The Design of the Link4Skills Navigator

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● Abstract

The Link4Skills (L4S) Navigator, whose design and conceptualization process is presented in this article , together with its mock-up prototype, is a platform that provides users with an interactive tool to explore and analyse migration and labour market data across selected regions in Europe, Africa, Asia, and America. Through a personalised data dashboard supported by a conversational chatbot interface, users can generate and customise visualisations in their own spaces, export them in various formats, and share them via URLs. The platform facilitates combining visualisations into reports and using them in presentations. Thanks to the L4S Navigator the users can access definitions and explanations of terms, explore data relationships, compare key information about countries or regions, and utilise filtering options to tailor data queries as well as create data visualisations.

These functionalities benefit a diverse range of stakeholders, primarily in the EU, including EU decision-makers, inter-governmental institutions, national and subnational policymakers, employers' organisations, employees' organisations, vocational training organisations, and various institutions—by enhancing their ability to access, interpret, and disseminate critical information related to the labour market and policies efficiently. Customizable and shareable visualisations support effective communication and collaboration, enabling stakeholders to present data-driven insights in reports and to use them in their presentations when discussing policy impacts and support programmes and initiatives. The user-friendly interface reduces the learning curve, allowing users to quickly obtain reliable data, even without extensive expertise in data analysis. By streamlining data exploration and keeping track of users' visualisations in their own spaces the L4S Navigator empowers stakeholders to make informed decisions, develop evidence-based policies, and effectively address critical policy challenges such as how the EU should respond to skill shortages, how businesses and policymakers can better identify skills needed in changing labour markets, and how to ensure fair and effective skills recruitment both domestically and among non-EU workforces.

● 1. Introduction

INTRODUCTION OF THE LINK4SKILLS PROJECT

The Link4Skills project, funded by Horizon Europe (Grant No. 101132476), addresses global skill shortages through innovative solutions like re-skilling, automation, and migration. Spanning Europe, Africa, Asia, and the Americas, it focuses on fair skill flows and the development of an AI-Assisted Skill Navigator to guide experts, policymakers and practitioners.. By analysing migration skill corridors and skill and talent partnerships with countries such as Ukraine, Indonesia, Nigeria, India, Morocco, and Ghana, the project fosters equitable and efficient labour market strategies. Link4Skills brings together 13 global partners to deliver actionable insights and ethical, sustainable outcomes for modern labour challenges.

The purpose of the document is to introduce the first concept and the vision of the Link4Skills Navigator: a web-based space, where the user can browse available data and results of the Link4Skills project, manage her/his workspace and create reports. The concept was developed as a result of the participatory design process with stakeholders. It focuses on the basic navigation and functional requirements presented in a form of mock-up prototype of the Navigator's graphical user interface. The prototype comprises the crucial parameters and functionalities that the Navigator should offer to its users and is an initial version of the Navigator that is used to demonstrate the concept, try out design options, and find out more about the problem and its possible solutions. In particular, the Navigator prototype allows users to create their own chars for data visualization, and their own dashboards in the form of separate windows, where a user can indicate and present information that interests them in a visual form. A user can manage elements, add new ones, remove them and also edit existing ones.

● 2. Development process of Link4Skills Navigator prototype

The general aim of the L4S Navigator is to support in solving skill-shortages, to mitigate the skill obsolescence in the EU labour market by taking into account re/up-skilling, automation (AI-assisted work, automation and robotics), migration (only legal channels, including fair skill flows between origins and the EU countries). The Link4Skills Navigator is dedicated to researchers, policy makers, decision makers, recruiters and all those interested in receiving insights and recommendations related to workforce skills, training needs, and talent development strategies. The Navigator will not only present the project results in an accessible way, but above all it is intended to be an interactive space designed with the assistance of users, aimed at helping in making decisions and supporting current work.

When creating the Link4Skills Navigator, the most common structure of the software development process is followed - The Systems Development Life Cycle (SDLC). SDLC, or Software Development Life Cycle in systems engineering, information systems and software engineering, is the process of creating or altering systems, and the models and methodologies that people use to develop these systems[1].
The key activities in this cycle that must be performed to develop system software are: elicitation of system requirements, designing the system, software development and testing. One of the SDLC methodologies is Agile methodology, which the Link4Skills Navigator development process is based on. Agile approach emphasises continuous collaboration and improvement. It focuses on rapid development and frequent releases of the software which in effect divides the entire work into stages

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[1] Prof. Seema Suresh Kute, Prof. Surabhi Deependra Thorat (2014), A Review on Various Software Development Life Cycle (SDLC) Models, International Journal of Research in Computer and Communication Technology, Vol 3, Issue 7,

and involves the customer directly in the development process. Throughout this process, aspects such as prioritising requirements and tasks and managing change are extremely important.

Work on the Navigator is strongly focused on the prototyping method. The first prototype (v0.1) created on the basis of user stories analysis and the formulation of the first user requirements takes the form of clickable mock-ups created in Figma (web application for interface design) which are available under the following link: https://www.figma.com/proto/lS6NoKz2DQ2owCJaQkJTQM/Link4Skills-Navigator-prototype?t=YR05FPceC95EY1jF-1&scaling=contain&content-scaling=fixed&page-id=0%3A1&node-id=64-3087&starting-point-node-id=64%3A3087. By double-clicking in the window, the user highlights the elements that are clickable.

They present in a user-friendly way the main use cases of the prototype, faithfully reproducing the functions that the system will fulfil in the future. This approach allows for quick changes to the prototype without involving high cost and time-consuming outlays.

Ontology and glossary

Work on creating a prototype began with standardising vocabulary and building a common understanding in the project. For this purpose, in consultation with partners, an ontology and glossary were defined as the basis for developing the database structure and the database itself.

The developed ontology (Figure 1) presents a set of entities (physical or abstract objects) and relationships between them, which together form a conceptual schema that describes the informational needs underlying the design of the database.

The Link4Skills Navigator ontology is a structured, AI-driven knowledge-based system designed to address global skill shortages through an interconnected framework. It integrates diverse datasets and stakeholder inputs across four continents—Europe, Africa, Asia, and America—to facilitate fair skill flows and evidence-based decision-making. The ontology emphasises a participatory approach, enabling policymakers, vocational training organisations, and employers to co-create solutions via the AI-Assisted Skill Navigator, a dynamic tool rooted in FAIR (Findable, Accessible, Interoperable, Reusable) data principles. Anchored in econometric microsimulations and real-time analytics, it supports identifying emerging skill demands, mapping migration patterns, and fostering equitable skill exchanges. This open-access system combines structured knowledge, interoperability, and stakeholder collaboration to drive sustainable strategies for global labour markets (see Figure 1).
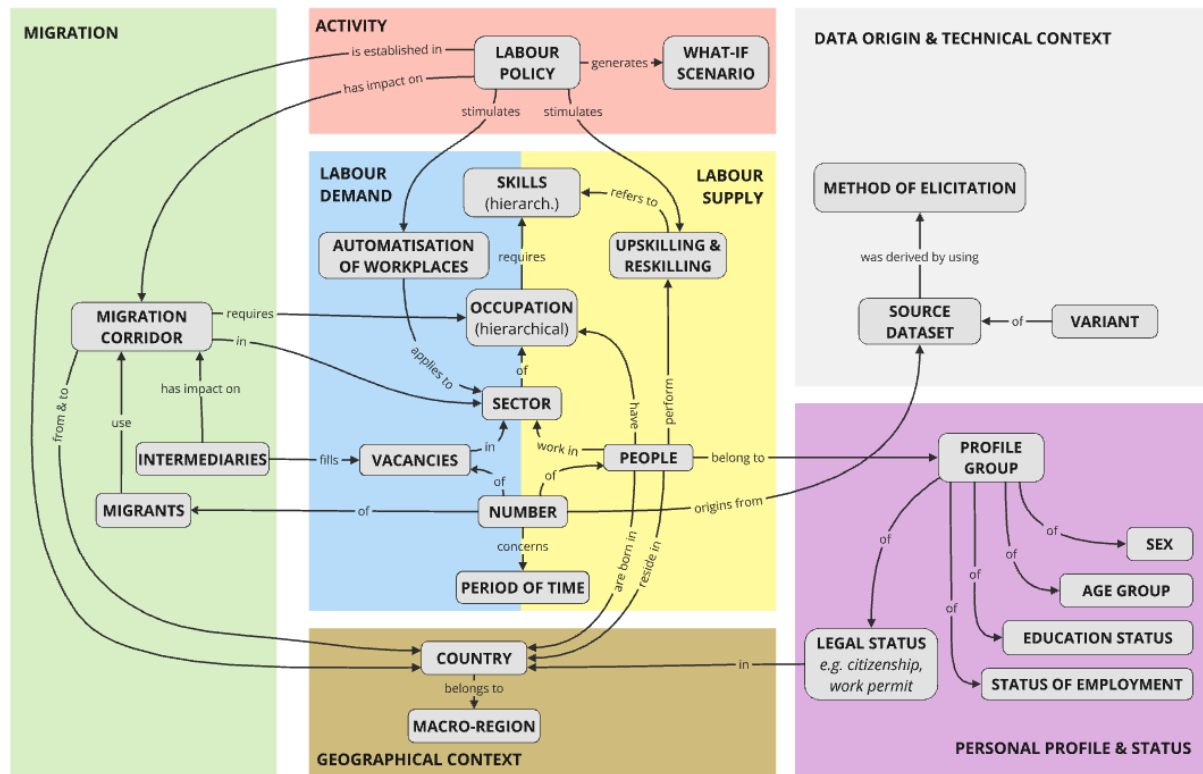
Figure 1 The ontology diagram for Link4Skills project (ver. 0.5)

The actions aimed to clarify the entities presented in the ontology resulted in the creation of the Link4Skills project glossary (see Attachment 1), which was prepared based on the following sources:

• Well-known public dictionaries of English,
• ILO glossary - from EMN glossary: Glossary of Skills and Labour Migration (ilo.org),
• EMN Asylum and Migration Glossary - European Commission (europa.eu),
• Media Friendly Glossary on Migration, Fair Recruitment and Forced Labour, International Labour Organisation.
The ontology defined in this way became the basis for developing the database structure and the database itself.

User stories

A series of 20 Individual Design Interviews (IDIs) were conducted online between 17.06 – 12.07 2024 with a diverse group of stakeholders to gather insights that would inform the development of the Link4Skills Navigator. These stakeholders included a wide range of professionals such as policy experts, academics, lawyers, recruiters and NGO representatives. For instance, participants came from institutions like the International Centre for Migration Policy Development (ICMPD), the Centre of Migration Research at Warsaw University, the Toronto Region Immigrant Employment Council (TRIEC), Municipality of Warsaw, the Ukrainian Catholic University, Ukraine's State Statistics' Service as well as Joint Research Centre of EC, Knowledge Center for Migration and Demography. Representatives from government bodies, such as the Counsel of the Vice Prime Minister on European and Euro-Atlantic Integration in Ukraine, were also involved. The IDIs were conducted after obtaining approval from the ethical committee of the Polish-Japanese Academy of Information Technology (Decision No….), ensuring that the research met the necessary ethical standards and all interviewees gave their informed consent to take part in this research.

The IDIs were structured around detailed scenarios that explored the participants' roles, workflows, and interactions with data and technology. Participants were asked about their typical tasks, the tools

they use, challenges they face in their work, and their preferences for data visualisation as well as the details of the workflow of the decision-making processes they assist or are engaged with. These interviews also provided in-depth insights into how stakeholders currently interact with existing tools and what improvements they would like to see when it comes to the Link4Skills Navigator. The discussions also touched on the potential integration of AI-supported features, such as chatbot interfaces, and how these could assist in their use of the Navigator as well as their daily work. The needs expressed by users or observed during interviews or workshops are represented in plain language as "user stories", pointing to distinct requirements or desired functionalities. As users often convey multiple needs and preferences, it is common for a single interview to yield multiple user stories, which generally are small in scope to allow for very precise evaluation and mapping.

Based on the contents of the conducted interviews (243 stories), as well as on prior discussions and workshops with project partners (15 stories) a total of 258 user stories were initially compiled. They were then classified based on the type of design problem they referenced. The categories of stories were as follows: chatbot interaction (41 stories), country views (42 stories), and map views (30 stories). Additionally, there was a strong focus on charts (24 stories), sources (26 stories), and interface interaction (12 stories). Other key areas included account management (2 stories), comparisons (12 stories), data corridors (12 stories), definitions (16 stories), and projections (12 stories). Some consideration was given to limitations (3 stories), disclaimers (12 stories), search functionality (3 stories), and tables (11 stories). The above list of categorised user stories contained some redundancy, due to an overlap in preferences and needs of the users engaged at this early stage of the participatory design process.

User requirements

User stories were subjected to in-depth analysis, which resulted in the definition of 158 user requirements presented in the form of   tables (table 6 na table 7 in Attachment 2   ). The table itself was developed in such a way to facilitate the management of user requirements. Each requirement was marked with a unique ID number and classified in terms:
-    of source (Grant Agreement, User Story or Consortium),
-    priority (the MoSCoW technique: must, should, could, won't have) and
-    feasibility (functional feasibility or data feasibility).
 Additionally, the requirements were grouped according to the scope they concern (like comparison, data visualisation, chatbot, disclaimer, disclaimer, interface, presenting project results, etc.).

The user requirements are still the subject to verification. Not all of the requirements may be considered as relevant and used during implementation. Their feasibility in terms of budget limitations, human resources, and technical constraints will be taken into account. During the verification process, it should be analysed whether the implementation of individual requirements will affect other elements of the system negatively, disturb its cohesion, or reduce user-friendliness and usability.

System functional requirements

During the development of the first version of the prototype, attention was paid primarily on functional requirements (80) in order to define the functions of the system and its components.
Their inclusion among the functions offered by the next versions of Link4Skills Navigator will be continuously monitored. For this purpose, the existing table with user requirements will be the basis for creating the Functions-Requirements Traceability Matrix at a later stage.
Because of the large number of requirements that have been proposed by stakeholders, several of which are out of scope of the project, it became necessary to prioritise the requirements. All consortium members are invited to review the requirements and comment on the proposed priorities of their implementation (we have used the MoSCoW method: must, should, could, won't).
From the whole list, 36 requirements have been implemented in the prototype (their status: "covered in Prototype 0.1"). They mainly focus around those that are necessary for the proper functioning of

the Navigator and seem to be crucial for stakeholders, i.e. data visualisation, chatbot interface, generating reports and saving the results. Part of the requirements has been confirmed as feasible but will be implemented after the next version of the prototype is created (mainly related to the chatbot). Moreover, the current version of L4S Navigator has been designed to meet 38 requirements that relate to the presentation of project results. These have the status "designed functions in Prototype 0.1 enable it").

Chatbot design

The Link4Skills chatbot will be an integral part of the Link4Skills Navigator. From user requirements, we have formulated a specification for the chatbot. The chatbot implementation is ongoing according to the following stages:

1. Creation of knowledge base about migration, labour market, upskilling, reskilling and work automation. The knowledge base consists of a set of over 300 articles and documents selected and provided by the members of the Link4Skills consortium.
2. Implementation of a first prototype of the chatbot that uses Retrieval Augmented Generation (RAG) technology to index the knowledge base, and to reply to user questions using a language model that bases on contex obtained from most relevant documents. Replies are accompanied by sources: the bibliographical data of relevant documents from the knowledge base that were selected by the RAG method to reply to the user's question. The first prototype of the chatbot has been implemented using the DialogFlow technology as an interface, and a RAG technology and language model provided by Cohere.
3. The second chatbot prototype will use RAG to access the Link4Skills database and be able to reply to user questions using statistical data or forecasts obtained from the database. This approach requires the generation of SQL queries to the database from user questions. A semantic description of the database has been created in order to support SQL query generation. The second chatbot prototype will also use functions of data visualisation provided by the Link4Skills navigator, and be able to respond to the user with a URL that is a link to a relevant data visualisation   of the Link4Skills Navigator.
4. The second chatbot prototype will be tested in an experiment with Link4Skills stakeholders and users.

Currently, the first chatbot prototype has been developed. However, as the current Link4Skills Navigator is still a mockup prototype that uses the Figma platform, the first chatbot prototype could not be integrated with the Link4Skills Navigator prototype.

●   3. The Design of the Link4Skills Navigator

This User Manual describes the Link4Skills Navigator prototype part concerning the graphical user interface in the form of a GUI prototype (designed in the Figma). It is currently a "living" description that will be continuously updated with new content as the functionality of subsequent versions of Link4Skills Navigator becomes available. Its final version will be publicly available on the Link4Skills Navigator landing page.

The main functions described in the following subsections are presented in the Figure 2.
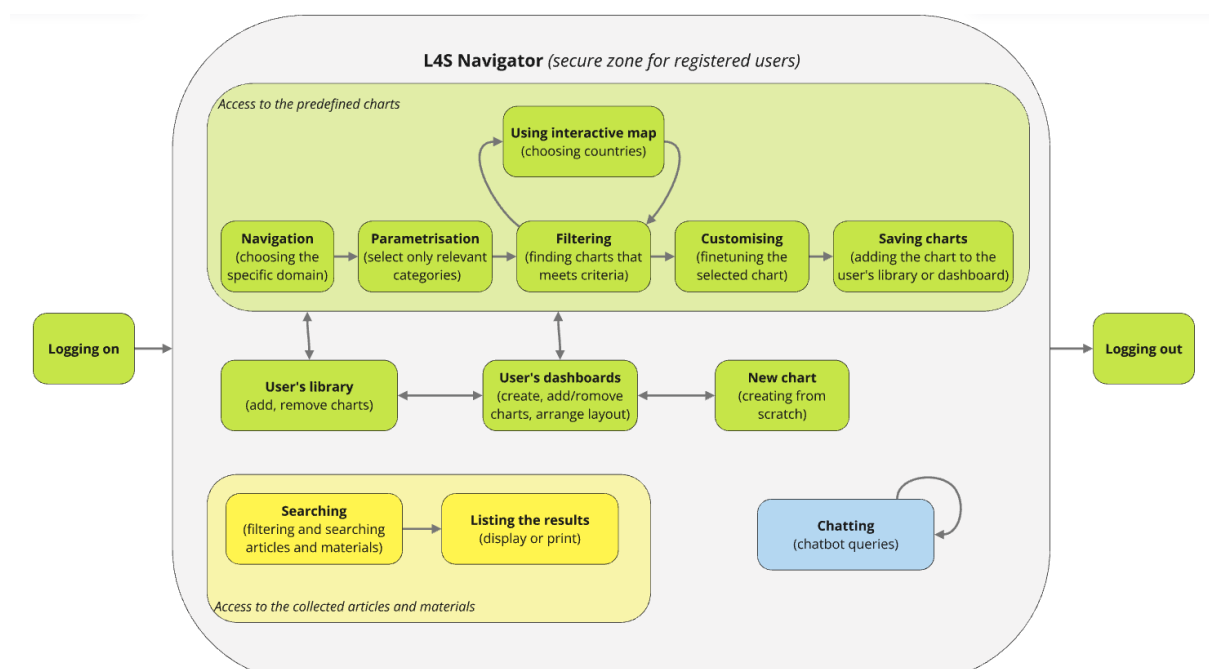
Figure 2 Main functions designed in Link4Skills Navigator prototype v. 0.1

Access to the Navigator

The Navigator should be accessible in a friendly way that guarantees security for its users, tool developers and data providers. Therefore, it was decided to provide access directly from the Link4Skills project website and to limit access to the tool only to registered users.

To get to the Navigator a user (having access to the Internet) should open in the browser the dedicated address. Redirection to the Navigator landing page will be possible from the Link4Skills project webpage mainly (https://link4skills.eu/). From there, a user will be able to enter the Navigator via the "Link4Skills Navigator" subpage or from any part on the page by clicking the "Go to Link4Skills Navigator" floating button, sticked to the scroll bar (see Figure 3).
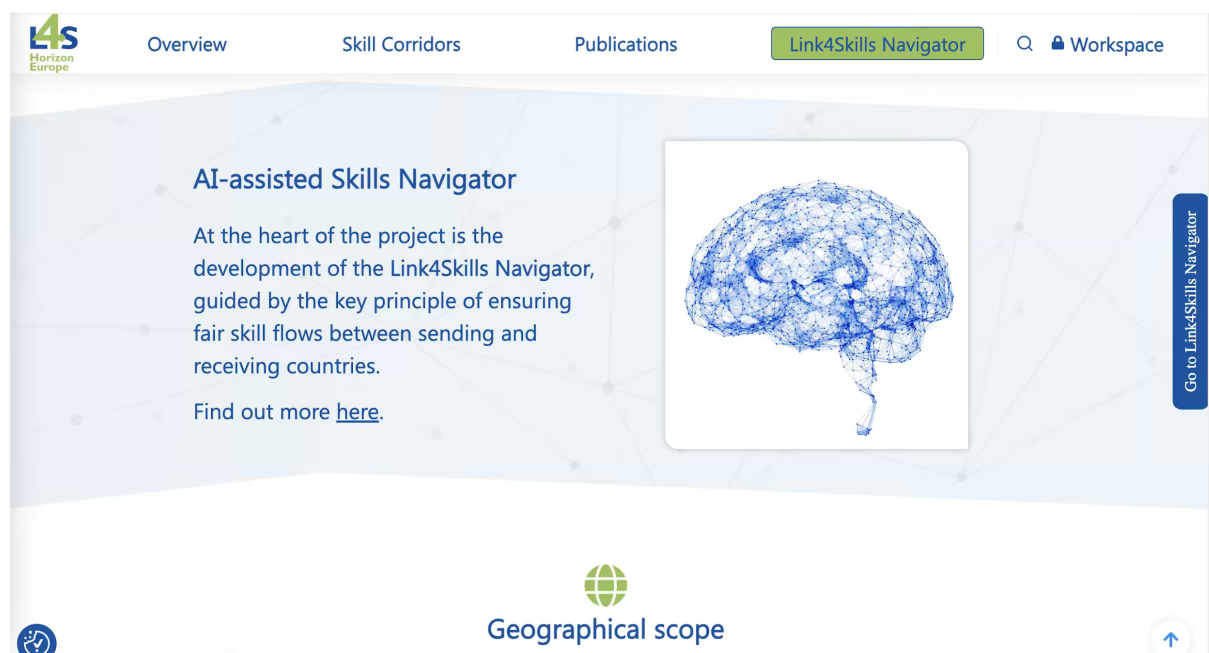

Figure 3 Link4Skills project page - access to the Navigator

After that, the Navigator landing page will be displayed with the option of registration. User registration should be carried out taking into account the type of user (policy maker, researcher or recruiter) and the role (User and Researcher) that provides opportunities or imposes restrictions on the use of the tool's functionalities.

Depending on the level of advancement and access, there should be two types of Navigator users: a user with basic interface access (User) and with advanced access (Researcher). Basic access will allow a user exploration of predefined dashboards (with predefined results, such as charts). This kind of user will be able to navigate through the tool, display maps and the results of Link4Skills project, save a given dashboard in his/her own workspace, customise the chart and dashboards, generate and download the reports. Compared to this, the Researcher will have access to a wider range of functionalities that Navigator will provide. He/she will be able not only to browse existing dashboards, but above all, modify them (incl. their elements), create his/her own dashboards and their elements (e.g. tables, charts and maps) from the scratch, and enrich the database with new datasets.

Landing page of the Link4Skills Navigator

The Navigator's landing page will have an informative function, encouraging exploration of the Navigator and giving the possibility of setting up an account. From this level, a user will be able to apply for creating an account and log in to his/her workspace. Moreover, a user should see a main menu containing the following subsections:

- Overview (a short description containing information about what the Navigator is, what it is for and who it can serve along with a brief elaboration on the potential benefits it can bring to end users, see Figure 4),
- Quick Guide (customised to different user roles and types),
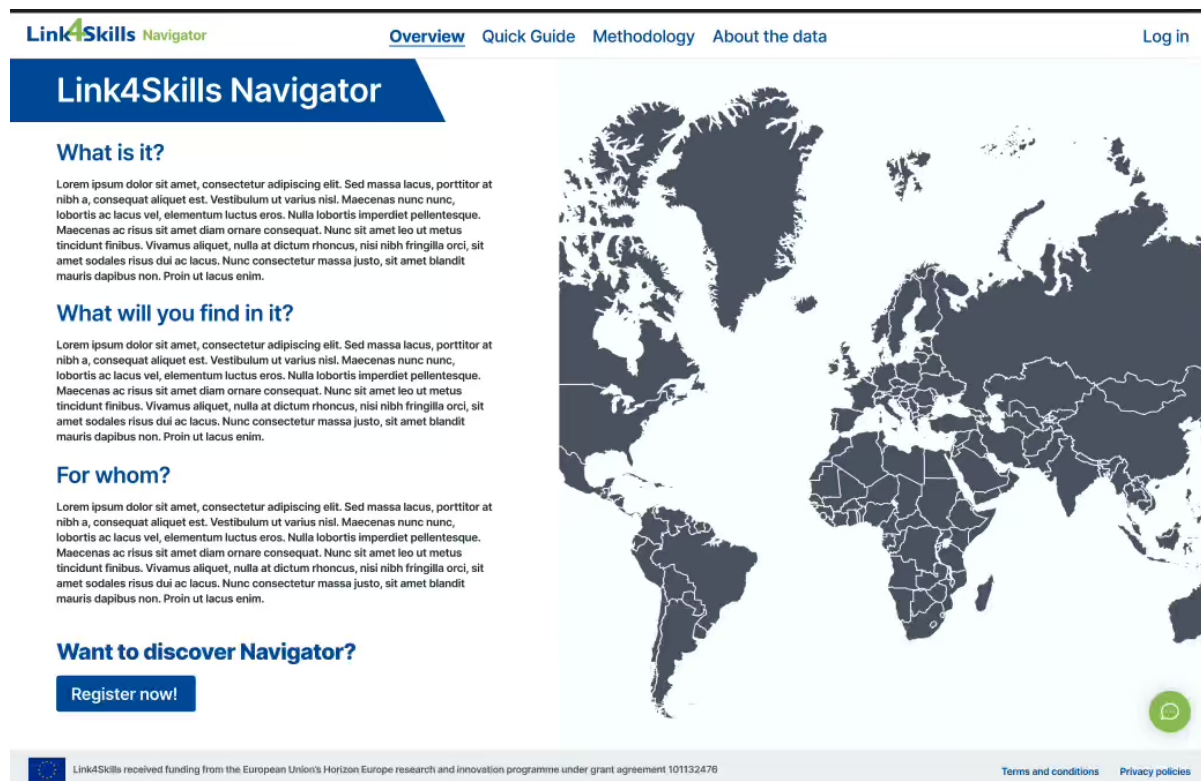- Methodology,
- About the data.

Figure 4 Landing page – Overview

From this early level, a user will have access to a dialogue system allowing them to ask questions by clicking on a green icon (presented in Figure 5). This component will appear on every page of Link4Skills Navigator, making access to the AI element of the tool easy and visible.

Figure 5 Chatbot icon
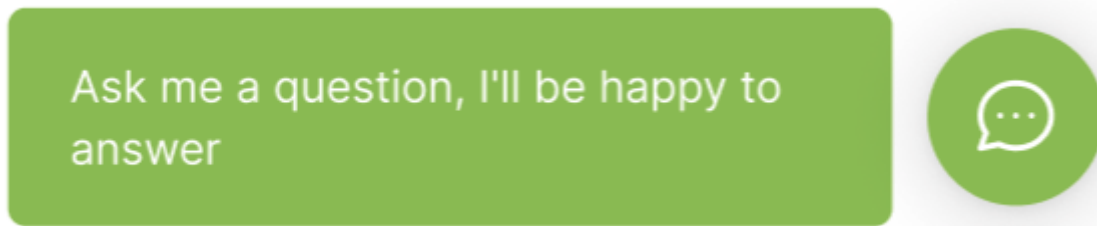
After clicking on the icon, a chatbot window will be displayed, where a user will be able to ask a question and receive AI-generated answers (Figure 6).

Figure 6 Chatbot window

To learn how to use Link4Skills Navigator, a user should click on the "Quick Guide" in the navigation bar menu. A step-by-step guide will appear with the option to download the file in pdf. format (see Figure 7).
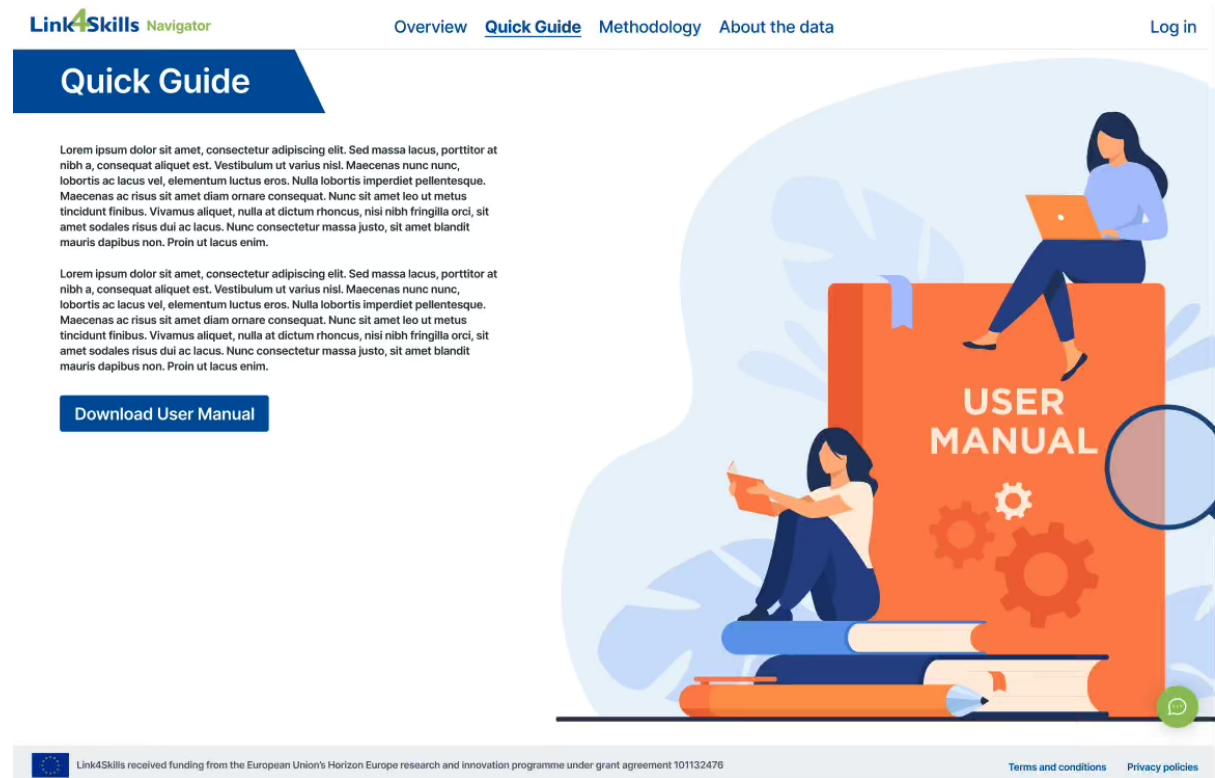
Figure 7 Quick Guide view - ready to be filled with content

If a user wants to learn about the research methods used to create the Navigator, he/she should select "Methodology" from the navigation bar menu. A window with the desired information will be displayed (Figure 8).
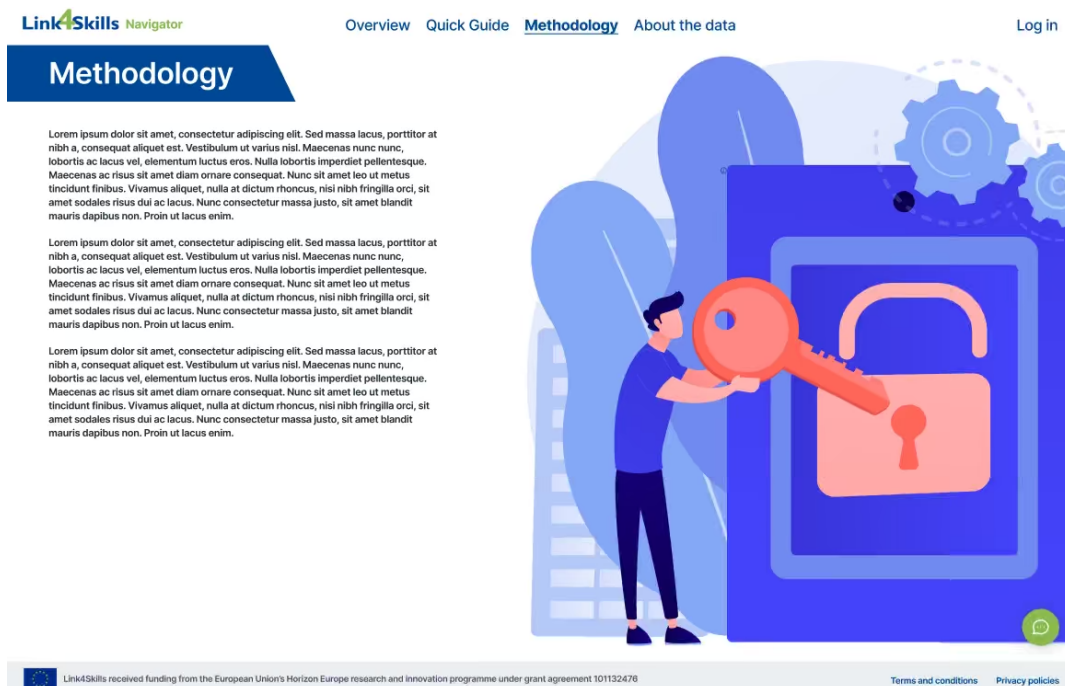

Figure 8 Methodology View - ready to be filled with content

Potential users of the system strongly emphasised the need to receive information about the data, its source and the rules of use. To answer this requirement, Link4Skills Navigator will have a separate, dedicated subpage: "About the data", accessible from the navigation menu (Figure 9).

Figure 9 About the data view - ready to be filled with content

Registration and authentication

User registration will proceed from the landing page of the Navigator. To register, a user should fill out the registration form by clicking on the link on the main page: "Register now". A registration window will appear (Figure 10). A user should provide the following information: User name, Name, Surname, e-mail address and propose a password.

Roles and user types
A user should also select from the drop-down list whether the Navigator should present the default **view customised** for the needs of a researcher, recruiter or policy maker. Depending on future needs, the list of user types may be extended/changed.
During registration, it should also be indicated what **permissions** he/she is applying for. To find out what capabilities are assigned to the **User** and **Researcher** roles, a user should hover the mouse over the letter "i" (information) next to the phrase "Register as". The appropriate information will appear as a tooltip. The role selected during the sign-up phase can later be adjusted/changed based on the needs of a user in their profile settings. The initial vision is for users acting in the "Researcher" role to be able to create their own personalised charts from scratch and perform more complex operations, with the option of operating on their own source data. Registering as the regular User will allow the users to browse existing charts, without the ability to create their own from scratch. This type of user will however be able to perform basic operations on the charts (customise them to their needs) but without changing the source data.

The method of granting permissions will be defined at a later stage of work on the Navigator (e.g. whether it will be subject to additional verification or not). After filling in all the required fields, a user clicks the "Send request" button. Depending on future arrangements, a user may be redirected to a window allowing logging in or will have to wait for offline confirmation of his/her registration (via e-mail).
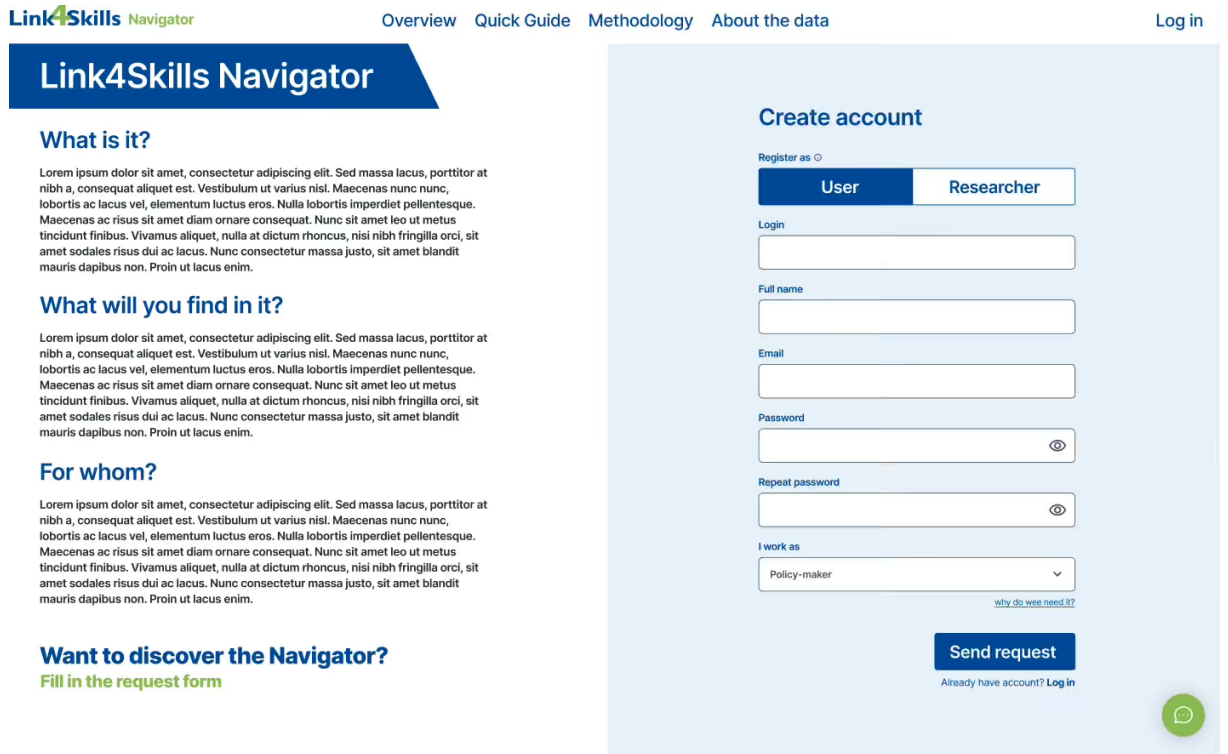
Figure 10 Registration form

After successful registration, a user will have access to his/her account. After clicking on the log in (top right corner of the page), a window will open in which the user should type in the username and password and press Login (Figure 11).
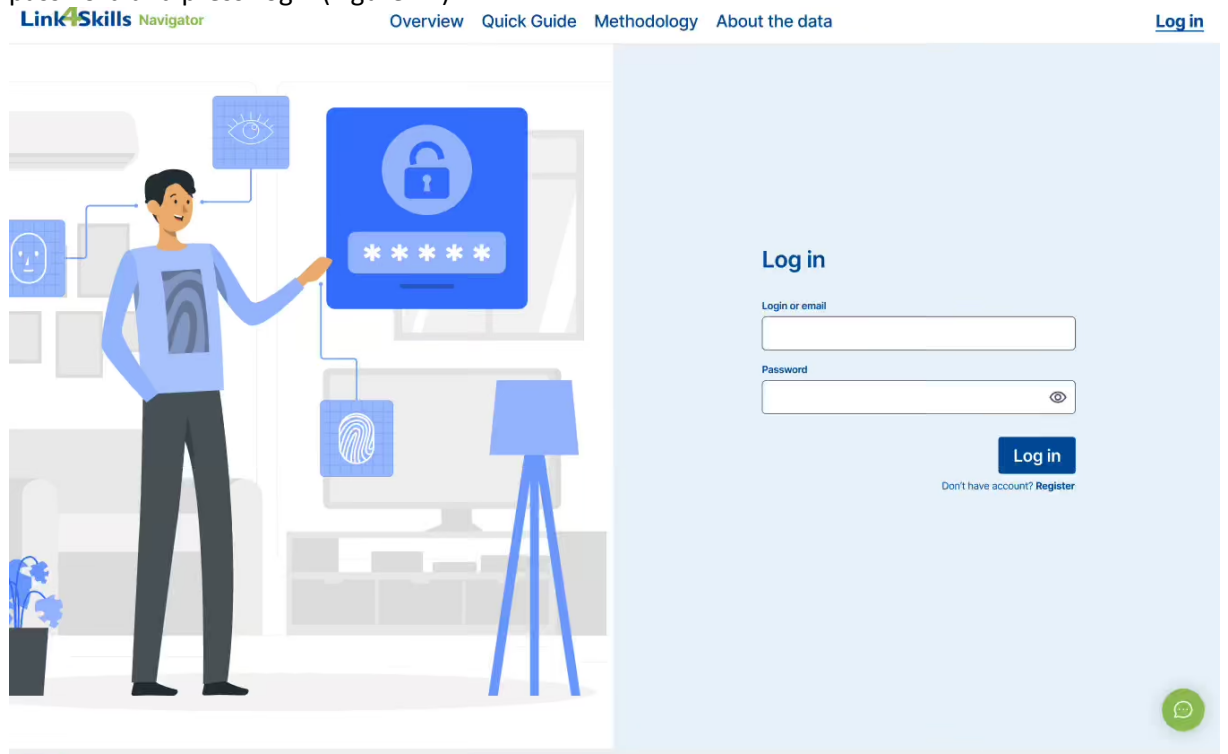

Figure 11 Log in window

User workspace

After logging in, a user will see a space adjusted to her/his roles (researcher/policy-maker/recruiter). This means that initially a user will be presented with a dashboard showing predefined charts that may be of most interest to him/her. The default view will be the Charts Panel. From the main menu, a user will be able to return to the landing page (by clicking "Switch to the landing page"), visit the section related to the "Repository", explore corridors via an "Interactive map" and enter to "My Workspace" to see his/her own area with the dashboards and charts (created/saved by a user or shared with him/her by other users).
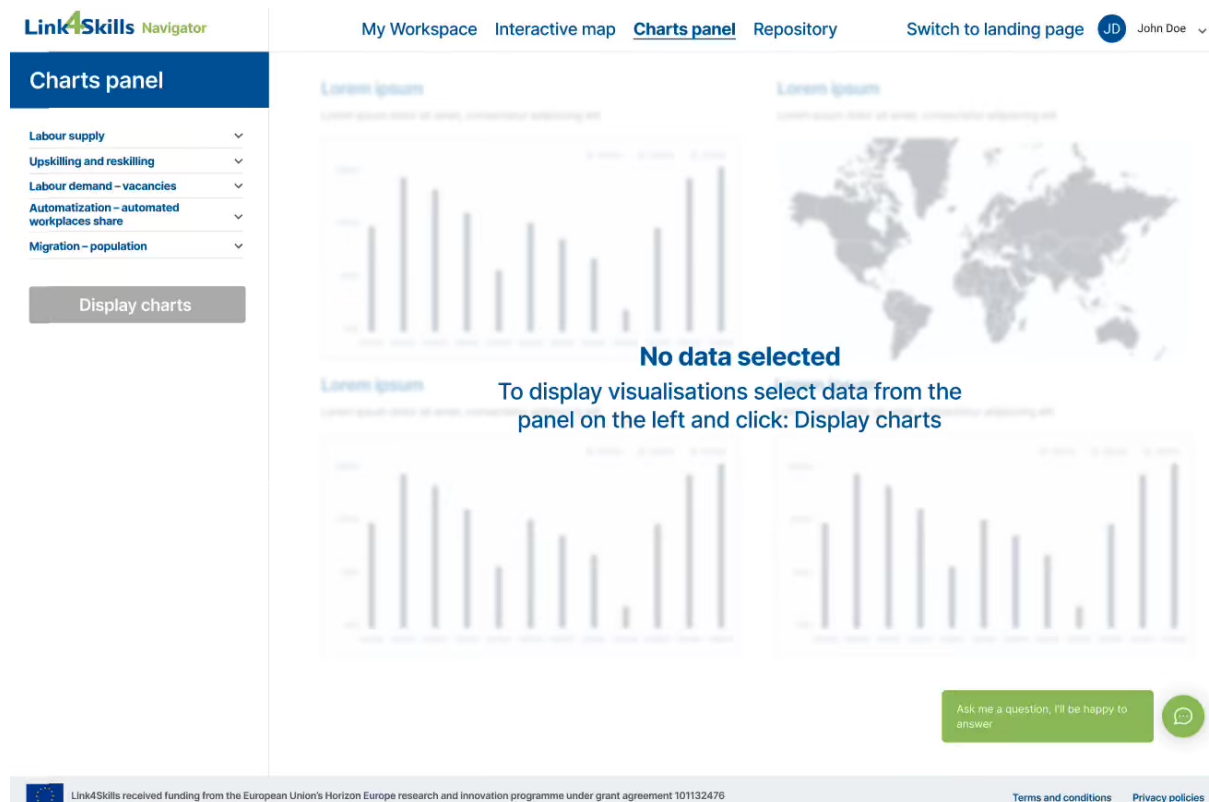
Figure 12 User workspace – Default view

Charts Panel

The view of this space will consist of two main parts: a window with elements (on the right side) and a panel with categories and filters. The Charts Panel will allow a user to search for information via a menu, presenting categories and filters. Such structure makes searching faster and also allows a user to easily operate on sorted data. In the following mock-ups, an example of a filter/categories structure is presented and will be adjusted, depending on the results emerging over the project.

To display interesting information, a user browses the menu and selects the fields of interest by clicking on the checkboxes. After choosing the category and filters, the "Display charts" button becomes active (Figure 13).
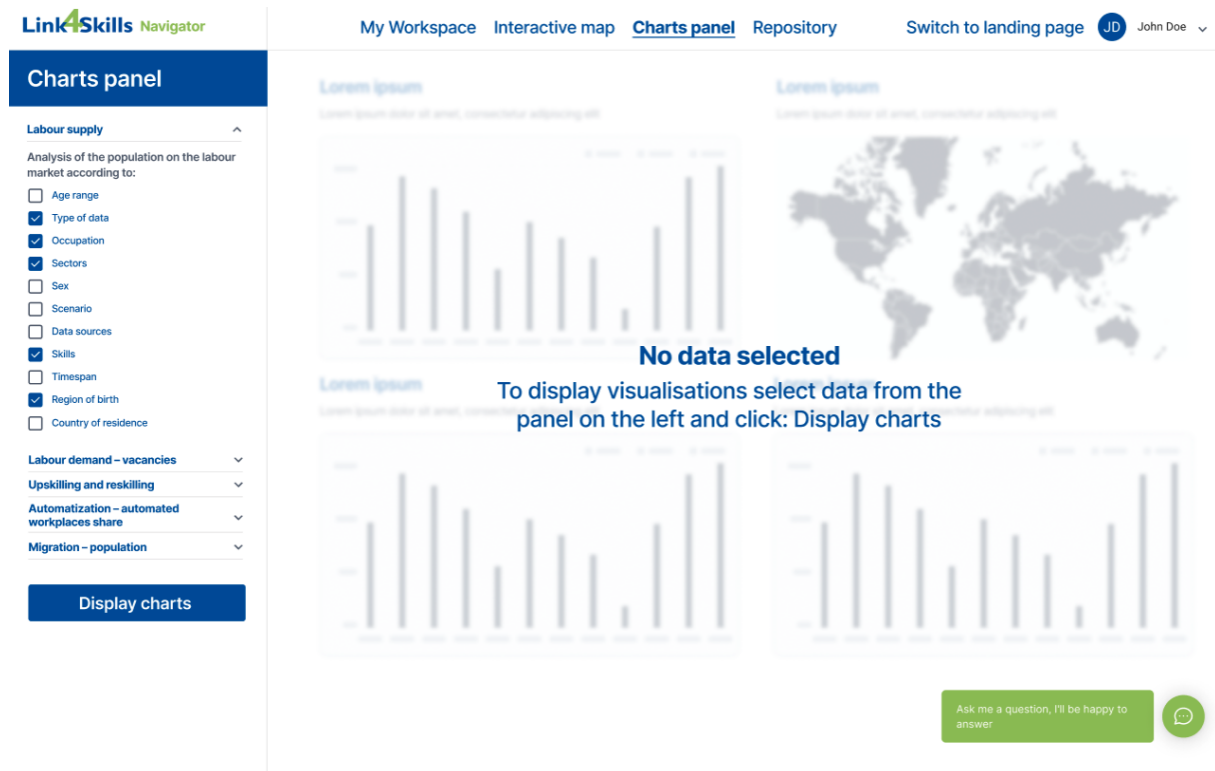
Figure 13 Navigation Panel - selection of data that a user would like to visualise

To see the visualisation of the selected data, a user must click on this button which will result in displaying different elements (maps, graphs, tables) on the right side (Figure 14).

Figure 14 Navigation Panel - view of the displayed visualisations after selecting categories and filters

A user navigating this part of the tool will see the legend and source of the chart and be able to narrow down his/her search results by customising the filters selected in the previous step using the drop down menu (Figure 15) or a map (Figure 16).
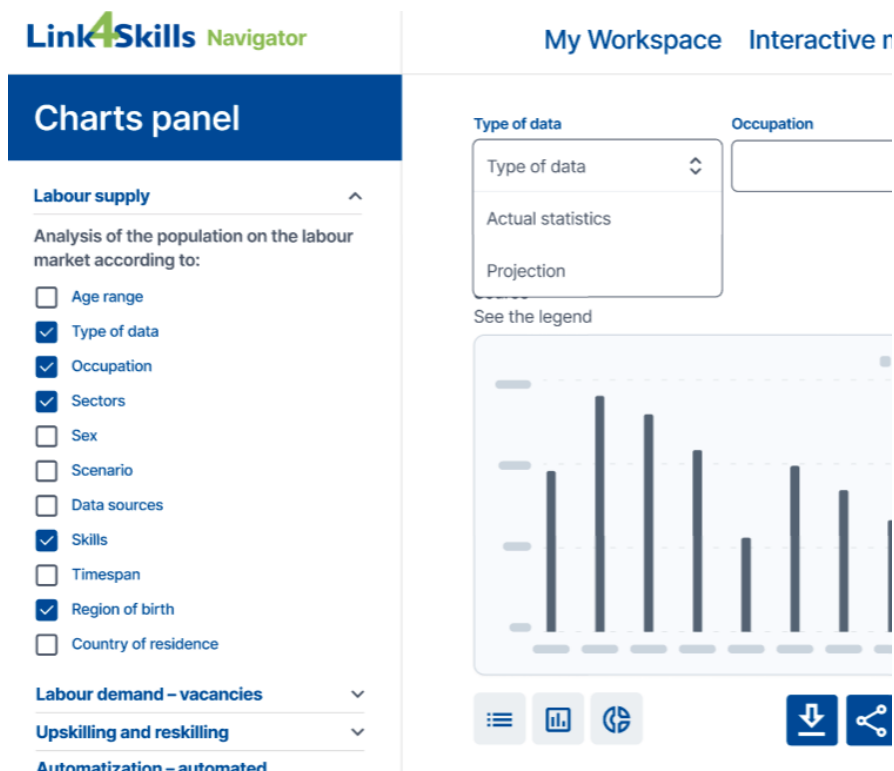
Figure 15 Customisation of the results – drop down menu

Figure 16 Customisation of the results – on the map

He/she will also be able to change the type of selected chart (e.g. from pie chart to histogram). To do this, he/she will have to click on the icon to change the type of chart (as presented below).
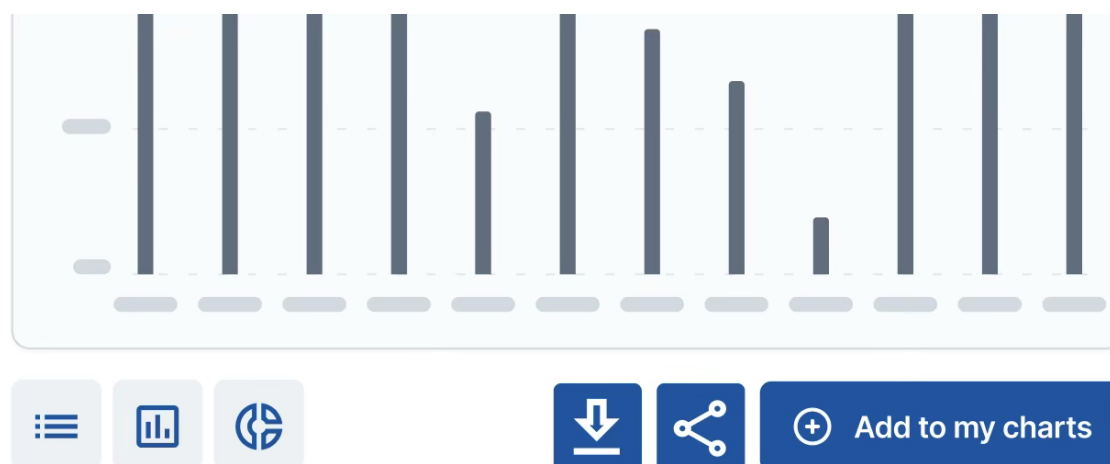
Figure 17 Functionality of changing the type of a chart

A user will be able to download the results locally, share it on social media channels or via e-mail and add the displayed element to his/her workspace ("Add to my charts" button) for reuse or creating a report. To save a given element locally to a device, a user must click on the save icon with an arrow. After this a small menu will be displayed, allowing him/her to choose the format of the file and location.

My Workspace – dashboards (managing, creating and editing)

To go to the section where a user can create dashboards, find already existing dashboards or view dashboards previously shared with him/her by other users, a user must click on the "My Workspace" button. It is located in the navigation menu home page of the Navigator. The dashboards available to him/her will be displayed as a list of records or as a tiles view (Figure 18).
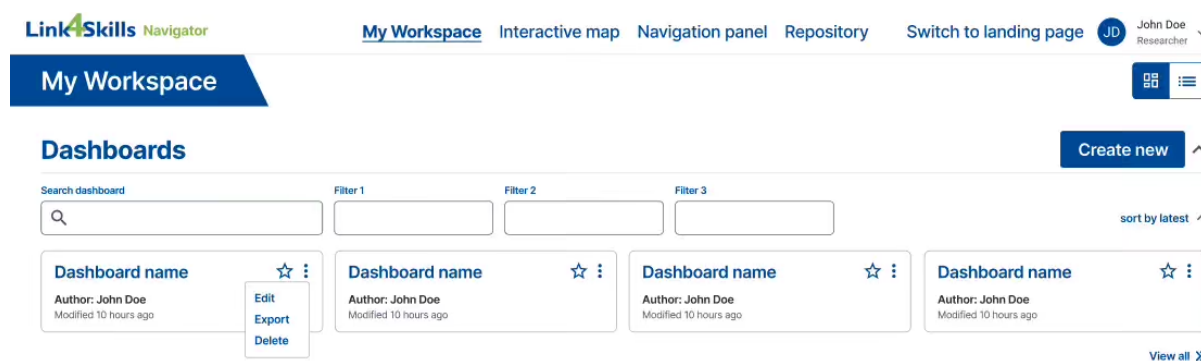
Figure 18 My Workspace - List of dashboards – Tiles view

From the list level, a user will be able to create a new dashboard and see basic information about existing ones, such as: name, author, last modification date and whether it is assigned to the "favorites" group. The actions that the view with records should enable include the ability to modify a given dashboard, export it, delete it or assign it to "favorites". Thanks to additional functions, such as searching, filtering and sorting by selected parameters, a user will find the records that interest him/her in a user-friendly way (Figure 19).
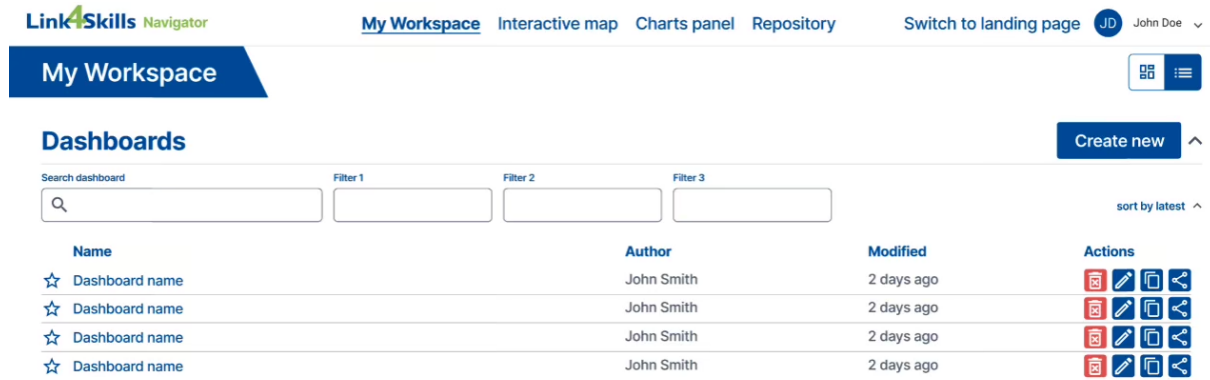
Figure 19 My Workspace - List of dashboards – List of records view

To create a new dashboard a user will have to click the button: "Create new". The result of this action will be opening a new window, in which a user will be able to organise the empty space by adding existing charts, like graphs, pie charts, tables, maps (Figure 20) or layout elements (Figure 21).
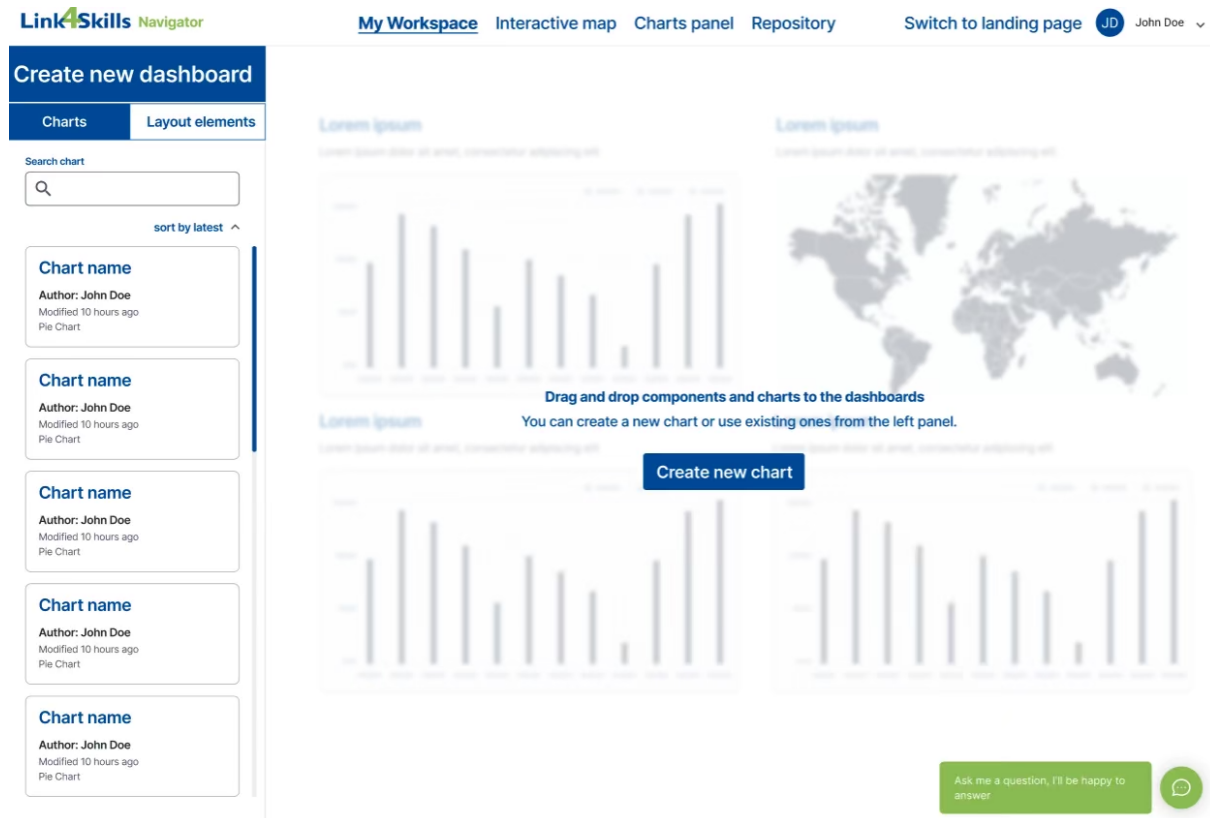
Figure 20 My Workspace – Creating new dashboard – adding new chart
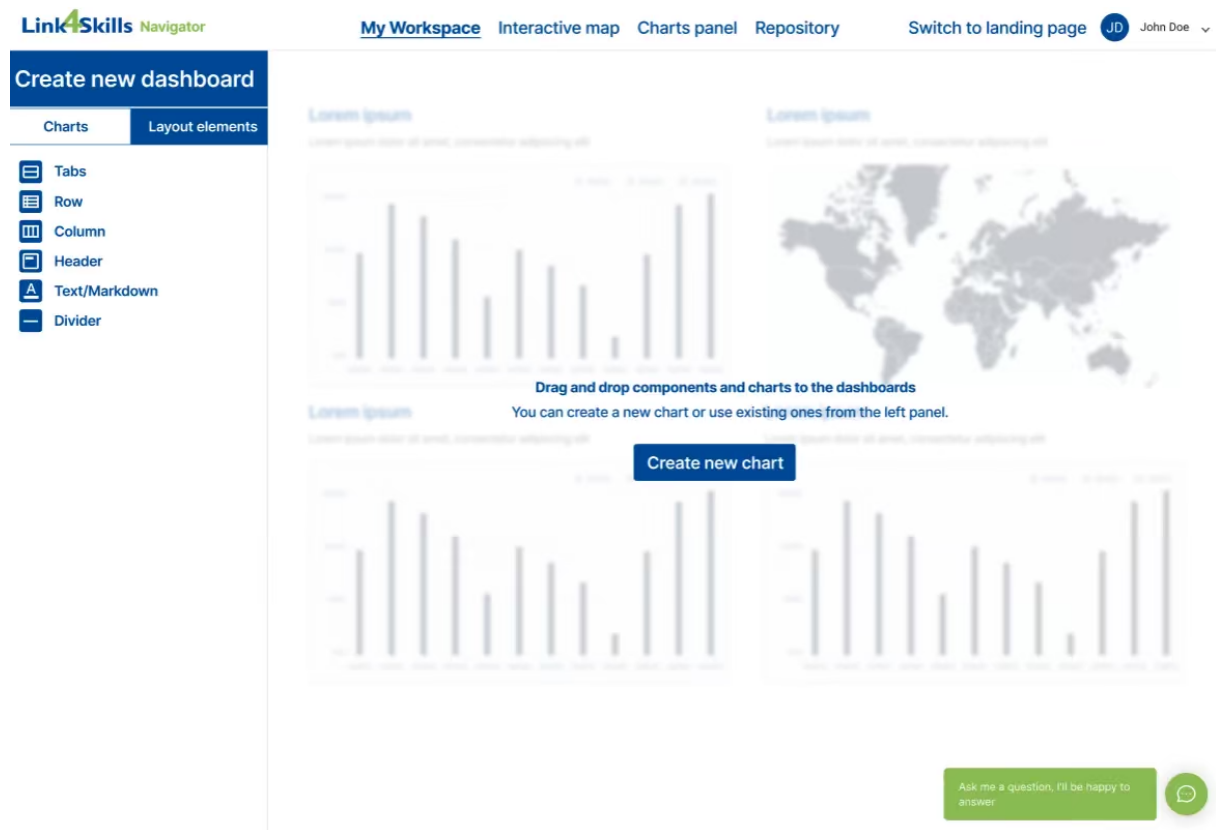
Figure 21 My Workspace – Creating new dashboard – adding a new layout element

To display a given dashboard from a list, a user should click on it. A user will be presented with a window containing all the dashboard elements, such as charts, title, descriptions, maps (Figure 22). The dashboard view will be enriched with necessary functions, such as: delete, edit, create a copy, share and download as pdf (in the form of a structured report) or image.
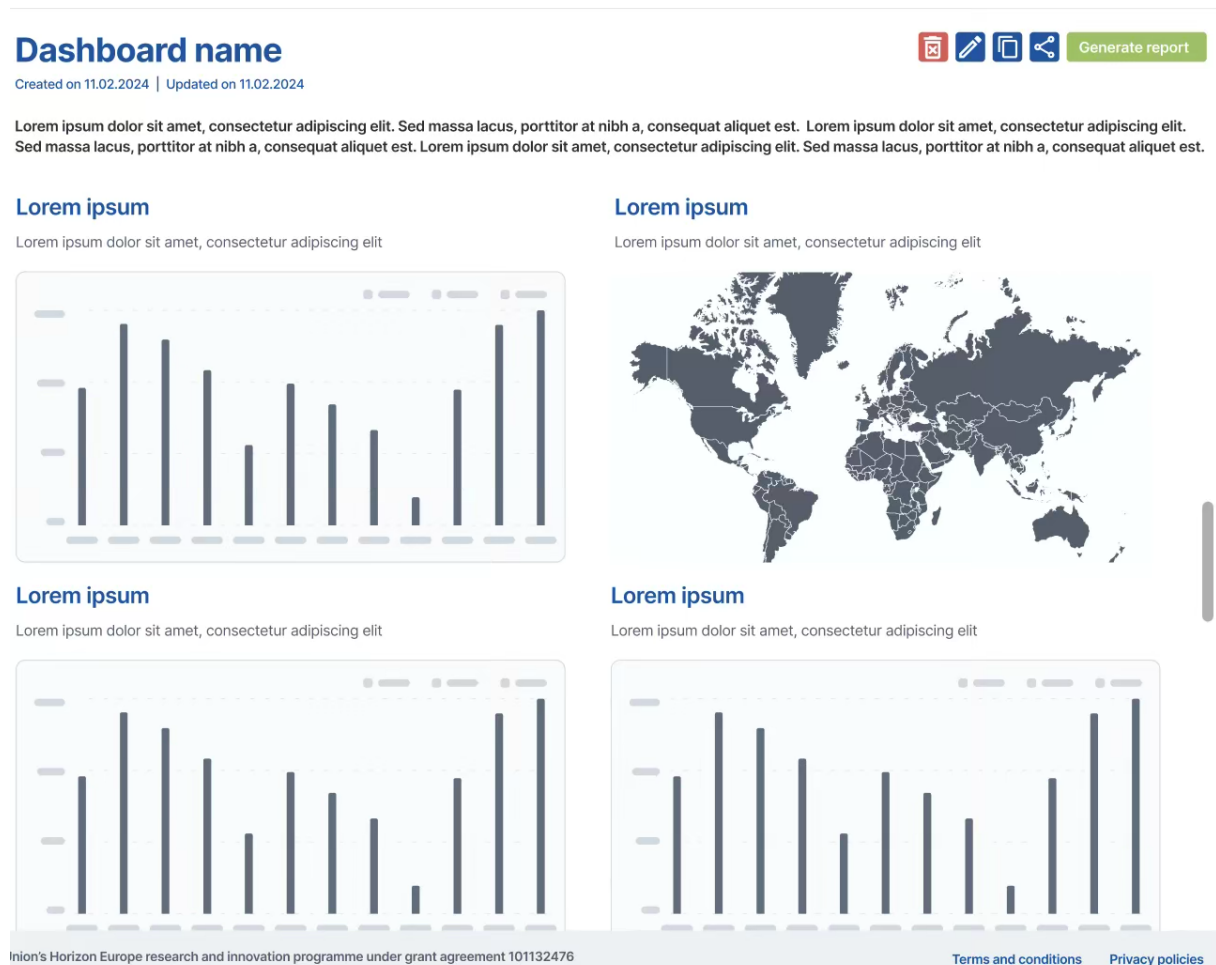
Figure 22 My Workspace – Detailed dashboard view

By clicking on the edit icon a user will be able to modify each dashboard element, remove its individual parts and add new ones from the list of existing charts. After that, a user will have to click the "Save " or "Discard" button (Figure 23).

Figure 23 My Workspace – editing a dashboard

My Workspace – charts (managing, creating and editing)

Under the list of dashboards a user will find a list of already defined charts (in the form of various types of tables, graphs, diagrams or maps). Similarly to dashboards it will be possible to present both as a list of records (Figure 25) or tiles (Figure 24). Also in this part, a user will be shown basic information about the existing charts. In this case, they will be: name, date of last modification, author and type of chart. A user will be able to export a chart, delete it or assign it to "favorites".
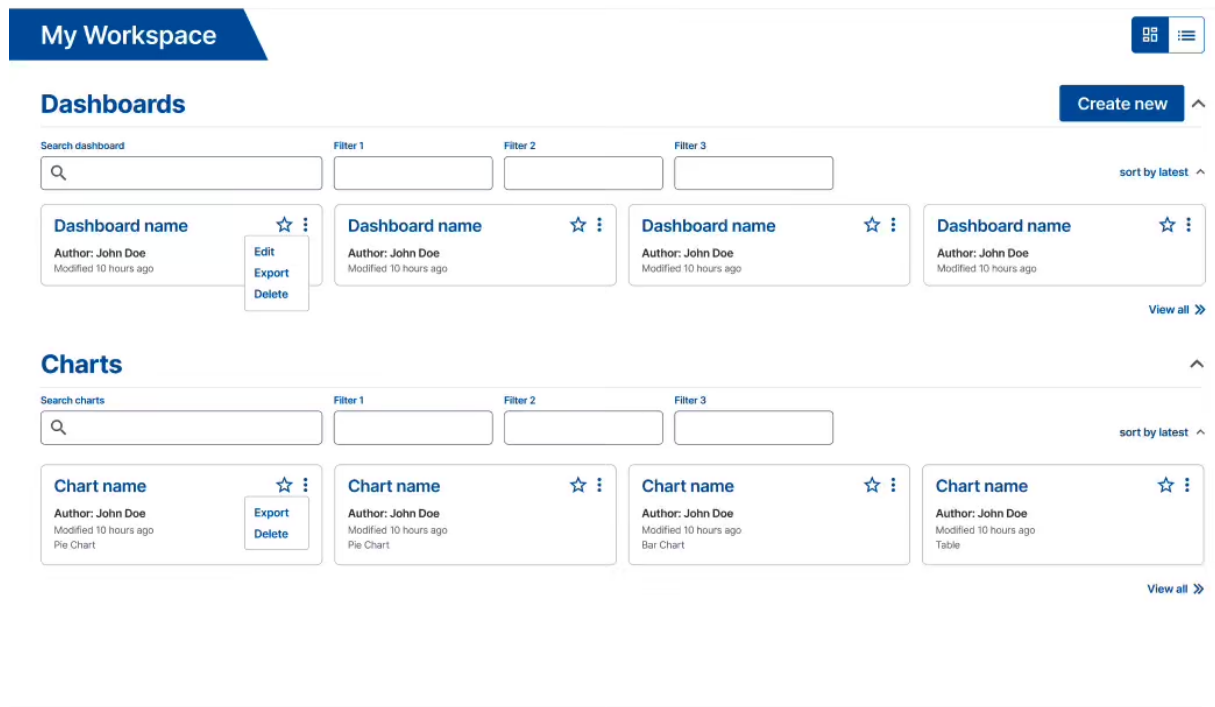
Figure 24 My Workspace - List of charts - Tiles view
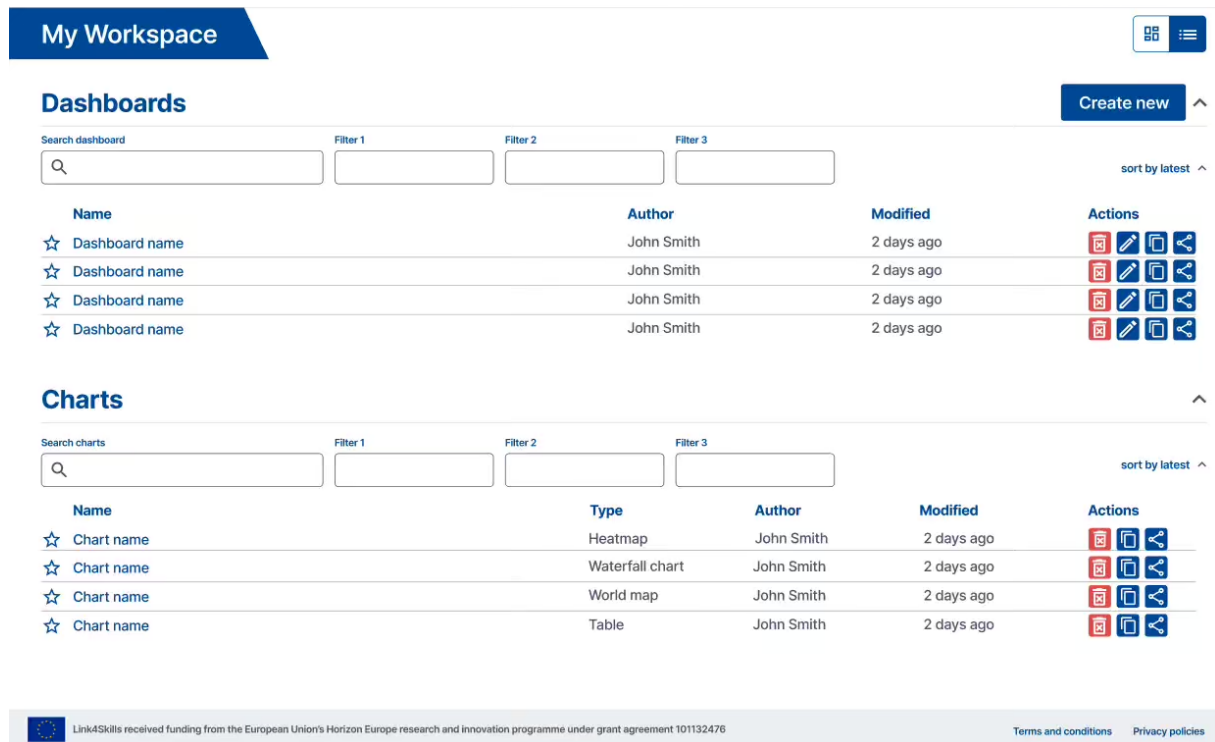
Figure 25 My Workspace - List of charts – List of records view

A user, with wider permissions (Researcher) will additionally have the possibility to edit or create new charts. To create a new chart, a user will have to click the "Create new" button. Then, a window will be displayed (Figure 26) allowing a user to compose a new chart by defining its type and the range of the data that the chart will present. To edit an existing chart, a user will have to click on the edit button on the list of dashboards or in the dashboard window.

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Figure 26 My Workspace are – creating new chart

My workspace - data entry

Adding a data set/information to the database will be possible via a dedicated, separated interface connected to the database. During data import, mechanisms for data validation or error-checking will be launched. The system will display an error message, along with an indication of which records should be corrected. The data integrity on the other side, will be guaranteed by providing a user with a form (template) for entering data in csv format (preferably). The possibility of data set entry by authorised partners ensures that after the project period this database will still be enriched with new sets of information. However, this functionality generates significant limitations regarding the integration of the database with existing records. Therefore, each data set will be treated as a separate source (not integrated with other sources).

After clicking the "Enter new dataset" button (Figure 27), a user will be redirected to an external window, which allows performing this operation in the database. Information on further steps of this procedure will be supplemented at a later stage of work on the Navigator.
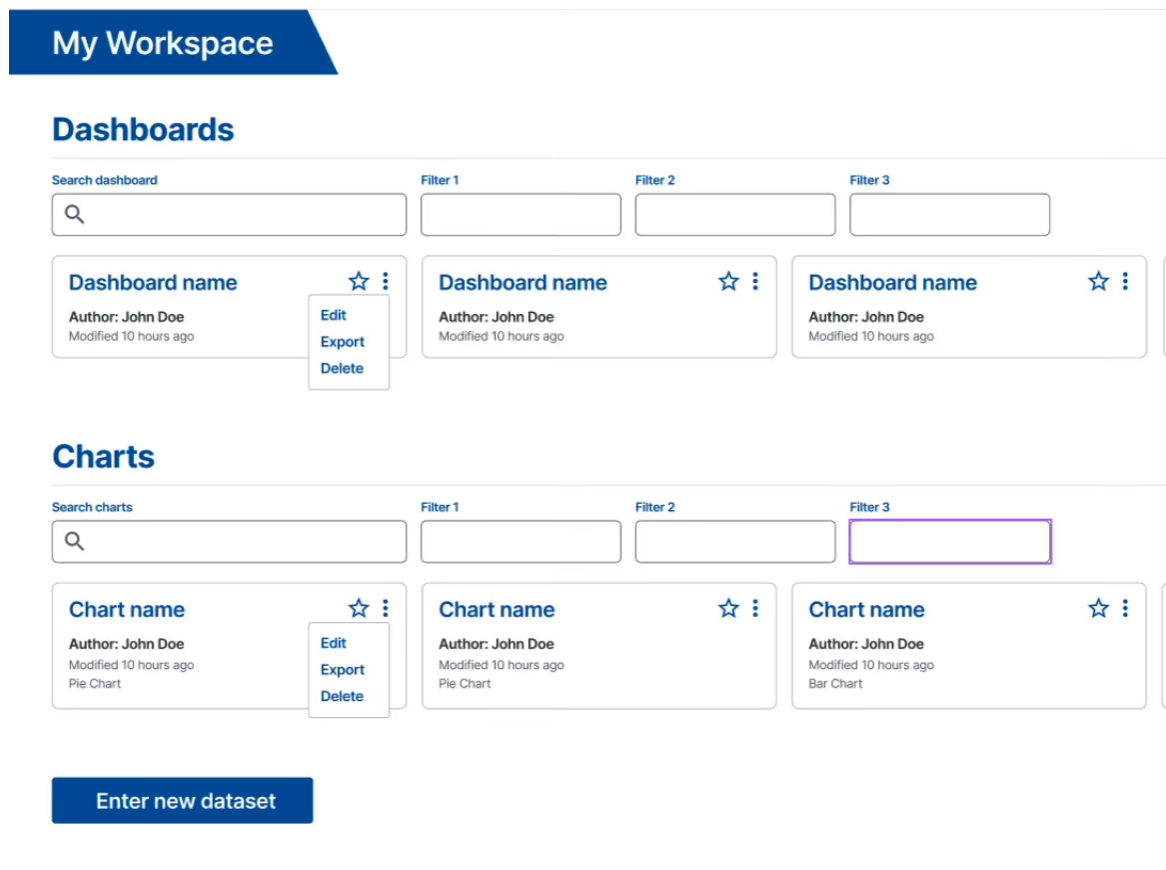
Figure 27 My Workspace - Enter new dataset

Interactive map

Navigating on an interactive map was one of the most frequently defined requirements during interviews with end users. Therefore, a separate part of the Navigator has been dedicated to it. To see the map view, the user must click "Interactive Map" in the navigation menu (Figure 28). The map will allow a user to navigate the skills corridors that are the subject of the project's research. A user will be able to display basic information about the origin/destination countries and others (depending on the available data) by hovering over them or in a separate window. Hovering the mouse over the arrow representing a given corridor should also display data about it.
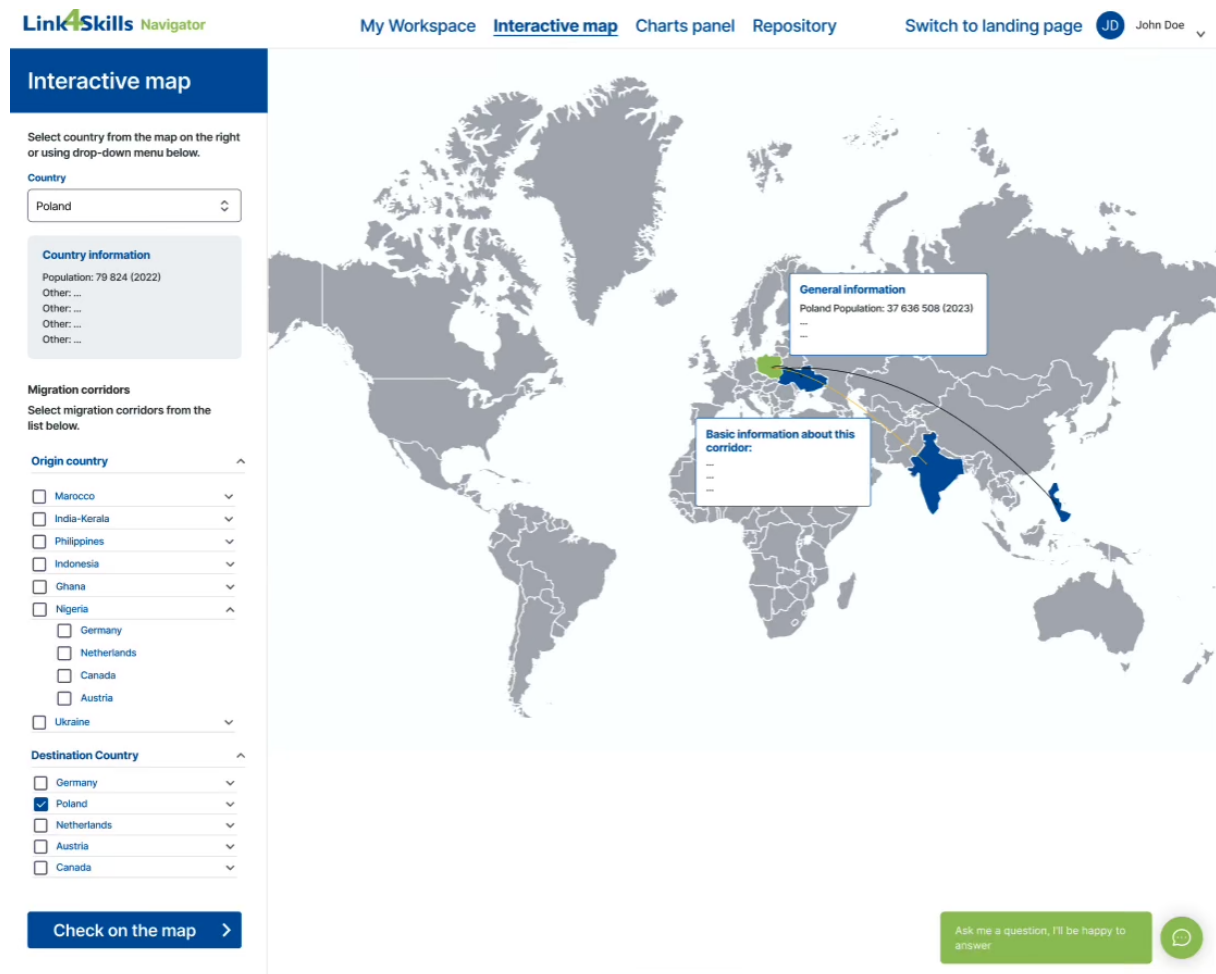
Figure 28 Interactive Map view

Repository

The repository will be a place where users can browse documents and publications collected in the project. It will focus on providing qualitative information. Systematising them and grouping in some categories will allow a user to browse the repository more easily (Figure 29). To display records that interest the users, they will have at their disposal filtering or search functions.

Figure 29 The Repository view

The prototype that is part of this deliverable is a clickable mockup of the Web interface of the Navigator. A prototype of the chatbot has also been developed, with the use of Dialogflow technology, but is not yet integrated with the current prototype. The next prototype of the Link4Skills Navigator should be integrated with the chatbot prototype.

● 4. Conclusions and Future Work

The presented concept and prototype of the Link4Skills Navigator represent a unique combination of functionality for stakeholders and decision makers responsible for decisions that can affect the European labor market and legal, skilled migration. The Navigator will enable its users to visualize statistical data, as well as forecasts, regarding the skill shortages in European countries. A user will also be able to create a custom-made dashboard containing data visualizations required for particular workflows or decision-making processes. The Navigator will also enable making reports based on selected data visualizations. The entire process will be supported by a chatbot that will be able to answer a user's questions using data stored in the Link4Skills database and knowledge base.

The mock-ups presented in the earlier parts of this document are a graphical visualisation of the main requirements collected so far. This prototype, in accordance with the principles of the Agile M ethodology and P   rototyping M   ethod, will be subject to another consultation with end users. The prototyping will take place until approximately month 24 (MS5) of the Link4Skills project, when a prototype at the TRL2 level (working software) is to be created. Even though the next iteration of the user manual is not planned in the deliverable schedule, it will be necessary for the release of subsequent Navigator prototypes.
Work on the Link4Skills Navigator in the coming months will focus on defining the substantive scope of presented content and non-functional requirements (quality requirements, such as performance requirements, security, or reliability).
To ensure the success and practical relevance of the AI-Assisted Skill Navigator developed within Link4Skills, extensive testing will be conducted with target groups, including experts, policymakers,

and practitioners, particularly those involved in Migration Skill Corridors cases, which will remain central to the project's objectives. Furthermore, a robust public relations campaign and dissemination strategy will be launched to promote awareness, foster engagement, and secure broad adoption of the Navigator among stakeholders. These efforts will enhance its usability and impact in addressing global skill shortages.

●

●   Attachment 1 Project glossary

For better understanding of this document the glossary of used terms and definitions is presented below.

Table 1 Glossary of used terms

Term	Definition
Chart	Data visualisation in the form of a table, map, graph or diagram.
Dashboard	A board in the form of a separate window, where a user can indicate and present information that interests them in a visual form. A user can manage elements, add new ones, remove them and also edit existing ones.
Home page	The page (view) that is displayed to the user after logging in to the Navigator.
Landing page	The first view that is displayed to a user in response to clicking on the Link4Skills Navigator website address.
Link4Skills Navigator Named also: the L4S Navigator, the Navigator	A web base space, where the user can browse available data and results of the Link4Skills project, manage her/his workspace and create reports.
Prototype	A prototype is an initial version of a software system that is used to demonstrate concepts, try out design options, and find out more about the problem and its possible solutions[2].
User	A person using Link4Skills Navigator.
Workspace	A space dedicated to a given user, where he/she can manage his/her dashboards and their individual elements.

Table 2 List of abbreviations

Abbreviations	Explanation
EMN	European Migration Network
ILO	International Labour Organization
SDLC	Systems Development Life Cycle

Link4Skills Project Glossary (divided into two parts: description of entities used in ontology and dictionary of remaining terms).

Table 3 Description of entities used in ontology

Entity	Definition
Age group	A range of natural numbers describing the age of people from a certain group e.g. 0-14 years; 15-24 years, etc.
Area	A political unit covering a particular area of land e.g. a region or a country; a body of land with one government; in L4S the classification according to OECD is used; in L4S we not only look at countries, but also sub-units, such as Kerala or Punjab in India.
Automated workplaces	A set of workplaces in which the technological solutions (e.g. machines or software) to perform predictable, repetitive, dangerous tasks, or tasks that require considerable strength, flexibility, and endurance without direct human input, were used.
Education level	A status of acquired general or professional knowledge as well as skills, in institutional and non-institutional forms; in L4S the classification according to International Standard Classification of Education (ISCED) is used.
Intermediaries	State-led or private-led employment agencies, NGOs, training institutions, professional chambers, trade unions, welfare and civil society organizations, migrant and return associations, etc. involved in the

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[2] Sommerville, I. (2011) Software Engineering. 9th Edition, Pearson

	individual labour migration process of a migrant worker, who is neither the migrant worker or the direct employer of the migrant worker. Intermediaries are considered at the "meso-level" scale.
People	A set of individuals which are defined by the same set of attributes e.g. sex, country of birth, age group, having specific skills or/and profession looking for jobs.
Legal status	A status or position held by an entity as determined by the law. It includes or entails a set of privileges, obligations, powers or restrictions declared by legislation.
Labour policy	A set of rules, laws and regulations that a given government implements in relation to labour migration. i.e. L4S recognises that while labour migration-related policies are highly relevant for regulating labour migration, policies outside of the field of labour and migration may nonetheless impact labour migration-related practices and labour migrants' experiences. Labour policies are considered at the "macro-level" scale.
Macro-region	A geopolitical subdivision that encompasses several traditionally or politically defined regions or countries e.g. a Baltic Sea Region, a Danube Region, an Alpine region.
Data origin	Method of elicitations - a way, method or algorithm how the source dataset was derived e.g. statistical observation, trend-based prediction (assuming various "what-if" scenarios), mathematical interpolation.
Labour migrants	A set of individuals who migrates from one country to another with a view to being employed otherwise than on his own account and includes any person regularly admitted as a migrant for employment. Migrants are considered at the "micro-level" scale.
Migration skill corridor	A migration route open/established between two countries/regions; corridor is in L4S used as heuristic; a corridor can be empty or many people move, the direction can be bilateral or primarily unilateral; corridors usually have a long history; in L4S we look at established, emerging and re-emerging corridors.
Occupation	A discipline (or a career identity) and overall expertise in a professional domain; it refers to vocation, in which high degree of education or skills is required; in L4S the classification according to European Skills, Competences, Qualifications and Occupations (ESCO) is used.
Period of time	A timespan covered by specific data e.g. employment or migration statistics. A timespan between the date of beginning and the date of ending date, of various length e.g. year, half f a year, quarter of a year, or a month.
Reskilling	A process of learning new skills so a person can do a different job, or of training people to do a different job; it entails acquiring new skills to transition into a different job role or training individuals for alternative roles.
Sector	A occupational sector; a sector of economy to which statistical data are referring to.
Sex/gender	The physical and biological characteristics that distinguish men and women (versus, socially constructed roles, or gender). In L4S, those not classified as neither female or male are classified as nonbinary.
Skills	Abilities to apply knowledge and use know-how to complete tasks and solve problems; skills are described as cognitive, involving the use of logical, intuitive and creative thinking, or practical, involving manual dexterity and the use of methods, materials, tools and instruments; in L4S the classification according to European Skills, Competences, Qualifications and Occupations (ESCO) is used.
Source dataset	A source of information from which the data originated.
Status of employment	A status of a person telling either he/she is being currently employed or not.
Upskilling	A process which focuses on improving current employees' skill sets so they can advance in their jobs find different roles and professional opportunities; it is also a workplace trend that provides training programs and development opportunities to expand an employee's abilities (skills) and minimize skill gaps.
Vacancies	Positions in a certain country, requiring the same set of skills, profession (representing labour market demand).
Variant	A designation of the data item that allows to distinguish it from the other data instances if they are described in the database with the same attributes. For instance they may be numbers of job seekers in the same county in the same time period, but forecasted assuming different "what-if" scenarios (or calculated using different statistical method).

Table 4 Dictionary of remaining terms

Entity	Definition
Bilateral labour migration agreement	Bilateral labour migration agreements are arrangements between two states. They describe in detail the specific responsibilities of each of the parties and the actions to be taken by them with a view to accomplishing their goals.
Circular migration	Circular migration refers to temporary movements, of a repetitive character and either formally or informally, of persons across borders. Managed or regulated circular migration programmes have emerged as a migration policy tool to mitigate the effects of brain drain and promote development in origin countries through a steady flow of remittances, return of skilled workers, and support for enterprise development.
De-skilling	In the sociology of work, the term is usually defined as situations in which the need for skilled labour within an industry is eliminated or diminished by the introduction of technologies operated by semiskilled workers (e.g. coffee machine replaces barista). In labour migration studies, however, the meaning is that persons with certain skills and certificates might not be able to use them after migrating to another country where these certificates are not recognized (e.g. nurses working as nursing aids).
Industry	A group of manufacturers or businesses that produce a particular kind of goods or services.
Recognition of skills and qualifications	The recognition of qualifications and skills covers two main areas: academic and professional. Academic recognition allows for the continuation of studies at the appropriate level, as well as facilitating access to an appropriate job. Professional recognition provides the opportunity to practice professional skills acquired abroad. Professional recognition covers both regulated (e.g. nursing) and non-regulated (e.g. tailor) professions. Regulated professions are usually governed by legal acts requiring registration,

	certification or licensing. Non-regulated professions do not imply any specific process, as the employer assesses qualifications and professional competency. (Source: ILO 2020, The role of social partners in skills development, recognition and matching for migrant workers - A contribution to the Global Skills Partnership).
Recruitment	The term recruitment includes the advertising, information dissemination, selection, transport, placement into employment and – for migrant workers – return to the country of origin where applicable. This applies to both jobseekers and those in an employment relationship (ILO Def.).
Sector	One of the areas into which the economic activity of a country is divided
Skill partnership	Based on a bilateral labour migration agreement between a country of origin and a country of destination between equal partners, with the latter providing the technology and funding for training the required skills in prospective labour migrants.
STEM	An acronym for science, technology, engineering, and mathematics, considered as a group of academic or career fields.
Talent Partnership	A policy framework to boost mutually beneficial international mobility based on better matching of labour market needs and skills between the EU and partner countries.[3]
Temporary migration	Migration for a specific motivation and / or purpose with the intention that afterwards there will be a return to the country of origin or onward movement.
'Triple win'	'Triple win' is not an academic concept, but it is used as a claim for some labour migration schemes (often circular migration schemes) that shall have positive effects on (1) the countries/regions of origin, (2) countries/regions of destination and (3) the migrants and their families. 'Triple win' claims need to be empirically examined with regards to developmental impacts of mobility; the concrete effects for the involved migrants, families and communities; as well as negative and positive effects on origin and destination countries. Stakeholders have often controversial perceptions and perspectives on 'triple win'.
TVET	An acronym of technical and vocational education and training. Refers to all forms and levels of education which provide knowledge and skills related to occupations in various sectors of economic and social life through formal, non-formal and informal learning methods in both school-based and work-based learning contexts.
What-if scenario	A set of assumptions on which the data forecasts are based e.g. prolonged Russia-Ukraine conflict, unfavourable demographic conditions in Europe, global crisis in World.

● ## Attachment 2 List of functional, general and data requirements

Table 6 A list of functional requirements

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_13	The Navigator must give the possibility to ask questions to chatbot	must	feasible	n/a	GA	chatbot	covered in Prototype 0.1
REQ_15	The dialog system must be able to detect, verify and debunk misinformation on the subject of skill shortages or migration	must	partially feasible	n/a	GA	chatbot	under investigation
REQ_16	The Navigator must be an open access and open-licence knowledge based expert system	must	feasible	n/a	GA	availability	confirmed
REQ_17	The Navigator must automatically import new available data coming from public statistics	must	feasible, but under some conditions	n/a	GA, US223, 225	up-to-date	to be agreed - dependent on other factors
REQ_18	The chatbot must be integrated with Microsoft Teams, the Facebook Messenger platform, and LinkedIn	must	partially feasible		GA	chatbot	under investigation
REQ_24	The Navigator (via the Dialog System) must understand the natural language.	must	Feasible		GA	chatbot	to be implemented
REQ_25	The Navigator must allow a visualisation and analysis of migration corridors on an interactive map	must	Feasible	n/a	GA, US177	data visualisation	covered in Prototype 0.1

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[3] Source: https://home-affairs.ec.europa.eu/policies/migration-and-asylum/legal-migration-and-integration/talent-partnerships_en

Link4Skills
Horizon Europe

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_26	The Navigator must enable user interaction through an AI dialog system	must	Feasible	n/a	GA	chatbot	covered in Prototype 0.1
REQ_27	The AI dialog system must be available on popular social media platforms (particularly Messenger, the Facebook communication platform).	must	Partially feasible	n/a	GA	chatbot	to be included
REQ_28	The Navigator must be able to monitor discussions of its users in Messenger groups (if the users invite the Navigator chatbot to their group), and contribute data, knowledge, forecasts and analyses, as well as answer questions, detect and debunk disinformation about migrations	must	Partially feasible	n/a	GA	chatbot	to be implemented
REQ_31	The Navigator should store the history of the conversation with the chatbot to download visualisation	should	feasible	n/a	US01	Chatbot	to be implemented
REQ_32	The Navigator should store the session history to enable saving previous actions/steps	should	feasible	n/a	US02	session history	to be included
REQ_33	The Navigator should enable the user to develop protocols that help all users use the tool consistently.	should	Feasible	n/a	US03	user manual	to be included
REQ_34	The Navigator should have the regular control interface with dropdown fields to easily select the data and generate the visualisations	should	Feasible	n/a	US04, US08	interface	covered in Prototype 0.1
REQ_35	The Navigator must present results/data in the form of a bar chart, pie chart or line chart, heat maps, network diagrams, symbol maps and stacked area charts as well as choropleth maps.	must	Feasible	n/a	US05, 178	data visualisation	covered in Prototype 0.1
REQ_36	The Navigator should allow saving (downloading) results	should	Feasible	n/a	US06, 255	saving the results	covered in Prototype 0.1
REQ_37	The Navigator should allow the user to choose the format in which the results should be saved (eg. Csv. svg, png, pdf. image file)	should	Feasible	n/a	US06, US09, 248	saving the results	covered in Prototype 0.1
REQ_38	The Navigator should allow customization of generated graphs by changing the axes, scale, legend and colours.	should	partially feasible	n/a	US07, US24, 254	data visualisation	covered in Prototype 0.1
REQ_39	The Navigator should inform what visualisations are recommended for the presentation of selected data.	should	Feasible	n/a	US10, US27	data visualisation	covered in Prototype 0.1
REQ_40	The Navigator should allow the user to select the type of chart to present the data	should	Feasible	n/a	US10	data visualisation	covered in Prototype 0.1
REQ_41	The Navigator should allow the visualisation to be resized depending on the publication needs (e.g. for social media, newsletters or LinkedIn)	should	Feasible	n/a	US12	data visualisation	under investigation
REQ_42	The Navigator should allow sharing the data on social media platform like Twitter or LinkedIn	should	Feasible	n/a	US14, 166	sharing the results	covered in Prototype 0.1 – partially

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_43	The Navigator should enable the generation of infographics (containing photos, text and graphs)	should	not feasible	n/a	US15	data visualisation	out of scope
REQ_44	The Navigator should be able to create a visualisation for more than one variable	should	Feasible	n/a	US18	data visualisation	covered in Prototype 0.1
REQ_45	The Navigator should visualise data in such a way as to interest the recipients	should	Feasible	n/a	US19	data visualisation	unmeasurable
REQ_46	The Navigator should explain the meaning of data and include a legend that will allow understanding the colours and symbols used	should	Feasible	tbc	US20	data visualisation	covered in Prototype 0.1
REQ_47	The Navigator should allow the user to download a single graph	should	Feasible	n/a	US21	data visualisation	covered in Prototype 0.1
REQ_48	The Navigator should allow the user to download raw data	should	Feasible	n/a	US23	saving the results	covered in Prototype 0.1
REQ_49	The Navigator should generate charts that are basic and familiar to ensure easy understanding of presented data	should	Feasible	n/a	US25	data visualisation	covered in Prototype 0.1
REQ_50	The Navigator should allow to display detailed information about individual graph elements by hovering the mouse cursor over them	should	Feasible	n/a	US22	data visualisation	to be included
REQ_51	The Navigator should highlight specific data points that are important for the question asked	should	Partially feasible		US26	Chatbot and user interface	under investigation
REQ_52	The Navigator could allow the user to select a few countries (a region or different MS) and present aggregated information about them	should	Feasible	n/a	US68	selecting countries	covered in Prototype 0.1
REQ_53	The Navigator should allow the user to select a few countries and present the relationships about them (policy agreements, projects, pathways)	should	feasible under conditions	tbc	US69	selecting countries	under investigation
REQ_54	The Navigator should enable comparison of data by country	should	feasible	n/a	US70, US72,US73, US75,78	comparison	covered in Prototype 0.1
REQ_55	The Navigator should enable comparison of data by year	should	feasible	n/a	US77, 78	comparison	covered in Prototype 0.1
REQ_56	The Navigator should display information about changing the way data is defined/collected over the years	should	feasible	tbc	US77	disclaimer	covered in Prototype 0.1
REQ_57	The Navigator could display key information about the country within a corridor when the user hovers over it with the mouse [comment: or another similar way] (e.g. in the form of a tooltip).	could	feasible	feasible	US80	data visualisation	covered in Prototype 0.1
REQ_63	The Navigator could present the migration corridors visualised as arrows with estimated numbers next to them and have information of how they cross, border, sea.	could	feasible	n/a	US90	data visualisation	covered in Prototype 0.1
REQ_64	The Navigator could enable the user to download a fact sheet in a pdf about the selected	could	feasible	n/a	US94	saving the results	to be implemented

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
	country (in a form of save screen view option).						
REQ_65	The Navigator, once selecting a country, should display a list of policies/projects, categorised by their status of activity (e.g. those that are active, those that are completed, continued, or were incorporated into the legislation). It is advisable to use colour coding for categorisation.	should	feasible	tbc	US95	data visualisation	under investigation
REQ_87	The Navigator could suggest tools to assess the qualifications of internationally trained individuals, for example, with the use of Education Services for Equivalency.	could	feasible	tbc	US121	providing list of tools to assess the qualifications	under investigation
REQ_95	The Navigator should provide glossary of terms used and should use standardised terminology	should	feasible	feasible	US134, 135, 136, 137, 138, 139, 141, 142, 143 144, 147,149	provide glossary of therms	to be implemented
REQ_96	The Navigator could provide the ready analyses	could	Feasible under some conditions	tbc	US140	providing analyses	under investigation
REQ_97	The Navigator should provide information (introduction) about the data provided, the possibilities and benefits of using it	should	feasible	tbc	US146	disclaimer	covered in Prototype 0.1
REQ_98	The Navigator should present the source, methodology and context of the data presented, and how often it is updated (also with links to the specific website)	should	feasible	tbc	US148, US222, 237, 241, 242, 244, 246, 247	disclaimer	covered in Prototype 0.1
REQ_99	The Navigator should provide a disclaimer to outline the risks of moving abroad based on information online	should	feasible	tbc	US150	disclaimer	under investigation
REQ_100	The Navigator should provide a disclaimer that the interpretation of national law may vary depending on the regions, which may result in different formal requirements when submitting legalisation documents	should	feasible	tbc	US152	disclaimer	under investigation
REQ_101	The Chatbot should provide disclaimer related to ethics and common sense things	should	feasible		US156	Disclaimer/chatbot	under investigation
REQ_102	The Navigator could present reviews of the tool about its correct functioning (recommendations) along with information about the authors	could	feasible	tbc	US157	disclaimer	under investigation
REQ_103	The Navigator should provide a disclaimer that the data are valid and safe to use	should	feasible	tbc	US158, 236	disclaimer	covered in Prototype 0.1
REQ_104	The Chatbot should present information about the source of its answer (eg. in a form of footnote or links)	should	feasible		US159, 224, 226, 236, 243, 245	chatbot	To be implemented

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_105	The Navigator should display a disclaimer about the chatbot with information on the purpose of its creation, authors, and data used to train it.	should	feasible	Feasible	US160	disclaimer	covered in Prototype 0.1
REQ_106	The Navigator should provide information on how the chatbot processes data.	should	feasible	Feasible	US161	disclaimer	covered in Prototype 0.1
REQ_107	The Navigator could be able to generate consistent visualisations	could	Partially feasible	Feasible	US162	User interface and chatbot	under investigation
REQ_108	The Navigator could be able to present several visualisations in order to be able to compare them	could	Partially feasible	Feasible	US162	User interface and chatbot	under investigation
REQ_109	The Navigator should enable to create advanced, custom queries.	should	Partially feasible	Feasible	US163	User interface and chatbot	under investigation
REQ_110	The Navigator should display a list of popular queries and allow the user to select from this list	should	Partially feasible	Feasible	US164	User interface and chatbot	under investigation
REQ_111	The Navigator could adjust the default view depending on the type of user (such as researcher, policy-maker or recruiter)	could	feasible	n/a	US165, 173	default view	covered in Prototype 0.1
REQ_113	The Navigator should allow the user to select the geographic area and country that the user is interested in	should	feasible	n/a	US169	data visualisation	covered in Prototype 0.1
REQ_114	The Navigator should allow the user to select the reference year	should	feasible	n/a	US170	data visualisation	covered in Prototype 0.1
REQ_115	The Navigator should present simple visualisations that give a clear picture of the most interesting trends at a glance and are understandable to everyone.	should	feasible	n/a	US171, 172	data visualisation	covered in Prototype 0.1
REQ_116	The Navigator should explain the limitations of the data provided and the methods for assessing their reliability.	should	feasible	tbc	US174	disclaimer	to be implemented
REQ_117	The Navigator should allow the user to display a snapshot of upskilling and reskilling policies of member states when exploring the data on a map.	should	feasible	tbc	US179	data visualisation	under investigation
REQ_118	The Navigator should present the most important data with the possibility of enlisting/choosing details	should	feasible	n/a	US180, 203	data visualisation	covered in Prototype 0.1
REQ_119	The Navigator should be a single integrated dashboard (comment: composition of reporting elements) presenting the relationships between different data, like education, migration, demography without having to switch dashboards	should	feasible	feasible	US186	data visualisation	covered in Prototype 0.1
REQ_128	After selecting a criterion, the Navigator should only consider those countries that have data available	should	feasible	n/a	US199, 202	data visualisation	under investigation
REQ_138	The Navigator should allow a user to search for data based on partial matches and synonyms	should	Feasible	Feasible	US219	User interface and chatbot	To be implemented

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_139	The Navigator should allow you to sort search results	should	Feasible	Feasible	US120	User interface	covered in Prototype 0.1
REQ_141	The Navigator could enable the ReliefWeb to store and use links to documents, initiatives and organisations	could			US227	sharing results with other databases	under investigation
REQ_142	The Navigator should provide direct links to policies, legal acts and to sources, possibly via the gov. Domain	should	feasible	Tbc	US228	providing direct references	under investigation
REQ_144	The Navigator should provide data coming from the direct source (not quoted)	should	feasible	n/a	US230	providing direct references	under investigation
REQ_146	The Navigator should present the regular and reliable data from the statistical office, indication when and what data has been updated, along with information about possible corrections	should	feasible	Tbc	US232	provide data from other sources	under investigation
REQ_147	The Navigator should present values of the same data coming from different, alternative data sources	should	feasible	Tbc	US233	provide data from other sources	under investigation
REQ_150	The Navigator could provide information about useful tools to be used to visualise data easily for free online.	could	n/a	n/a	US239	providing list of tools to visualise data	out of scope
REQ_151	The Navigator could enable access to European Labor Force Data	could	feasible	Tbc	US240	integration with other database	under investigation
REQ_152	The Navigator should present the data in the a form of a table with the ability to filter and sort data according to specific criteria (alphabetically, by number, where the data is from and when was it updated)	should	feasible	n/a	US249, 250, 256, 258	present project results	covered in Prototype 0.1
REQ_153	The Navigator should allow a user to apply advanced statistical tools (with an explanation of how they work) to the data selected	could	feasible	n/a	US251	statistical tool	under investigation
REQ_154	The Navigator should present correlations between data/results	should	tbc	Tbc	US252	data visualisation	under investigation
REQ_155	The Navigator should allow a user to explore tables easily, with percentages, proportions.	should	feasible	n/a	US253	data visualisation	under investigation
REQ_157	The Navigator should be accessible only by authorised/registered users	should	feasible	n/a	ITTI	user account	covered in Prototype 0.1
REQ_158	The Navigator should allow a user to build his own document out of particular elements (tables, charts, plots)	should	feasible	n/a	ITTI	creating report	covered in Prototype 0.1
REQ_159	The chatbot should allow users to generate visualisations, suggest data relationships, and locate difficult-to-find information.	should	Partially feasible	Partially feasible	US28, US29, US40, US41, US42, US62	Chatbot and user interface	Under investigation
REQ 160	The chatbot should quickly translate legislation and assist in drafting professional communication that does not appear automated.	Could	Partially feasible	Partially feasible	US30, US35, US38, US63	Chatbot	Under investigation

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ 161	The chatbot should condense and synthesize information to counter disinformation and create persuasive data-driven responses.	should	Partially feasible	Partially feasible	US31, US32, US56, US57, US66	Chatbot	Under investigation
REQ 164	The chatbot should generate social media-friendly content and assist in creating engaging posts for platforms like LinkedIn and Twitter.	could	Feasible	Feasible	US38, US48, US52, US60	Chatbot	To be implemented
REQ 166	The chatbot should facilitate brainstorming sessions, generate discussion questions, and identify relevant NGOs and organisations.	could	Partially feasible	Partially feasible	US59, US61, US51, US54	Chatbot	Under investigation
REQ 168	The chatbot should allow users to request datasets or visualisations via natural language, with options to manually adjust and verify outputs.	could	Feasible	Feasible	US39, US62, US28, US37	Chatbot and user interface	To be implemented

Table 7 List of general and data requirements

REQ No.	Name	Priority	Application-related Feasibility	Data-related Feasibility	Source	Scope	Status
REQ_1	The Navigator must provide insights and recommendations related to workforce skills, training needs, and talent development strategies	must			GA	present project results	designed in prototype - data is needed
REQ_2	The Navigator must leverage artificial intelligence and data analytics	must			GA	general	designed in Prototype 0.1 - data is needed
REQ_3	The Navigator must inform strategic decision-making in areas such as workforce planning, talent acquisition, and policy formulation	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_4	The Navigator must provide support in matching global evidence about skill demand and supply	must			GA	general	designed functions in Prototype 0.1 enable it - data is needed
REQ_5	The Navigator must present data, information and knowledge from an assessment of EU shortages and projections with validated various approaches to meeting skill shortages	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_6	The Navigator must present assessment of education and training structures in origins	must			GA	present project results	under investigation
REQ_7	The Navigator must present insights into migration skills corridors with special focus on skill transfer and skill recognition	must			GA	present project results	under investigation
REQ_8	The Navigator must present inventory of skill and talent partnerships	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_9	The Navigator must support decision making to navigate skills shortages and matching in the EU labour markets	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed

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REQ_10	The Navigator must present the results of modelling skill shortages (backcasting, nowcasting and forecasting)	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_11	The Navigator must make available the skill statistics	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_12	The Navigator must make available the projections of skill supply and demand	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_14	The Navigator must present the project results	must			GA, US181	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_19	The Navigator must be the main user interface of a Knowledge Based Expert System (KBES)	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_20	The Navigator must support the process of data gathering	must	feasible		GA	general	covered in Prototype 0.1
REQ_21	The Navigator must be integrated with the Skills Shortage Assessment Model (project results)	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_22	The Navigator must integrate Migration Skill Corridors data (project results)	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_23	The Navigator must integrate policy documents and pilot projects of talent partnerships (project results)	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_29	The Navigator must allow the users to simulate decision scenarios	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_30	The Navigator must allow the users to predict the long-term outcomes of user decisions	must			GA	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_58	The Navigator could support the user in assessing the level of difficulty of legalising the work of a specific person travelling within a migration corridor	could			US82	present project results	under investigation
REQ_59	The Navigator could present the corridors, where visa is not required	could			US83	present project results	under investigation
REQ_60	The Navigator could present the information about the likelihood of a person being granted a visa (rejection rate) to a another country	could			US83	present project results	under investigation
REQ_61	The Navigator could be able to present the data on the flight/travel prices for a certain corridor	could			US84	present project results	under investigation
REQ_62	The Navigator should present the data on on the composition of talent supply	should			US86	present project results	designed functions in Prototype 0.1

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							enable it - data is needed
REQ_66	The Navigator should display a diaspora in a specific country	should			US96	present project results	under investigation
REQ_67	The Navigator should help in understanding the educational system and support systems in origin countries	should			US97	present project results	under investigation
REQ_68	The Navigator could help in understanding the state of work permits in different countries depending on the industry	could			US100	present project results	under investigation
REQ_69	The Navigator could present the information on the ease of finding accommodation in the target country.	could			US101	present project results	under investigation
REQ_70	The Navigator should present information on the demography and demographic projections related to future labour shortages	should			US102	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_71	The Navigator could present the opportunities for upskilling related to local language lessons for migrants	could			US103	present project results	under investigation
REQ_72	The Navigator could present skill shortages and policies in different, smaller, regions than a country	could			US104	present project results	under investigation
REQ_73	The Navigator should present the vacancy statistics per industry in a country	should			US105	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_74	The Navigator could present information related to taxes, social security and services (educational opportunities, kindergarten) per country, and per smaller region.	could			US106	present project results	under investigation
REQ_75	The Navigator could present the information about accepting and verifying credentials by certain countries and industries	could			US107	present project results	under investigation
REQ_76	The Navigator should enable making a comparison of skill shortages in a given country with local programs that enable the employment of foreigners	should			US108	present project results	under investigation
REQ_77	The Navigator could present the salary range for a certain profession in a country	could			US109	present project results	under investigation
REQ_78	The Navigator could present the provincial-level pathways, not only federal/state levels	could			US110	present project results	under investigation
REQ_79	The Navigator could present the status of a foreign workers as they arrive in a country and what opportunities they will have (are they landed immigrants, or temporary), for example, whether they can become a permanent resident or a citizen.	could			US111	present project results	under investigation
REQ_80	The system could provide information on language requirements for what kind of permit in a given country	could			US112	present project results	under investigation
REQ_81	The system could provide up-to-date information on visa applications and requirements	could			US113	present project results	under investigation
REQ_82	The Navigator could provide the data about the person on the age, sex, language proficiency (of the country	could			US115	present project results	under investigation

	of starting work) as well as the plans to stay in the country						
REQ_83	The Navigator could provide information enabling the assessment of the likelihood of employees staying in a given country (such as plans related to the school enrollment of children)	could			US116	present project results	under investigation
REQ_84	The Navigator could be able to present what the barriers to employment in certain professions are in individual countries.	could			US117	present project results	under investigation
REQ_85	The Navigator should provide information about disappearing/shrinking jobs of certain types	should			US118	present project results	under investigation
REQ_86	The Navigator should facilitate data interpretation by showing connections between demographic data and other values, such as skills shortages	should			US119, 168	present project results	designed functions in Prototype 0.1 enable it - data is needed
REQ_88	The Navigator could present the requirements that an employed person must meet to enter a given country	could			US122, 128	present project results	under investigation
REQ_89	The Navigator could present what support a newcomer can receive in a given country	could			US122	present project results	under investigation
REQ_90	The Navigator could present reasons for leaving the country to change jobs (e.g. for a better job, or is their job replaced/automated)	could			US123	present project results	under investigation
REQ_91	The Navigator should provide information on stakeholders involved in the different pilot skills partnerships in the countries of origin	should			US124	present project results	under investigation
REQ_92	The Navigator could provide information on how to formally recognize diplomas in different industries and countries	could			US130	present project results	under investigation
REQ_93	The Navigator could present information on the policy regarding the legal protections of migrants who come to work in a given country.	could			US131	present project results	under investigation
REQ_112	The Navigator could enable exploring the data with an intersectional lens (not only select female migrants, but also black, muslim and with disability)	could			US167	present project results	under investigation
REQ_120	The Navigator could present the number of work permits for migrants from different origin countries and how they changed over time.	could			US187	present project results	under investigation
REQ_121	The Navigator could present the data from multiple countries on the employment, unemployment rates, the share of citizens in the local labour market, the projections of EC regarding economic growth	could			US189	present project results	under investigation
REQ_122	The Navigator could present the data on key industries of different countries and their size	could			US190	present project results	under investigation
REQ_123	The Navigator could present the policies and programs related to cross-cultural competency in different countries.	could			US191	present project results	under investigation
REQ_124	The Navigator could present the data on the investment in upskilling/reskilling programs in different countries	could			US192	present project results	under investigation

REQ_125	The Navigator could present the skill shortages when it comes to short term work, eg as a consultant	could			US195	present project results	under investigation
REQ_126	The Navigator could present the information on what roles are people moving from and what roles are they moving to	could			US196	present project results	under investigation
REQ_127	The Navigator could present the data on the emerging jobs and job market in different countries	could			US198	present project results	under investigation
REQ_129	The Navigator could present the predictions/potential for automation in different industries	could			US207	present project results	under investigation
REQ_130	The Navigator could present the projections on how many people will want to go back to their countries of origin after having some experience in the receiving country	could			US208	present project results	under investigation
REQ_131	The Navigator could present programs that could encourage migrants to return to their origin country	could			US209	present project results	under investigation
REQ_132	The Navigator could provide information on how to fill a skill shortage in a given country	could			US211	present project results	under investigation
REQ_133	The Navigator could provide information on the effects that can be caused by recognizing all diplomas, encouraged migration, encouraged automation.	could			US211	present project results	under investigation
REQ_134	The Navigator could present what costs and benefits result from taking steps to fill skill gaps (automate, recruit workers from abroad, upskill/reskill workforce)	could			US212	present project results	under investigation
REQ_135	The Navigator could present the possible gaps in wages between local and migrant workers and how to close the gap with proper programs and policies.	could			US214	present project results	under investigation
REQ_136	The Navigator could visualise skill shortages in certain countries and for different occupations (doctors, nurses) over time, together with projections.	could			US217, 216	present project results	under investigation
REQ_137	The Navigator could be able to visualise the impact of automation on skill shortages and surpluses in different occupations.	could			US218	present project results	under investigation
REQ_140	The Navigator could present the data created in related projects	could			US121	present the results from other projects	under investigation
REQ_143	The Navigator should present up to date policies and data	should			US229	present project results	under investigation
REQ_145	The Navigator should present the official data on the number of migrants as well as estimates on the potential numbers	should			US231	present project results	under investigation
REQ_148	The Navigator could present data on the labour market trends on a monthly basis (e.g. monthly unemployment rates)	could			US234	present project results	under investigation
REQ_149	The Navigator could present the more granular data on job posts and skills	could			US235	present project results	under investigation

REQ_152	The Navigator should present the data in the a form of a table with the ability to filter and sort data according to specific criteria (alphabetically, by number, where the data is from and when was it updated)	should	feasible		US249, 250, 256, 258	data visualisation	covered in Prototype 0.1
REQ_156	The Navigator should present the occupations based on the sectors in which the given profession is performed	should			US257	present project results	under investigation
REQ_112	The Navigator could enable exploring the data with an intersectional lens (not only select female migrants, but also black, muslim and with disability)	could			US167	present project results	under investigation
REQ_120	The Navigator could present the number of work permits for migrants from different origin countries and how they changed over time.	could			US187	present project results	under investigation
REQ_121	The Navigator could present the data from multiple countries on the employment, unemployment rates, the share of citizens in the local labour market, the projections of EC regarding economic growth	could			US189	present project results	under investigation
REQ_122	The Navigator could present the data on key industries of different countries and their size	could			US190	present project results	under investigation
REQ_123	The Navigator could present the policies and programs related to cross-cultural competency in different countries.	could			US191	present project results	under investigation
REQ_124	The Navigator could present the data on the investment in upskilling/reskilling programs in different countries	could			US192	present project results	under investigation
REQ_125	The Navigator could present the skill shortages when it comes to short term work, eg as a consultant	could			US195	present project results	under investigation
REQ_126	The Navigator could present the information on what roles are people moving from and what roles are they moving to	could			US196	present project results	under investigation
REQ 162	The chatbot should guide users on how to use it effectively through examples and ensure confidence in its use.	should	Partially feasible	Partially feasible	US33, US34, US47, US43, US44	Chatbot	Under investigation
REQ 163	The chatbot should allow users to save and reuse chatbot prompts with relevant context and customise chatbot behaviour according to specific roles.	Could	Feasible	Feasible	US49, US50, US65, US44	Chatbot	To be implemented
REQ 165	The chatbot-generated content should meet high standards for legal and policy work.	should	Partially feasible	Feasible	US34, US53, US55	Chatbot	Under investigation
REQ 167	The chatbot should help users understand and promote ethical recruitment practices.	could	Partially feasible	Partially feasible	US63, US67, US46, US45	Chatbot	Under investigation