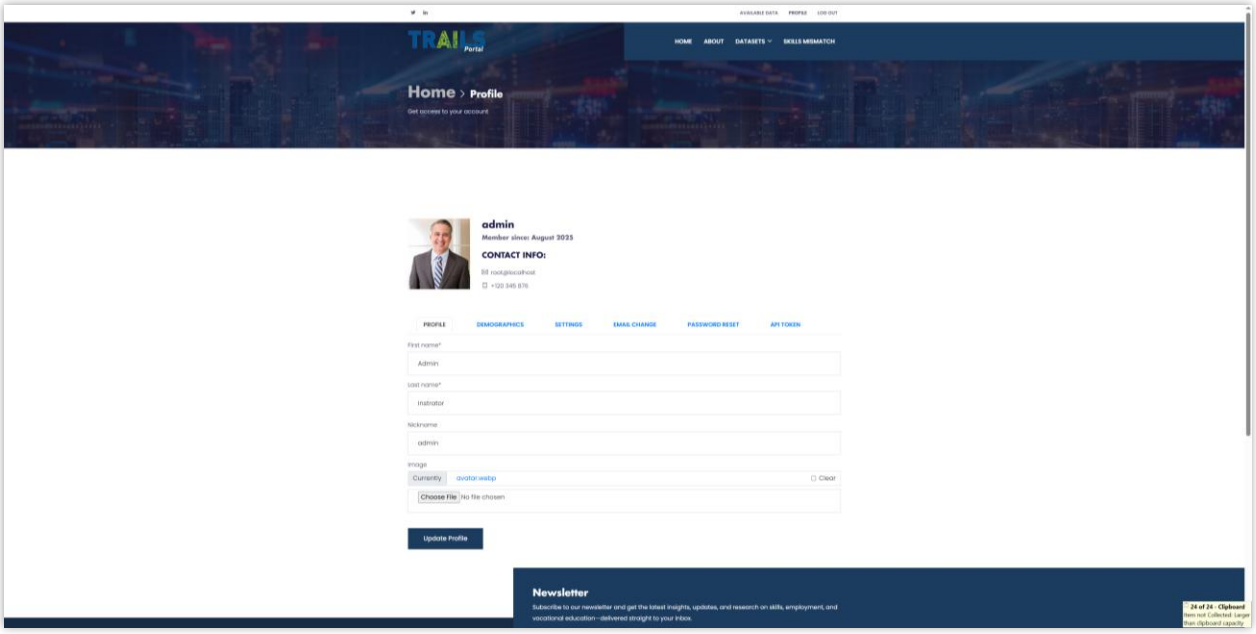

Figure 9: TRAILS portal Profile page

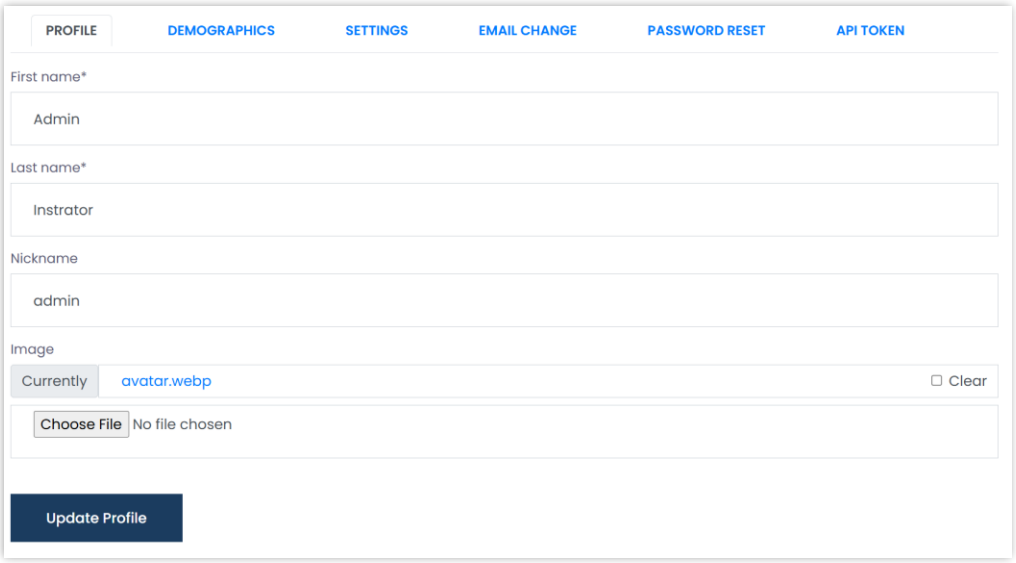

Figure 10: TRAILS portal Profile page (profile settings)

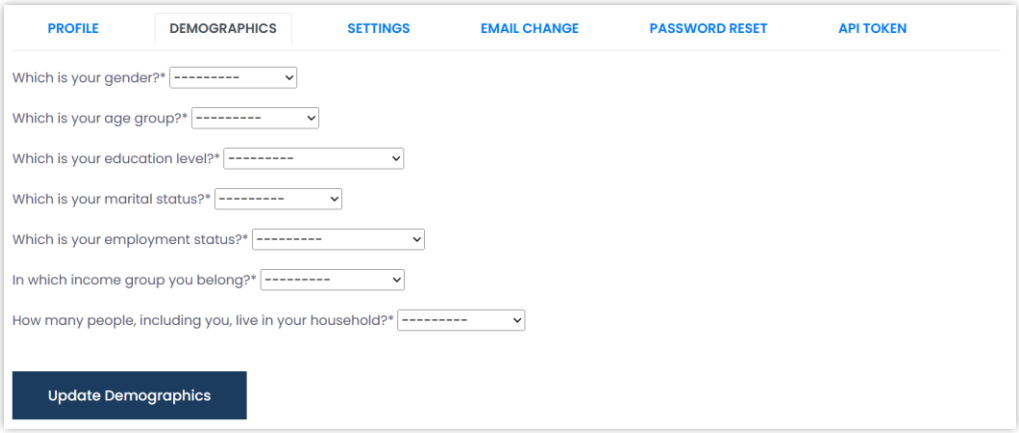

Figure 11: TRAILS portal Profile page (demographics settings)

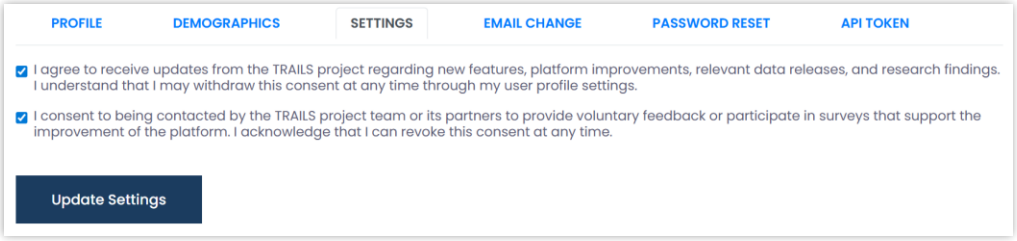

Figure 12: TRAILS portal Profile page (communication settings)

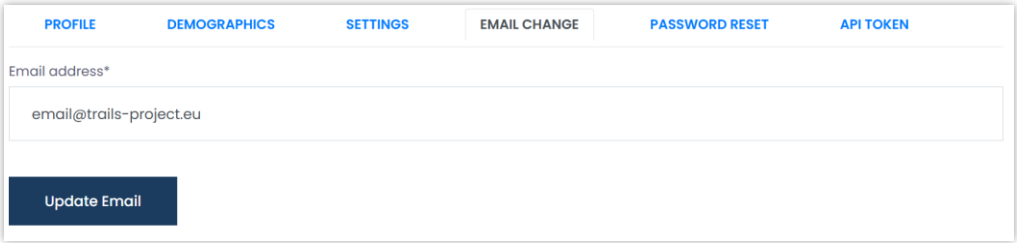

Figure 13: TRAILS portal Profile page (email settings)

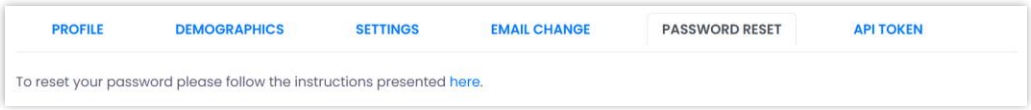

Figure 14: TRAILS portal Profile page (password reset)

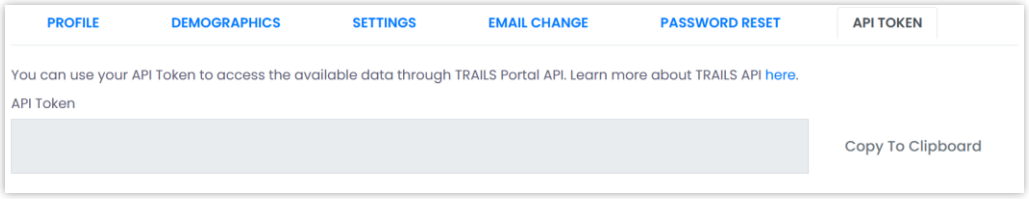

Figure 15: TRAILS portal Profile page (API token settings)

Figure 16 displays the Available Data page as seen by a logged-in user. The interface is expanded to provide structured access to data organized into four main categories: individual-level, household-level, skills mismatch indicators, and country-level data. Each entry provides direct download links to aggregate outputs derived from the underlying datasets, ensuring consistency with the visualizations presented in the corresponding dashboards. Additionally, the page features a dedicated section on the API, offering authenticated users with programmatic access to TRAILS datasets. This section includes links to the Swagger UI for interactive exploration and a downloadable Postman collection for simplified API integration. This layout ensures both manual and automated data access options are seamlessly available to registered users.

On the other side, when a user is not logged into the TRAILS portal, the Available Data page presents a brief overview of the datasets developed and collected within the TRAILS project (Figure 17). It introduces the scope of the data and invites the users to create an account to unlock these extended functionalities.

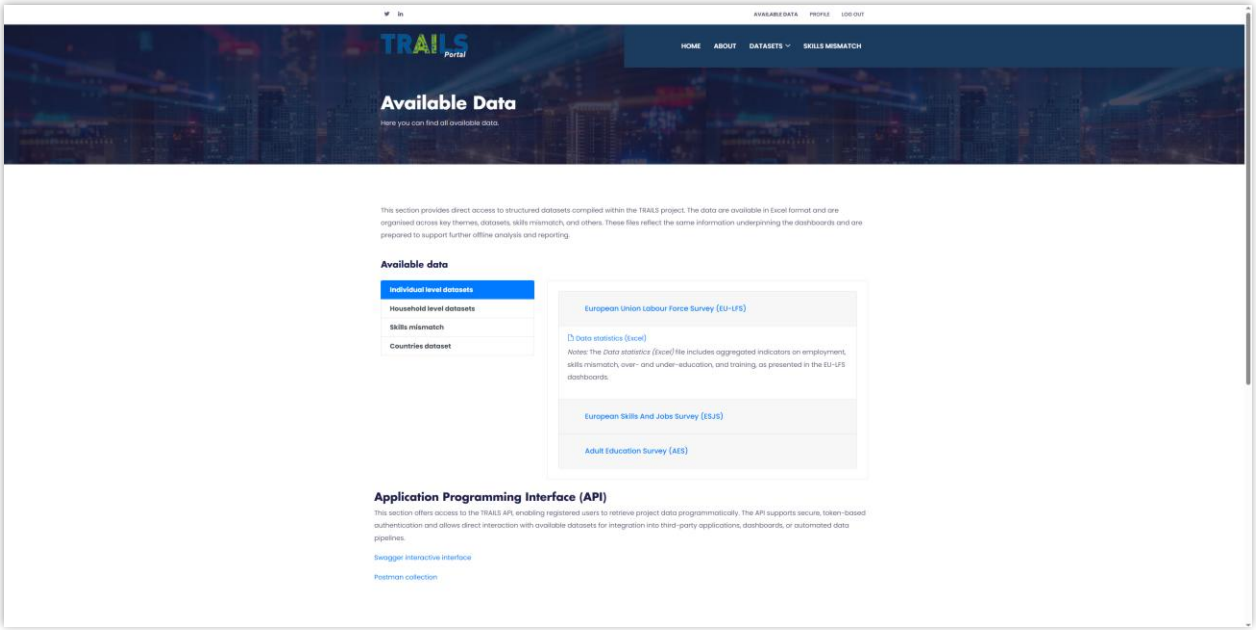

Figure 16: TRAILS portal Available data page (logged in)

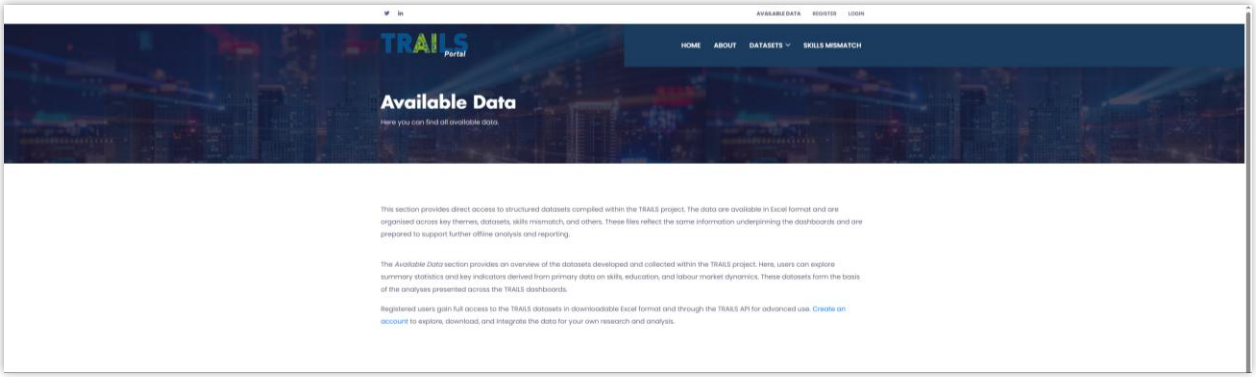

Figure 17: TRAILS portal Available data page (logged out)

4.2 DASHBOARDS

The following sections present the interactive dashboards developed by the TRAILS consortium to support data-driven insights into skills, education, and labour market dynamics across Europe. These dashboards provide visual representations of the datasets collected and processed within the project, allowing users to explore trends, compare indicators across countries and population groups, and extract valuable information on skills mismatches and employment patterns.

4.2.1 Datasets dashboards

This subsection presents the dashboards developed for each of the five core datasets integrated into the TRAILS portal: the European Union Labour Force Survey (EU-LFS) (EU labour force survey), the European Skills and Jobs Survey (ESJS) (European skills and jobs survey), the Adult Education Survey (AES) (Adult education survey), the Household Finance and Consumption Survey (HFCS) (Household Finance and Consumption Survey), and the European Union Statistics on Income and Living Conditions (EU-SILC) (EU statistics on income and living conditions). Each dashboard offers tailored visualisations and summary statistics that highlight key indicators relevant to skills, education, employment, and socioeconomic conditions.

Built with interactivity and usability in mind, the dashboards allow users to engage with the data dynamically. Users can apply filters across dimensions such as country, gender, age group, or income level, enabling the exploration of patterns and trends within specific population subgroups. Comparative views are supported to allow cross-country and cross-demographic comparisons, while drill-down capabilities enable users to move from aggregated indicators to more detailed breakdowns.

All data presented in this section, have been extensively presented and analysed in D2.1 “QUESTION I – Review and Analytics of the Core Secondary Datasets “, thus in the rest of the section we focus on the portal’s functionalities.

European Union Labour Force Survey (EU-LFS)

The EU-LFS dashboards on the TRAILS portal present a comprehensive view of the European Labour Force Survey data through a series of interactive visualisations. These dashboards are organised into thematic sections, offering rich insights into the dynamics of employment, skills mismatch, and training across EU countries, with breakdowns by gender, age, and income. Each dashboard allows users to interact with the data using filters and tabs to tailor their exploration by country, year, and population groups. Figure 18 provides an overview of the EU-LFS, explaining its purpose, structure, and relevance within the TRAILS project.

Figure 19 presents the EU-LFS Data and Frequencies dashboard. This dashboard presents an overview of the sample size collected through the EU-LFS in each participating country, over time. It includes data from both the Yearly and Quarterly EU-LFS datasets. Users can explore country-specific frequencies and examine trends in sample coverage across years. The dashboard combines bar charts and line plots to visualise sample evolution, enabling users to assess data consistency, identify periods of growth or decline, and understand the scale of national data contributions.

The dashboard in Figure 20, offers a detailed breakdown of the EU-LFS employed sample. It includes interactive pie charts and bar graphs to display the economic activity status of individuals (e.g. employed FT, employed PT, self-employed FT, self-employed PT, unemployed, inactive, etc.), both in unweighted and weighted terms. The second part presents disaggregated figures by country, enabling users to assess employment structures across national contexts. At the bottom, a comprehensive summary table displays key descriptive statistics from the yearly EU-LFS sample. Variables include gender, education, working hours, occupation, job search, and more, offering a foundational understanding of the dataset's composition.

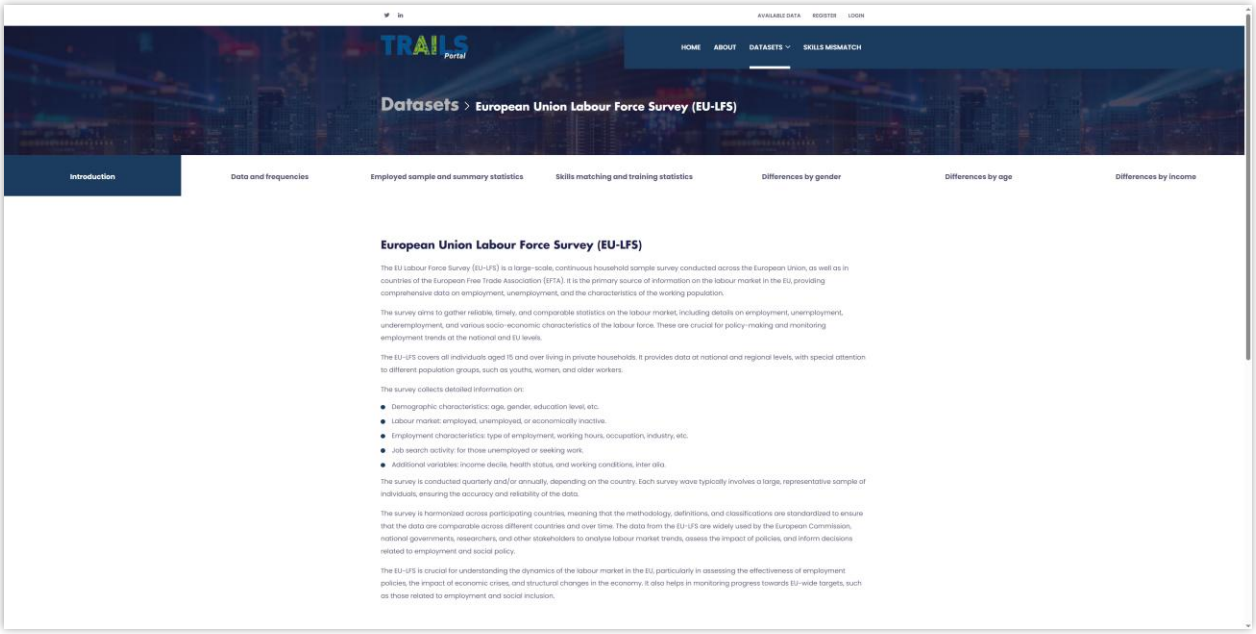

Figure 18: EU-LFS Dashboard (Introduction)

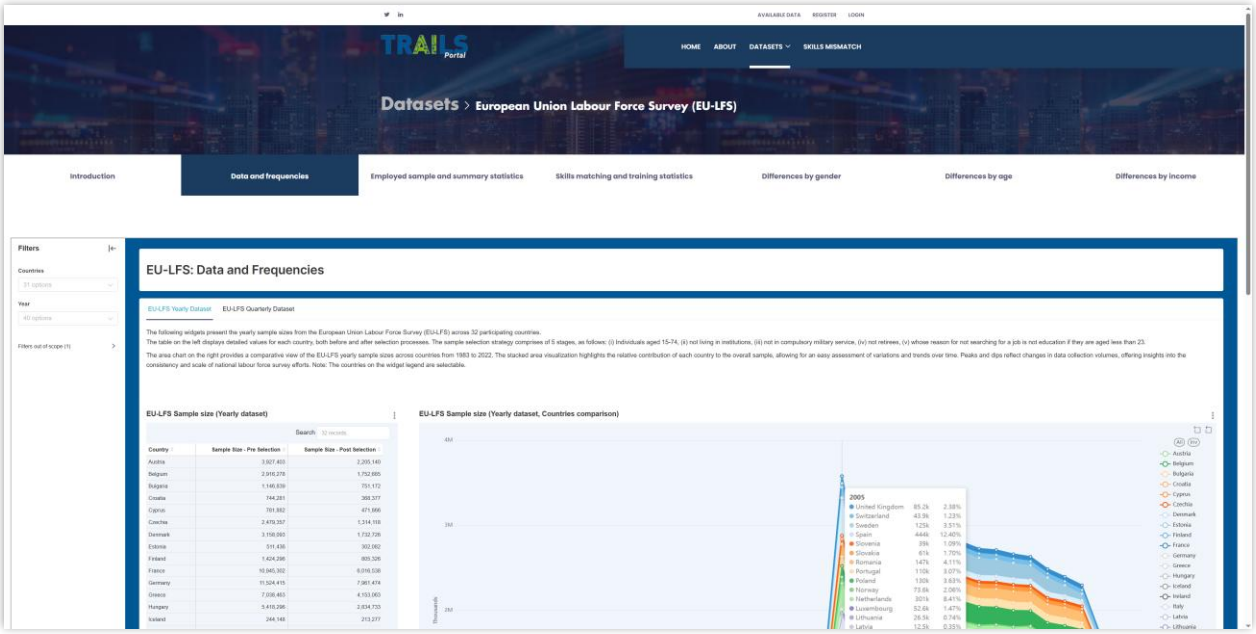

Figure 19: EU-LFS Dashboard (Data and Frequencies)

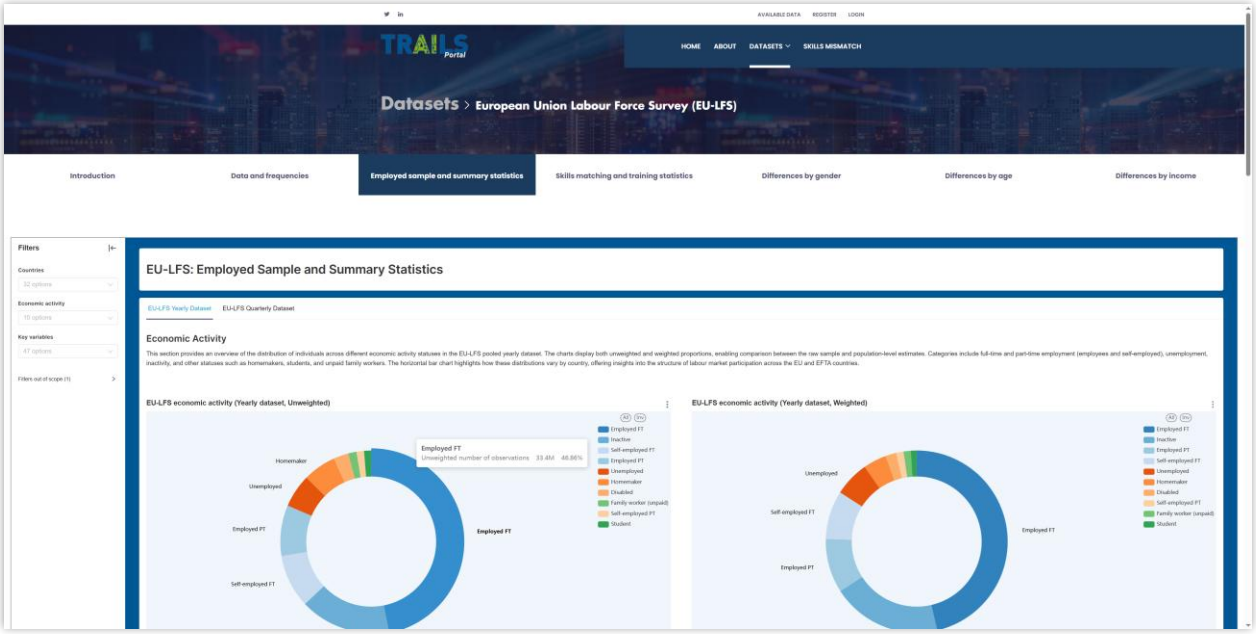

Figure 20: EU-LFS Dashboard (Employed sample and Summary Statistics)

Figure 21 explores skills matching indicators using EU-LFS data, presenting the distribution of matched, overeducated, and undereducated individuals by country. Three visualisations, a pie

chart, and two maps, offer an overview of skills matching status based on different definitions[2]. Additional charts examine changes over time, country-by-country employment rates, and differences in key variables. Training statistics are also visualised, showing participation rates in various training types (formal, informal job-related, and non-job-related) within the last four weeks. These visualisations help identify national differences in workforce development and mismatching across Europe.

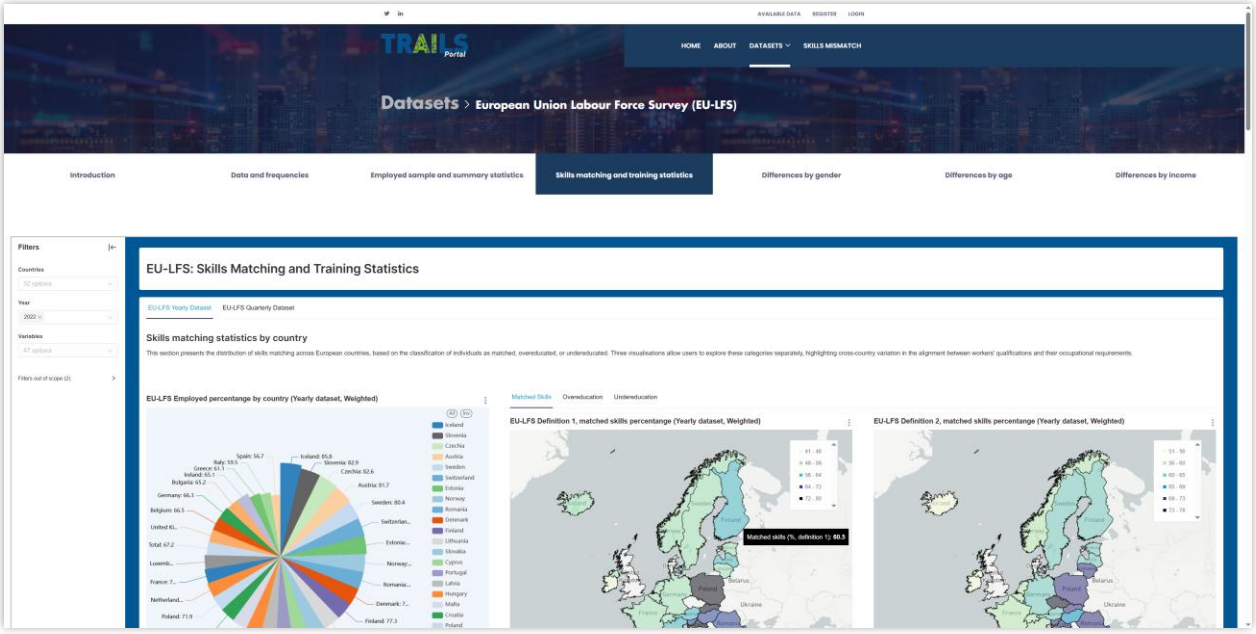

Figure 21: EU-LFS Dashboard (Skills Matching and Training Statistics)

The dashboard presented in Figure 22 investigates the gender-based differences across employment and education indicators. The top section features a colour-coded table showing gender gaps in employment, vertical mismatching, overeducation and undereducation by country. Below, a bar chart and a bubble chart compare gender differences in skills mismatch. Additional bar graphs show gender gaps in employment and training across countries and years, disaggregated by training type.

Following a similar format, the dashboard depicted in Figure 23, examines employment and education outcomes across different age cohorts and generations (Silent Generation, Baby Boomers, Gen X, Millennials, and Gen Z). A horizontal bar chart shows the generational composition of national workforces while additional visualisations present age-related gaps in employment, vertical mismatch, and training. The interactive charts highlight the challenges and strengths of different generations, for example, younger workers' higher training participation or older workers' lower undereducation rates.

[2] More details on "definitions" can be found in Deliverable D2.1

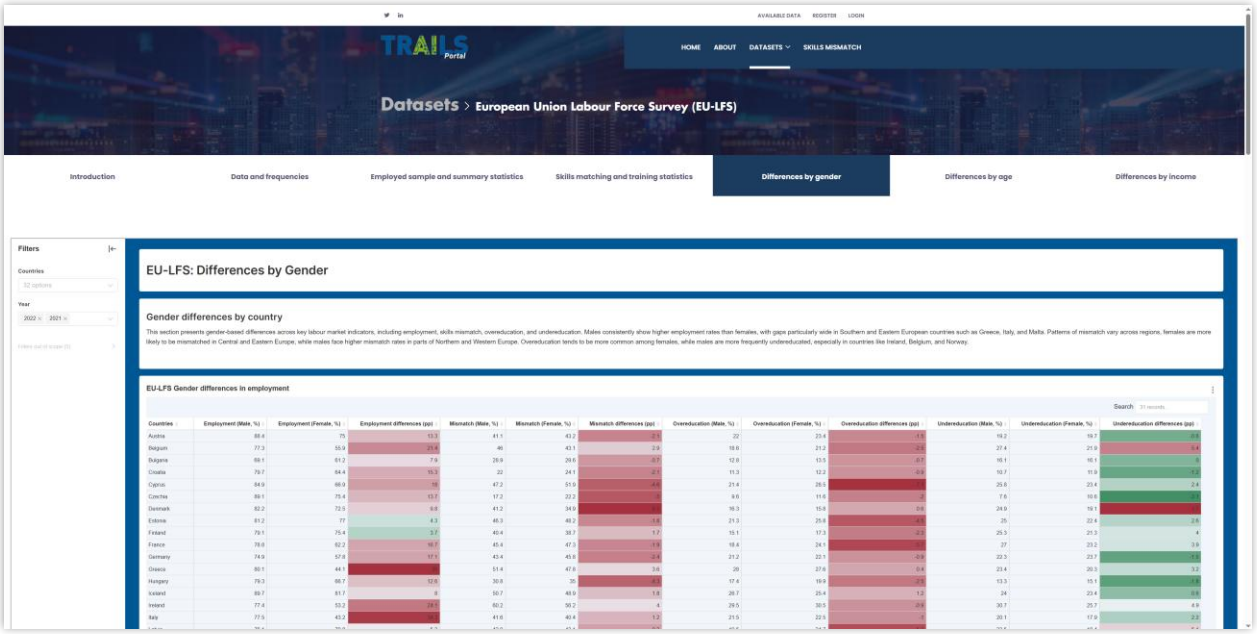

Figure 22: EU-LFS Dashboard (Differences by Gender)

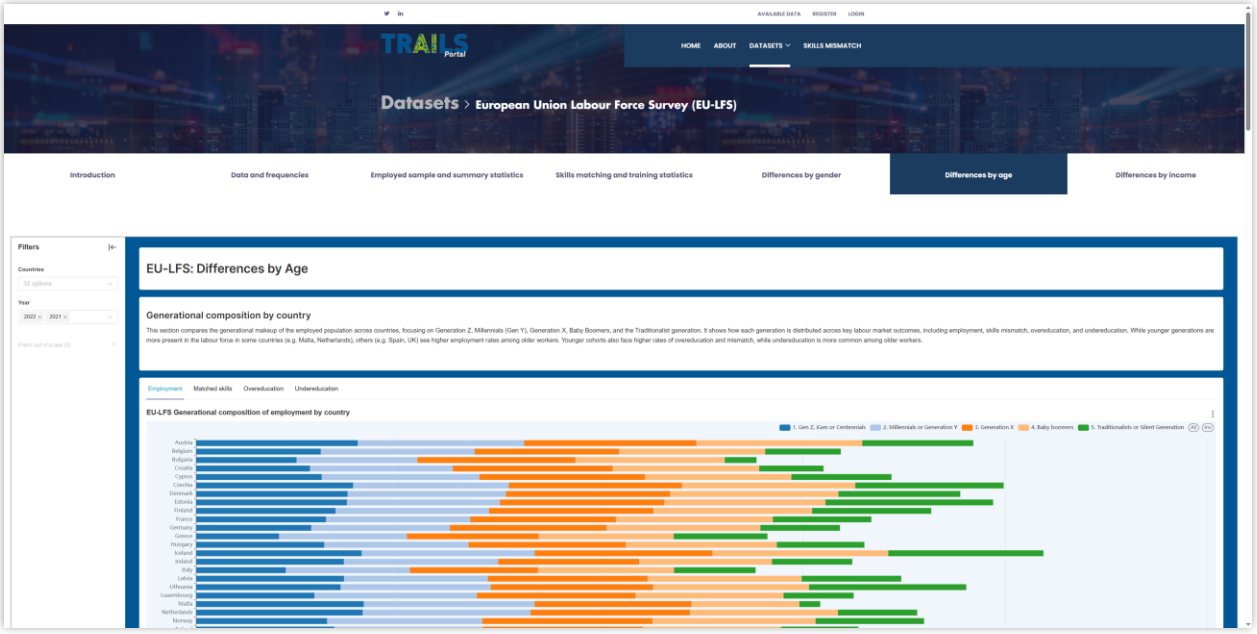

Figure 23: EU-LFS Dashboard (Differences by Age)

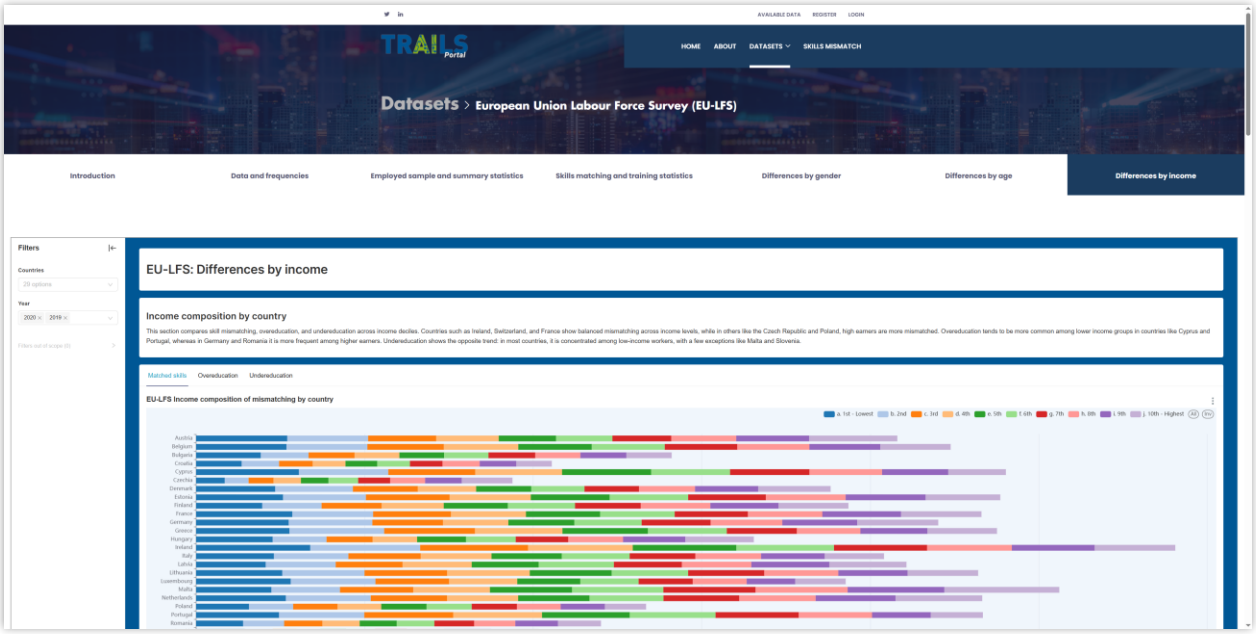

Figure 24: EU-LFS Dashboard (Differences by Income)

Finally, the dashboard in Figure 24, examines employment and mismatch differences across income deciles. The first section uses a stacked bar chart to visualise the skills mismatching composition by income group. A second chart presents country-specific gaps in employment, overeducation, undereducation, and matched status across income deciles. A bubble chart shows income-based differences in mismatch across countries, followed by a bar chart showing how these differences have evolved over time. Finally, an additional section visualises participation rates by income level.

European Skills and Jobs Survey (ESJS)

The introduction page of the European Skills and Jobs Survey dashboard, presents an overview of the dataset, as sourced from the European Centre for the Development of Vocational Training (CEDEFOP). The ESJS offers insights into the skill development, mismatch, and utilisation patterns across European labour markets. It highlights how individuals acquire and apply their skills over time, the extent of mismatch between qualifications and job requirements, and how training supports or fails to support workforce adaptability. The introductory section, presented in Figure 25, outlines the dataset's thematic scope, methodological design, and relevance for policy analysis.

The Employee Data and Summary Statistics dashboard (Figure 26), presents an overview of the composition of survey respondents across countries and survey years (2014 and 2021). The first visualisation shows the distribution of observations per country and wave, allowing users to assess the representativeness and data coverage. In addition, the lower section features two tables with descriptive statistics, displaying both unweighted and weighted values across a wide set of variables, including gender, education, contract type, occupation, and more.

Figure 25: ESJS Dashboard (Introduction)

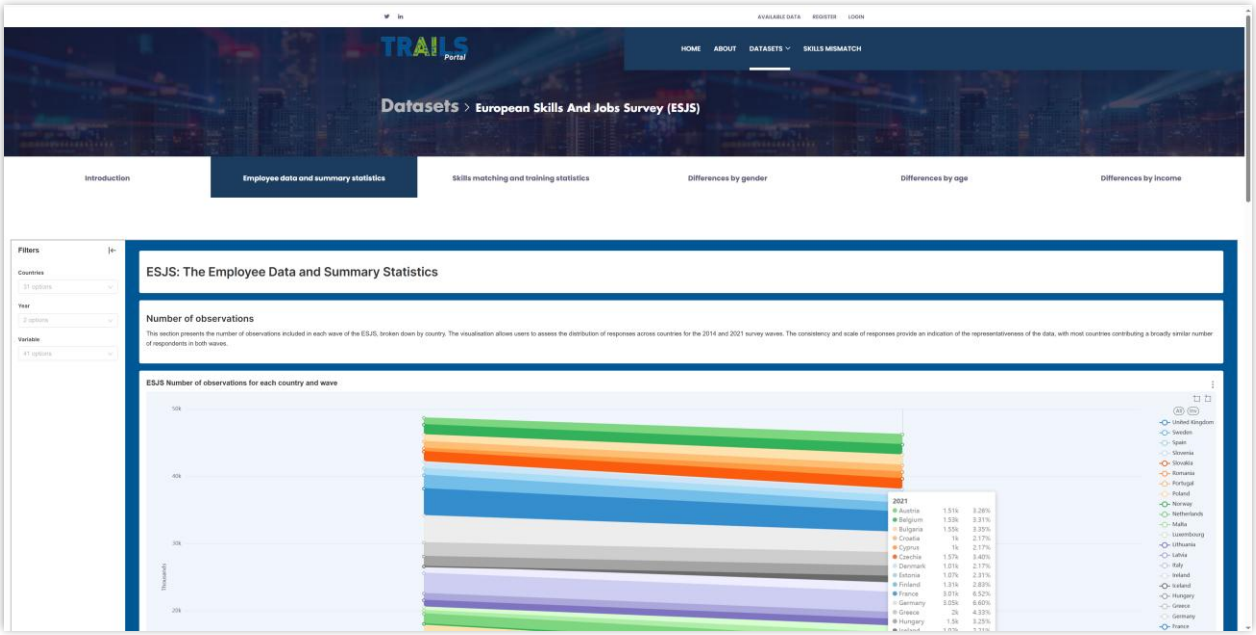

Figure 26: ESJS Dashboard (Employee Data and Summary Statistics)

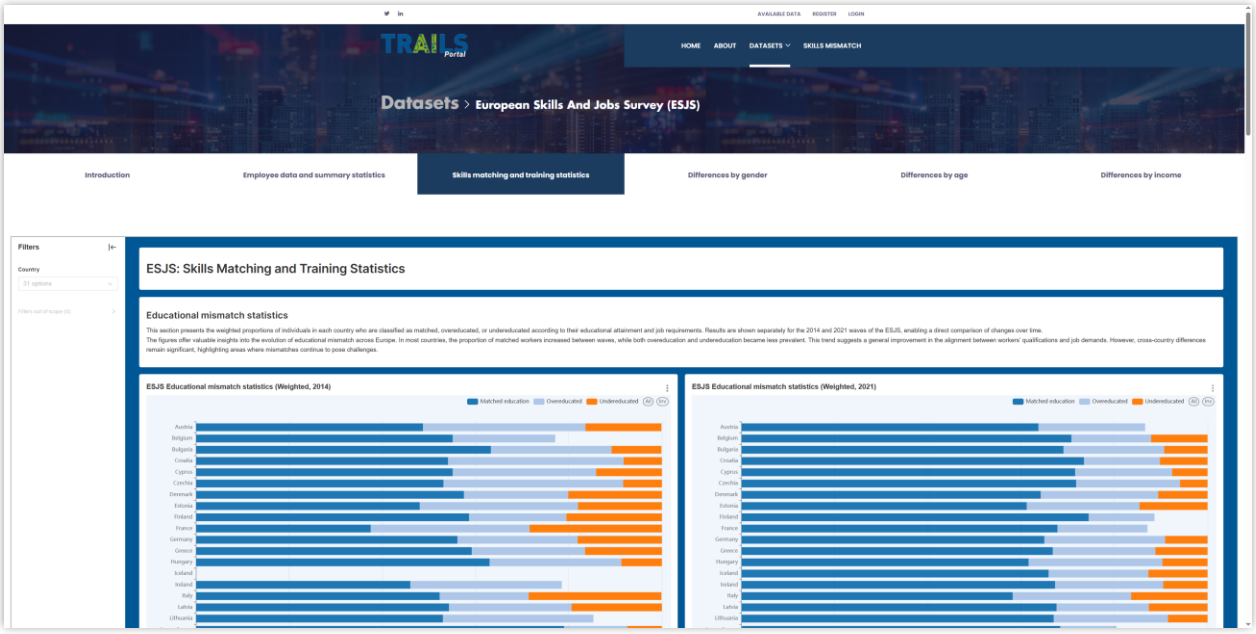

Figure 27: ESJS Dashboard (Skills Matching and Training Statistics)

This dashboard, presented in Figure 27, focuses on the educational mismatch and training participation among European workers, based on ESJS data from 2014 and 2021. The top section presents two stacked bar charts comparing the shares of matched, overeducated, and undereducated workers by country and year, while a summary statistics table follows, providing mismatch levels disaggregated by key variables such as gender, education, field of study, and occupation. The second half of the dashboard introduces the skills mismatch framework as measured in the 2021 wave. Below, three maps depict the extend of the vertical, horizontal, and skills mismatch by country, offering a spatial perspective on these challenges. The final visualisation presents VET qualifications by field of education and industry, showing the relationship between vocational qualifications and sectoral employment.

Figure 28 presents the Differences by Gender dashboard. This dashboard explores differences in educational mismatch and VET completion between male and female respondents across ESJS waves 2014 and 2021. The first two bar charts depict mismatch levels by gender, allowing users to compare trends over time and between subgroups. In details, the charts show the proportions of males and females who are overeducated, undereducated, or matched to their jobs. In addition, the section on VET completion by gender compares the proportion of men and women who hold vocational qualifications.

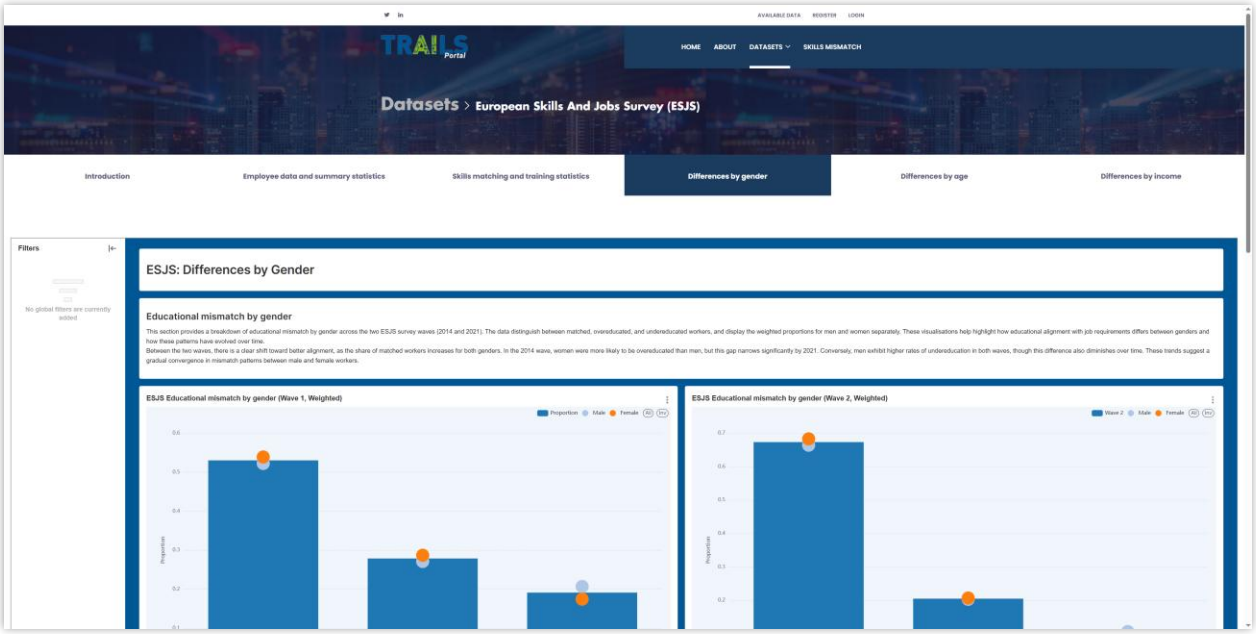

Figure 28: ESJS Dashboard (Differences by Gender)

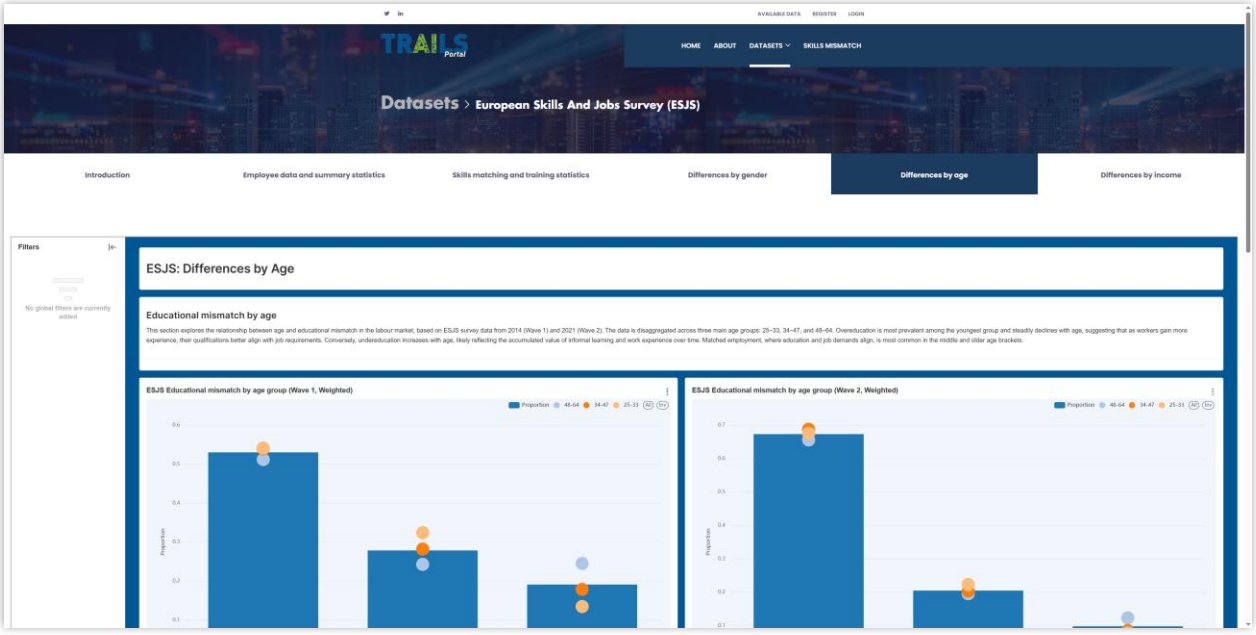

Figure 29: ESJS Dashboard (Differences by Age)

Very similarly to the previous dashboard, the dashboard presented in Figure 29, focuses on the generational differences. This dashboard disaggregates mismatch and training data by age groups. Users can compare the mismatch levels among younger workers (25-34), middle-aged (35-49), and older workers (50-64), observing trends such as greater overeducation in younger cohorts or

increased matching in experienced groups. Furthermore, the VET completion by age chart complements this analysis by showing the distribution of vocational education across age groups.

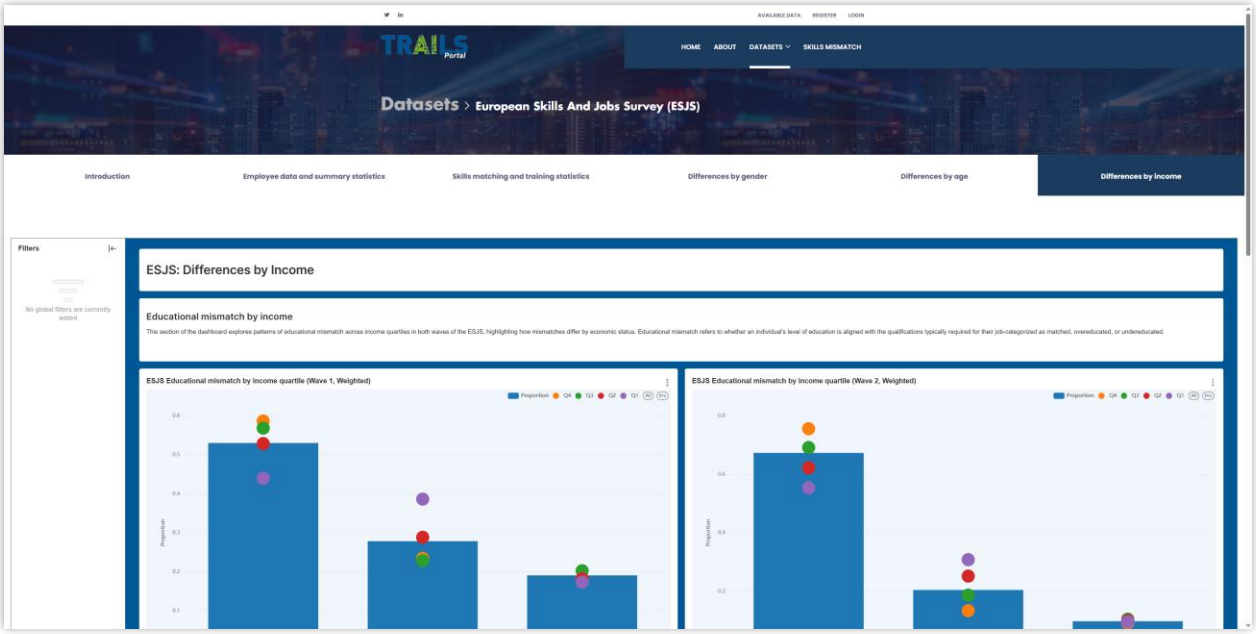

Figure 30: ESJS Dashboard (Differences by Income)

The last ESJS dashboard, presented in Figure 30, highlights how income levels relate to educational mismatch and vocational training. Respondents are categorised into income quartiles, allowing users to examine whether individuals in higher or lower income groups are more likely to experience overeducation or undereducation. At the top of the dashboard, two main bar charts present mismatch levels by income quartile across both survey waves, while in the VET completion by income quartile, the dashboard visualises the percentage of vocational education by income quartile.

Adult Education Survey (AES)

The AES dashboards present the key findings from the Adult Education Survey, an EU-wide data collection effort focusing on participation in lifelong learning. The introductory section, presented in Figure 31, offers an overview of the survey's scope and methodology, highlighting the types of education and training activities it covers, including formal, non-formal, and informal learning. The text outlines the key variables collected, such as motivation for participation, barriers to access, employer support, and financing of adult learning. Users are also informed about the survey's evolution across waves.

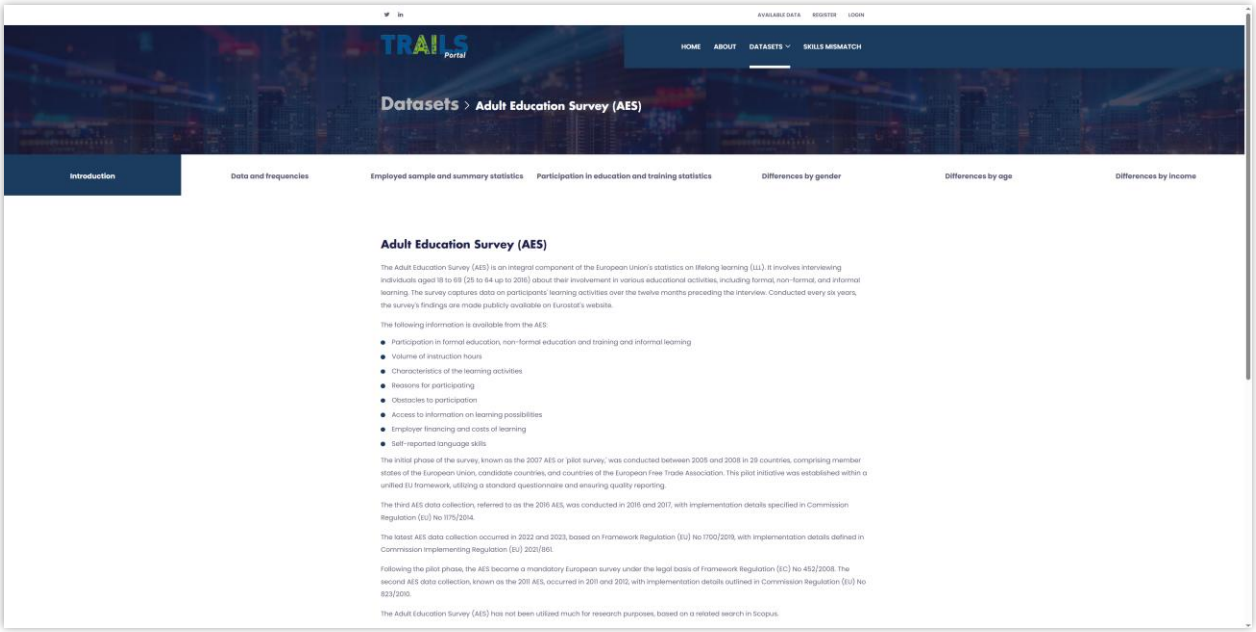

Figure 31: AES Dashboard (Introduction)

The "Data and Frequencies" dashboard, presented in Figure 32, provides an overview of the AES sample structure across the available survey years (2007, 2011, 2016, and 2022). On the left, a table displays the number of observations by country, allowing the users to assess the extent of representation across participating countries. The interactive chart on the right enables visual comparison of sample sizes over time, revealing changes in data coverage and providing insights into country-level trends in participation.

The dashboard presented in Figure 33, offers insights into the economic activity status of AES respondents. Pie charts illustrate the distribution of employment categories across the sample, including employed, unemployed, and inactive individuals. These charts are presented both unweighted and weighted, allowing users to explore raw data and its adjusted representation. Below, two bar charts disaggregate economic activity by survey wave, helping users detect shifts in labour market participation over time. Finally, the detailed tables provide summary statistics for key variables such as hours of education, employer support, and barriers to training.

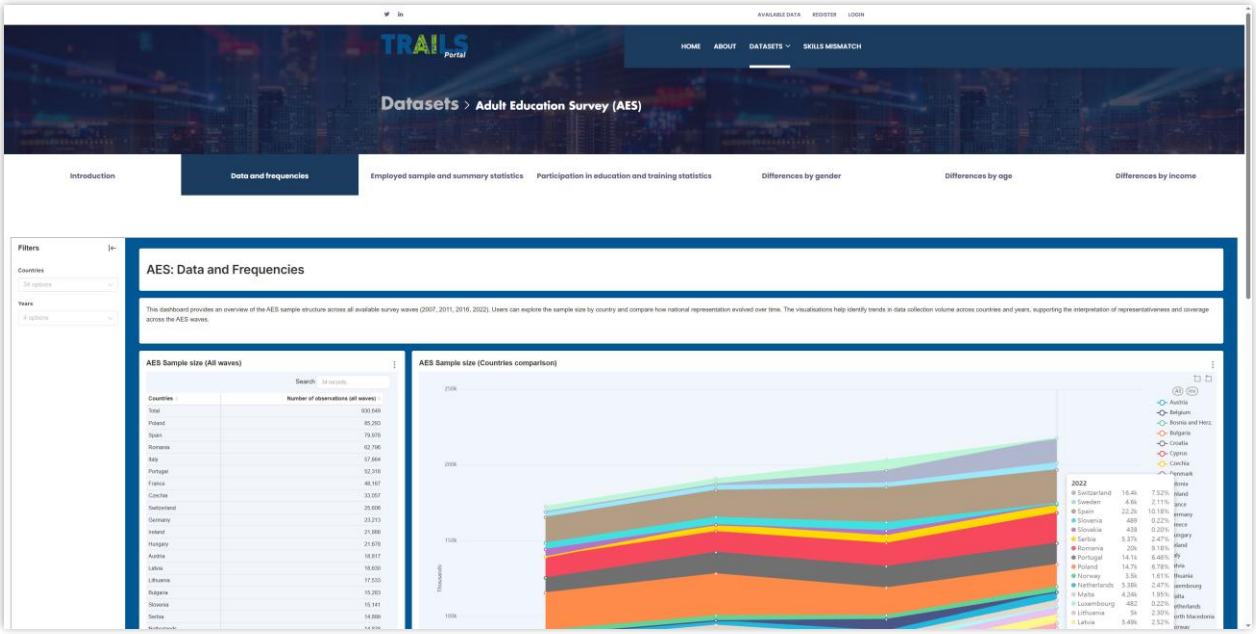

Figure 32: AES Dashboard (Data and Frequencies)

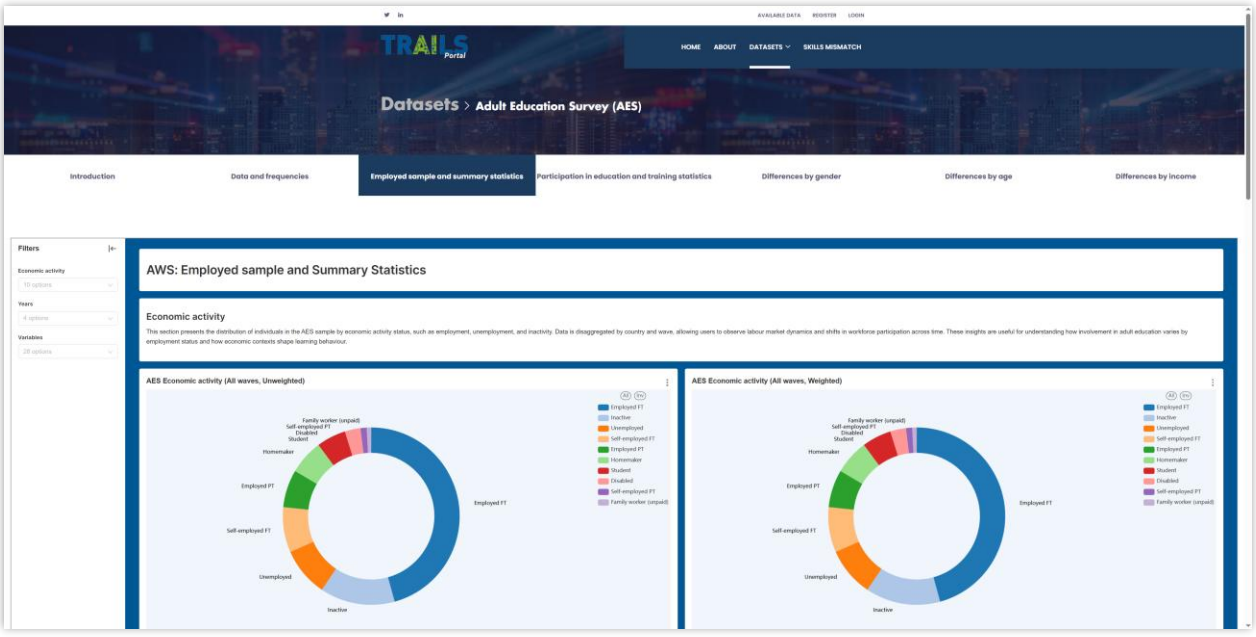

Figure 33: AES Dashboard (Employed Sample and Summary Statistics)

The "Participation in Education and Training Statistics" dashboard (Figure 34), focuses on the participation rates in education and training activities, broken down by country, wave, and type of learning (formal, non-formal, and informal). In addition, three maps show spatial variation across Europe in the latest available data, while horizontal bar charts present a country-level comparison

of participation rates. At the bottom, the summary statistics by education status are provided in a table format, helping researchers and policymakers understand how participation correlates with demographic and socio-economic variables.

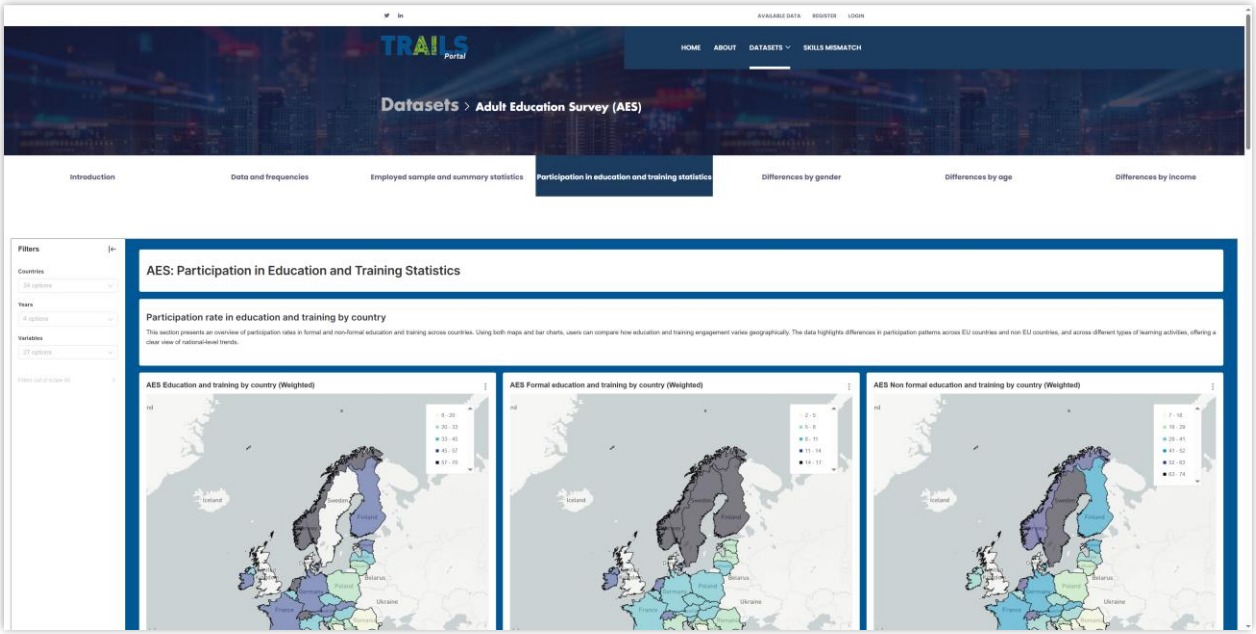

Figure 34: AES Dashboard (Participation in Education and Training Statistics)

The next dashboard, presented in Figure 35, explores the gender-based disparities in adult learning participation. A map provides a country-by-country breakdown of gender differences across education and training types. The additional chart shows the gender gap in participation, with filters allowing users to select specific categories of learning. Below, the bar charts illustrate how gender gaps have evolved over survey waves, highlighting where differences have widened or narrowed.

Very similarly, the "Differences by Age" dashboard (Figure 36) investigates disparities between younger and older adults in their participation in learning. Countries are compared in a map showing differences between the two age groups (younger vs. older), while a bar and bubble chart visualizes these differences for formal, non-formal, and overall education and training. The final section of the dashboard presents trends over time and across survey waves, enabling an assessment of whether generational gaps in learning participation are narrowing or widening.

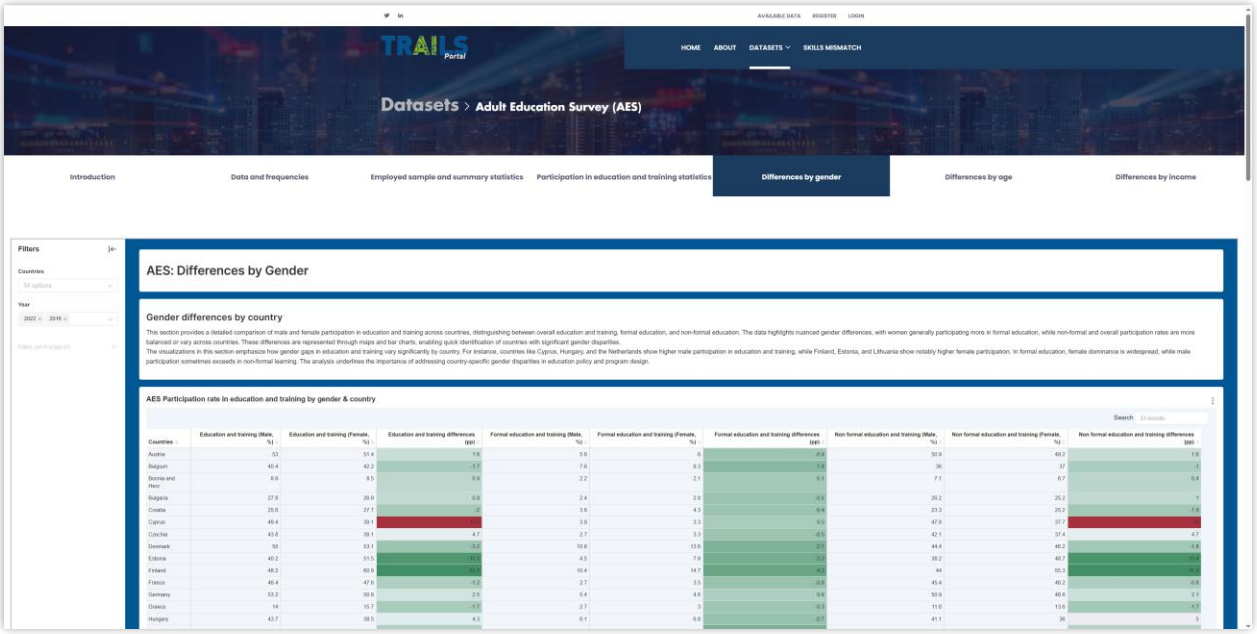

Figure 35: AES Dashboard (Differences by Gender)

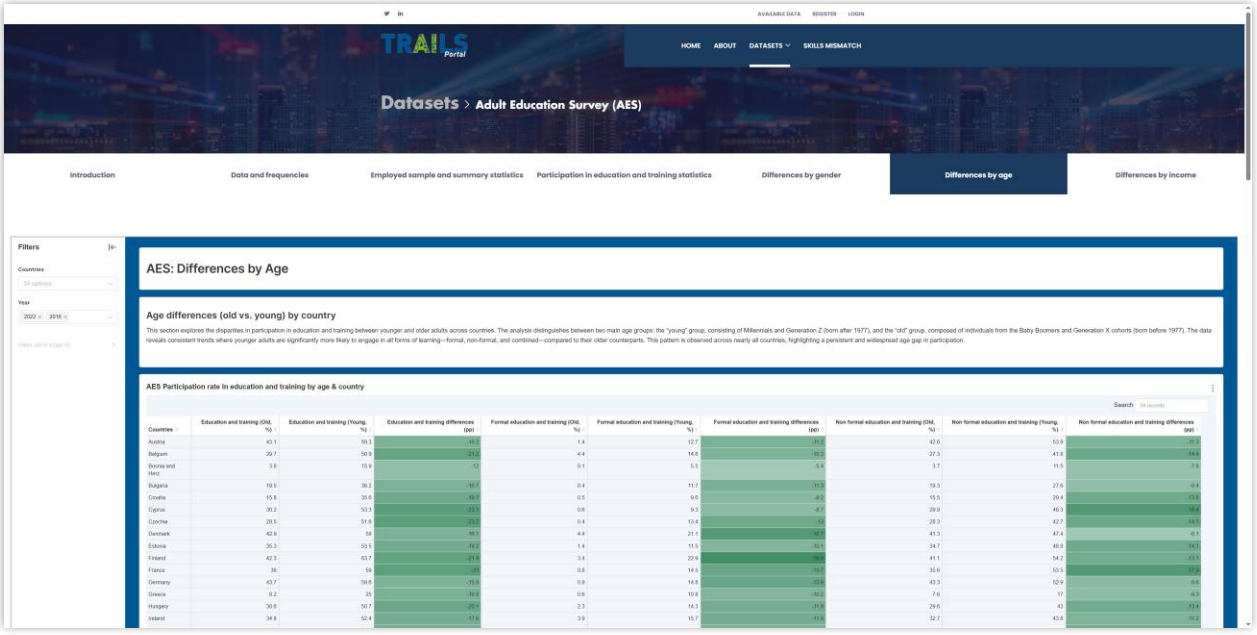

Figure 36: AES Dashboard (Differences by Age)

This final dashboard in Figure 37 analyses the income-based inequalities in education and training participation. A map highlights differences across countries, while the accompanying bar plot visualizes these differences at the EU level. Users can also track how income disparities in participation have evolved across survey waves.

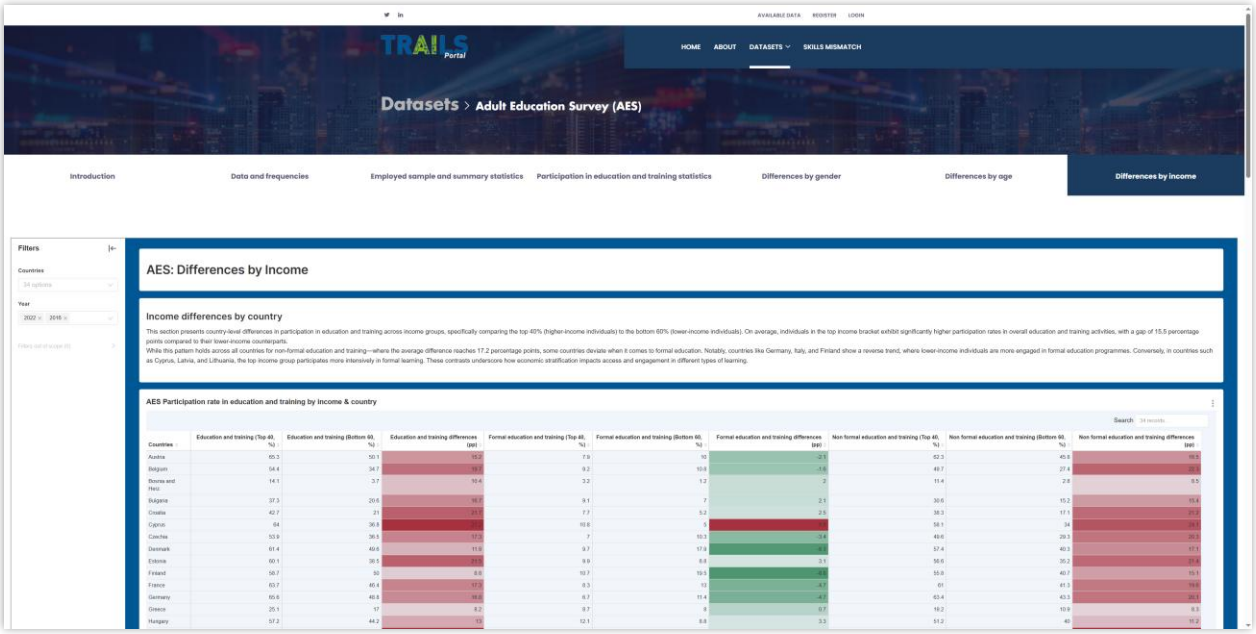

Figure 37: AES Dashboard (Differences by Income)

European Union Statistics on Income and Living Conditions (EU-SILC)

The SILC dataset is a key instrument for monitoring social inclusion and living standards across the European Union. It provides harmonised microdata on income, poverty, material deprivation, and access to key services. The dashboards developed for the SILC dataset in the TRAILS portal offer a broad analytical toolkit to visualise and interpret key trends across countries and population groups. Through the SILC dashboards, users can explore extensive data on household structures, employment patterns, education levels, and various dimensions of skills mismatch. The dashboards are organised across multiple thematic tabs, including sample structure, employment characteristics, skills matching, and disaggregations by gender, age, and income.

Figure 38 presents the introduction page of the SILC dashboard. It introduces the purpose and scope of the SILC dataset, outlining the core domains covered such as income, employment, material deprivation, housing conditions, and social exclusion while also explaining how the SILC survey contributes to policy development and EU monitoring frameworks.

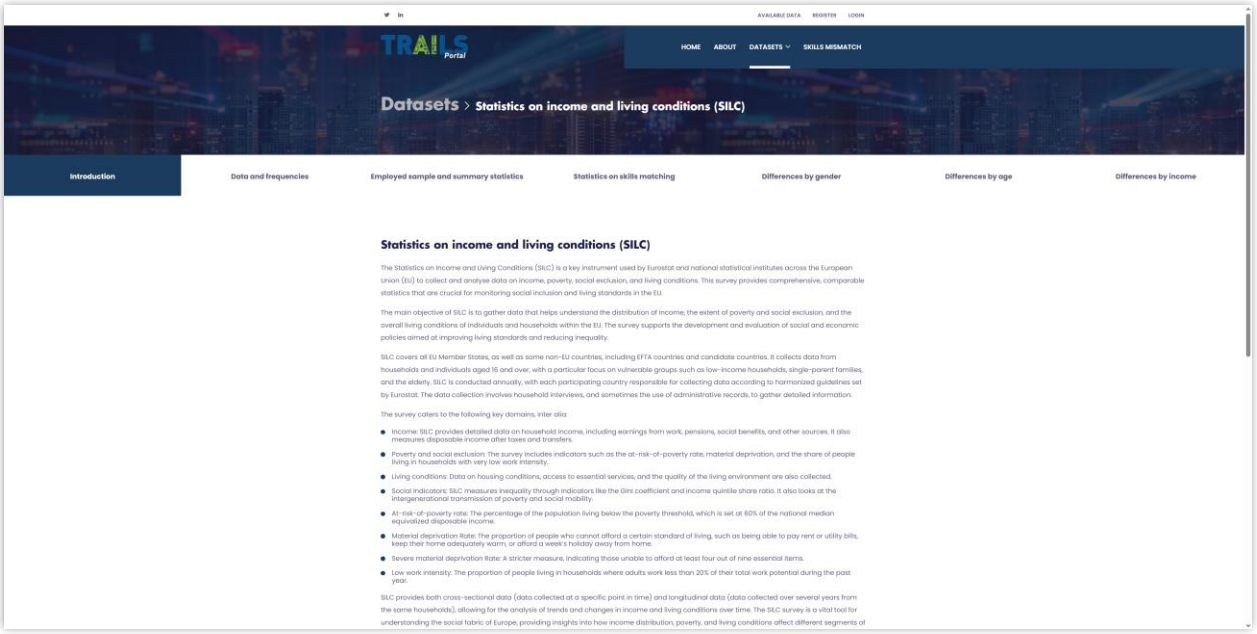

Figure 38: SILC Dashboard (Introduction)

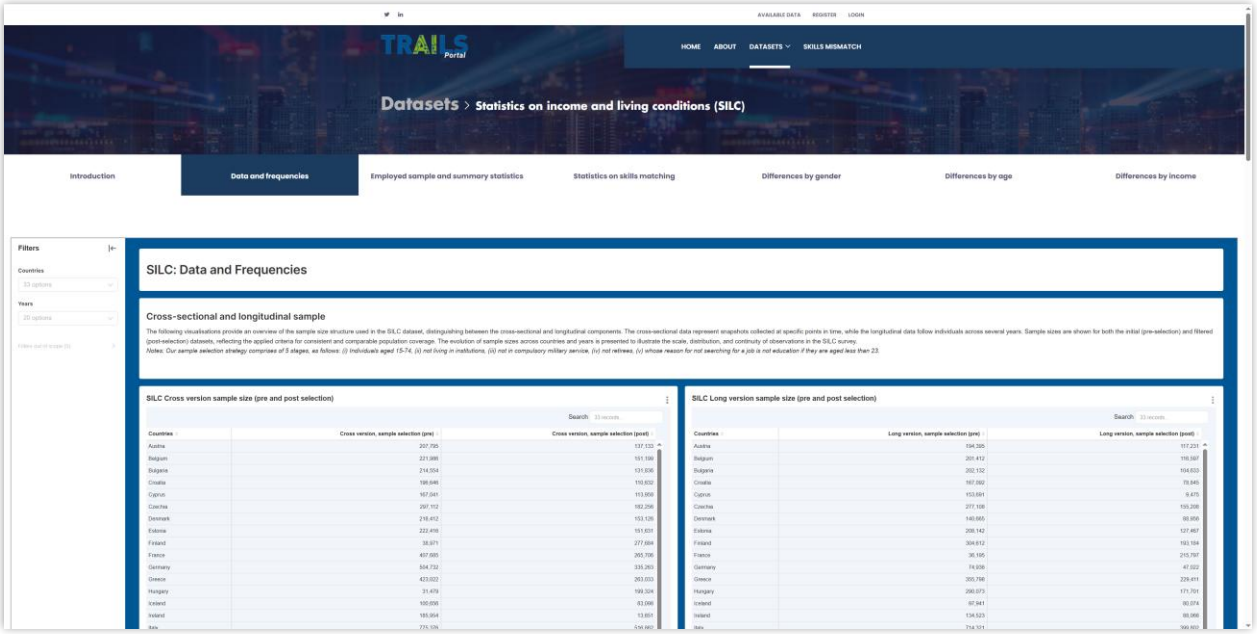

Figure 39: SILC Dashboard (Data and Frequencies)

The “Data and Frequencies” dashboard (Figure 39), presents the structure of the SILC dataset by providing information on the number of observations across countries and years, distinguishing between the cross-sectional and longitudinal (panel) versions. Users can view the total sample size of individuals and households, assess country coverage, and evaluate panel rotation structures. In addition, interactive visualisations allow for comparisons over time and between survey versions.

The dashboard presented in Figure 40 focuses on the characteristics of employed individuals within the SILC dataset It shows the distribution of economic activity status (e.g., employed full-time, employed part-time, self-employed full-time, self-employed part-time, unemployed, etc.) disaggregated by country and survey version (cross-sectional or panel). Users can also examine weighted and unweighted statistics, and compare sample means across a wide range of variables. Two summary tables display values for both the full and employed sample, helping users understand employment trends and their relationship to demographic and socioeconomic factors.

The skills matching dashboard (Figure 41) explores the employment matches and mismatches based on educational attainment and job requirements. It includes a breakdown by matching status (matched, undereducated, and overeducated) and enables comparisons across countries, years, and the SILC versions (cross sectional and panel). The visualisations include maps and bar charts that show regional patterns and differences in mismatch prevalence. A summary table quantifies the average values of selected variables by matching status, allowing users to assess the impact of mismatches on indicators such as income, employment stability, and living conditions.

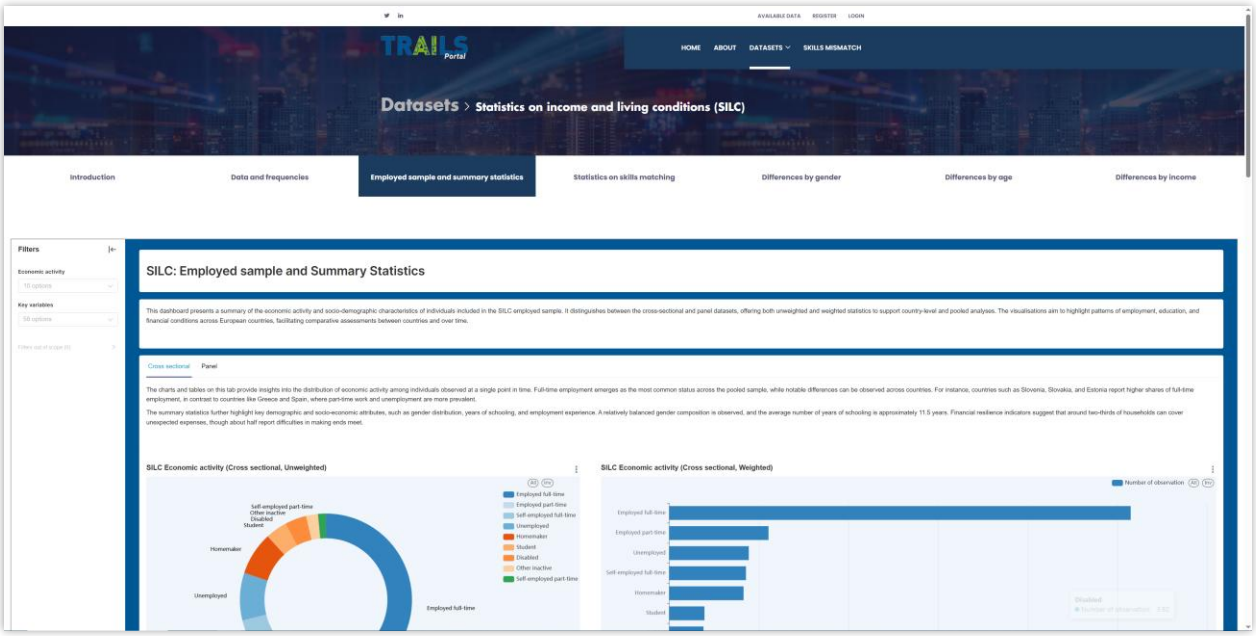

Figure 40: SILC Dashboard (Employed Sample and Summary Statistics)

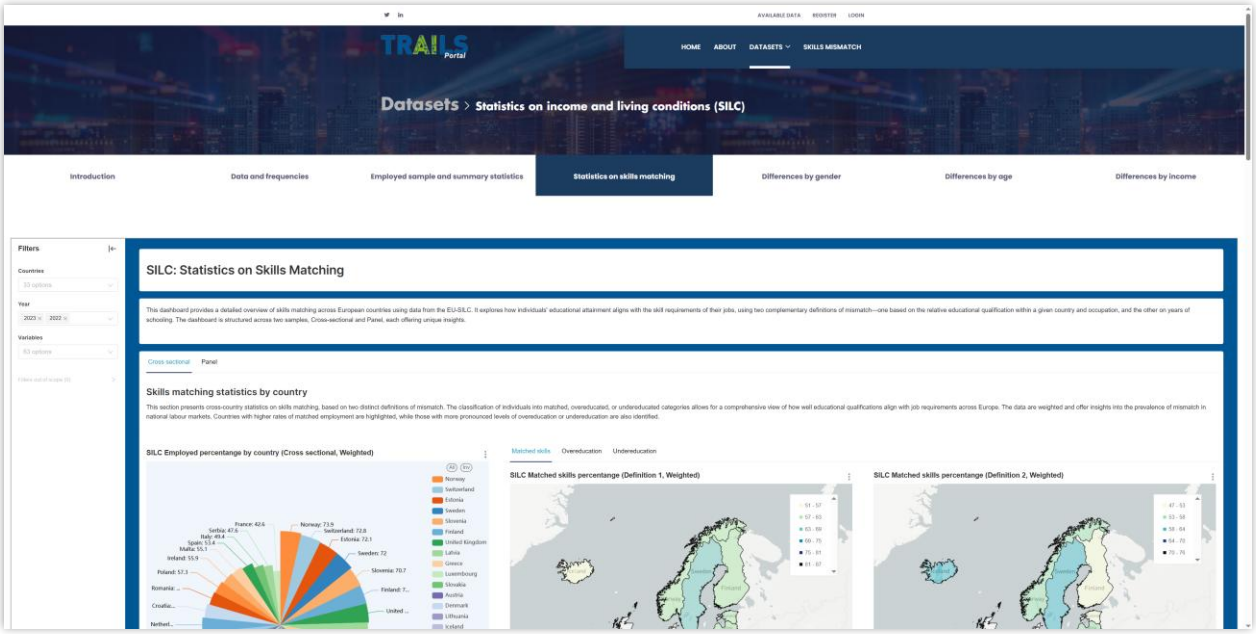

Figure 41: SILC Dashboard (Statistics on Skills Matching)

The following dashboard, presented in Figure 42, compares employment and skills matching patterns between male and female respondents. It presents gender gaps across various domains, including employment rates, skills mismatch, and over/under education, and visualises them using both bar charts and maps. Differences are shown by country and can be tracked over time using a multi-wave comparison.

Similarly, the "Differences by Age" dashboard in Figure 43 investigates the generational differences in employment and mismatch rates. It includes a detailed breakdown of employment composition by age groups (e.g. Generation Z, Millennials, Generation X, Baby Boomers), showing how each cohort contributes to the workforce and experiences mismatches. Additional tables and charts compare younger and older individuals in terms of mismatch status, employment levels, and labour market participation, highlighting intergenerational trends.

The final dashboard (Figure 44) analyses the skills mismatch and participation in relation to income groups, such as income deciles. Users can explore how skills matching varies across the income distribution, often highlighting the disadvantages experienced by lower-income groups in accessing stable or well-matched jobs.

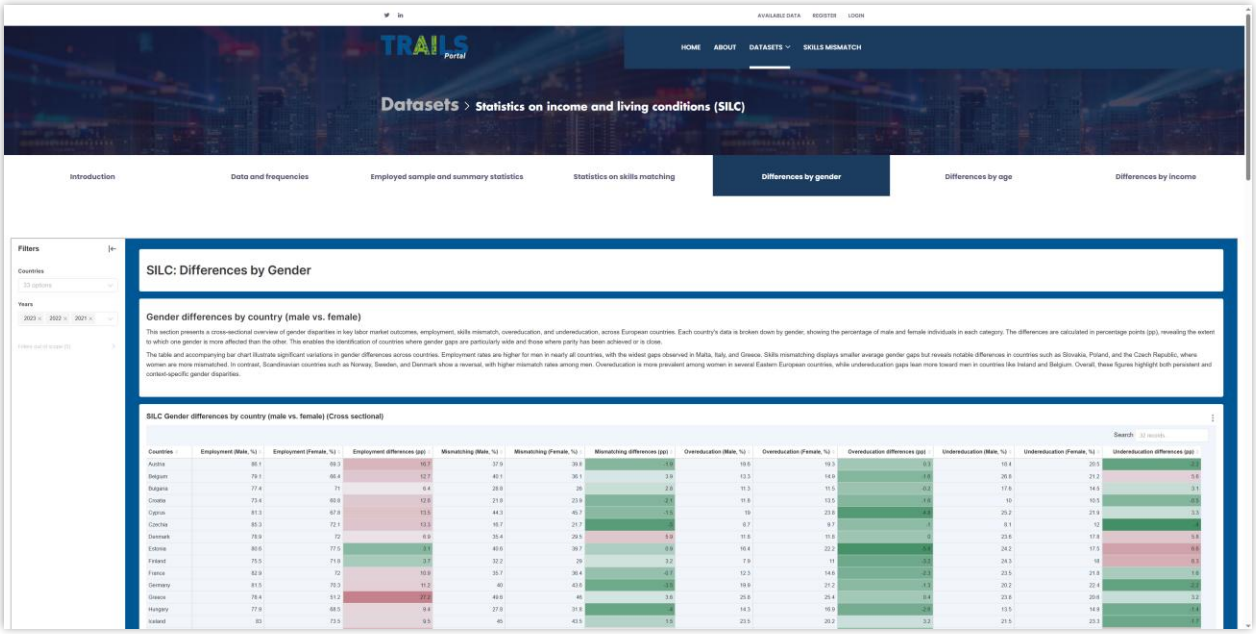

Figure 42: SILC Dashboard (Differences by Gender)

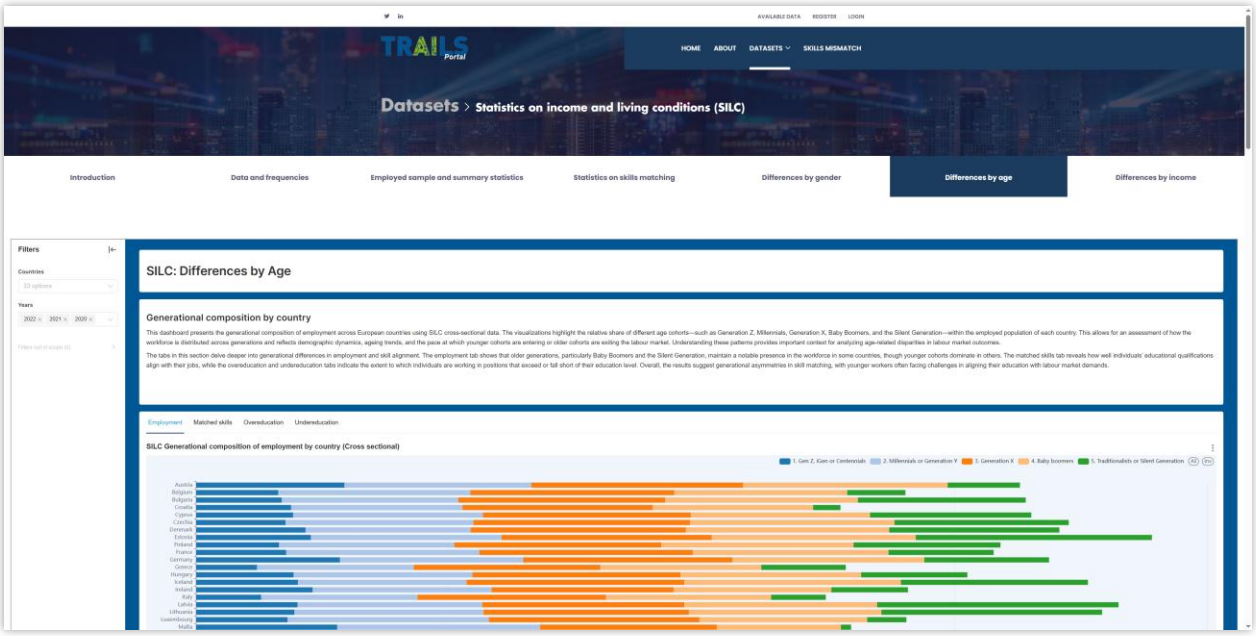

Figure 43: SILC Dashboard (Differences by Age)

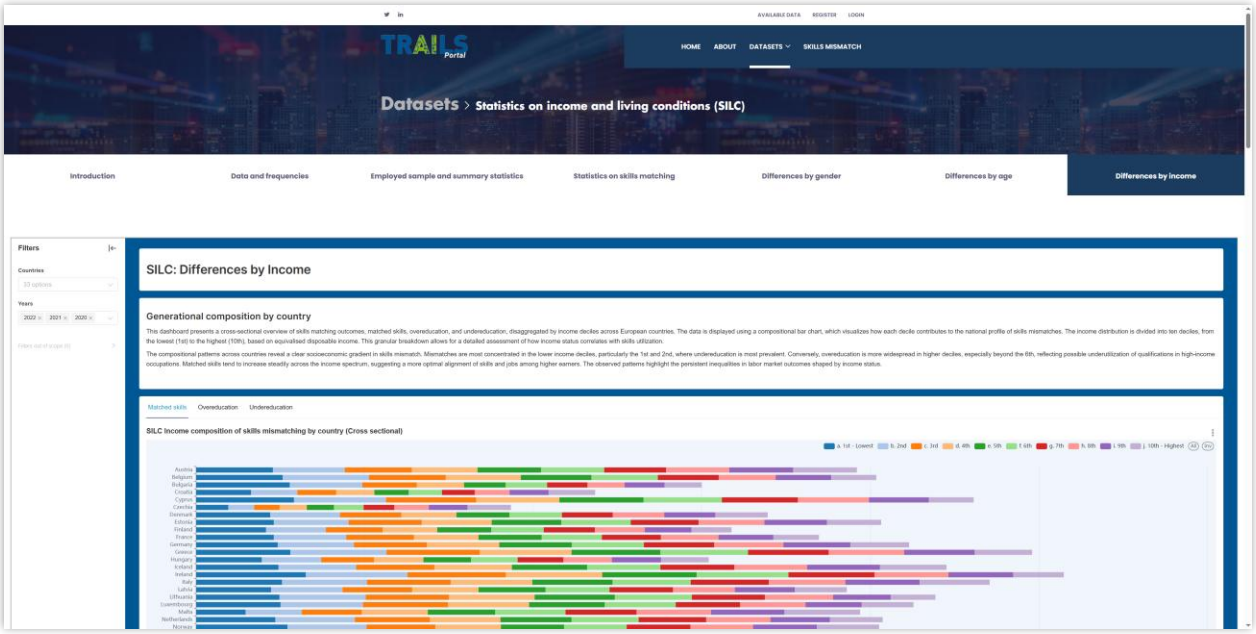

Figure 44: SILC Dashboard (Differences by Income)

Household Finance and Consumption Survey (HFCS)

The HFCS is a comprehensive dataset coordinated by the European Central Bank (ECB), offering detailed insights into the financial behaviour and conditions of households across European countries. The HFCS covers wealth, income, consumption, debt, and key household demographics, serving as a crucial tool for understanding the economic well-being of households and informing monetary policy and financial stability assessments.

The introductory page presented in Figure 45 provides an overview of the HFCS, including a breakdown of the main topics covered in the dataset: assets, liabilities, consumption, income, and pensions, as well as demographic characteristics. It also highlights the relevance of the HFCS for analysing household resilience, financial security, and intergenerational transmission of wealth.

The "Data and Frequencies" dashboard (Figure 46) tab provides a comprehensive view of the HFCS pooled and panel sample structures across four survey waves (2010, 2014, 2017, 2021). It displays key statistics including the number of observations and individuals per country, both before and after applying sample selection filters. The Pooled Sample section includes a summary table for each country, showing the raw and filtered number of observations and individuals, while the Panel Sample section explores the repeated participation of households across survey waves. A bar chart compares the number of observations across countries and waves, highlighting longitudinal components in the dataset.

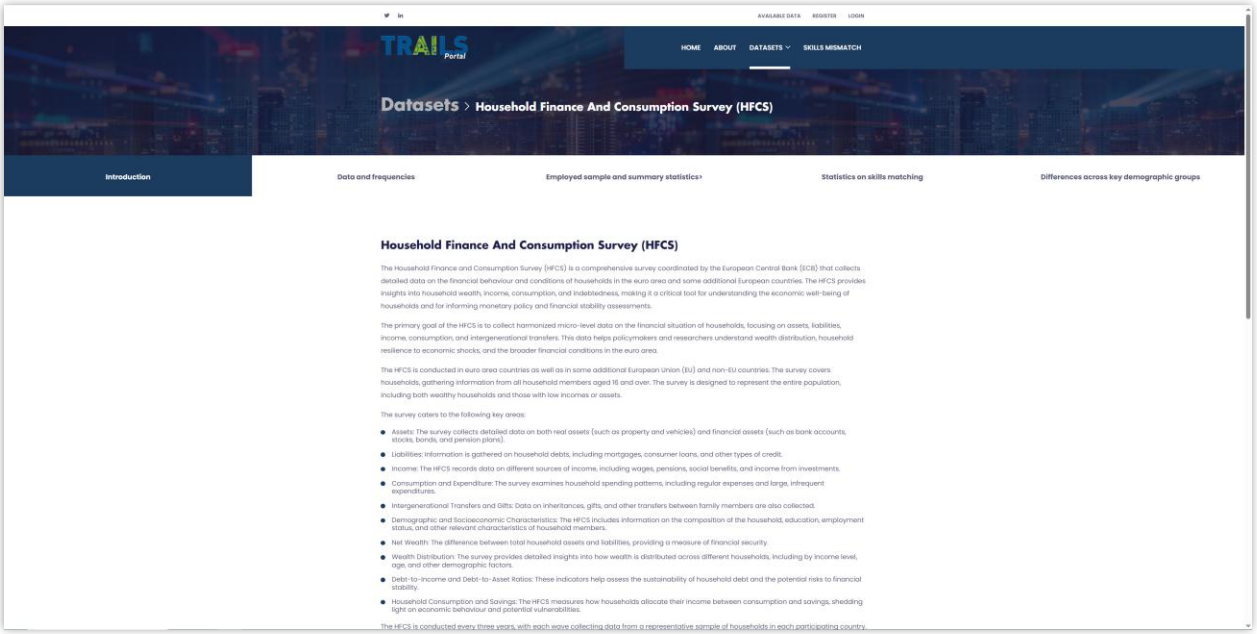

Figure 45: HFCS Dashboard (Introduction)

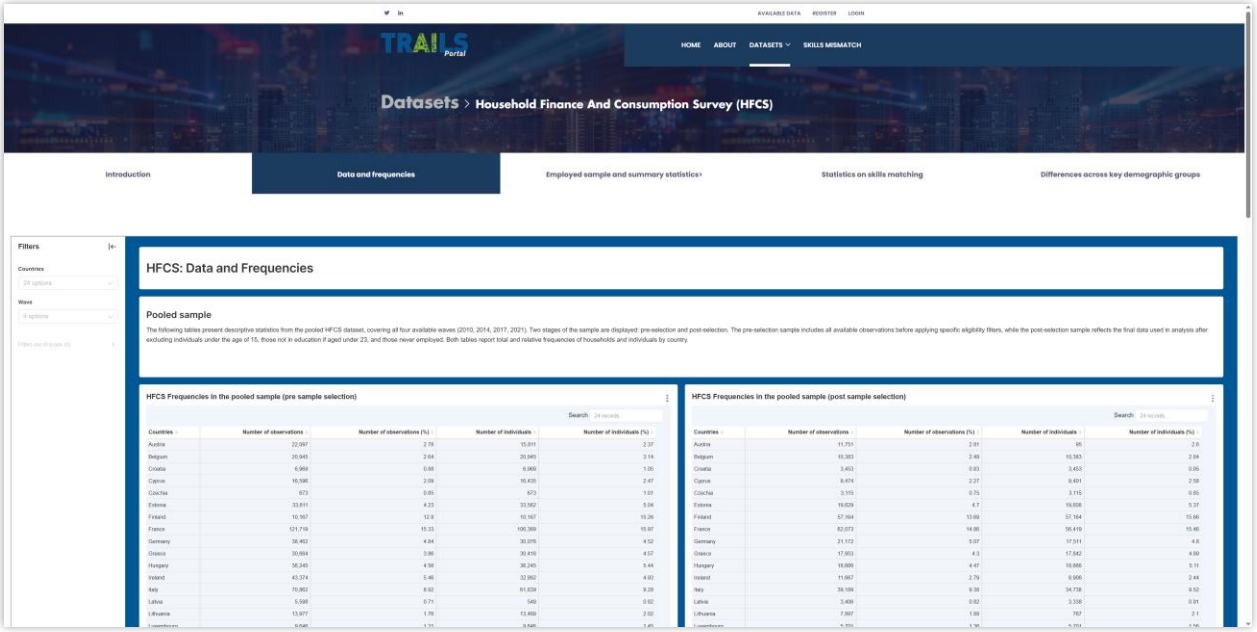

Figure 46: HFCS Dashboard (Data and Frequencies)

The dashboard in Figure 47, focuses on the employment situation of household members in the HFCS sample. It presents the distribution of economic activity categories such as full-time employment, self-employment, unemployment, and retirement, using both pie charts and bar charts. Visualisations are disaggregated by country and survey wave, enabling users to explore how employment status varies across countries and time.

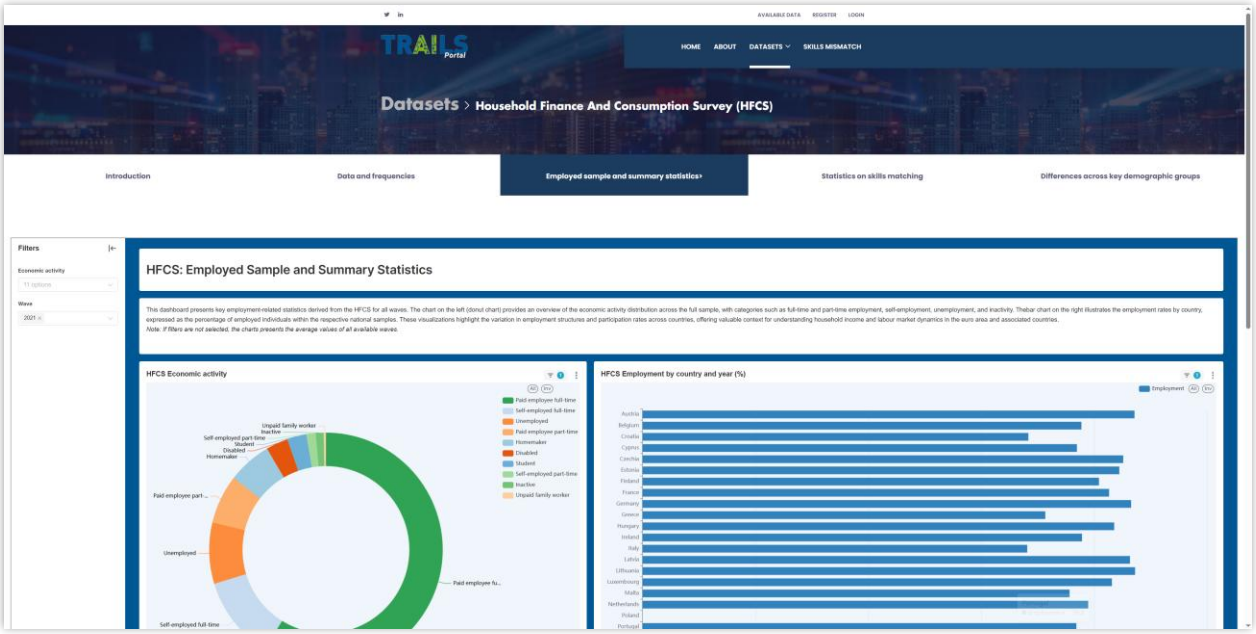

Figure 47: HFCS Dashboard (Employed Sample and Summary Statistics)

The following dashboard (Figure 48) presents information on skills matching based on the HFCS data. Specifically, it examines the alignment between individuals' educational qualifications and the skill requirements of their jobs. Skills mismatch is categorised into three groups: matched, overeducated, and undereducated. In the first case, a bar chart shows the proportion of mismatched individuals by country and year, helping identify trends and country-specific patterns. Users can switch between tabs to visualise different mismatch types.

The final dashboard, presented in Figure 49, provides comparative statistics on skills mismatch, employment, and undereducation rates across key demographic dimensions: gender, age, income, and wealth. The charts visualise the extent of differences between demographic subgroups. For example, the gender tab, displays skills mismatch gaps between males and females for each country. The rest tabs allow users to compare results by age groups (old-young), income (high-paid – low-paid), and wealth (wealth-rich – wealth-poor), offering a multi-faceted view of labour market inequalities.

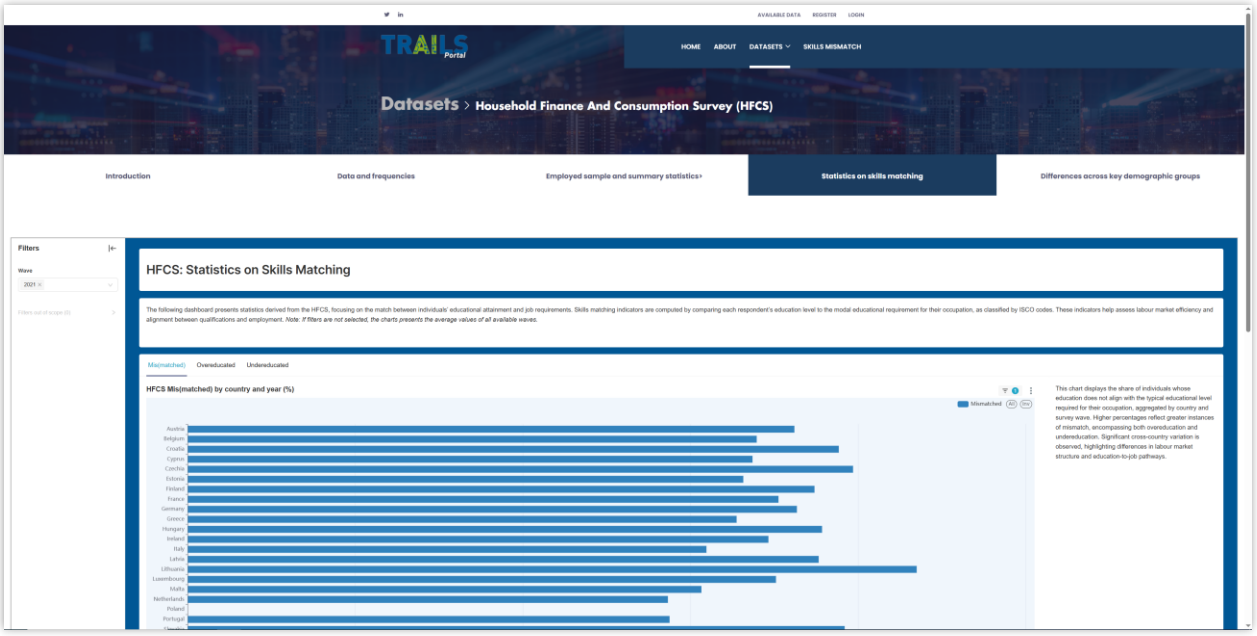

Figure 48: HFCS Dashboard (Statistics on Skills Matching)

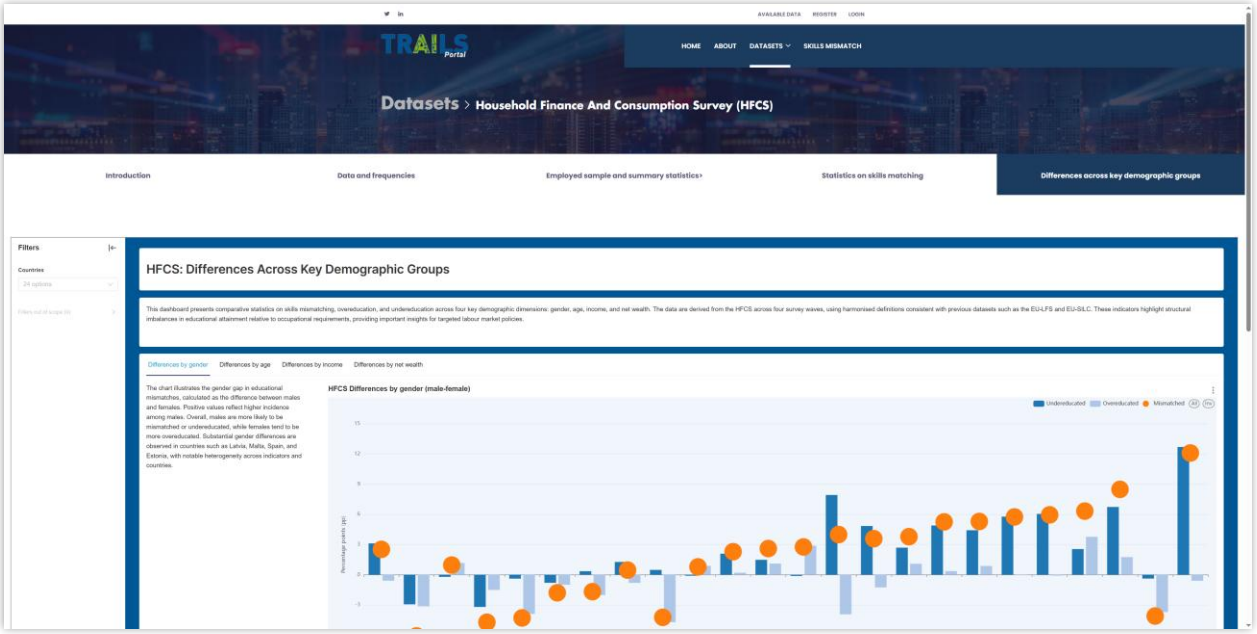

Figure 49: HFCS Dashboard (Differences across Key Demographic Groups)

4.2.2 Skills mismatch dashboards

This subsection presents the interactive dashboards developed to visualise key indicators related to skills mismatch across Europe, as analysed within the TRAILS partners. Unlike the dataset-specific dashboards focused on structured survey data, this section explores multidimensional metrics

linked to the misalignment between workers' qualifications and job requirements, the prevalence and patterns of VET, and changes in skill demands based on labour market trends.

The skills mismatch dashboards are structured into three distinct thematic areas, each supported by multiple visualisations:

- Vertical Mismatch in Europe: focusing on undereducation and overeducation before and after COVID-19
- Vocational Education and Training: analysing VET incidence, wage effects, and job satisfaction
- Dynamic Skill Change: assessing skill shifts in labour demand using job vacancy data

All dashboards offer high interactivity, allowing users to filter by country, education level, gender, or time period, and to compare trends across countries or regions. The visual widgets include maps, scatter plots, bubble charts, and bar graphs, enabling intuitive exploration and cross-variable comparisons. These dashboards are closely aligned with the data and findings of D3.1 "COMPARE I: Skills mismatching in Europe pre- and post-pandemic".

The introduction page, presented in Figure 50, provides an analytical overview of the misalignment between workers' qualifications and the requirements of their jobs across Europe. It brings together interactive dashboards to explore trends in vertical mismatch, the role of VET, and emerging skill needs in a changing labour market.

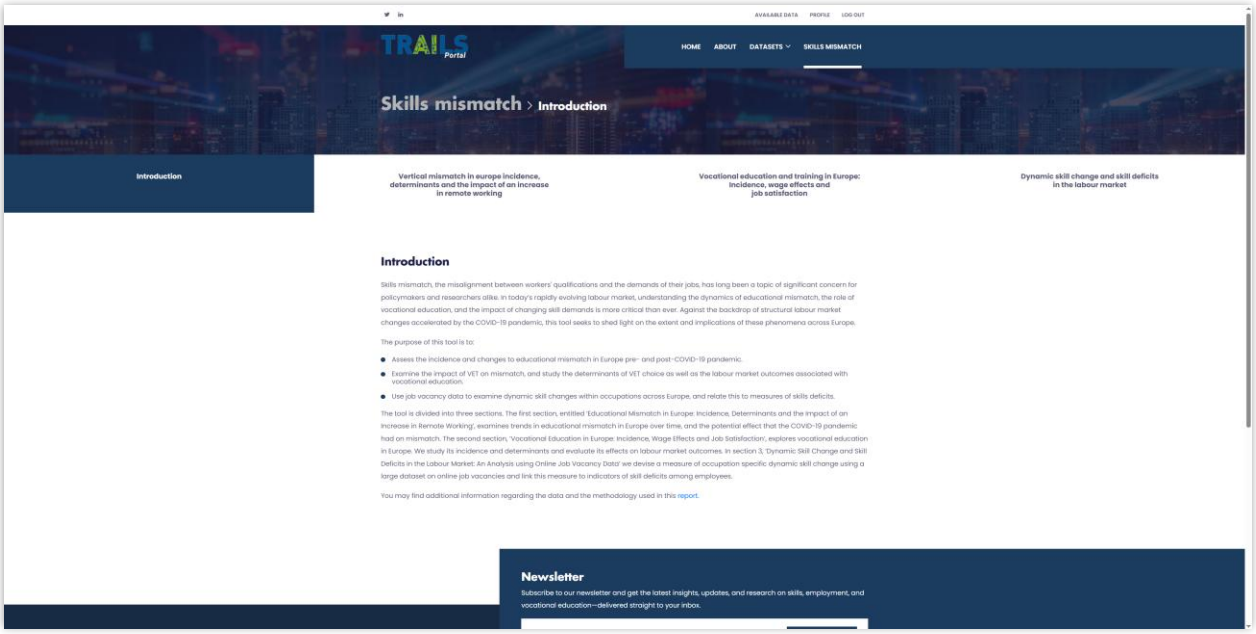

Figure 50: Skills Mismatch Dashboard (Introduction)

The first dashboard, presented in Figure 51, focuses on vertical mismatch across Europe. It provides an overview of undereducation, overeducation, and matched education using visualisations such as time series plots showing trends over the years, boxplots highlighting regional differences across Europe, maps and scatter plots that visualise country-level incidence and comparative changes from previous periods.

Moreover, several interactive elements allow users to analyse the change in mismatch incidence before and after the COVID-19 pandemic. In addition, the determinants of mismatch are explored using bar charts that disaggregate overeducation and undereducation by key factors such as education level, sector, and occupation.

The dashboard also includes data on changes in remote working during the pandemic, revealing the percentage of individuals who transitioned to remote work in different European countries. A dedicated map illustrates this shift, offering insights into how the pandemic reshaped labour practices and skill requirements.

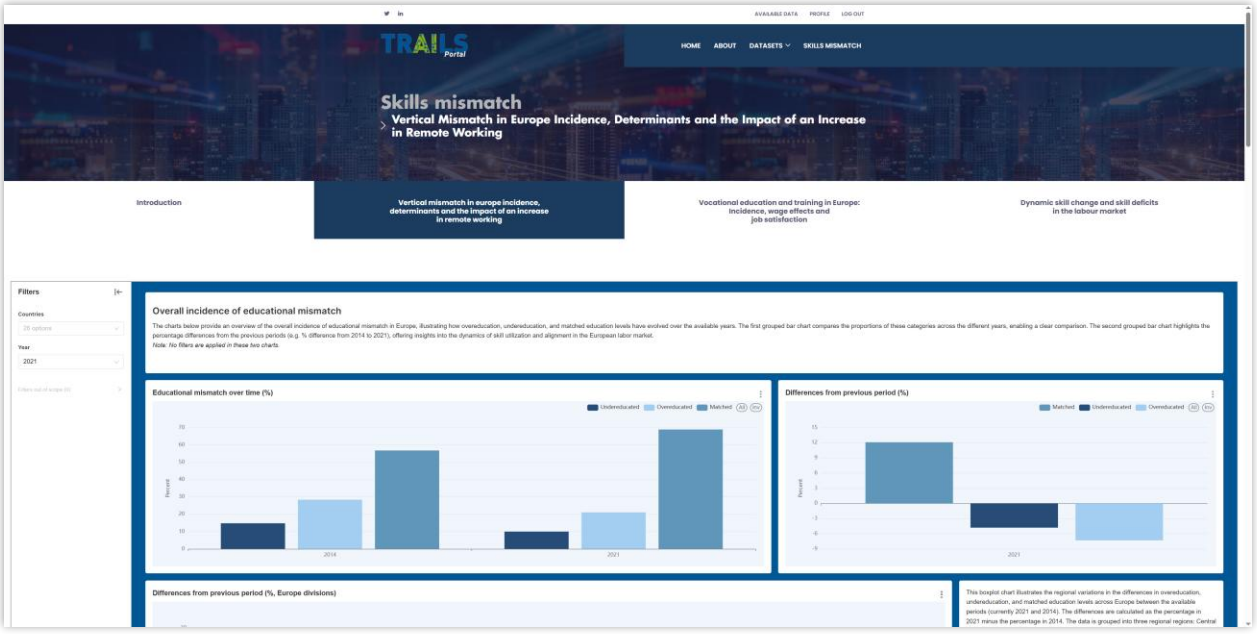

Figure 51: Skills Mismatch Dashboard (Vertical Mismatch in Europe Incidence, Determinants and the Impact of an Increase in Remote Working)

The second dashboard explores VET across Europe (Figure 52). The dashboard is divided into several sections such as a scatter plot that shows the share of employees with VET by country, a boxplot which compares VET incidence across European regions and a bar chart which presents the share of employees with VET by field of education.

Further, the dashboard analyses the impact of VET on wages and job satisfaction, with corresponding maps illustrating the country-level differences in outcomes for individuals with vocational qualifications.

The final dashboard (Figure 53) analyses the dynamic skill changes across European labour markets using job vacancy data. This section reflects how job demand has shifted due to technological advancement and structural changes between 2019 and 2023.

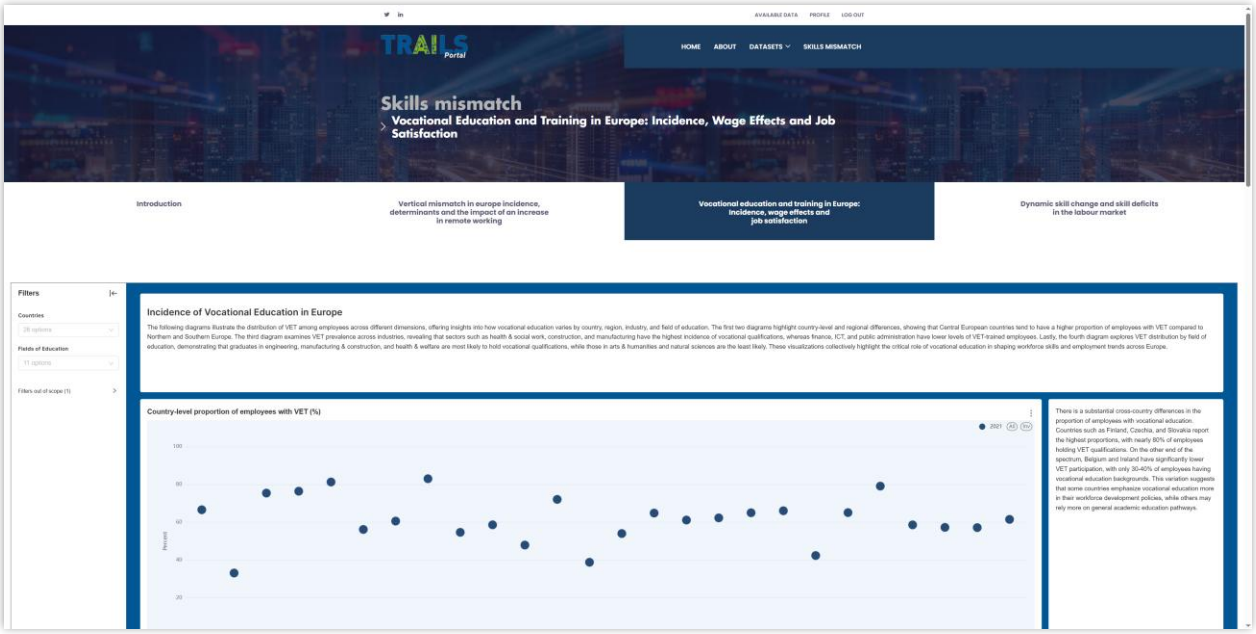

Figure 52: Skills Mismatch Dashboard (Vocational Education and Training in Europe: Incidence, Wage Effects and Job Satisfaction)

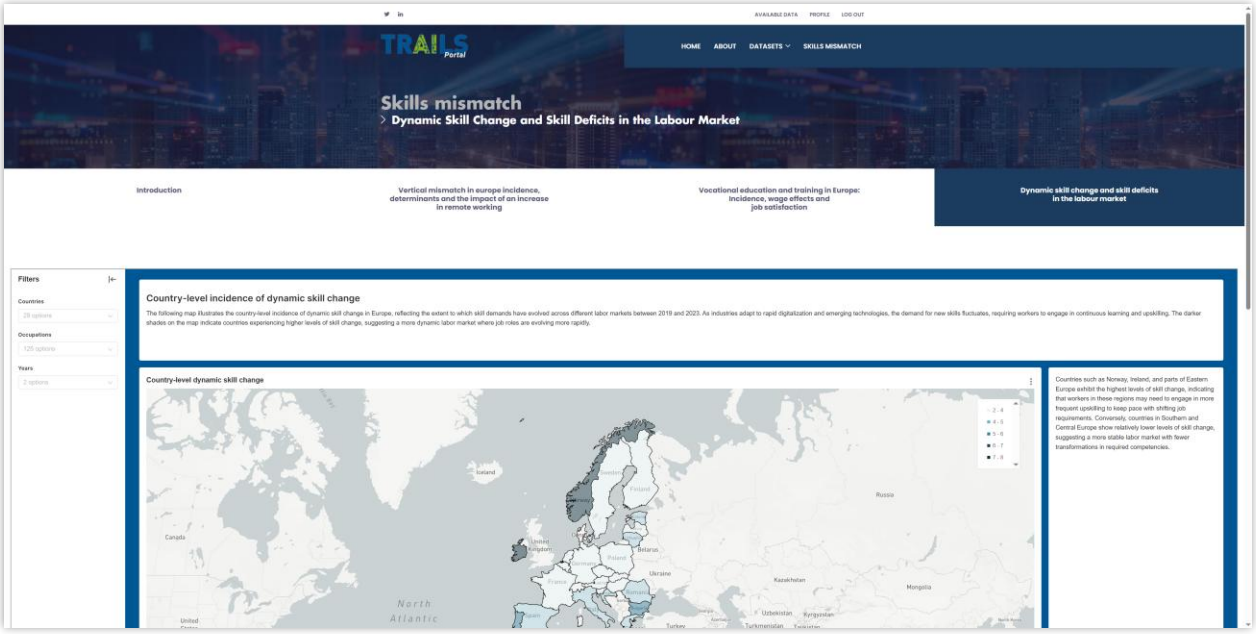

Figure 53: Skills Mismatch Dashboard (Dynamic Skill Change and Skill Deficits in the Labour Market)

5. MEET THE REQUIREMENTS

This section outlines how the development of the TRAILS portal reflects the requirements defined in Deliverable D7.1. The first subsection examines the extent to which these system requirements have been addressed and implemented. The second subsection describes the API developed to enable data extraction and integration with third-party applications. The following part presents key integration milestones and the current development phase of the portal. Finally, the section concludes with an overview of the progress made on the TRAILS mobile applications.

5.1 SYSTEM REQUIREMENTS

Table 4 below outlines the system requirements, both functional and non-functional, as identified in Deliverable D7.1. For each requirement, the table presents the corresponding coverage percentage and the method of verification. The complete list of system requirements, along with their descriptions, can be found in D7.1.

Table 4: Verification of TRAILS portal functional and non-functional requirements

Requirement ID	Requirement Title	Coverage	Mean of verification
FR001	User registration	100%	Django comes with a user authentication system. It handles user accounts, groups, permissions and cookie-based user session.
FR002	User login	100%	The users can login after the portal's authentication/authorisation.
FR003	User logout	100%	The TRAILS portal offers the log-out functionality to its logged-in users independently from their role.
FR004	Update user profile	100%	The users can provide their profile information after their successful registration.
FR005	Update user settings	100%	The users can provide their profile settings after their successful registration.
FR006	Update user demographics	100%	The users can provide their profile demographics after their successful registration.
FR007	Update user preferences	100%	The users can provide their profile preferences after their successful registration.

FR008	Password reset	100%	The users can reset their passwords through their profile page or login page.
FR009	Access portal via mobile application	100%	The Android application can be found here. The iOS application can be found here.
FR010	Upload dataset	100%	Users under the proper roles can upload a dataset on the portal.
FR011	Update dataset	100%	Users under the proper roles can update a dataset (meta data or data) on the portal.
FR012	Delete dataset	100%	Users under the proper roles can delete a dataset on the portal.
FR013	View dataset details	100%	Users under the proper roles can view a dataset on the portal.
FR014	Create dashboard	100%	Users under the proper roles can create dashboards on the Apache Superset (visualization engine) and link them with portal's pages.
FR015	Update dashboard	100%	Users under the proper roles can update dashboards on the Apache Superset.
FR016	Delete dashboard	100%	Users under the proper roles can delete dashboards on the Apache Superset.
FR017	View dashboard	100%	Users under the proper roles can view dashboards on the Apache Superset. Visitors can only see dashboards linked with the portal.
FR018	Interact with dashboard	100%	All users can interact with dashboards by applying filters and drill-down functionalities.
FR019	Manage API key	100%	All users can manage their API key through their profile page[3].

[3] More details in Section 5.2 DATA EXTRACTION

FR020	Access API documentation	100%	All users can access the API documentation here.
FR021	API authentication	100%	All users can authenticate through API using their username/password (registration needed).
FR022	Test API endpoints	100%	All users can test the API endpoints (registration needed). There is also a Postman collection for ease here.
FR023	Extract data via API	100%	All users can use the API endpoints to download the available data (registration needed). There is also a Postman collection for ease here.
FR024	Download data to CSV/Excel	100%	All users can download all available data in Excel format from here (registration needed).
FR025	Report API issues	100%	All users can use the contact us page to report technical issues with the API.
FR026	Contact support	100%	All users can use the contact us page to report technical issues.
FR027	Submit feedback	100%	All users can use the contact us page to submit feedback.
NFR001	Portal load time	To be implemented by M33 in D7.3	The portal is hosted in DUTH's premises, a virtual private server with enough resources to load the homepage within 3 seconds. In D7.3, thorough validation testing will be performed to ensure the smooth operation of the TRAILS portal.
NFR002	API response time	To be implemented by M33 in D7.3	The portal is hosted in DUTH's premises, a virtual private server with enough resources to handle up to 500 requests per second, ensuring a response time of less than 1 second for each request. In D7.3, thorough validation testing will be performed to ensure the smooth operation of the TRAILS portal.
NFR003	Concurrent user support	To be implemented	The portal is hosted in DUTH's premises, a virtual private server with enough resources

		by M33 in D7.3	to support up to 10,000 concurrent users. In D7.3, thorough validation testing will be performed to ensure the smooth operation of the TRAILS portal.
NFR004	Data volume growth	100%	The portal is design with scalability in mind using containerization techniques. Through the use of Kubernetes which automates the deployment, scaling, and management of containerized applications, the portal can scale horizontally to handle a 50% increase in data volume annually.
NFR005	Data encryption	100%	All personal data (e.g. user passwords) are safely stored in portal's database using the PBKDF2 algorithm with a SHA256 hash. Regarding the API encryption, access to the API is only allowed over the TLS protocol.
NFR006	Role-based access control	100%	The portal enforces a role-based access control to ensure users only access authorized data and features.
NFR007	System uptime	100%	The portal is hosted in DUTH's premises, a virtual private server with enough resources to maintain 99.9% uptime during operational hours, excluding scheduled maintenance. The machine the VPS is hosted, uses additional power sources (UPS) to cover unexpected power outages.
NFR008	Mobile responsiveness	100%	The portal is designed with mobile-first approaches. All content is responsive with support for small screens (mobiles and tablets).
NFR009	Code quality standards	To be implemented by M33 in D7.3	In D7.3, thorough unit testing will be performed to ensure the smooth operation of the TRAILS portal.
NFR010	Log retention	100%	The system logs all critical actions for 1-year period. After this period, the logs are cleared for capacity reasons.

NFR011	Integration capabilities	100%	The portal supports data extraction through an API mechanism allowing integration with external systems via standardized APIs (e.g., REST).
NFR012	Dashboard configuration	100%	Apache Superset (visualization tool) allows all users under the proper roles to configure the dashboards.
NFR013	Backup success rate	100%	A backup mechanism has been set up successfully to backup the portal's data in a daily basis.

As presented in Table 4, all technical requirements have been addressed. Nonetheless, additional pages and dashboards are planned for development in the upcoming period, as new data and analytical results become available. These additions will be presented in Deliverable D7.3.

5.2 DATA EXTRACTION

The ability to extract data from the TRAILS portal plays a central role in enabling its practical value. By allowing stakeholders to retrieve datasets in structured formats, data extraction ensures that insights generated through the portal can be integrated into other tools, platforms, and workflows. Whether through direct downloads or programmatic access via API, this feature supports deeper analysis, promotes transparency, and enhances the portal's usability for policymakers, researchers, and other end users.

Structured formats

Registered users gain access to the "Available Data" page (https://portal.trails-project.eu/apidocs/availabledata/), where datasets are organized by category (e.g., datasets, skills mismatch, etc.). The page provides access to data used in the dashboards as well as in Excel files prepared by the project partners. Unregistered visitors are prompted with an informative message encouraging registration for full access.

Programmatic access through API

In addition to direct downloads, the TRAILS portal supports data extraction through an API, offering programmatic access to available resources. An interactive interface built with Swagger UI (https://portal.trails-project.eu/apidocs/docs/) allows users to authenticate via personal API tokens (registration to the portal is needed) and test available endpoints in a browser-based environment. This setup enhances developer usability and facilitates seamless integration.

Furthermore, a ready-to-use Postman collection is provided on the "Available Data" page, including preconfigured endpoints to assist users in querying the API with minimal setup.

The available resources are summarized in Table 5. Additional endpoints are planned for future implementation, aligned with the release of new datasets and analytical outputs. These updates will be detailed in Deliverable D7.3, and the Postman collection will be updated accordingly.

Table 5: TRAILS portal API endpoints

Category	Method	Endpoint	Description	Parameters
Authentication	POST	/apidocs/token/	Obtain authentication token using username and password	- username - password
Countries	GET	/apidocs/countries/	Retrieve information about all available countries	
Countries	GET	/apidocs/countries/{iso_a3}/	Retrieve information about a specific country using ISO Alpha-3 code	- iso_a3
Datasets	GET	/apidocs/datasets/	Retrieve a list of all available datasets	
Datasets	GET	/apidocs/datasets/{key}/	Retrieve a specific dataset by providing its key	- key
Skills Mismatch	GET	/apidocs/skillsmismatch/	Retrieve all available skills mismatch data	
Skills Mismatch	GET	/apidocs/skillsmismatch/{key}/	Retrieve specific skills mismatch indicator data by key	- key

Table 5 in conjunction with the Entity Relationship Diagram presented in Section 3.1, offers a clear overview of the available resources provided by the TRAILS portal API.

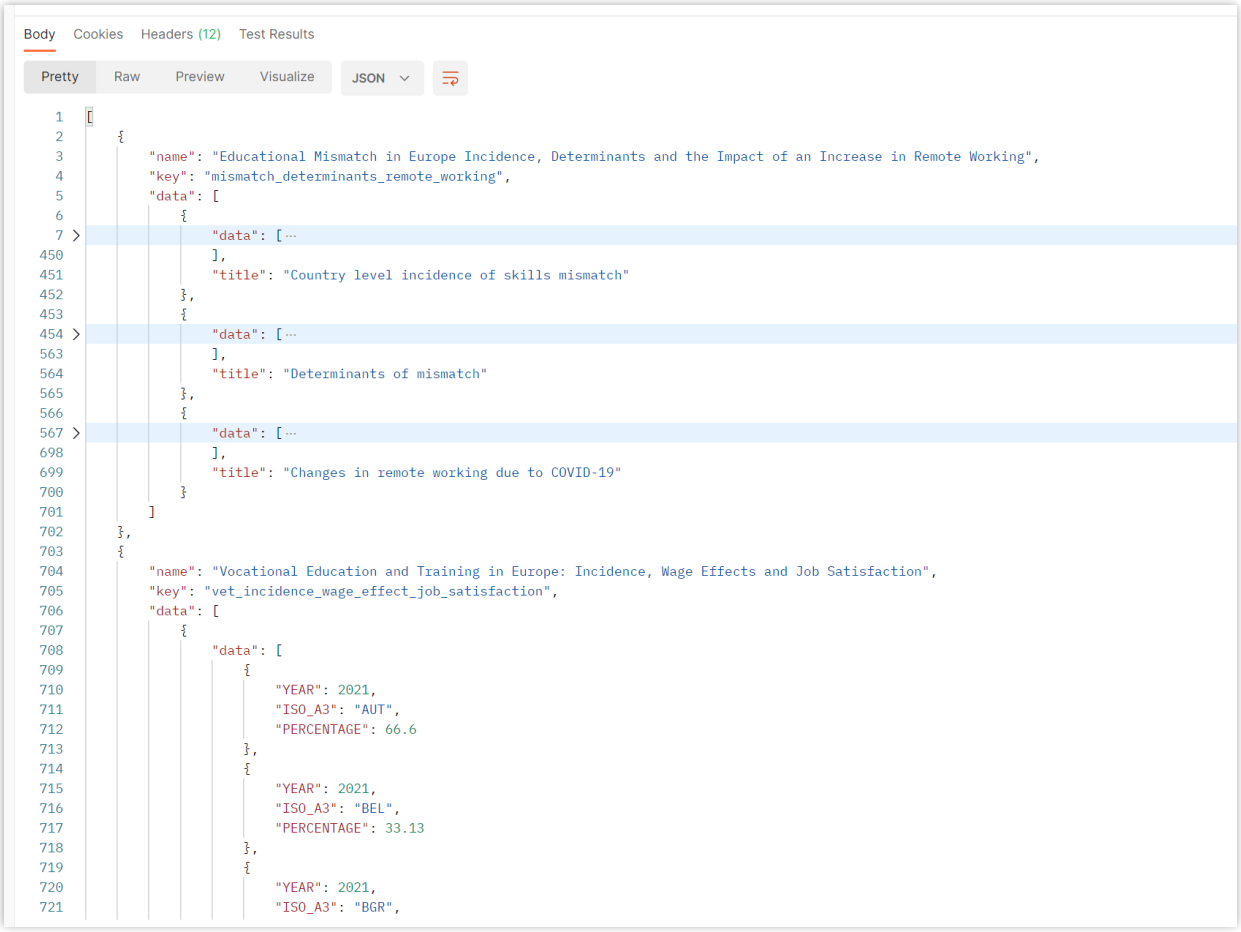

Figure 54: Example of the "/apidocs/skillsmismatch/" API endpoint

Figure 54 illustrates an example of the "/apidocs/skillsmismatch" API endpoint executed in Postman. The example demonstrates the endpoint returning all available data for the skills mismatch indicator, using the same format as on the TRAILS portal.

5.3 INTEGRATION MILESTONES

Figure 55 presents the TRAILS portal integration milestones aligned with the project timeline, as defined in Deliverable D7.1. At the time of writing, the TRAILS portal is in its Beta version phase, and it is expected to reach the Release Candidate version by Month 24 (January 2026). By this milestone, the portal will have implemented all identified system requirements and will undergo extensive testing and validation. In parallel, work package 7 actively monitors the progress of the other work packages to incorporate as much relevant information as possible into the portal.

Following the Release Candidate milestone, efforts will focus on enriching the data catalogue and extending the API to cover new indicators emerging from the final phases of the project. The

integration roadmap of the TRAILS portal ensures not only the timely delivery of system features but also the responsiveness of the portal to the evolving analytical outputs of the project.

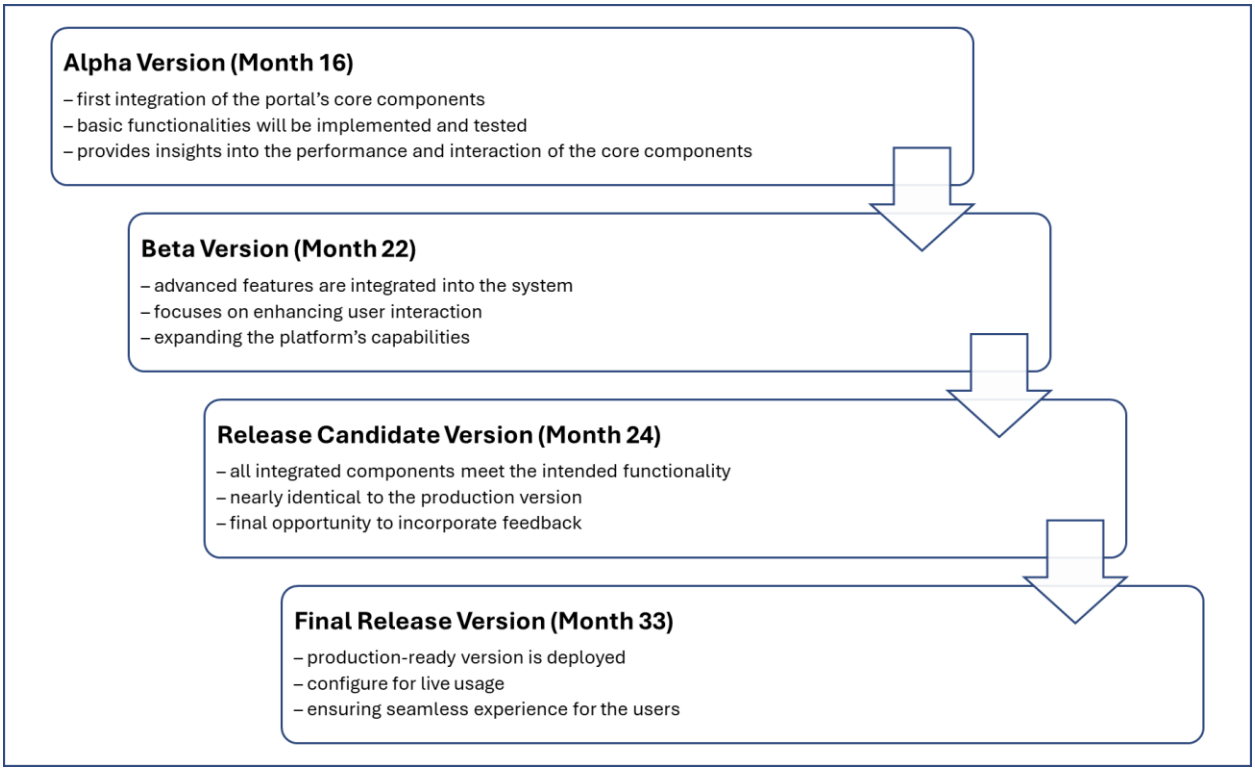

Figure 55: TRAILS's portal integration milestones

5.4 SMARTPHONE APPLICATION

At the time of writing this report, key preparatory steps have been completed to enable the development of the TRAILS mobile application. The cross-platform development environment using Flutter (Google) has been set up and initial configuration for both Android and iOS deployment has been successfully completed. A dedicated repository has been created, and a first functional prototype has been implemented, featuring a secure WebView that loads the TRAILS portal and the website supporting user interaction with dashboards and visual content. In addition, all core functionalities such as authentication, navigation control, and API integration have been tested in the development environment.

Moreover, internal testing has already been carried out to ensure the application performs reliably across different devices and screen sizes. As a result, both Android and iOS versions of the TRAILS

mobile application has been successfully developed and published[4], providing users with immediate access to the portal's dashboards and visual content.

Figures Figure 56 and Figure 57presents the TRAILS mobile application as it appears on Google Play and App Store, respectively. Finally, Figure 58 presents several screenshots illustrating portal's main features and interface.

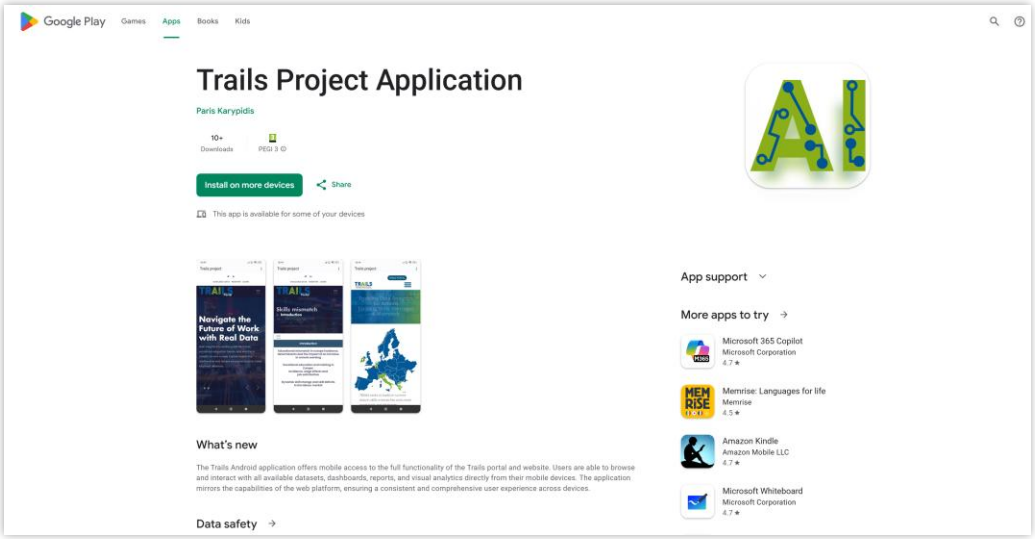

Figure 56: TRAILS mobile application on Google Play

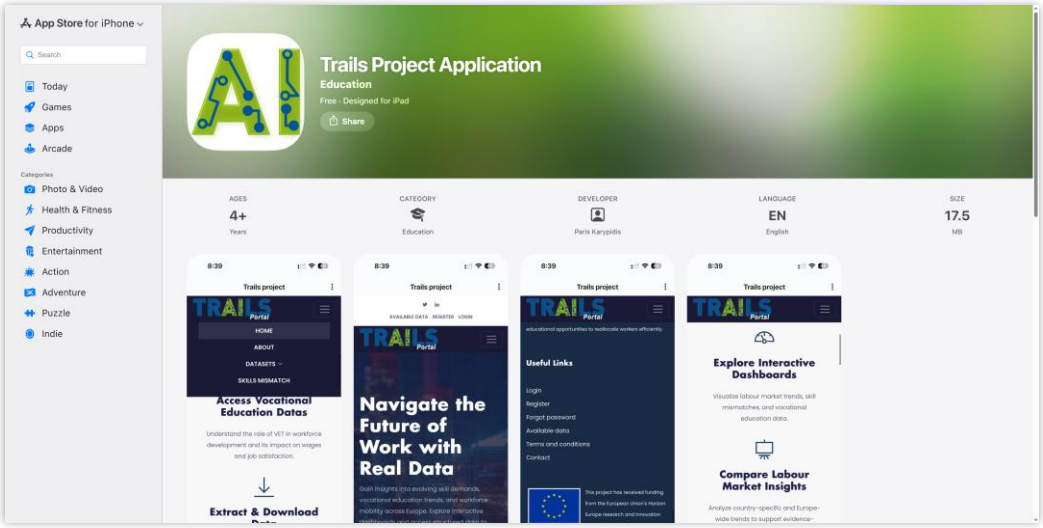

Figure 57: TRAILS mobile application on App Store

[4] The Android application can be found here while the iOS application can be found here.

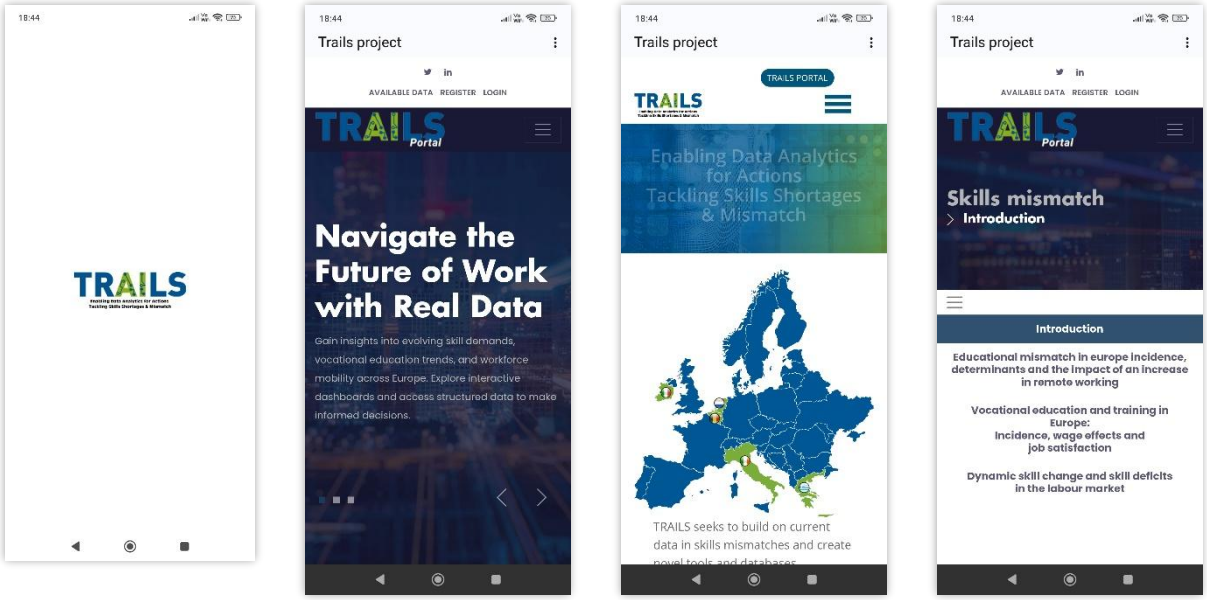

Figure 58: Screenshots from the Android TRAILS application

6. CONCLUSION

This deliverable presented the implementation of the TRAILS portal, documenting its architecture, components, and functionalities as developed under Task 7.2. Building upon the specifications defined in D7.1, the portal now integrates a diverse set of datasets and interactive dashboards, offering users intuitive access to insights on skills, employment, education, and labour market dynamics.

The deliverable provided a detailed walkthrough of the portal's system design, including the underlying entity relationship structure, user navigation paths, and dynamic visualisation features. It also described the technical implementation, such as the containerisation approach that ensures modularity, scalability, and ease of deployment, while support for data extraction via APIs and third-party integration mechanisms is now in place.

At this stage, the TRAILS portal serves as a robust digital environment, ready to be tested and validated. The validation activities, including user testing and performance evaluation, are scheduled to be carried out in the context of the next deliverable D7.3. These upcoming processes will ensure that the portal meets its non-functional requirements and will confirm its readiness to support stakeholders and decision-makers with evidence-based insights across European labour market.

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