



DS4Skills

COMMON EUROPEAN DATA
SPACE FOR SKILLS

D3.1 Implementation report on Data Space for Skills use cases

January 31st, 2026



Co-funded by
the European Union

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Health and Digital Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

D3.1 Implementation report on Data Space for Skills use cases V1

Work package	WP3
Task	T3.1
Due date	30/01/2026
Submission date	02/02/2026
Deliverable lead	Prometheus-X
Version	1.0
Authors	Partner Entity (People's name if desired, not necessary)
Reviewers	Partner Entity (People's name if desired, not necessary)
Keywords	
Dissemination level	PU
Nature of the deliverable	R

Document Revision History

Version	Date	Description of change	List of contributor(s)

Partners



Grant Agreement No.: 101195165
Call: DIGITAL-2024-CLOUD-DATA-06
Topic: DIGITAL-2024-CLOUD-DATA-06-SKILLS
Start Date of Project: 01 January 2025
Duration: 36 months

DISCLAIMER

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Health and Digital Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

COPYRIGHT NOTICE

© DS4Skills Consortium, 2025-2027
 This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both. Reproduction is authorised provided the source is acknowledged.

Executive summary

This report, **D3.1 Implementation Report on Data Space for Skills Use Cases**, details the successful completion of the initial definition phases for the eight use cases within the DS4SKILLS project. The overarching objective of the project is to implement these use cases to demonstrate the practical applications and strategic benefits of the Data Space for Skills, ensuring better alignment between workforce skills and the evolving demands of the European labour market by adopting the methodology used in EDGE SKILLS.

Key Results and Progress:

- **Phase Completion:** All eight use cases have successfully finalized both their Phase 1 (Initiation) and Phase 2 (Design) stages, including the comprehensive development of their use case descriptions, value propositions, key performance indicators (KPIs), risk mitigation strategies, and detailed testing plans.
- **Use Case Portfolio:** The project is validating solutions across diverse sectors and countries through eight distinct use cases:
 - **LIST (Luxembourg):** Mind the Gap: Personalized and Job Market-Aligned Training for Future-Ready Workforce.
 - **Scheer (Germany):** Skill-driven Strategic Workforce Learning and Development.
 - **LMS (Greece):** Manufacturing skills forecasting & matching.
 - **CSC (Finland):** Supporting Student Mobility and Lifelong Learning.
 - **UOC (Spain):** Skills-driven Higher Education Institutions.
 - **Athumi-IMEC (Belgium):** Bridging Data Spaces – Exploring Interoperability.
 - **Mylia-Badgebox (Italy):** Digital Fusion Skills Assessment and Upskilling Tool.
 - **AFP-Tralalère (France):** When Media Data Meets Education – Empowering Media Literacy.
- **Foundation for Governance:** The document also highlights the project's technical considerations, specifically concerning interoperability, maintenance, and the integration of European datasets. It further documents productive initial discussions with the European Union concerning the integration of tools like EUROPASS and identifying synergies with the Union of Skills initiative.

Next Steps and Outlook:

The project is now transitioning into the critical Phase 3 (Testing). This phase will focus on not only validating the technical functionality of each use case but, crucially, advancing the development and refinement of their long-term **business and governance models**. This approach ensures the solutions are technically sound and strategically prepared for scalable deployment in Phase 4, securing the project's lasting impact on skills development across the European Union.

Table of Contents

Introduction	7
1 Use Case Descriptions and Testing Plans	8
1.1 LIST Use Case : Mind the Gap: Personalized and Job Market-Aligned Training for Future-Ready Workforce	8
1.1.1 Use case description, value and goal	8
Use Case partners	8
Use case functionalities	10
KPIs (quantitative)	10
Personas, user stories, user flows, data flows	12
Potential risks identification and mitigation measures	20
Ethical aspect	22
1.1.2 Testing Plan	23
Testing Scope	23
Testing Environment	25
End Users	26
Testing Tools	27
Testing Execution Plan	28
Building blocks	30
Governance	31
1.2 Scheer Use Case : Skill-driven Strategic Workforce Learning and Development	31
1.2.1 Use case description, value and goal	31
Use case partners	32
Use case functionalities	34
KPIs (quantitative)	34
Personas, user stories, user flows, data flows	35
Potential risks identification and mitigation measures	47
Ethical aspect	49
1.2.2 Testing Plan	51
Testing Scope	51
Testing Environment	58
End Users	60
Testing Tools	61
Testing Execution Plan	62
Building blocks	66
Governance	67
1.3 LMS Use Case : Manufacturing skills forecasting & matching	68
1.3.1 Use case description, value and goal	68
Use Case partners	68
Use case functionalities	70
KPIs (quantitative)	71
Personas, user stories, user flows, data flows	72
Potential risks identification and mitigation measures	79
Ethical aspect	80
1.3.2 Testing Plan	80
Testing Scope	80
Testing Environments	82

End Users	84
Testing Tools	85
Testing Execution Plan	86
Building Blocks	88
Governance	89
1.4 CSC Use Case : Supporting Student Mobility and Lifelong Learning	90
1.4.1 Use case description, value and goal	90
Use Case partners	91
Use Case functionalities	91
KPIs (quantitative)	92
Personas, user stories, user flows, data flows	92
Potential risks identification and mitigation measures	96
Ethical aspects	97
1.4.2 Testing Plan	97
Testing Scope	97
Testing Environment	99
End Users	99
Testing Tools	99
Testing Execution Plan	99
Building Blocks	101
Governance	101
1.5 UOC Use Case : Skills-driven Higher Education Institutions	102
1.5.1 Use case description, value and goal	102
Use Case Partners	103
Use case functionalities	105
KPIs (quantitative)	105
Personas, user stories, user flows, data flows	106
Potential risks identification and mitigation measures	112
Ethical aspects	112
1.5.2 Testing Plan	114
Testing Scope	114
Testing Environment	116
End Users	117
Testing Tools	118
Testing Execution Plan	119
Building Blocks	122
Governance	122
1.6 Athumi-IMEC Use Case : Bridging Data Spaces – Exploring Interoperability between Athumi and DS4Skills	123
1.6.1 Use case description, value and goal	123
Use Case partners	124
Use Case functionalities	124
KPIs (quantitative)	125
Personas, user stories, user flows, data flows	126
Potential risks identification and mitigation measures	128
Ethical aspects	129
1.6.2 Testing Plan	131
Testing Scope	131
Testing Environment	134
End Users	135

Testing Tools	135
Testing Execution Plan	135
Building Blocks	140
Governance	140
1.7 Mylia-Badgebox Use Case : Digital Fusion Skills Assessment and Upskilling Tool for Workforce	142
1.7.1 Use case description, value and goal	142
Use case partners	143
Use case functionalities	144
KPIs (quantitative)	145
Personas, user stories, user flows, data flows	146
Potential risks identification and mitigation measures	153
Ethical aspects	154
1.7.2 Testing Plan	157
Testing Scope	157
Testing Environment	158
End Users	158
Testing Tools	158
Testing Execution Plan	159
Building Blocks	161
Governance	162
1.8 AFP-Tralalère Use Case : When Media Data Meets Education – Empowering Media Literacy	162
1.8.1 Use case description, value and goal	162
Use case partners	163
Use case functionalities	165
KPIs (quantitative)	165
Personas, user stories, user flows, data flows	166
Potential risks identification and mitigation measures	176
Ethical aspects	178
1.8.2 Testing Plan	181
Testing Scope	181
Testing Environment	182
End Users	182
Testing Tools	183
Testing Execution Plan	183
Building Blocks	183
Governance	183
2 Relationship between DS4SKILLS and EDGE SKILLS	183
3 EU Datasets	185
Conclusions	185

Introduction

This document provides the first comprehensive report on the implementation of the eight use cases that have been validated under the DS4SKILLS project within the Data Space for Skills. It details the development and execution of use cases led by the use case orchestrators and includes the scope and objectives of each use case, roles of orchestrators, the processes and main results gathered throughout the use cases development.

This is part of the WP3 task with the main objective is to implement eight use cases to demonstrate the practical applications and benefits of the Data Space for Skills. The use cases are following the use case methodology used in the EDGE SKILLS project.

Additionally, this document highlights the relationships between DS4Skills and EDGE-Skills, and technical considerations such as interoperability and maintenance.

It is also documenting the polishing of EU datasets, with the European Commission as the data provider, ensuring that all use cases meet the technical and operational requirements necessary for successful implementation

WP3- Methodology

PHASE 1 INITIATION	PHASE 2 DESIGN	PHASE 3 TESTING	PHASE 4 DEPLOYMENT
<ul style="list-style-type: none"> • Use case description, objectives (templates) • Definition of users and data flows (templates) • KPIs definition • Search for relevant data / service providers • Set-up of monitoring and quality assurance. • Set-up of helpdesk. 	<ul style="list-style-type: none"> • Integration of the providers in the use case • Negotiation and contractualisation in VisionsTrust. • Data space connector's integration. • Workshops on business model. • Workshops on governance. 	<ul style="list-style-type: none"> • Technical testing • Iterations, • Reporting on test results (templates) 	<ul style="list-style-type: none"> • Long term contractualisation. • Validation of scalable business and governance.

The use case description includes following information:

- Description, Value and goal
- Ecosystem roles with Data / AI and service provider
- Personas, user stories, user and Data flows
- KPIs
- Potential risks identification and mitigation measures
- Ethical aspects

The testing plan details the testing scope, key performance indicators, and testing strategies to measure the solution's ability to identify gaps, deliver actionable insights, and support strategic workforce development across participating organizations. The testing phase aims to ensure data accuracy, assess analytical capabilities, and verify the platform's usability for different organizational needs.

1 Use Case Descriptions and Testing Plans

Overview of the 8 Use Cases

Use Case (Country)	Summary of Use Case Description	Summary of KPIs
LIST (Luxembourg)	Focuses on analyzing résumés, job offers, and trainings to recommend personalized, lifelong learning pathways, bridging skill gaps to align with the labor market. It supports both employment counselors and training providers.	Focuses on Data Space Adoption & Collaboration (Target: At least 4 stakeholders, 3 shared data sets, 3 services, each used once/year) and Automated Services Precision (Target: Min. 80% accuracy for ESCO skill extraction, Min. 65% accuracy for training matching to skills/job offers).
Scheer (Germany)	Aims for cost-effective, skill-driven strategic workforce learning and development within Scheer. Goals include consolidating skills data into a dashboard, increasing skill transparency, promoting targeted upskilling in areas like AI/SAP, and enabling data-driven decisions for recruiting and training investments.	Focuses on Data/Service Quality (Target: 4 data sources, Min. 75% recall for skills extraction, Min. 75% accuracy for tagged content, Min. 65% accuracy for matching trainings to skill gaps) and User Satisfaction (Target: Min. 4/5 rating for both the internal dashboard and the enhanced LMS for clients).
LMS (Greece)	Focuses on bridging the gap between theoretical knowledge and practical skills in advanced manufacturing/Industry 4.0 technologies. The goal is to provide tailored, personalized learning pathways for students and employees using a GDPR-compliant platform and skills analytics to dynamically match learners with relevant training content.	Focuses on Adoption & Engagement (Target: At least 500 users, 25 employer companies, 85% learner satisfaction), Service Usage (Target: At least 1,000 skills-gap assessments, 400 completed learning paths), and Resource & Infrastructure (Target: At least 200 training resources, 2 PTX connectors with 99% reliability).

CSC (Finland)	<p>Aims to improve the discoverability of learning opportunities in European university alliances and reduce manual administrative workload. It involves automatically transferring and AI-enriching data (e.g., with ESCO classification) from Finnish student information systems (Peppi, Sisu) to create an interoperable model for student mobility and lifelong learning.</p>	<p>Focuses on Data Contribution (Target: At least 1,000 study units available), AI Data Quality (Target: At least 10 units for ESCO testing, Min. 50% admin acceptance rate for ESCO suggestions), and Interoperability (Target: At least 2 HEIs, at least one data service integrated).</p>
UOC (Spain)	<p>Aims to become a skills-driven Higher Education Institution by developing a data framework that combines learning data and skills data. It provides two main services: teaching & learning feedback for faculty and student advising services for labor market skills. The project also focuses on making datasets FAIR and standardized (ESCO/European Learning Model).</p>	<p>Measures Internal Operational Impact (Number of queries and departments using the data), Internal Academic Impact (Faculty staff usage and rate of course adaptation), and External Impact (Interest from DS4Skills and HEIs, and rate of FAIR data). <i>Note: Specific target numerical values were not provided in the source.</i></p>
Athumi-IMEC (Belgium)	<p>Explores the challenge of bridging two autonomous data spaces (Athumi's Flanders ecosystem and DS4Skills) to achieve minimal viable interoperability. The goal is to retain separate governance while enabling cross-ecosystem value, avoiding fragmentation, and facilitating cross-border visibility for data and services.</p>	<p>Focuses on achieving two prototypes: Federated Catalogue Prototype (Target: A working prototype demonstrating metadata discoverability and number of offers in the catalogues) and Consent Model Mapping (Target: Documented report, demonstration of bidirectional consent, and proof that consent revocation works in both systems).</p>
Mylia-Badgebox (Italy)	<p>Aims to create a Digital Fusion Skills Assessment and Upskilling Tool focused on developing critical thinking as a key professional competency. The tool prepares managers and employees for challenging organizational situations and supports their leading role in society in an era of increasing machine involvement in cognitive tasks.</p>	<p>Focuses on User Adoption (Target: 500 total users), Service Integration (Target: At least 2 non-mandatory Skills Data Space Services linked to the application), and Behavioral Data Analysis (Target: Enough data gathered, at least 4 dimensions analyzed through the assessment process).</p>

AFP-Tralalère (France)	Aims to strengthen media and information literacy through an interactive, personalized, and news-connected learning experience to counter disinformation. It uses AI-driven tools and relies on verified content from the Trusted European Media Dataspace (TEMS) to deliver contextualized and up-to-date educational pathways.	Focuses on Content Generation (Target: 5-10 educational scenarios), User Engagement (Target: 500-1,000 students and 20-30 teachers, ≥85% satisfaction), Impact (Target: +25% improvement in media literacy skills, 3-5 pilot schools extensible to 50+), AI Quality (Target: ≥80% positive validation for AI agent accuracy), and Interoperability (Target: ≥95% interoperability success rate with TEMS).
-------------------------------	--	---

1.1 LIST Use Case : Mind the Gap: Personalized and Job Market-Aligned Training for Future-Ready Workforce

1.1.1 Use case description, value and goal

The Luxembourg Use Case focuses on analysing résumés, job offers, and trainings to recommend personalised, lifelong learning pathways that effectively bridge skill gaps and align individual capabilities with the evolving demands of the labour market.

It serves as a dual-support tool for both employment counsellors and training providers:

- Employment counsellors can identify skill gaps in candidates' profiles and recommend targeted training programmes, helping individuals better qualify for specific roles.
- Training providers can analyse industry-wide job postings to detect emerging skill needs and adapt their offerings accordingly to address those gaps.

Ultimately, this use case aims to demonstrate enhanced alignment between workforce skills and labour market requirements by delivering customised learning pathways that foster continuous upskilling and future-ready career development.

Use Case partners

Data providers

The use case gathers 4 stakeholders who act as data providers: the National Employment Agency and 3 organisations active in the field of lifelong learning.

ADEM¹ is a reference partner on the Luxembourg labour market. The ADEM offers personalised and free services for jobseekers and employers.

¹ <https://adem.public.lu/en.html>

INFPC²The National Institute for the Development of Continuing Vocational Training (Institut National pour le Développement de la Formation Professionnelle Continue - INFPC) is the central body for information about training in Luxembourg.

CNFPC³The National Centre for Continuous Vocational Training (*Centre National de Formation Professionnelle Continue*) is a multi-purpose training centre with strong roots in the world of work.

DLH⁴The Digital Learning Hub's mission is to help reduce the digital skills gap in Luxembourg. To do so, DLH offers in-person, affordable courses in various fields of IT and related sectors.

The following data are required to execute the use case:

- **Résumés:** they are obtained from the Kaggle repository⁵. We have decided to use fake résumés first to avoid legal issues.
- **Job offers** are sourced from ADEM, accessible through the EURES⁶ platform. The job offers are detailed, including the job ID and a brief description of each listing
- **Trainings** are sourced from INFPC, CNFPC and DLH. The type of data includes the ID of the training, its name, a short and long description, and some meta data such as the training objectives, the learning outcomes and the pedagogical contents.

Firstly, our focus will be on jobs and occupations in the digital sector, before extending to other sectors, such as HORESCA.

Service providers (=data consumers)

The use case will develop 3 services:

- The skills annotation service: it generates skills annotations of résumés, job offers and trainings considering the ESCO framework.
- The skill gap analysis service:
 - it performs difference computations between annotated résumés and targeted job offers. It identifies the required ESCO skills that are missing from the résumés in relation to the selected job offers.
 - it performs difference computations between annotated trainings and job offers. It identifies the required ESCO skills that are not covered by the trainings in relation to the job offers.
- The recommendation service:
 - it provides a list of training ranked according to a predefined criteria like the relevance.
 - it provides a list of training subjects to be created.

² <https://www.infpc.lu/accueil/en>

³ <https://cnfpc.public.lu/fr.html>

⁴ <https://www.dlh.lu/>

⁵ <https://www.kaggle.com/datasets/snehaanbawal/resume-dataset>

⁶ https://eures.europa.eu/index_en

In this use case, LIST is initially identified as the service provider. A further reflection should be carried out to determine how to transfer the different services to the Luxembourg stakeholders involved.

Use case functionalities

The Luxembourg Use Case functionalities are as follows:

- Annotation of job offers, résumés and trainings based on ESCO skills (exchange of files xls, json, csv...) using generative AI, reasoning systems, and classifiers AI tools.
- Gap analysis between sets of required skills in the job offers' clusters and sets of existing skills in *the résumés* using reasoning techniques.
- Gap analysis between sets of required skills in the job offers' clusters and sets of covered skills in *the training* catalogues using reasoning techniques.
- Provide recommendations of training for supporting missions of employment counsellors to unemployed people (on demand and via https request).
- Provide recommendations of missing trainings in Luxembourg for training managers (on demand and via https request).
- Option to explore: Generate EUROPASS fragments based on the set of Skills extracted from unstructured resumés (see 1)). These fragments could help end users get started with a EUROPASS CV more quickly.

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
Stakeholders engagement	Establish a DS4Skills stakeholder network in Luxembourg	At least 4 Luxembourg stakeholders integrated	Number of Luxembourg stakeholders registered on the data space/VisionsTrust platform	
Data space usage	Promote active collaboration among DS4Skills stakeholders in Luxembourg	At least 3 shared data sets	Number of data sets shared by Luxembourg stakeholders on the data space/VisionsTrust platform	
Data space services publication	Publish Luxembourg services on the data space/VisionsTrust platform	3 services	Number of services published	

Data space services usage	Encourage use Luxembourg services on the data space/VisionsTrust platform	At least usage of each service once/year	Luxembourg Data Services Usage Frequency	
Skills annotations	Ensure high level of precision in the automated extraction of ESCO skills from relevant documents (CVs, job offers, and training offers).	Minimum 80% accuracy	Percentage of existing ESCO skills in documents that are correctly identified by the automated system, as validated by human expert evaluation on a representative sample (measuring discrepancies between automated and experts' annotations).	
Matching trainings to skills	Ensure high level of precision in recommending trainings that address individual's skill gaps.	Minimum 65% accuracy	Percentage of recommended trainings that are correctly identified by the automated system, as validated by human expert evaluation on a representative sample (measuring discrepancies between automated and experts' matching).	
Matching trainings to job offers	Ensure high level of precision of recommending trainings' adaptations in response to job offer requirements.	Minimum 65% accuracy	Percentage of recommended trainings adaptations and creations that are correctly identified by the automated system, as validated by human expert evaluation on a representative	

			sample (measuring discrepancies between automated and experts' matching).	
--	--	--	---	--

Personas, user stories, user flows, data flows

Personas

Employment Agency Professionals

Name	Demographic/Background	Goals/motivations
Tom	<ul style="list-style-type: none"> ● Job centre manager / job expert for employment agency ● <i>Experience with ESCO and ROME frameworks</i> ● <i>Knowledge of Luxembourg job market</i> ● <i>Knowledge of training offers</i> ● <i>Knowledge of employment support measures</i> 	<p><i>He wants to:</i></p> <ul style="list-style-type: none"> ● <i>Provide clear career guidance</i> ● <i>Gain a good understanding of the skills required for specific roles</i> ● <i>Recommend relevant training programs tailored to a targeted occupation</i>

<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • <i>Need to develop a more proactive service to job seekers</i> • <i>Lack of standardisation in the recommendation process of trainings</i> • <i>Complexity of manual generation of ESCO annotation</i> • <i>Skill gap analysis is time-consuming</i> • <i>Adapting and evolving ESCO to reflect the specificities of the Luxembourg labour market</i> 	<p>How can we help</p> <ul style="list-style-type: none"> • <i>Generate precise annotations for job offers, professions, and résumés</i> • <i>Accurately calculate skill gaps</i> • <i>Establish a clear and consistent methodology</i> • <i>Provide tailored training recommendation services</i> • <i>Implement a proactive "push" approach to encourage dialogue between job seekers and employment advisor</i> 	<p>Recap</p> <p><i>Tom is an experienced job centre manager / job expert with deep knowledge of the Luxembourg job market, training offers, and support measures. He wants to provide clear career guidance, identify skill gaps, and recommend tailored training programs but is hindered by complex ESCO annotations, time-consuming analysis, and a lack of standardised tools. To support him, we can streamline annotation and gap analysis, offer consistent methodologies, and implement proactive, personalized recommendation services.</i></p>
<p>Name</p> <p>Stéphanie</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • <i>- Job counsellor for employment agency</i> • <i>Familiar with guiding diverse job seekers</i> • <i>Knowledge of ESCO and ROME frameworks</i> 	<p>Goals/motivations</p> <p><i>She wants to:</i></p> <ul style="list-style-type: none"> • <i>Quickly identify skill gaps for job seekers</i> • <i>Offer actionable, relevant training</i>

	<ul style="list-style-type: none"> • Understands job matching and training opportunities 	<p>recommendations</p> <ul style="list-style-type: none"> • Provide job seekers with clear, personalized career guidance
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • Need for fast, reliable skill gap insights during consultations • Difficulty in manually comparing résumés and job offers • Limited time to tailor recommendations for each job seeker • Frustration with unstandardized or unclear training suggestions 	<p>How can we help</p> <ul style="list-style-type: none"> • Implement a proactive "push" approach to encourage dialogue between job seekers and employment advisor • Offer instant, ESCO-based skill gap analysis per job seeker • Automate the matching between training and needed skills • Provide easy-to-explain, standardized output for recommendation • Enable proactive communication with relevant 	<p>Recap.</p> <p>Stéphanie is a job counsellor aiming to provide actionable, personalized guidance to job seekers. She is challenged by time constraints and manual matching processes.</p> <p>To support her, we can provide automated skill gap analysis and ready-to-use training recommendations that standardize her interactions, thus improving service quality and job seeker outcomes.</p>

	recommendations	
<p>Name</p> <p>Luc</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • Data analyst for employment agency • Experienced with labour market data • Proficient in ESCO/ROME data, data pipelines, analytics tools • Supports improvement of job matching services through data insights 	<p><i>Goals/motivations</i></p> <p><i>He wants to:</i></p> <ul style="list-style-type: none"> • Monitor and improve the quality of skill annotations and gap analysis • Assess and optimize matching algorithms • Generate actionable reports for management and counsellors • Ensure data interoperability with partner systems via PDC

<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • Inconsistent quality or coverage of incoming data • Evaluating the performance of matching/recommendation algorithms • Integration issues with external datasets 	<p>How can we help</p> <ul style="list-style-type: none"> • Provide benchmark of high-quality skill annotation datasets • Enable automated result validation and easy feedback collection • Offer dashboards for tracking performance and algorithm improvements • Simplify integration and data exchange via standardized APIs and the PDC 	<p><i>Recap.</i></p> <p>Luc is a data analyst keen to leverage data to improve the employment agency's services. He faces challenges with data quality, volume, and integration, but can benefit from harmonized, annotated datasets, automated validation tools, and efficient integration mechanisms to optimize services and reporting.</p>
--	--	--

Training provider

<p>Name & pic</p> <p><i>Elisabeth</i></p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • <i>Training manager</i> • <i>Knowledge of Luxembourg job market needs</i> • <i>Knowledge of existing training</i> • <i>Experience with ESCO and ROME frameworks</i> 	<p>Goals/motivations</p> <p>She wants to:</p> <ul style="list-style-type: none"> • <i>Understand needs of the job market</i> • <i>Design and develop relevant training adapted to market needs</i>
--	---	--

<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • <i>Understand the Luxembourg job market dynamic is time consuming</i> • <i>The training gap analysis is time consuming</i> • <i>Complexity of manual generation of ESCO annotation</i> 	<p>How can we help</p> <ul style="list-style-type: none"> • <i>Generate precise and harmonised annotations for training programs</i> • <i>Identify the skills addressed by existing training offerings</i> • <i>Measure the gap between labour market needs and current training provision, and provide biannual recommendations for adaptation</i> 	<p>Recap</p> <p>Elisabeth is a training manager with strong knowledge of both the Luxembourg job market and training landscape, and she has experience with ESCO and ROME frameworks. She aims to design training programs aligned with market needs but faces challenges such as time-consuming market analysis, and the complexity of manual ESCO annotation. To support her, we can offer harmonised training annotations, clear skill coverage mapping, and biannual gap analyses with actionable recommendations of adaptations of the training portfolio she manages.</p>
---	--	---

Job Seeker / Learner

<p>Name</p> <p>Léon</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> ● Job seeker or upskilling learner ● Looking for new career opportunities or advancement ● Has a CV/resume and some prior work/training experience ● May not be familiar with ESCO/ROME frameworks 	<p>Goals/motivations</p> <p><i>He wants to:</i></p> <ul style="list-style-type: none"> ● <i>Identify which skills he lacks for specific target jobs</i> ● <i>Receive clear suggestions for training to improve employability</i> ● <i>Understand how his profile matches with current job market needs</i> ● <i>Streamline his application process (e.g., generate standard CV fragments like EUROPASS)</i>
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> ● Difficult to understand which skills are missing compared to target jobs ● Unclear or overwhelming list of possible training opportunities ● Manual CV updating and tailoring is tedious 	<p>How can we help</p> <ul style="list-style-type: none"> ● Provide clear skill gap analyses vs. targeted jobs ● Deliver prioritized, relevant training options, explained in simple terms ● Allow quick generation of structured CV fragments from his résumé ● Enable practical feedback and next steps via counsellors using 	<p>Recap.</p> <p>Léon is a job seeker or learner aiming to improve his employability by acquiring in-demand skills. He struggles to see exactly what is missing from his profile and how to address gaps, but will be empowered by focused, easily understandable recommendations and tools to make his job search and training decisions clearer and more effective.</p>

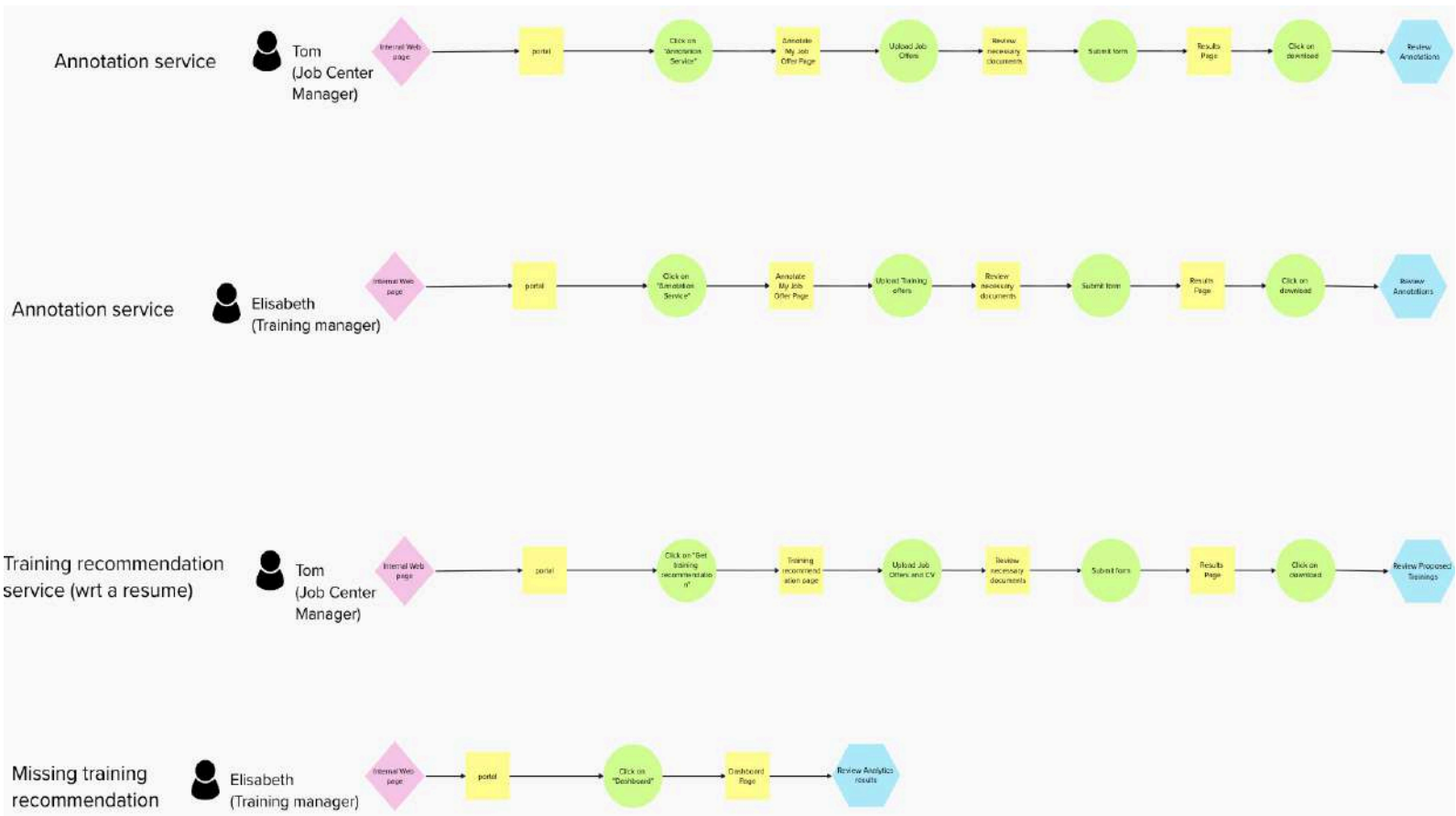
	the recommendation service	
--	----------------------------------	--

User stories

- As a Job centre manager / expert for an employment agency, I want to provide proactive, personalised career guidance advice for job seekers' upskilling and reskilling, so that job seekers can be better aligned to the job market.
- As a job counsellor for an employment agency, I want to view ESCO-based skill gap analysis results to quickly guide job seekers toward relevant training offers.
- As a data analyst for an employment agency I want to leverage data to improve the employment agency's services
- As a training manager, I want to provide and create relevant training adapted to current and future market needs, so that job seekers and employees are better aligned with their career plan as well as the labour market
- As a job seeker, I want to understand what skills I lack compared to a target job so that I can enrol in relevant training.
- As a learner, I want to easily understand recommendations and tools to make my training decisions clearer and more effective.

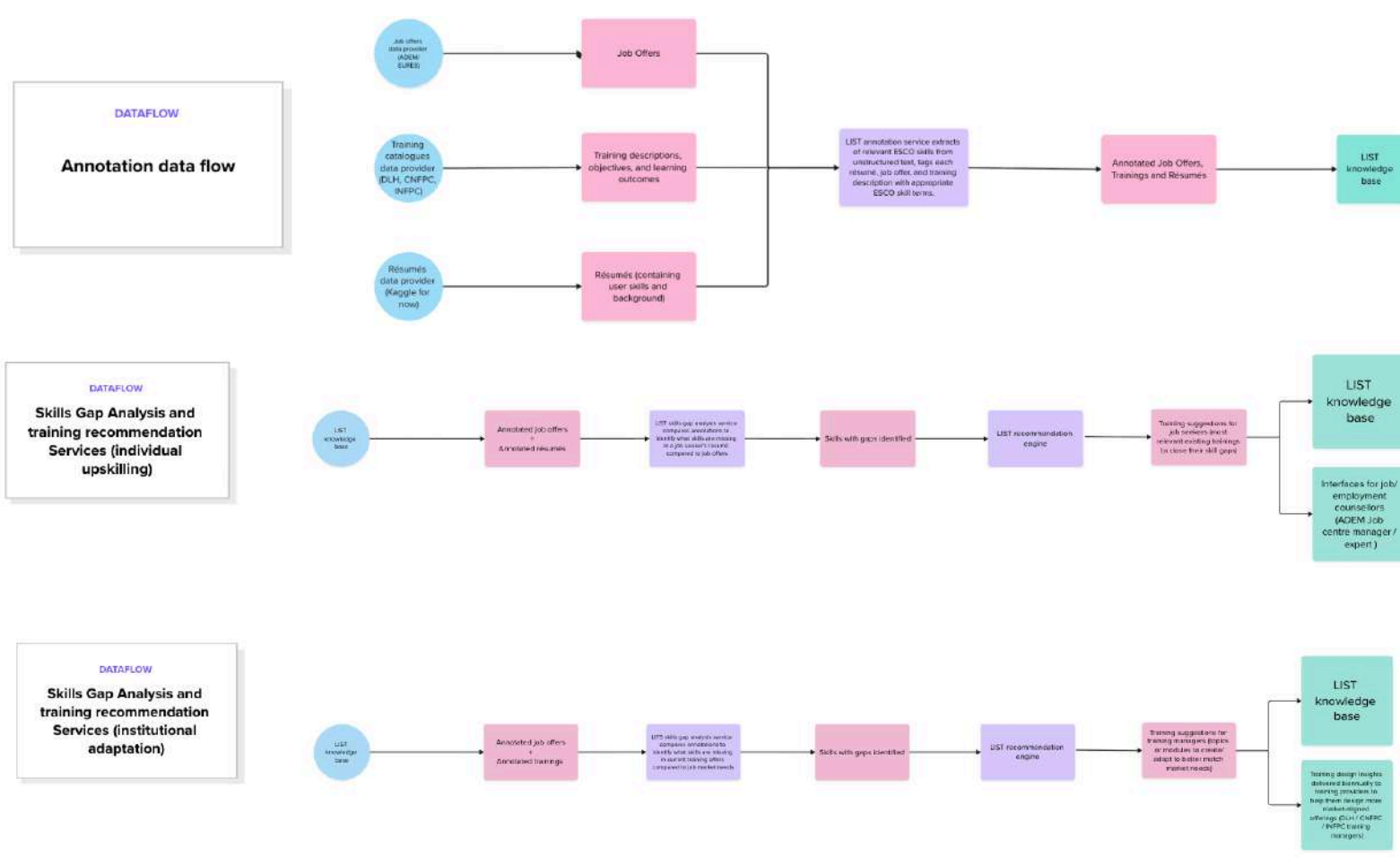
User Flows

This Use Case foresees 4 main user journeys targeting the two different types of stakeholders identified in section 5.1 and 5.2.



Data Flows

In this section we describe the 3 main data flows attached to the 3 services developed as part of the use case and described in 2.2 and 3.



Potential risks identification and mitigation measures

N°	Risk description	Impact	Likelihood	Mitigation measures
1	Lack of acceptance of the solution by end-users / stakeholders in Luxembourg	High	Medium	<p>1.1: involve end-users / stakeholders from the start and continuously during the project's duration. Include them in the design, testing, and feedback phases through co-creation and beta-testing process.</p> <p>1.2: plan continuous collective training and individual support: organise webinars, provide clear documentation, and ongoing</p>

				<p>individual support adapted to stakeholders' profiles.</p> <p>1.3: communicate benefits: highlight how the data space and the services can benefit to end-user/stakeholders</p> <p>1.4: seamless and suited integration into existing workflows of end-users/stakeholders: ensure the technical solution is well-suited and integrates seamlessly with the existing tools and workflows of end-users and stakeholders to minimize disruption</p> <p>1.5: monitor adoption: track KPIs such as usage frequency, feature adoption, user satisfaction, and support requests, and adopt a continuous improvement approach.</p>
2	Difficulties to engage the end-users/stakeholders in Luxembourg in the data space in a sustainable way	Medium	Medium	<p>2.1: early engagement: involve Luxembourg end-users/stakeholders from the early stages of the use case.</p> <p>2.2: demonstrate clear value of the use case: communicate on benefits to each stakeholder group.</p> <p>2.3: ensure legal and ethical alignment: address local data sovereignty, privacy, and compliance concerns (e.g., GDPR, Luxembourg-specific frameworks).</p> <p>2.4: communicate success stories: advertise outcomes and testimonials from other DS4Skills use cases stakeholders.</p> <p>2.5: explore other opportunities to deploy DS4Skills to other initiatives in Luxembourg (e.g. national and local projects).</p>
3	Delay in the design and deployment of the	Medium	Medium	<p>3.1: develop a detailed and realistic timeline, including key milestones and deliverables, and</p>

	use case in Luxembourg			<p>implement regular monitoring to track progress and address delays proactively.</p> <p>3.2: allocate dedicated resources not only within LIST but also across stakeholder organisations. Clearly define roles and responsibilities and identify backup staff to ensure continuity.</p>
4	More efforts needed to design and deploy the use case in Luxembourg	Medium	Medium	<p>4.1: conduct a technical pre-implementation assessment with end-users/stakeholders in Luxembourg.</p> <p>4.2: ensure LIST use case coordination. Assign a dedicated project manager at LIST to coordinate with end-user/stakeholders and issues if they arise.</p> <p>4.3: explore and leverage existing local initiatives. Identify and synergy with existing initiatives already operating in Luxembourg.</p> <p>4.4: monitor effort vs. plan continuously. Track time and resource use regarding estimates, and plan adjustments if needed.</p>

Ethical aspect

The Luxembourg Use Case focuses on analyzing résumés, job offers, and trainings to recommend personalized, lifelong learning pathways that effectively bridge skill gaps and align individual capabilities with the evolving demands of the labour market. To address the ethical aspects of this use case, it is essential to consider several key factors.

Firstly, data privacy is a significant concern as the use case involves processing sensitive personal data, such as résumés and job offers. Ensuring compliance with relevant data protection regulations, such as the General Data Protection Regulation (GDPR), is crucial. This includes obtaining informed consent from individuals whose data is being processed, implementing robust data security measures, and providing transparency about how the data is being used.

Secondly, bias and fairness are critical ethical considerations. The use of AI-driven tools to analyze data and make recommendations can perpetuate existing biases if the training data is not carefully curated. Therefore, it is essential to ensure that the data used to train the models is diverse, representative, and free from bias. Regular audits and testing should be conducted to identify and mitigate any potential biases.

Thirdly, transparency and explainability are vital in building trust among stakeholders. The use case should provide clear explanations about how the recommendations are generated and what data is being used to inform these recommendations.

Lastly, the use case should be designed with inclusivity in mind, ensuring that the benefits of the personalized learning pathways are accessible to all individuals, regardless of gender, age, background or socioeconomic status.

By addressing these ethical considerations, the Luxembourg Use Case can ensure that it not only achieves its goals but does so in a responsible and ethical manner.

1.1.2 Testing Plan

Testing Scope

Functionalities, Features, and Components Covered

The Luxembourg Use Case provides a suite of AI-enabled services for analysing labour-market documents and supporting employment and training stakeholders. Its main functionalities are as follows:

1. Skills Annotation Service

Automatic annotation of job offers, résumés (CVs), and training descriptions using the ESCO terminology (skills, occupations, qualifications). This includes:

- Annotation of documents in various formats (XLS, JSON, CSV, unstructured text, etc.) using generative AI, reasoning systems, and classifier tools.
- API interfaces for document upload and retrieval of ESCO-tagged outputs.
- Validation of accuracy, consistency, and interoperability with the data space connector and partner systems.
- Support for multilingual or incomplete content.
- Related testing groups
- Employment Agency Professionals want to standardize job advertisements with ESCO tags for improved matching.
- Training providers want training descriptions correctly aligned with ESCO skills.

2. Skill Gap Analysis Service

Comparison and reasoning over annotated data to identify skill differences:

- Gap analysis between required skills in clusters of job offers and existing skills in job seekers' résumés.
- Gap analysis between job-offer skill requirements and the skills covered by available training catalogues.

- APIs for computing skill gaps and returning structured results.
- Evaluation of matching algorithm quality, including handling multilingualism.

Related testing groups

- Employment Agency Professionals want to visualise individual skill gaps to guide job seekers.
- Job Seekers and learners want to understand which skills are missing for a targeted occupation, through their relationship with the Employment Agency Professionals.

3. Training Recommendation Service

AI-based recommendation of training opportunities to bridge identified skills gaps:

- Suggestions of relevant ESCO-annotated training offers to support job counsellors (and job seekers) (on demand or via HTTPS requests).
- Insights for training managers regarding missing or insufficient training programmes in Luxembourg.
- Assessment of recommendation quality (relevance, diversity, interpretability), latency, and scalability.
- Integration with training providers through the data space connector.

Related testing groups

- Job Seekers and learners via the job counsellor and the training manager receives a ranked list of recommended training courses to improve employability.
- Training Providers gain insights into how their offerings align with labour-market needs and where gaps exist.

4. Optional Feature: EUROPASS Fragment Generation

As an optional extension, the system may generate EUROPASS-compatible CV fragments based on the ESCO-extracted skills from unstructured résumés. This feature supports end users (i.e., the job seekers and learners) in quickly initiating a structured EUROPASS CV.

Testing Organisation and Indicators

Testing type	Objective	Indicators	Responsible
Functional testing	Verify API correctness, input/output formats, and performance	API error rate, response times, compliance with OpenAPI specs	LIST team
Integration Testing	Validate interoperability via data space connector with real partner systems	Successful data exchange rate, API log validation	LIST team
Value and Usability Testing	Measure how the services contribute to user goals	User satisfaction, relevance score, training click-through rate, F1-score for annotation accuracy	Domain partners: - ADEM • DLH • INFPC • CNFPC

1.3 Assumptions and Constraints:

- Access to partner APIs and datasets (job ads, CVs, trainings) will be available during the testing period.
- The data space connector and identity management services are stable and support secure authentication and authorization.
- Annotated training data and job ads will be available in sufficient quantity to validate recommendation performance.
- Any delay in delivery of consortium building blocks (e.g. connector updates, data pipelines) may affect test scheduling.

Testing Environment

Each use case participant will be connected to the dataspace via an instance of the PDC (in blue on the following diagram figure 1). LIST will expose via the Dataspace two main services: the *Skills Annotation Service* and the *Gap Analysis Service*. LIST also provides to partners the possibility to deploy on their premise an instance of a so-called *Data Service* which essentially provides the ability to read/write data from/to an object storage (e.g. S3 Bucket). This will enable partners to easily expose file-based datasets required for the use-case through the dataspace. This *Data Service* can also be used to receive data generated by the different LIST services and store the results as files for offline/asynchronous processing. Some of the use case partners already have existing data APIs (e.g. for accessing Training offers), in grey on the diagram (figure 1), that they will expose through the PDC.

The exact needs for data format adapters will be assessed in the coming phase but will most likely be handled by LIST Team directly.

Finally, the *Validation Tool* is a service developed by LIST that will allow partners to provide feedback on the annotations generated by the *Skills Annotation Service*. This feedback is gathered through a web interface. We foresee two options to access it. The first one is to connect directly to a LIST hosted instance (outside of the Dataspace). In this case, access will be secured via a token or password which will be shared through the Dataspace. The second option is to deploy a private instance at the partner premise, connected only to their data, e.g. stored on the object-storage.

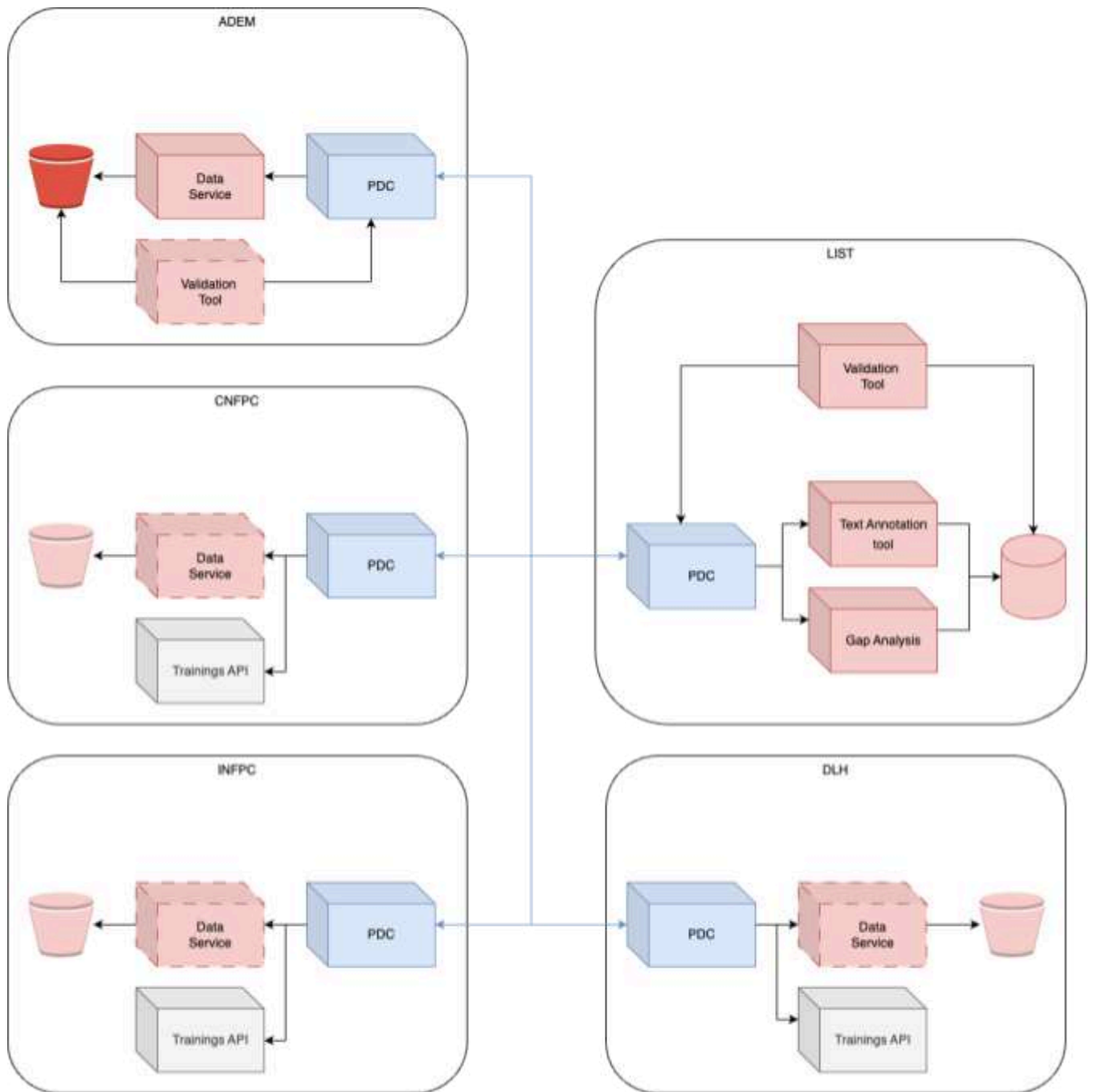


Figure SEQ Figure * ARABIC 1 Use Case Testing Environment

Figure 1: Luxembourg use case testing environment

The detailed testing sequence is documented further in the testing execution plan.

End Users

Testing groups

Category	Description	Estimated number	Testing objective
Employment Agency Professionals	1) Job centre manager / expert for employment agency 2) Job counsellors 3) Data analysts using the services for job matching	1) 10 2) 10 3) 1	Validate annotation and gap analysis accuracy and usefulness
Training Providers	Training managers representatives from training institutions (DLH, CNFPC, INFPC) testing recommendation integration	At least 1 training manager per training institution	Assess training recommendation relevance and feedback mechanisms
Job Seekers and Learners via the employment agency and the training providers	Individuals interacting with the results (through stakeholders' interfaces)	25 / stakeholder	Verify understandability, perceived value, and practical benefit of recommendations

User Profiles

- o Employment Agency Professionals: experienced in matching available skills with job market needs; focuses on automation quality and interoperability.
- o Training Provider: focuses on the quality and validation of recommended trainings to adapt and to create.
- o Job Seeker / Learner: represents end beneficiaries; validates recommendations and perceived improvement in employability.

Testing Tools

Environment:

- o **Infrastructure:** deployed in LIST managed public cloud.
- o **Tools:**
 - Skills Annotation tool. User enters a text and requests the set of skills extracted from this text. The text must be one of the following types: Job Offer, Training Offer, or Resume. This tool is used to test the user interface and collect feedback from the users. Feedback is used to improve the skills extraction algorithm.
 - Batch Annotation tool. This is the main tool developed in this phase of the project. User sends via DS a file with a list of records to be

annotated. The annotator generates a file with the skills extracted from each record. The annotations file is transferred to users via the DS.

- **Validation tool.** User can select, edit, delete, or add skills to the list of extracted skills.
- **Search tool.** User can enter one term and search the closest term found in ESCO terminology. A set of terms' label, definition, and URI are presented to the user.
- **Next steps:**
 - Develop and test the Gap Analysis (Phase 2).
 - Develop and test the Recommendation analysis (Phase 3)

Test Data:

- Dataset's formats, size, and ways to access it (API or File transfer) were previously defined with the partners.
- Job Offers dataset. Provided by ADEM, this dataset contains 2000 job offers published by ADEM in the last 5 years. ADEM add to DS the CSV file and allow LIST to recover it via a DS service.
- Training Offers dataset. Three partners are able to provide access to their training catalogues (DLH, INFPC, CNFPC). Two of them (DLH and INFPC) provide API access in the DS. The third one provides a file (CSV) in the DS. LIST is allowed to collect the catalogues via de DS.
- Resumes (3447 all domains, and IT 120). The temporary solution is to use a list of resumes available in the KAGGLE website. Legal aspects (e.g., RGPD compliance) need to be solved before accessing real resumes. This legal process is under discussion.

Testing Execution Plan

The execution plan for the use case aligns with the development of the three services: Skills Annotation (Year 1), Skill Gap Analysis (Year 2), and the Training Recommendation (Year 3).

Each service will be developed in two phases: a validation and calibration phase, followed by a pre-production phase.

Validation/calibration of the Skills Annotation Service

During this phase, the objective is to assess and refine the quality of the annotations generated by the *Skills Annotation Service* against the different type of documents (i.e. resumes and training offers) provided by the partners. In this phase, the dataspace will be used to transfer training documents corpus in batch to the *Skills Annotation Service*. The results will then be available through the *Validation Tool* for partners review and feedback.

We foresee two possible scenarios for implementing this phase, as illustrated in Figure 2 and Figure 3. In both cases, the data is exchanged through the dataspace between the partner and LIST. The *Skills Annotation Service* is configured to process the received data asynchronously.

In the first scenario, the annotations generated are made available via a LIST hosted *Validation Tool* instance. The partner's experts can connect directly to this web interface to review and provide feedback on the generated annotations. This feedback is then used offline by the LIST team to further refine the internal logic of the Annotation Service. This is illustrated in Figure 2.

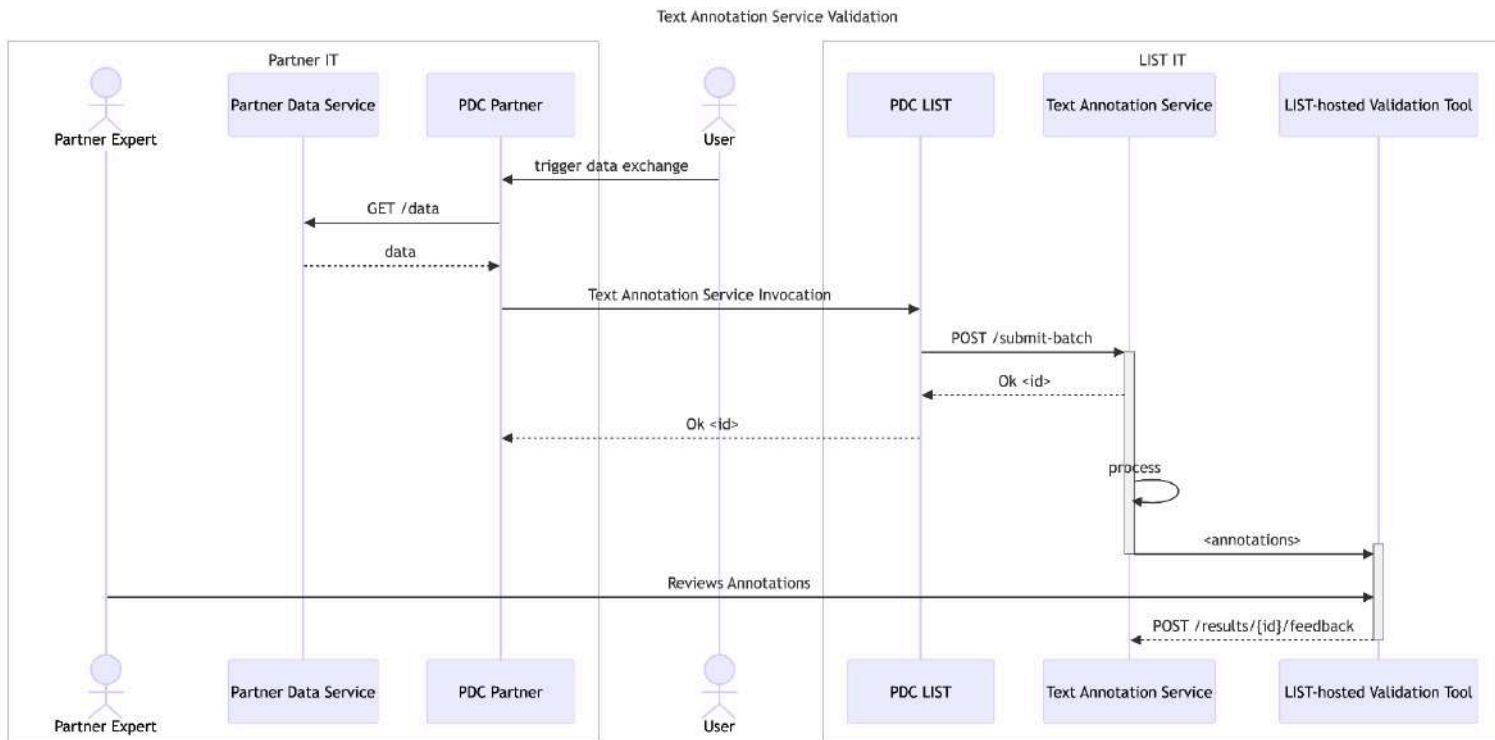


Figure SEQ Figure * ARABIC 2 Annotations validation phase - using LIST hosted Validation Tool

Figure 2: scenario 1 of use case validation

In the second scenario, the annotations generated posted back to the partner through the dataspace and the Partner hosted *Data Service*. The annotations are then available via a Partner hosted *Validation Tool* instance. The partner’s experts can connect directly to this web interface to review and provide feedback on the generated annotations. Once finishing with the review, the expert can submit their feedback back to LIST via the Dataspace and used offline by the LIST team to further refine the internal logic of the Annotation Service.

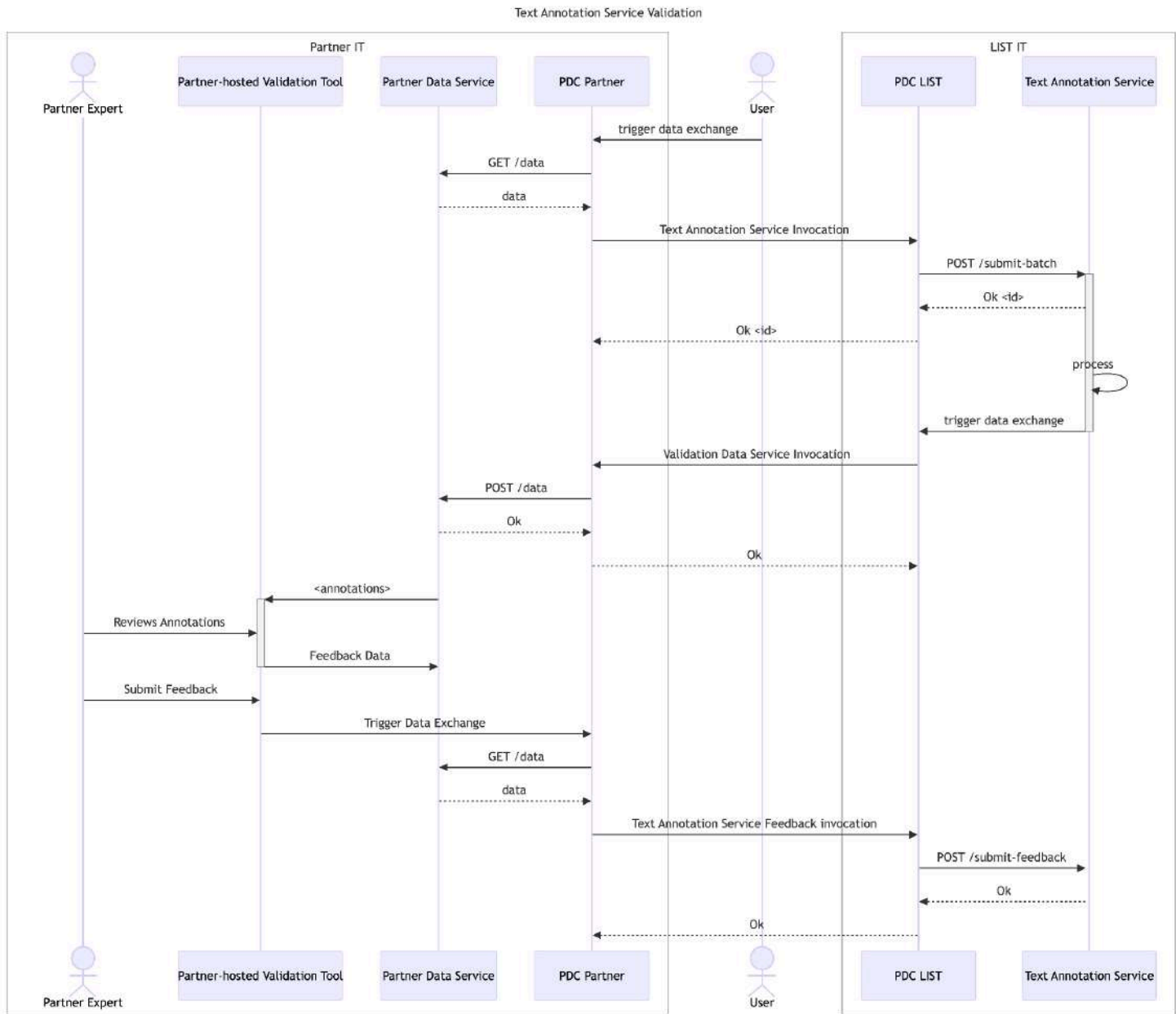


Figure SEQ Figure * ARABIC 3 Annotations validation phase - using Partner hosted Validation Tool

Figure 3: scenario 2 of use case validation

The same **logic will be applied to validate the other services (i.e, Gap Analysis and Recommendation service).**

Pre-production phase

In this phase, the Skills Annotation Service **(and other services)** is used in synchronous mode with Partners triggering the service via the PDC whenever they

have new data to be annotated. The service will then post the annotations back to the partner **for their internal use.**

Building blocks

The use case relies on the following Prometheus-X building blocks:

- o **Connector (PDC)**
 - Core building block enabling secure, interoperable data exchange
 - Ensures compliance with dataspace policies
- o **Catalog**
 - Allows publishing and discovering data and service offerings
 - Makes cross-provider integration technically feasible
- o **Contract**
 - Manages the contractual layer associated with data flows
 - Provides legal traceability for access and usage

Governance

The use case doesn't generate, share and store personal data as LIST will use fake resumes' data.

1.2 Scheer Use Case : Skill-driven Strategic Workforce Learning and Development

1.2.1 Use case description, value and goal

Scheer is a forward-thinking IT consulting company that prioritizes the continuous professional and personal development of its employees. With a strong focus on growth, adaptability, and operational efficiency, Scheer remains agile and competitive in a rapidly evolving market landscape. Through strategic planning, Scheer continuously analyses, reviews and documents its needs to increase its market value and keep its employees well-trained to face current and future challenges. By leveraging the DS4Skills data space - its offerings, building blocks, trust framework, regulatory compliance and governance structure - Scheer aims to strengthen collaboration with trusted data and (AI) service providers. This is expected to unlock new business and innovation opportunities and support cost-effective, advanced skill-driven strategic workforce learning and development.

Using Skills Management, Scheer aims at supporting HR (L&D), Managers and Team Leads to:

- Increase skill transparency (mapping, identification, evaluation, analysis)
- Promote targeted and personalized upskilling, particularly in future-oriented areas (AI, agile, SAP)
- Support career development (vertical, horizontal)

- Leverage analytics for data-driven decision-making (hiring, investing in areas and training)

More specifically, Scheer aims to enable targeted personnel development, focused upskilling, recruiting, and simple matching of individuals to projects within the company. By integrating and visualizing all available skills at the individual, team, and organizational levels, and analysing the resulting skill gaps, we can better adapt our training needs, recruit employees with the required skills, and match our workforce to suitable projects based on their skillsets.

Additionally, Scheer aims to consolidate skills data from disparate systems into one integrated skills dashboard. Over the years, Scheer has collected various data that support the evaluation of the employees' skills and needs. However, this data is distributed across multiple systems and is available in multiple formats. Hence, the data requires to be properly prepared, collected and aggregated from various sources. Using various services to support the preparation and analysis of data is therefore needed.

Having an overview of all existing skills, the company can easily compare them with the company's and market's requirements. Through an analytical tool, HR, Managers and Team Leads can quickly identify gaps and tailor upskilling and recruiting strategies accordingly. This allows managers to align the training programs more closely with the actual needs of the organization.

As a company, Scheer assumes that skills management and analysis will provide them with effective monitoring of which skills are lacking or need to be strengthened. This enables more targeted personnel development, which in turn leads to cost savings - for instance, by only offering training that is truly needed. In addition, a skills dashboard can be used to inform and support management decisions. For example, investing in training or departmental development. Besides, Scheer can respond more quickly to emerging needs. For example, if a new skill is required, Scheer can first analyse whether it already exists within the organization. If not, it can be developed in a focused way. Moreover, identifying skill gaps allows Scheer to specifically recruit new employees with the required competencies, which will also result in cost savings.

As a German and EU-based company, Scheer takes the rules and regulations around data privacy and security very seriously. Since skills data are personal and sensitive, it is crucial for Scheer as a company, not only to follow these rules and regulations itself, but also to collaborate with other services and systems that respect and follow them.

Use case partners

Data providers

Existing data and data services (sources) at Scheer:

- **Employees' Data** within **Decidalo**, a system that enables the management of IT consulting projects and staffing. All **employees** involved in project work have a **profile with skills, projects, and certificates**
- **Projects' Data** within **Decidalo's**, i.e. project descriptions

- **Data from projects' and tenders' offers**, descriptions and proposals
- **Training Data** from within the **imc LMS** (i.e. Empower Scheer), a system used for training and skills management. Tracked data in the system includes available **training courses** and their **descriptions**.
- **Learners' Data** from within the **imc LMS** (i.e. Empower Scheer), namely **learner's history and progress** in the LMS.
- Scheer **employees' organisation data**: Organisation and User / learner data from Scheer
- **Scheer Skill matrix**, an excel file for Skill matrix (under continuous development)

Additional data sources foreseen:

- **Standardized Skill Ontologies and Job Profiles** to support the shift towards a structured, skill-based talent management approach (own or external ontology)
- **Internal Job Role Data**: information on current internal job roles and responsibilities.
- **External Occupations and Jobs Data**: market-wide job role definitions to benchmark and support skill modelling
- **External Training Offers Aligned to the Identified Skills**: data of external training offerings aligned to the organization's skill framework
- **Additional data** from within the **imc LMS** (i.e. Empower Scheer): data could include the **assigned skills per learner**, **target job profiles**, **skills gap** and the alignment of skills to the training content.

Future considerations

- Labour Market **Forecasting Data**: trends and predictions on emerging and future in-demand skills

Service providers (=data consumers)

Support / Preparation Services

These services should extract, translate, map and align existing skill data sources which are spread across silos and systems into an interoperable format and standard.

- **Dataspace Infrastructure Services** (Provider: PTX)
- **Dataspace Connection Service** of the used systems (at least imc LMS) to the Skills Dataspace (Provider: IMC)
- **Data Preparation Service** (Provider: Headai)
- **Data Aggregation Service** (Provider: Headai)
- **Skill Extraction Service** to extract skills from unstructured text (CVs, job ads, profiles, project descriptions) (Provider: Headai)
- **Skill Translation Service** to align various ontologies (Provider: Headai)

- **Tagging Services** that annotate content with relevant skills (Provider: Headai + Inokufu)
- **Anonymization Service** for personal data (Provider: IMC, Headai)

Value-adding services

These value-adding services list the various services to be explored and selected from during the realization of the use case. Prioritization and selection of these services for implementation is still needed.

Organisational

1. **Frontend Gateway Service** to trigger user-friendly workflow for the multiple preparation and support services chain (Provider: IMC)
2. **Data Analytics Services** to conduct data analysis, including available trainings and skills, needed trainings and skills (internal & market), gap analysis training vs. skills (Provider: IMC + Headai)
3. **Visualization Service** as in a Dashboard to present and interact with the results of data analysis (Provider: IMC + Headai)
4. DS4Skills enhanced **Empower Scheer LMS** (Provider: IMC)
5. **Decidalo software** (Provider: Decidalo). Currently not part of DS4Skills dataspace, however extraction / export services from Decidalo are available

Individual

1. **Matching Service** to match **employees to skills and projects** (Provider: Headai)
2. **Matching Service** to match **skill profiles to learning content** (Provider: Headai + Inokufu)
3. **Recommendation Services** to recommend targeted job profiles, skills and learning content (Provider: IMC + Headai + Inokufu)

Use case functionalities

- **Consolidate and manage** various skills data
- **Visualize data** to support data-driven decision making
- **Analyse Skill Gaps** on personal, team and company levels, as well as market insights
- **Match employees** with personalized **trainings** and **career paths**
- **Match employees** to suitable **projects** based on their **skillsets**
- **Identify new employees** based on the required skills and/or identified skill gaps


KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
KPI 1. Data Sources	Number of connected data sources	4 various data sources	Integrity and security of data	- Use of data from multiple sources to feed into the services (to aggregate, translate, align and map, match, recommend...)
KPI 2. Skills extraction	Percentage of actual (existing) skills in the text that are successfully extracted	Min. 75% recall	Human evaluated result from a selected sample	- Increase trust in automation & services - Better skill management and recommendations
KPI 3. Tagged content	Degree of precision of tagged skills in training content	Min. 75% accuracy	Human evaluated result from a selected sample for correctly tagged skills in training content	- Increase trust in automation & services - Recommend relevant personalized training by skill
KPI 4. Matching Training & Skills	Measure how accurately recommended trainings address the individual's skill gaps.	Min. 65% accuracy of matched trainings to skill gaps	Human evaluated result from a selected sample for recommended trainings, and the target identified skill gaps	- Increase trust in automation & services - Better match targeted training content to the individual's skill gaps
KPI 5. Skills Analytics Dashboard	Quantitative & Qualitative feedback from users on the usefulness and usability of the dashboard.	Min. 4/5 rating in feedback surveys	- Survey scores - Comments and improvement suggestions	- Increased tool adoption - Stronger alignment between HR, L&D, and business units
KPI 6. Enhanced Empower Scheer	Quantitative & Qualitative feedback from Clients on the usefulness and results of the	Min. 4/5 rating in feedback surveys	- Survey scores - Comments and improvement suggestions	- Increased value in using the enhanced Empower Scheer system (imc LMS) - New business


	DS4Skills enhanced LMS (Empower Scheer)		opportunities and values
--	---	--	--------------------------


Personas, user stories, user flows, data flows

Personas

<p>Name & pic</p> <p>Anna</p> 	<p>Demographic/ Background</p> <ul style="list-style-type: none"> • Age 30 • Employee in the HR department, focusing on Learning & Development • 5 years of experience in Human Resources • Strong interest in data-driven people development and workforce planning 	<p>Goals/ Motivations</p> <ul style="list-style-type: none"> • Wants to identify skill gaps within teams and across the organization • Aims to offer targeted and effective training opportunities • Wants to recruit new employees based on actual skill needs • Hopes to save time and budget by avoiding unnecessary trainings
<p>Challenges/ Frustrations</p> <ul style="list-style-type: none"> • She has no centralized tool with an overview of employee skills • She only plans training based on the information she receives from the stakeholders – it lacks a standardized analysis tool to identify training requirements 	<p>How can we help</p> <ul style="list-style-type: none"> • Provide tools to map and manage workforce skills • Automatically identify gaps and training needs 	<p>Recap</p> <p>Anna is a 30-year-old HR professional with 5 years of experience, focused on data-driven people development and strategic workforce planning. She wants to identify skill gaps, offer targeted training, and recruit based on actual needs, aiming to optimize HR resources and avoid unnecessary expenses. Her main challenge is the lack of a centralized, standardized tool to analyse employee skills and training needs. She would benefit from tools that map skills, provide an overview of competencies, and automatically identify training gaps across the organization.</p>

<p>Name & pic</p> <p>Raj</p>	<p>Demographic/ Background</p>	<p>Goals/ Motivations</p> <ul style="list-style-type: none"> • Wants to keep an overview of
---	---------------------------------------	---

	<ul style="list-style-type: none"> • Age 44 • Team Lead: SAP consulting • 15 years of experience in IT consulting • Strong interest in targeted and personalized professional development of his employees / team members • Interest in using data-driven analytics to manage and follow-up on team members 	<p>his employees' skillsets, progress and professional development needs</p> <ul style="list-style-type: none"> • Aims to take decisions based on internal company data, as well as market data • Wants to ensure the readiness of his team members to confidently handle emerging technologies and projects. • Wants to match his team members to projects based on their skillsets • Hopes to better understand and make use of his employees' strengths, skills and knowledge and support them with targeted and personalized trainings as the need arises.
<p>Challenges/ Frustrations</p> <ul style="list-style-type: none"> • Doesn't have a comprehensive view of his employees' strengths and needs, as information and data are dispersed (or unavailable) • Continuously and easily stay up to date with the skills status and progress of his team members • Taking the time to plan the professional development needs of his employees to match the projects and market's growing needs 	<p>How can we help</p> <ul style="list-style-type: none"> • Provide a dashboard with an overview of his team members' skills, follow-up on internal progress and compare that to the latest requirements and market trends • Get data-driven insights, recommendations and trigger actions. 	<p>Recap</p> <p>Raj is a 44-year-old SAP consulting team lead with 15 years of IT consulting experience. He's deeply invested in the professional development of his team and values data-driven approaches for managing skills and performance. His main goals are to maintain visibility over his team's capabilities, ensure their readiness for future challenges, and align their skills with project needs and market trends. He faces challenges in keeping training aligned with business demands and proactively managing skill gaps. Raj would benefit from a smart dashboard offering insights into team skills, development progress, and actionable recommendations based on both internal and market data.</p>

<p>Name & pic</p> <p>Michael</p> 	<p>Demographic/ Background</p> <ul style="list-style-type: none"> • Age: 52 • CEO of a mid-sized IT consulting company • Over 25 years of experience in the IT industry, including 10+ years in executive leadership roles • Responsible for strategic direction, innovation, and sustainable company growth • Strong advocate for future-proofing the organization and investing in talent development <p>Highly focused on efficiency, competitiveness, and digital transformation</p>	<p>Goals/ Motivations</p> <ul style="list-style-type: none"> • Wants to make well-informed decisions about investments in training, departmental development, and strategic initiatives • Aims to identify development opportunities and potential risks within teams early on • Seeks to drive data-based personnel and organizational development • Wants to ensure the company has the necessary future-relevant skills • Desires full transparency into company-wide skills, gaps, and development opportunities • Goal: Increase competitiveness through targeted upskilling and strategic skill management
<p>Challenges/ Frustrations</p> <ul style="list-style-type: none"> • Lacks a comprehensive view of employee qualifications and competencies across departments • Struggles to assess the impact of training initiatives on overall business goals • Finds it difficult to align learning and development initiatives with strategic and market needs • Has limited time for deep analysis and decision preparation 	<p>How can we help</p> <ul style="list-style-type: none"> • Provide a clear and comprehensive skills dashboard covering all departments • Integrate internal data (skills, trainings, performance) with external market trends • Deliver actionable recommendations for training investments, strategic initiatives, and team development • Offer early warnings on critical skill gaps in key areas • Support the measurement of training effectiveness 	<p>Recap</p> <p>Michael is an experienced CEO who thinks strategically and aims to future-proof his organization. He believes in the power of data-driven decision-making to guide investment in skills and development. His biggest challenge is the lack of transparency around company-wide capabilities and needs. A smart skills dashboard can help him take proactive, evidence-based action to steer the company in the right direction.</p>

User stories

User stories	Data needed	Services needed	Data produced or added value services
<p>As an HR employee</p> <p>I want to have all the employees' skills related data from various sources, dynamically consolidated and managed in one tool</p> <p>so that I can have a comprehensive and dynamic data source to support me in the targeted planning of professional development offers</p>	<ul style="list-style-type: none"> • Employees' Data (Decidalo) • Projects' Data (Decidalo) • Data from projects' and tenders' • Training Data (Empower Scheer) • Learners' Data (Empower Scheer) • Scheer employees' organisation data • Scheer Skill matrix (Excel file) • Labour Market Forecasting Data (future considerations⁷) 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	Data preparation, aggregation and extraction tool
<p>As an HR employee</p> <p>I want to have a standardized structure and representation of my company's skills related data, for instance as Job profiles, Job Roles, Skills Categories...</p> <p>so that I can make use of data analysis tools to dynamically create and update employees' profiles and identify skill gaps</p>	<ul style="list-style-type: none"> • Standardized Skill Ontologies and Job Profiles • Internal Job Role Data • External Occupations and Jobs Data 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p>	A service to standardize the structure and representation of data
<p>As an HR employee</p> <p>I want to identify the missing training offerings in Empower Scheer, which my employees need to close their skill gaps</p>	<ul style="list-style-type: none"> • Available training data • External Training Offers Aligned to Identified Skills 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass</p>	<p>Content tagging service (training content and skills)</p> <p>Content mapping service</p> <p>Content matching</p>

⁷ Future considerations – lower-priority or long-term ideas depending on project timeline and implementation roadmap

<p>so that each employee receives the targeted training s/he needs to further develop</p>		<p>Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p>	<p>service</p>
<p>As an HR employee</p> <p>I want to have user-friendly and simple tools that map skills, provide an overview of competencies, and automatically identify training gaps across the organization.</p> <p>so that I can get data-driven insights, recommendations and trigger actions for the further professional development of my employees and the recruitment of new employees according to specific needs.</p>	<ul style="list-style-type: none"> All aggregated data 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	<p>Dashboard Data Analytics Service</p>
<p>Team Lead & CEO user stories are built on the HR user stories above.</p>			
<p>As a Team Lead</p> <p>I want to always have an updated preview on my teams' skillsets and gaps</p> <p>so that I can assign them to the right project and/or suggest targeted trainings</p>	<ul style="list-style-type: none"> All aggregated data of his team members All aggregated data related to the Job Profiles, Roles and Skills in his team. 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	<p>Dashboard Data Analytics Service</p>

<p>*Future consideration* As a Team Lead</p> <p>I want to compare my teams' skillsets with the recommended and forecasted market skills</p> <p>so that I can easily identify actions supporting my team to meet the challenges of the new trends and technologies</p>	<ul style="list-style-type: none"> • All aggregated data of his team members • All aggregated data related to the Job Profiles, Roles and Skills in his team. • Labour Market Forecasting Data 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	<p>Dashboard Data Analytics Service</p>
<p>As a CEO</p> <p>I want I want to have access to a company-wide skills dashboard</p> <p>so that I can identify critical skill gaps early and make strategic decisions about upskilling and talent development.</p>	<ul style="list-style-type: none"> • Employees' Data (Decidalo) • Data from projects' and tenders' • Scheer employees' organisation data • Scheer Skill matrix (Excel file) 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	
<p>*Future consideration* As a CEO</p> <p>I want to receive actionable insights that combine internal skill data with external market trends</p> <p>so that I can prioritize training investments that increase our</p>	<ul style="list-style-type: none"> • Labour Market Forecasting Data • Employees' Data (Decidalo) • Data from projects' and tenders' • Scheer employees' organisation data • Scheer Skill matrix (Excel file) 	<p>IMC Empower Scheer Demo system</p> <p>Headai Compass Bundle Service</p> <p>Inokufu</p>	

<p>competitiveness and align with future business needs.</p>		<p>Match Digital Trainings Service</p> <p>Headai Foresight Service</p>	
--	--	--	--

User Flows

Link to [Scheer Use Case Mural Board here](#).

User Flow HR1-2 — Consolidate Skills Data from Multiple Sources into a Standardized Structure

Description

In this user flow, the HR employee (Anna) uses Empower Scheer (imc Learning Suite) with the Skills Intelligence Add-on to consolidate skills-related data originating from multiple internal systems, files, and external sources.

The goal is to create a **clean, unified, standardized, and continuously updated skills dataset** inside the LMS, enabling analytics, skill gap detection, matching, and recommendations.

The HR employee logs into Empower Scheer and accesses the Skills Intelligence workspace. From there, the user may either **upload new files** (documents, Excel sheets, job descriptions, project descriptions, training catalogues) or **trigger automatic synchronization** with systems such as Decidalo, Scheer Organization DB, and external job/ontology sources.

Once the upload or sync is initiated, Empower Scheer transfers the data through the **VisionsTrust / PTX Data Space Connector (PDC)** to the preparation services. These services execute **skill extraction, ontology alignment, data cleaning, aggregation**, and when required, **anonymization**.

The processed and standardized results are returned to Empower Scheer, where the HR employee reviews and confirms the import.

After completion, the LMS contains a **consolidated skill and job role structure**, ensuring that all dashboards, analyses, and recommendations rely on a single, unified skill dataset.

User Flow HR3-4, TL1 — Gap Analysis Dashboard: Identify Skill Gaps and Missing Training Offerings

Description

In this user flow, HR employees and Team Leads analyse skills at the individual, team, or organizational level using the Empower Scheer Skills Intelligence Dashboard. The objective is to identify **skill gaps**, understand their impact, and determine **whether appropriate training exists** internally or externally.

Once logged in, the user accesses the Skills Intelligence workspace and opens the Gap Analysis Dashboard. The LMS retrieves standardized skills and job-role structures already consolidated via Headai services. The user can run comparisons between required job skills and current employee/team skills, generating an overview of which skills are missing or below required proficiency levels.

If gaps are detected, Empower Scheer retrieves recommended trainings from two sources:

- **Internal LMS training catalogue** (content already tagged or analyzed for relevant skills)
- **External training catalogue via Inokufu**, accessed through the PTX PDC, using skills as the query input.

The user reviews the training recommendations, selects the most relevant options, and assigns them to employees for development. If no training exists—internally or externally—the system highlights unmet needs for future training content creation or procurement.

At the end of the flow, HR and Team Leads have clear visibility into skills gaps, available training, and actionable development paths.

User Flow TL1 — Analysis Dashboard: Recommend and Assign Employees to Projects

Description

In this user flow, the Team Lead uses the Empower Scheer Skills Intelligence Dashboard to evaluate the skills of team members, compare them with the skills required for upcoming or ongoing projects, and identify suitable employees for assignment.

The Team Lead begins by accessing the Skills Intelligence workspace to view the team overview and project requirements. Empower Scheer retrieves standardized skills data (consolidated via Headai), job role structures, learning progress, and project skill requirements imported from Decidalo.

The system compares required project skills with each team member's profile (skills, proficiency, certifications, training history). The dashboard displays matching scores and recommendations. If a match is found, the Team Lead reviews the match details and proceeds to assign the employee to the project. If no match is found, the system highlights skill gaps and suggests targeted development actions.

Once the Team Lead selects a suitable employee and assigns them to the project, Empower Scheer synchronises the assignment with the relevant project management systems (e.g., Decidalo). The dashboard updates the status, providing transparency for future planning.

User Flow TL2 + CEO – Analysis & Comparison Dashboard: Skills, Training Effectiveness, Forecasts & Strategic Recommendations

Description

In this user flow, the Team Lead or CEO accesses the **Analysis & Comparison Dashboard** in Empower Scheer to obtain a strategic, organization-wide overview of skills availability, skills development, training effectiveness, workforce readiness, and alignment with **forecasted market trends**.

The dashboard integrates:

- **Consolidated and standardized skills data from Headai,**
- **Learning progress and training effectiveness data from Empower Scheer,** and
- **Headai labour-market forecasting and trend insights** delivered through the PTX Data Space Connector (PDC).

This enables the user to compare current internal capabilities with emerging skill demands. Filters allow analysis by team, department, job role, skill category, or organizational level.

The dashboard provides insights into:

- Skills strengths and weaknesses
- Skill trends and progression over time
- Training participation and effectiveness
- Forecasted future skill demand and market trends (via Headai)
- Strategic skill gaps and risk areas
- Recommended high-level actions for hiring, targeted upskilling, or workforce reorganization

The system also generates data-driven recommendations by comparing internal data with **Headai's external benchmarks, forecasts, and market insights**. When users accept recommendations, Empower Scheer updates the relevant dashboards, enabling targeted training programs, informed hiring strategies, and proactive workforce development.

Data Flows

Data Flow — Consolidating, Mapping and Skill-Tagging for Job Profiles, Projects and Trainings

Purpose of the Data Flow

This data flow describes how Empower Scheer (imc LMS), Decidalo, internal documents, and external services (Headai, Inokufu) exchange data—via the PTX PDC—to consolidate, standardize, enrich, and map all skills-relevant information needed to support job profiling, project staffing, and training recommendations.

The flow covers:

- Collecting internal and external skills-related data
- Processing and enriching data via Headai services
- Returning structured, aligned, and standardized skills and job-role representations to Empower Scheer
- Tagging and mapping content such as job profiles, employee skills, project data, and training materials

Participants

1. Data Providers

- **Empower Scheer (ILS):** internal training data, learners' data, job profiles, roles, skills
- **Decidalo System:** organization data, employee data, project/tender data
- **Internal Documents:** job descriptions, skill inventory files, competency spreadsheets
- **External Sources via Headai:** external job-role data, standard skills, ontology structures

2. Data Processors

- **Headai Services** (via PTX PDC):
 - Skill extraction from documents
 - Ontology alignment & normalization
 - Data aggregation & merging
 - Job-role enrichment
 - Mapping & tagging of skills
- **IMC Gateway / ILS Gateway:**
 - Prepares data for processing

- Sends/receives structured results

3. Data Destinations

- **Empower Scheer (ILS):** enriched job profiles, mapped skills, tagged trainings
- **Scheer centralized skills database (internal knowledge base)**

Data Flow – Skills Analytics & Gaps

Purpose of the Data Flow

This data flow explains how Empower Scheer’s internal skills data is compared with Headai’s external labour-market datasets to identify organizational skill gaps, future skill needs, and strategic gaps relative to industry benchmarks. The output supports dashboards for HR, Team Leads, and Executives.

Participants

Data Providers

- **Enhanced Empower Scheer (ILS)** – central skills repository (job roles, profiles, skill-tagged trainings, mapped project skills, learner progress).
- **Headai Labour-Market Data Service** – external market trends, skill benchmarks, forecasting data.

Data Processor

- **Analytics & Comparison Engine** (within Empower Scheer, supported by Headai insights).

Data Destinations

- **Empower Scheer Skills Database** – enriched insight on internal skill gaps compared to external trends.
- **Dashboards (HR, Team Lead, CEO)** – not shown in the diagram, but implied by the data flow.

Data Flow – Skills Matching and Learning Matching

Purpose of the Data Flow

This data flow explains how Empower Scheer uses its internal skills data, combined with internal and external training catalogues, to generate personalized training recommendations and match people to suitable roles or projects. It shows how learning matching services (training alignment to skill gaps) and skills matching services (employee → project/job role recommendations) operate within the DS4Skills environment.

Participants

Data Providers

- **Empower Scheer Skills Database (Central Repository)**
Internal skills, profiles, job-role requirements, project skills, training metadata.
- **Inokufu External Learning Catalogue**
External training metadata and skill-aligned content.

Data Processors

- **Learning Matching Services**
Align missing skills with internal and external training options.
- **Skills Matching Services (Headai)**
Match employees to job roles, teams, or projects based on skill profiles.

Data Destinations

- **Empower Scheer Skills Database** (updated with recommendations)
- **Empower Scheer Analytics Dashboards** (Skills Intelligence interface)

Data Flow — Headai LEADSx2030 Trends and Forecasting

Purpose of the Data Flow

This data flow explains how Empower Scheer compares its internal skills and training landscape with external **EU-level advanced digital skills demand**, delivered by **Headai's LEADSx2030 forecasting services**.

The objective is to identify future-oriented skill gaps and strategic workforce needs.

Participants

Data Providers

- **Empower Scheer (Skills Database, Central Repository)**
Contains skill-tagged job roles, profiles, project skill requirements, and training metadata.
- **Headai LEADSx2030 Service**
Provides EU-level advanced digital skills demand, trends, and forward-looking competencies.

Data Processor

- **Skills & Gaps Analytics Component**
Compares internal skills vs. Headai external trends and generates forecasting-aligned gap insights.

Data Destination

- **Empower Scheer Skills Database**
Stores the resulting future skills gap insights for dashboards and strategic analytics.

Potential risks identification and mitigation measures

Following are the identified concrete risks associated with implementing the Scheer use case within the DS4Skills project and proposed mitigation measures. The risks and mitigations reflect the real architecture of the use case, including:

- **Scheer IMC's** Empower Scheer LMS, Skills Intelligence Add-on and Gateway
- **Headai** (skills extraction, ontology alignment, forecasting & trends)
- **Inokufu** (external training-matching)
- **VisionsTrust & Prometheus-X** (data-space operator & governance layer)
- **PTX PDC (Data Space Connector)** (consent, contracting, secure data-sharing)

The measures also leverage the **DS4SKILLS KPIs** where relevant, ensuring ethical and operational monitoring.

Risk	Description	Mitigation measures
1 Data Protection, GDPR Compliance & Data Sovereignty Risks	Skills, project, and learning data processed in the use case includes personal data (HR data, project assignments, skills, learning history). When shared with external services (Headai, Inokufu) through the PTX PDC, there is a risk of: <ul style="list-style-type: none"> • Unintended exposure or re-identification • Insufficient consent or unclear legal basis • Data misuse outside originally agreed purposes 	<ul style="list-style-type: none"> • Use the VisionsTrust / Prometheus-X data-space architecture, which ensures contract-based, consent-managed, purpose-bound sharing of sensitive personal data. • Use the PTX PDC to guarantee certified secure data exchange, standard metadata, and traceable data flows. • Minimise personal data before transmission; pseudonymise/anonymise where possible (required for analytics in Headai or Inokufu). • Ensure GDPR-compliant Controller/Processor role mapping between Scheer IMC, external providers, and PTX. • Monitor compliance via the KPI: "Integrity and Security of Data", ensuring only authorized data is used and trace logs remain consistent.
2 Low Data Quality, Fragmentation & Semantic Interoperability Risks	Data originates from multiple, inconsistent formats: <ul style="list-style-type: none"> • Empower Scheer LMS • Decidalo (projects, consultants, CV-like data) • Excel-based skill matrices • Job descriptions & training descriptions 	<ul style="list-style-type: none"> • Headai's ontology alignment, skill extraction and "any source → harmonised data" capabilities ensure that fragmented skill data is standardised into a unified structure. • PTX service chaining ensures that each data transformation step (extraction, alignment, aggregation) is logged and auditable. • Human-in-the-loop validation: HR and Team Leads review extracted/mapped

	<ul style="list-style-type: none"> External training catalogues (Inokufu) External labour market trends (Headai) <p>Result: errors, inconsistent skill naming, duplicates, outdated data, or non-interoperable ontologies.</p>	<p>skills before import to Empower Scheer.</p> <ul style="list-style-type: none"> Monitor quality via KPI: Skills Extraction Recall \geq 75% and Tagged Content Accuracy \geq 75%.
3 Forecasting, Analytics & Recommendation Reliability	<p>External skill forecasts (Headai) and external training matches (Inokufu) may not fully reflect Scheer’s internal project demands or sector-specific consulting patterns.</p>	<ul style="list-style-type: none"> Combine internal Empower-Scheer data (employees, job roles, team skills) with external forecasts to contextualize trends. Treat Headai forecasts as advisory, not deterministic. All recommended actions must be confirmed by HR or Team Leads (human oversight). Measure accuracy using the KPI: Matching Training & Skills \geq 65% relevance.
4 Provider Lock-In and Service Interruption Risk	<p>Reliance on specific providers (Headai, Inokufu, PTX, VisionsTrust) may create dependency. Outages or provider changes could disrupt workflows.</p>	<ul style="list-style-type: none"> Prometheus-X is open-source, standard-based and interoperable, reducing lock-in. PTX Data Space Connector allows service substitution via modular service chains. Maintain fallback workflows inside Empower Scheer (manual import, internal search). Define Service Level Agreements for uptime and support.
5 Low Adoption & Trust Risk (HR, Team Leads, Employees)	<p>Users may distrust analytics or data sharing, leading to low adoption.</p>	<ul style="list-style-type: none"> Transparent explanations (why a recommendation or match was generated). Consent & control via VisionsTrust personal data governance mechanisms. Training for HR/Team Leads on data-space flows, privacy, and dashboards. Monitor trust through the KPI: Dashboard Feedback \geq 4/5.
6 Ethical Risks: Bias and Non-Discrimination	<p>If internal historical data is biased, AI recommendations could reinforce inequality (e.g., uneven training</p>	<ul style="list-style-type: none"> Use Headai’s ontology alignment to neutralize biased legacy term usage. Run fairness audits on recommended training, project assignments, and dashboards.

	access or biased staffing).	<ul style="list-style-type: none"> • Ensure human oversight for final staffing decisions.
7 Misuse of Forecasts, Analytics, or Dashboards	Forecast insights could be misinterpreted or used against employees (e.g. for unwanted re-skilling pressure or talent reduction).	<ul style="list-style-type: none"> • Purpose-bound processing enforced via VisionsTrust & PDC contractual rules. • Limit access to sensitive trends to decision-makers only. • Establish internal governance to review strategic uses of AI insights.
8 Technical Reliability & Performance Risks	Data flows, extraction pipelines, or PDC-based services may experience delays or failures.	<ul style="list-style-type: none"> • PTX building blocks and connectors are designed for scalable, distributed deployment. • Scheer IMC dashboards should have fallbacks to cached data. • Continuous monitoring of service health and sync status in Empower Scheer.

Ethical aspect

Ethical principal	Ethical concern	Mitigation
1 Fairness and Non-Discrimination	AI-driven extraction, matching and forecasting may inadvertently reinforce existing inequalities (e.g. biased job assignments, uneven training access).	<ul style="list-style-type: none"> • Use diverse data sources (internal + external) to reduce structural bias. • Run fairness checks on recommendations (team staffing, training suggestions). • Require human approval for final project assignments or re-skilling actions. • Use PDC contracts to enforce purpose limitation: no use of skilled data for discriminatory outcomes.
2 Transparency and Explainability	Users must understand: <ul style="list-style-type: none"> • How skills were extracted • Why training was recommended • How skill gaps are identified • How forecasts are generated 	<ul style="list-style-type: none"> • Empower Scheer dashboards must show explainability messages (e.g. “This skill gap was identified based on X patterns”). • VisionsTrust & PDC provide metadata, provenance and contract visibility, enabling traceability of every data transformation. • Employees can access their profile and correct or contest inaccuracies. • Clear communication of which external service processed which portion of their data.

<p>3 Accountability & Responsibility</p>	<p>Complexity of multi-provider ecosystems requires clear roles.</p>	<ul style="list-style-type: none"> ● Define roles: <ul style="list-style-type: none"> ○ Scheer IMC → Data Controller ○ Headai / Inokufu → Data Processors ○ VisionsTrust / PTX → Data-space Operator / Connector Provider ○ HR & Team Leads → Final decision-makers ● PTX PDC logs all data flows → supports audits and investigations. ● Internal group reviews analytics-driven decisions.
<p>4 Accuracy and Validity</p>	<p>Incorrect skills, outdated ontologies, or weak forecasts lead to poor HR/staffing decisions.</p>	<ul style="list-style-type: none"> ● Headai’s Natural Language Processing (NLP) + ontology alignment ensures consistent interpretation of job/project descriptions. ● Continuous update of internal skills data ● Measure accuracy via KPIs: <ul style="list-style-type: none"> ● Skills Extraction Recall ≥ 75% ● Training Tagging Accuracy ≥ 75% ● Matching Accuracy ≥ 65% ● Human-in-the-loop validation for job-role mapping.
<p>5 Privacy, Safety and Security</p>	<p>Sensitive employee data is processed externally; compliance with GDPR and corporate confidentiality is mandatory.</p>	<ul style="list-style-type: none"> ● VisionsTrust & Prometheus-X ensure contractual, consent-driven, purpose-limited data sharing. ● PTX PDC provides secure exchange, encryption, and usage control mechanisms. ● Apply full data minimisation: only share what the external service needs. ● Use pseudonymisation/anonymisation for analytics where possible. ● Clearly document retention policies, access rules, and deletion rights.
<p>6 Public Good and Sustainability</p>	<p>Systems must contribute to long-term sustainability, workforce resilience, and societal benefit.</p>	<p>Positive Impact</p> <ul style="list-style-type: none"> ● Fosters continuous learning and employability. ● Supports EU-wide skills transparency & mobility through Prometheus-X ecosystem. ● Reduces duplication of training investments by highlighting real needs. <p>Mitigation of Risks</p> <ul style="list-style-type: none"> ● Regularly update ontologies and skill frameworks to avoid outdated guidance (Headai). ● Ensure fairness across departments (no “training advantage” for certain groups).

		<ul style="list-style-type: none"> • Promote long-term career visibility, not only project-based utility.
7 Human-Centricity and Human Oversight	AI may pressure employees (e.g., mandatory re-skilling) or be misused for automated performance assessment.	<ul style="list-style-type: none"> • Final decisions always remain with humans (HR, Team Leads, Management). • Dashboards serve as decision-support, not decision-making tools. • Provide clear mechanisms for contesting AI outcomes or requesting explanation. • Ensure user-friendly UX in Empower Scheer so employees feel empowered, not monitored.

1.2.2 Testing Plan

Testing Scope

This Testing Plan covers **technical dataspace testing**, **functional user-flow testing**, **value testing**, and **business-model validation** for the Scheer Use Case.

Testing is structured into **specific functionalities**, **features**, **testing methods**, **dependencies**, and **assumptions**.

Testing is aligned with **personas (Anna, Raj, Michael)**, **user stories**, **user flows**, and **data flows** defined for the use case.

Skills Extraction, Normalization & Structuring

Technical Scenario T1 — Empower Scheer → Headai → Empower Scheer

Purpose

To validate extraction, alignment, and structuring of skills and job profiles from Scheer internal data using Headai AI services.

Features tested

- Skill extraction from unstructured text (Decidalo exports, job descriptions, project descriptions)
- Normalization & ontology alignment
- Job-profile structuring
- Importing standardized skills into Empower Scheer, and enabling selection of skills to be imported

Testing methods

- PDC data exchange validation

- Manual evaluation of extraction accuracy using sample dataset
- Comparison of Headai output vs expected job-role model
- Schema/ontology consistency checks

Dependencies

- **Headai:** Compass extraction, normalization, ontology alignment
- **PTX:** Connector, Catalog, Contract, Consent, Negotiating Agent
- **Scheer IMC:** Empower Scheer test environment, Skills Intelligence Add-on/ Gateway (optional for Iteration 1)
- **Scheer:** Decidalo data, job profiles, internal domain knowledge

Expected Output

- A set of **normalized, structured job profiles** imported into Empower Scheer (for iteration 1, if Job Profiles not ready with Headai, we can test with Skills)
- A validated **skills ontology alignment** between Headai and Scheer
- A quantitative **skills extraction accuracy score** (e.g., $\geq 75\%$ recall)
- A technical verification report confirming **PDC data exchange success**
- A list of **detected custom skills** versus **mapped standard skills**

Ontology & Metadata Interoperability

Technical Scenario T2 – Headai ↔ Inokufu

Purpose

To validate interoperability between Headai's normalized skill IDs and Inokufu's course metadata fields.

Features tested

- Shared or aligned skill identifiers
- Metadata mapping between Headai skills and Inokufu MOOC tags
- Ability for Empower Scheer to unify both sources

Testing methods

- Ontology alignment test: Headai IDs → Inokufu metadata fields
- Consistency testing across sample skills sets
- Validation of MOOC filtering accuracy based on Headai outputs

Dependencies

- **Headai:** stable skill identifiers, export of normalized skill IDs

- **Inokufu:** catalog metadata compatibility
- **Scheer IMC:** visualization, ingestion of combined datasets
- **PTX:** policy-controlled data exchange

Expected Output

- A validated mapping table: **Headai Skill ID ↔ Inokufu Metadata Tag**
- Confirmed **searchability** of MOOCs via normalized skills
- Consistent skill-tag behavior across multiple samples
- Confirmed **compatibility** for enabling unified dashboards
- A short report documenting **interoperability success or gaps**

[Skills → External Training Discovery Chain](#)

Technical Scenario T3 — Empower Scheer → Headai → Inokufu → Empower Scheer

Purpose

To validate that skills detected and normalized by Headai can be used to retrieve appropriate MOOCs from Inokufu’s catalog and displayed inside Empower Scheer.

Critical Information

- Inokufu does not provide recommendations.
- Inokufu returns *MOOCs linked to skill keywords* (metadata-based retrieval).
- Headai provides *skill normalization* required for Inokufu search.

Features tested

- Skill normalization → keyword generation
- Skill-based MOOC retrieval
- Enriched metadata display (tags and explanation of recommendation)
- Integration of internal (LMS) + external MOOCs listed in LMS catalogue and analytics dashboards

Testing methods

- PDC interoperability test (multi-hop chain test)
- Keyword consistency validation
- Human relevance scoring of retrieved MOOCs
- Display validation in Empower Scheer, including approval of external trainings to be added to the LMS catalogue (wireframe + real dashboard)

Dependencies

- **Headai:** normalized skill keywords
- **Inokufu:** Match Digital Training catalog (25,000+ MOOCs)
- **PTX:** multi-step PDC data exchange
- **Scheer IMC:** dashboard integration & UI
- **Scheer:** skill-gap data

Expected Output

- A validated **skill → keyword → MOOC pipeline**
- A consolidated list of **MOOCs linked to skill gaps**, visible in Empower Scheer
- A **MOOC relevance score** (target: ≈65% relevance)
- Verified **metadata completeness** (provider, length, level, description)
- Successful multi-hop PDC data transfer logs
- Initial dashboard prototype showing **internal + external trainings combined**

HR Skills Consolidation & Gap Identification

Functional Scenarios F1 & F2 — Persona: Anna, HR Manager

Functional Scenario F1 — HR: Consolidate Skills Data

Functional Scenario F2 — HR: Identify Skills Gaps + Training Options

Purpose

Validate that HR can consolidate skills, detect gaps, and view relevant internal and external training options.

Features tested

- Multi-source skill consolidation
- Visualization of skills in Empower Scheer
- Gap detection (Headai & LMS)
- Training options from LMS + Inokufu

Testing methods

- Wireframe walkthroughs
- HR task-based scenario execution/ Task-based testing (“HR performs consolidation workflow”)
- Accuracy validation of identified gaps
- Relevance scoring of MOOC results
- UX feedback survey (1–5)

Dependencies

- **Scheer IMC:** Skills Intelligence dashboards (TBD)
- **Headai:** gap detection
- **Inokufu:** MOOC retrieval
- **PTX:** Connector
- **Scheer:** HR testers

Expected Output

- HR successfully completes the **end-to-end consolidation flow**
- A list of identified **employee & team skill gaps**
- Verified training lists matching those skill gaps
- Clean UX feedback from HR (goal $\geq 4/5$ satisfaction)
- Documented **gap detection accuracy** and quality notes
- Updated wireframes based on HR feedback

Team Lead Decision-making View

Functional Scenario F3 — Persona: Raj, Team Lead

Functional Scenario F3 — Team Leads: Team Gap Review & Training Discovery

Purpose

Validate that Team Leads can use dashboards to understand team skills, identify gaps, and see relevant training options.

Features tested

- Team-level skill visualization
- Gap analysis for teams
- External and internal training relevance for specific team needs
- Recommended job roles (Headai)

Testing Methods

- User-story driven test tasks
- UX satisfaction scoring/ UX scoring (1–5)
- Relevance rating of training lists / relevance scoring
- Comparison to real team training needs, ex: comparison of training options vs actual team needs

Dependencies

- **Scheer IMC:** Team dashboards
- **Headai:** analytics at team level
- **Inokufu:** catalog retrieval
- **Scheer:** team lead testers

Expected Output

- A validated **team skills dashboard**

- Team-level skill gaps correctly reported
- A list of targeted external/internal trainings
- Team Lead satisfaction score $\geq 4/5$
- A summary of mismatches or missing skills/training options
- Clear decision-support insights (e.g., staffing, upskilling)

Strategic Dashboard & Forecasting for Executives

Functional Scenario F4 — Persona: Michael, CEO

Functional Scenario F4 — CEO: Company Dashboard + Foresight

Purpose

Validate whether strategic decision-makers can use consolidated skills data and forecasting insights for workforce planning.

Features tested

- Company-wide skills overview
- Skills heatmaps. Skill gaps visualization
- Market foresight (Headai Foresight service)
- Training landscape overview

Testing methods

- Guided scenario walkthrough (“CEO reviews strategic dashboard”)
- Executive qualitative interview: qualitative interview on decision-making support
- Perceived usefulness scoring
- Forecast relevance scoring

Dependencies

- **Headai:** Foresight service
- **Scheer IMC:** strategic dashboards
- **PTX:** dataspace-level data exchange
- **Scheer:** executive testers

Expected Output

- A validated **strategic dashboard** usable for real decisions
- CEO qualitative insights on value & clarity
- A relevance score for Foresight predictions
- Documented examples of actionable strategic insights
- Feedback for dashboard enhancement

Value & Business-Model Validation

Testing cross-cutting value of combined services

Purpose

To determine whether the combined Headai + Inokufu + Empower Scheer solution brings measurable value to Scheer.

Features tested

- Perceived value of dashboards (HR, TL, CEO)
- Trust in automation
- Willingness to adopt
- Impact of forecasting (strategic level)
- Value of integrated internal + external training options

Testing methods

- At least 3 semi-structured interviews (HR, TL, CEO)
- Likert-scale scoring
- Observational data (speed, clarity) / Observed behavioural indicators (time saved, clarity obtained)
- Business model radar update
- Value chain assessment

Dependencies

- **Scheer:** user participation
- **Headai & Inokufu:** quality of outputs
- **Scheer IMC:** prototype dashboards
- **PTX:** stable technical environment

Expected Output

- A compiled **value validation report**
- A revised **Business Model Radar**
- A refined **Value Chain Timeline**
- Documented user perceptions (pain points & value points)
- Clear decision on future procurement or scaling
- Evidence of value creation (e.g., faster decisions, reduced manual work)

Constraints & Assumptions

Dependencies & blockers to verify

- **Inokufu** does not provide recommendations → relevance must be validated by users.
- **Headai** must deliver skill normalization & forecasting on time.
- **PTX** must provide all required building blocks (Connector, Catalog, Contract, Consent, Negotiating Agent).
- **EDGE Gateway** optional depending on timeline.
- Multi-hop **PDC connections** must be functional (Empower Scheer → Headai → Inokufu → Empower Scheer).
- **Scheer IMC** must have the Skills Intelligence Add-on configured for dashboards.
- **Decidalo data** may require anonymization before extraction.
- Availability of real/synthetic **data sets** must be ensured before testing.

Expected Output

- A consolidated **risk & mitigation log**
- A list of **confirmed vs unresolved constraints**
- Final readiness checklist for Phase 2 execution

Testing Environment

The data exchange testing will be conducted through VisionsTrust / Prometheus-X dataspace infrastructure, the Prometheus-X Data Space Connector (PDC) and the Empower Scheer environment.

Dataspace Infrastructure — PTX / Prometheus-X Core Building Blocks

The following **core building blocks** will be used in all technical tests (T1–T3):

1. Connector (PDC)

1. Core building block enabling secure, policy-controlled data exchange
2. Ensures interoperability and GDPR compliance

2. Catalog

3. Enables discovery of Headai and Inokufu services in the dataspace
4. Ensures that Empower Scheer and providers can find and connect to each other

3. Contract

5. Generates and manages contractual agreements for data exchange
6. Ensures legal compliance and traceability of data flows

4. Consent

7. Manages data usage permissions and consent
8. Ensures transparency and regulatory compliance for personal data use

5. Consent/Contract Negotiating Agent

9. Automates negotiation of consent and contract settings
10. Supports data sovereignty and user-controlled data sharing
11. Optional in the use case, but included in testing where feasible

These building blocks enable the **PDC-based data exchanges** described in Testing Scope (Section 5) and the **Technical Scenarios T1–T3** (Section 9.1).

Use Case System Components

The following system components are involved in the tests:

Scheer IMC (Empower Scheer)

- Provides the LMS backbone used in the use case
- Includes the **Skills Intelligence Add-On** and/or **EDGE Gateway** (depending on readiness)
- Hosts dashboards that consume internal and external data
- Serves as the main user interface for HR, Team Leads, and Executives

Headai

- Provides skills extraction from unstructured text (Decidalo exports, job descriptions, project descriptions)
- Performs tagging, anonymization, ontology alignment, matching, recommendations and visualization
- Provides **Foresight Service** (labour-market/skills forecasting)
- Exposes normalized skills and job profiles for use by Empower Scheer and Inokufu

Inokufu

- Provides access to a catalog of **25,000+ MOOCs and digital learning objects**
- Offers **skills → MOOC retrieval** based on skill/keyword metadata (no recommendation engine)
- Maintains enriched metadata on learning objects for relevance and filtering
- Returns learning objects linked to skills provided by Headai via PDC

The environment will initially use **test, synthetic or anonymised data** where necessary to meet GDPR and internal governance requirements.

End Users

Roles and numbers (TBD)

Testing tasks will reflect actual user stories from the [Mural board](#).

Testing will be conducted with **real users at Scheer** corresponding to the personas defined in the use case (Section 1):

- **Persona Anna – HR / L&D**
- **Persona Raj – Team Lead / Manager**
- **Persona Michael – CEO / Executive**

Planned Testing Groups

- **HR / L&D (Persona Anna)**
 - Target: **3–5 users**
 - Roles: HR, L&D managers, people responsible for training planning and skill management
- **Team Leads / Managers (Persona Raj)**
 - Target: **3–5 users**
 - Roles: team leads, project managers responsible for staffing and development of consultants
- **Executives / Decision Makers (Persona Michael)**
 - Target: **1–2 users**
 - Roles: CEO or senior executives concerned with strategic workforce planning

Relation to Personas and User Stories

Testing tasks in the Functional Scenarios (F1–F4) are directly derived from:

- Personas Anna, Raj, Michael
- User stories for HR, Team Leads, CEO
- User flows for skills consolidation, gap analysis, training discovery, and strategic dashboards
- Data flows involving Empower Scheer, Headai, Inokufu and PTX

This ensures that testing covers all **critical real-world interactions** of the use case.

NOTE: An effort will be made to collect selected feedback from other companies regarding the main functionalities and results.

Testing Tools

The following tools and artefacts will be used during the testing activities:

- **Clickable wireframe prototype** of the dashboards and flows (for F1–F4)
- **Empower Scheer test instance** with Skills Intelligence Add-On and connected external services (for realistic scenarios)
- **Task scenario scripts** describing step-by-step actions for HR, Team Leads, and Executives (unless free exploration and speak-aloud protocols are used - TBD)
- **PDC logs & interoperability tools** to inspect and validate data exchanges in T1–T3
- **Relevance evaluation sheets** for MOOCs/training lists (Inokufu returns learning objects; relevance is human-rated)
- **Survey forms** (Likert-scale, qualitative comments) for usefulness, usability, trust & perceived value
- **Interview templates** for business model and value chain validation (Section 5.7 and 12)
- **Tracking sheets** for KPIs (skills extraction quality, matching accuracy, dashboard usefulness, Empower Scheer added value)
- Use of **documentation and screencasts** for the various iterations of the testing phases and scenarios

Where feasible, tools will be reused across scenarios to ensure consistent data collection for WP3 KPIs.

Testing Execution Plan

Testing execution covers **Technical Scenarios (T1–T3)** and **Functional Scenarios (F1–F4)**, with timing summarized in Section 9.3.

Responsibilities will be shared between **Scheer, Scheer IMC, Headai, Inokufu and PTX** according to their roles in Section 4 (Use case partners, roles and contributions) and Subject to further detailed agreements with each provider.

Technical Scenarios

Scenario T1 — Empower Scheer → Headai → Empower Scheer

Test focus:

- Extraction of skills from Scheer internal data
- Ontology alignment and job-profile structuring
- Re-import into Empower Scheer

Expected result:

- Standardized job roles, normalized skills, and structured profiles available in Empower Scheer
- Sufficient extraction quality to meet KPI targets (e.g. Skills Extraction Quality, ≥75% recall)

Plan details (high level):

- Prepare representative sample datasets from Decidalo / Scheer sources
- VisionsTrust contract between Scheer-Headai has been signed
- Service chain(s) defined and created in VisionsTrust (required, to be used depending on the maturity of EDGE Gateway)
- Configure PDC connection between Empower Scheer and Headai
- Execute multiple extraction and alignment runs
- Evaluate precision/recall on selected samples
- Log and resolve issues with Headai and PTX if needed

Scenario T2 — Headai ↔ Inokufu**Test focus:**

- Ontology and metadata alignment between Headai skill IDs and Inokufu metadata

Expected result:

- Headai skill IDs correctly map to catalog fields in Inokufu
- Training discovery behaves consistently across different skill types

Plan details (high level):

- Select a subset of skills across different domains
- Map Headai skill IDs to Inokufu's metadata fields
- Validate that these skills reliably filter/return appropriate MOOCs
- Document mapping rules, limitations, and improvement points

Scenario T3 — Empower Scheer → Headai → Inokufu → Empower Scheer**Test focus:**

- End-to-end skills → MOOC retrieval chain
- Headai normalized skills used as keywords for Inokufu search
- Training lists displayed inside Empower Scheer

Expected result:

- Relevant MOOCs retrieved and displayed for identified skill gaps
- Consistent metadata and no technical errors across the multi-hop chain

Plan details (high level):

- VisionsTrust contract between Scheer-Headai, Scheer-Inokufu and Headai-Inokufu has been signed
- Service chain(s) defined and created in VisionsTrust (required, to be used depending on the maturity of EDGE Gateway) □ Service Chain(s) might be tested in multiple chunks first, until full chain could be done.
- Configure Headai → Inokufu PDC chain and integration into Empower Scheer
- Use selected skill gaps as input scenarios
- Run several queries and collect MOOC lists
- Evaluate relevance and metadata completeness
- Analyze and fix any data-format or mapping issues

Functional Scenarios (Wireframe and/or Empower Scheer UI)

Scenario F1 — HR: Consolidate Skills Data (Persona Anna)

- Upload/import skills-related data
- Trigger extraction and normalization
- Review consolidated views in the Skills Intelligence dashboard
- Validate Headai's representation of skills
- Validate UX: simple and user-friendly workflow

Scenario F2 — HR: Identify Skills Gaps + Training Options (Persona Anna)

- Use dashboards to identify skill gaps (individual and team level)
- View internal trainings from Empower Scheer LMS
- View external MOOCs from Inokufu returned via T3 chain
- Evaluate relevance of training options to gaps (focus on relevance, not algorithmic accuracy)
- Validate UX: simple and user-friendly workflow

Scenario F3 — Team Leads: Team Gap Review & Training Discovery (Persona Raj)

- View team skill map and strengths/gaps
- Identify key training options (internal and external MOOCs) for the team
- Compare suggested trainings to actual team needs and priorities
- Validate UX: simple and user-friendly workflow

Scenario F4 — CEO: Company Dashboard + Foresight (Persona Michael)

- View high-level company-wide skills overview
- Explore skills gaps across units or domains

- Review market and labour-market forecasts from Headai Foresight
- Evaluate training landscape and strategic implications
- Validate UX: simple and user-friendly workflow

These scenarios will be tested first on **wireframes**, then (where feasible) on the Empower Scheer UI connected to test data and data services.

Timeline

Initial timeline – to be updated as talks with providers are ongoing.

Q1–Q2 2026 – Preparation Phase

- Finalize data flows and testing scope
- Prepare internal & external datasets (including anonymisation/pseudonymisation where required)
- Configure PDC connectors (Empower Scheer ↔ Headai ↔ Inokufu via PTX)
- Set up testing environments for T1–T3 and F1–F4

Q2–Q3 2026 – Technical Testing Phase (T1–T3)

- T1: Skills Extraction, Normalization & Structuring
- T2: Ontology & Metadata Interoperability (Headai ↔ Inokufu)
- T3: Skills → Training Discovery Chain (Headai → Inokufu → Empower Scheer)

Q4 2026 – Q1 2027 – Functional Testing Phase (F1–F4)

- F1: HR – Consolidate Skills Data
- F2: HR – Identify Skill Gaps & Training Options
- F3: Team Lead – Team Gap Review & Training Discovery
- F4: CEO – Strategic Dashboard & Foresight

Q1–Q2 2027 – Consolidation Phase

- Consolidate technical + UX results
- Validate value & business model (linked with Section 12)
- Refine dashboards, flows, and recommendations
- Prepare final use case outputs for DS4Skills (WP3/WP4)

ID	Phases	Preparation	Technical Testing		Functional Testing		Consolidation		
	Testing Scope & Scenario	Q1.2026	Q2.2026	Q3.2026	Q4.2026	Q1.2027	Q2.2027	Q3.2027	Q4.2027
P1	Preparation: *Finalize data flows and testing scope *Prepare internal & external datasets (including anonymisation/pseudonymisation where required) *Configure PDC connectors (Empower Scheer ↔ Headai ↔ Inokufu via PTX) *Set up testing environments for T1–T3 and F1–F4								
T1	5.1 Skills Extraction, Normalization & Structuring Technical Scenario T1 — Empower Scheer → Headai → Empower Scheer								
T2	5.2 Ontology & Metadata Interoperability Technical Scenario T2 — Headai ↔ Inokufu								
T3	5.3 Skills → External Training Discovery Chain Technical Scenario T3 — Empower Scheer → Headai → Inokufu → Empower Scheer								
F1 & F2	5.4 HR Skills Consolidation & Gap Identification Functional Scenarios F1 & F2 — Persona: Anna, HR Manager, F1. Consolidate Skills Data & F2. Identify Skills Gaps + Training Options								
F3	5.5 Team Lead Decision-making View Functional Scenario F3 — Persona: Raj, Team Lead, Team Gap Review & Training Discovery								
F4	5.6 Strategic Dashboard & Forecasting for Executives Functional Scenario F4 — Persona: Michael, CEO, Company Dashboard + Foresight								
S1	5.7 Value & Business-Model Validation Testing cross-cutting value of combined services								

Building blocks

The following **Prometheus-X building blocks** form the core chain used in the use case:

- **Connector (PDC)**
 - Core building block enabling secure, interoperable data exchange
 - Ensures compliance with GDPR and dataspace policies
- **Catalog**
 - Allows publishing and discovering data and service offerings (Headai, Inokufu, Empower Scheer endpoints)
 - Makes cross-provider integration technically feasible
- **Contract**
 - Manages the contractual layer associated with data flows
 - Provides legal traceability for access and usage
- **Consent**
 - Handles consent/preferences for personal data usage when applicable
 - Ensures transparent and compliant use of skills-related personal data
- **Consent/Contract Negotiating Agent**
 - Orchestrates communication between Consent and Contract building blocks
 - Automates negotiation, helping enforce data sovereignty

Optional / Supporting Building Blocks

- **EDGE Gateway (IMC)**
 - To be considered if ready within the implementation timeline
 - Could be used as a technical gateway between Empower Scheer and PTX
- **Utility: Data Value Chain Tracker**
 - If easy to integrate, can support evaluation of the **business value** of data chains
 - Helps trace how data flows contribute to value creation in the use case
- **Utility: Distributed Data Visualization**
 - If integration is feasible, can support building **advanced analytics dashboards**

- o May help visualize distributed datasets while preserving privacy

These optional utilities will be evaluated based on **effort vs added value** and may be used to strengthen the evaluation of the data value chain and analytics capabilities.

Governance

This use case deals with **skills-related data**, which can be considered personal or sensitive, depending on context.

Key governance principles:

- All **personal data will be pseudonymised or anonymised** before crossing the PDC, unless strictly necessary and covered by appropriate legal and contractual bases.
- Only **skills/keywords (without identifiable personal information)** will be sent to Inokufu.
- The **Consent** and **Contract** building blocks must be active and correctly configured to reflect data processing purposes and usage policies.
- Headai may receive anonymised project descriptions and job-role texts, where required for skills extraction.
- Raw personal data should remain stored inside Empower Scheer and Scheer's controlled environments, unless an explicit policy allows otherwise.
- Access to dashboards and logs will be restricted to **authorised project members and test participants**, with role-based access where appropriate.

Governance settings will be aligned with Scheer's internal data protection policies, GDPR requirements, and the DS4Skills dataspace governance framework.

1.3 LMS Use Case : Manufacturing skills forecasting & matching

1.3.1 Use case description, value and goal

Today the manufacturing sector is in need of a workforce possessing advanced skills in terms of Industry 4.0 technologies. Students of this sector, who will form the future workforce, usually lack practical skills in these areas, which are necessary in today's digital age. The primary challenge that this use case addresses is therefore to bridge the gap between theoretical knowledge and practical skills in advanced manufacturing.

In order to achieve this ambitious goal, this skills data space use case aims at **providing tailored learning pathways** for both students and employees of the sector

to equip individuals with essential competencies in AI, digital twins, data modelling, and other Industry 4.0 technologies - skills that are increasingly demanded in the manufacturing sector but often lacking among graduates.

This project aims to develop **an advanced platform that offers personalised learning content recommendations** to students/employees. This will be done by leveraging data space technologies, enabling a structured and GDPR-compliant exchange of skills-related data between the University of Patras and its Laboratory for Manufacturing Systems and Automation (LMS), training providers, and industry stakeholders. The envisioned platform will match learners with the most relevant training content based on their current expertise and career aspirations, facilitating a more personalised and effective learning experience. Additionally, the system will integrate skills analytics services to identify industry needs dynamically and ensure that training offerings remain aligned with labour market demands.

A key **assumption** is that by providing targeted upskilling opportunities, students and employees will be better prepared for the workforce, while manufacturers and employers will benefit from a more skilled talent pool. The project also seeks to create a feedback loop where data insights on skills gaps inform curriculum development, fostering continuous improvement in education and training strategies.

Use Case partners

Data providers

- Data about learners (students - *from University of Patras* & employees)
 - Educational background (curriculum followed, courses completed, certifications)
 - Current skill set (manual input via CVs)
 - Learning preferences and goals (career aspirations, areas of interest)
 - Learning engagement history (participation in previous training, completed tutorials, performance data)
 - Student project participation (e.g., Formula Student projects, hands-on experience)
- Data about training and learning content
 - Existing learning resources (tutorials, training materials)
 - Learning paths and structured courses (specific steps to acquire a skill)
 - Skills ontology/taxonomy (structured definitions of required skills for different roles)
 - Online learning content from external providers (potential inclusion of YouTube tutorials, MOOCs, etc.)
 - Training success metrics (effectiveness of courses, completion rates)
- Data from employers and the Labour Market
 - Skills demand data (collected via employer interactions in projects)
 - Job descriptions and required competencies (from Greek national job portals, LinkedIn, Indeed)

- Industry skill gap analysis (matching job requirements with available workforce skills)
- Data from the University of Patras and training organisations
 - Competency frameworks (what skills students are expected to develop)
 - Performance assessments (if available, to measure learning progress)

Service providers (=data consumers)

- Data Space technologies (VisionsTrust)
 - Data exchange infrastructure (GDPR-compliant sharing of private, protected, and anonymised data)
 - Catalogue of data providers and services (organisations, datasets, and services for use in the platform)
 - Contractualisation and access management (standardised agreements between stakeholders)
- AI Services Needed
 - Skill extraction and classification
 - AI models that analyse job descriptions and learning content to extract required skills
 - Taxonomy-based classification of skills across industries
- Skills gap analysis
 - AI-powered tools to compare individual learner profiles with job market demands
 - Identifying missing competencies and suggesting relevant learning resources
- Personalised learning recommendations
 - AI-driven matching engine to connect learners with the best-suited training content
 - Adaptive learning services to tailor recommendations based on prior knowledge
- Labour market analytics
 - AI-based job market analysis (to identify trends in the manufacturing sectors)
 - Real-time insights into evolving industry needs
- Employer-student matching
 - AI-driven job matching services (connecting upskilled learners with potential employers)
 - Predictive analytics to forecast demand for certain skills
- Learning assessment and certification tracking
 - AI-based evaluation of skills acquired through training
 - Potential gamification and certification validation

Use case functionalities

1. Learner-centric functionalities (Students & Employees)
 - o Skills Profiling & Onboarding
 1. Self-reporting of skills and experience (manual input / CV upload)
 2. Career goal setting to personalise recommendations
 - o Personalised learning pathways
 1. AI-driven course recommendations based on skills gap analysis
 2. Interactive and adaptive learning paths tailored to individual needs
 3. Integration of different learning formats (videos, tutorials, online courses)
 - o Skills gap identification
 1. AI-driven comparison between current skills and market demand
 2. Automated suggestion of missing competencies and upskilling paths
 - o Job matching
 1. Connection to potential employers
 2. AI-driven job recommendations based on skill progression
 3. Employer dashboard to track potential hires
 - o Learning progress tracking & certification
 1. Monitoring of completed courses and acquired competencies
 2. Certification tracking and potential integration with credentialing systems
 3. Gamification elements to boost engagement
2. Educator & training provider functionalities
 - o Training & Course Catalogue Management
 1. Listing of available courses, learning paths, and tutorials
 2. AI-powered tagging of content with relevant skills and categories
 3. Skills Analytics Dashboard
 - o Insights into which skills are most in demand
 1. Identification of knowledge gaps in students and workers
 2. Suggestions for curriculum updates based on industry needs
 - o Integration with existing learning resources
 1. Ability to pull training materials from universities and third-party providers
3. Employer & labour market functionalities
 - o Labour market data & skills demand analytics
 1. Aggregation of job postings and market trends to analyze demand for skills
 2. AI-driven reports on emerging skills and future workforce needs
 3. Employer Dashboard
 - o Ability to view potential talent pools based on skills acquired
 - o Recruitment pipeline tracking for industry partners

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
Users onboarded	Unique users (students, employees, job-seekers) who are using the LMS use case through the VISION TRUST platform	At least 500	Number of users recorded in the use case	KPI to be examined during the testing phase.
Training resources integrated	Total distinct learning paths, tutorials, and MOOC units available through the dataspace	At least 200	Count of resources in the catalogue	KPI to be examined during the testing phase.
Dataspace connectors deployed	Operational PTX connectors linking LMS resources	At least 2	Count of active PTX connectors	KPI to be examined during the testing phase.
Skills-gaps assessments executed	Number of skills gap-analysis reports generated for learners or employees	At least 1000	Monitor service usage logs	KPI to be examined during the testing phase.
Personalised learning paths completed	Completed learning paths in which learners successfully pass the paths' final assessment	At least 400	Monitor service usage logs	KPI to be examined during the testing phase.
Employer engagement	Distinct manufacturing companies actively sharing job-skills data requirements	At least 25	Number of new data providers registered	KPI to be examined during the testing phase.
Learner satisfaction	Percentage of satisfaction of learners who have interacted with the LMS use case	At least 85%	Survey collection after the completion/failure of learning paths	KPI to be examined during the testing phase.

PTX connector reliability	High PTX connector uptime	At least 99%	Measured using tools like Prometheus	KPI to be examined during the testing phase.
---------------------------	---------------------------	--------------	--------------------------------------	--

Personas, user stories, user flows, data flows

Personas

Name & pic	Demographic/Background	Goals/motivations
University Students	<ul style="list-style-type: none"> Age 20 – 25 Studying engineering, mathematics, economics, business administration Already possess theoretical skills & knowledge on manufacturing topics 	<ul style="list-style-type: none"> Acquire practical skills that will complement their theoretical knowledge in applying technologies for manufacturing (e.g. apply predictive analytics) Discover training related to manufacturing
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> Lack of knowledge on which training material is suitable for his/her needs Too much training material on digital technologies but they lack their application for manufacturing 	<p>How can we help</p> <ul style="list-style-type: none"> Match university students with the appropriate training content Support the students in the development of new skills 	<p>Recap</p> <p>University students interested in the domain of advanced manufacturing are usually studying in the fields of engineering, mathematics or economics and are interested in acquiring practical skills that can not be obtained through theoretical courses. However, students, despite their familiarity with technology are challenged to identify the appropriate courses based on their experience and needs. To address we will support students in identifying for them the best content based on their needs and support them during the later stages by matching them with potential employers.</p>

<p>Name & pic</p> <p>Steel Industry Manufacturer</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • Plan manager or HR manager • Age 30-35+ • Often work with industrial legacy systems 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • Upskill personnel in topics such as automation, quality control, etc. • Enhance safety and process efficiency
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • Difficulty integrating modern training with shop floor operators • Lack of sector-specific training on AI use cases 	<p>How can we help</p> <ul style="list-style-type: none"> • Support employers in identifying relevant training material that their employees can use • Matchmaking services 	<p>Recap</p> <p>Steel manufacturing is undergoing a transition to automated production, control and quality control. This exposes shortcomings in the skills of existing personnel who are often not skilled to develop or interact with intelligent systems. Also, especially operators, are usually reluctant to use modern systems, given their unfamiliarity with them. Assisting such manufacturers, we will provide them with the ability to match employees with the right skills development content for upskilling & reskilling in automation, AI, and system control.</p>

<p>Name & pic</p> <p>Automotive Industry Manufacturer</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • Plan manager or HR manager • Age 30-35+ • Often work with industrial legacy systems 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • Equip the workforce with practical knowledge on AI-based solutions like proactive quality control and digital twins
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • The use of intelligent services requires a workforce highly skilled on 	<p>How can we help</p> <ul style="list-style-type: none"> • Support employers in identifying relevant training material that their employees 	<p>Recap</p> <p>Such manufacturers differ from steel manufacturers, given that such industries are higher in complexity and are often accompanied by manual processes in quality control. However, the</p>

modern autonomous technologies	<p>can use</p> <ul style="list-style-type: none"> • Create a more skilled future workforce 	<p>current workforce is not accustomed to using tools like digital twins, non-destructive inspection systems and AI services. To assist, we will identify the needed training material that will focus on the technical skills needed to create a more skilled future workforce.</p>
--------------------------------	---	--

<p>Name & pic</p> <p>People part of the workforce but not currently employed</p>	<p>Demographic/Back ground</p> <ul style="list-style-type: none"> • Age 25+ 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • Acquire new skills that will help them find a new job • Enhance their existing skills that will help them find a new job
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • Knowing what skills and traits are needed to apply for jobs in manufacturing can be challenging • Too much training material available on digital technologies but they lack their application for manufacturing 	<p>How can we help</p> <ul style="list-style-type: none"> • Provide information on what skills and traits are required by manufacturers • Provide matchmaking services • Create a more skilled future workforce 	<p>Recap</p> <p>Apart from students and people already employed in manufacturing, people who are part of the workforce but are not employed are motivated by gaining new skills to be employed in manufacturing-related positions. However, such people are challenged by the sheer amount of information available online, making the identification of needed skills for certain roles impossible. To assist them, we will provide aggregated information on the needed skills for specific job titles in manufacturing, as well as provide them with the appropriate content to build a new set of skills targeting roles selected by them.</p>

User Stories

User stories	Data needed	Services needed	Data produced or added value services
As a university student,	<ul style="list-style-type: none"> • User profile that includes: <ul style="list-style-type: none"> o Background info o Current skillset 	<ul style="list-style-type: none"> • AI services to extract skills from 	<ul style="list-style-type: none"> • Personalized skills gap report

<p>want to log in to an online platform so that I can easily find relevant training material to gain specific skills</p>	<ul style="list-style-type: none"> o Skills that the student wants to acquire o Manufacturing subdomain where the skills will be applied • Information on the available training material in the dataspace <ul style="list-style-type: none"> o Topic o Previous skillset required to complete the training 	<p>user profiles</p> <ul style="list-style-type: none"> • Skills gap analysis tools • Learning courses, matchmaking services • Learning assessment & certification • Employer-student matching service 	<ul style="list-style-type: none"> • Recommended learning path • Progress and performance KPIs • Aggregated performance of students and the new skill level
<p>As a manufacturer, I want to have access to high-quality training material so that I can help employees become more productive and efficient</p>	<ul style="list-style-type: none"> • Employee data: <ul style="list-style-type: none"> o Current place in the company o Tasks being performed o Future tasks planned o Background knowledge • Information on the available training material in the dataspace <ul style="list-style-type: none"> o Topic o Previous skillset required to complete the training 	<ul style="list-style-type: none"> • AI services to extract skills from user profiles • Skills gap analysis tools • Learning courses, matchmaking services • Learning assessment & certification 	<ul style="list-style-type: none"> • Employee skills gap dashboard • Training ROI estimates • Aggregated reports on skills distribution for task planning
<p>As a person interested in getting a new job, I want to learn about job opportunities and evaluate my skills level so I can find training material to enhance them and be able to apply</p>	<ul style="list-style-type: none"> • User profile that includes: <ul style="list-style-type: none"> o Background info o Current skillset o Job descriptions that are of interest to the user • Available jobs in the labor marketplace • Information on the available training material in the dataspace <ul style="list-style-type: none"> o Topic o Previous skillset required to complete the training 	<ul style="list-style-type: none"> • Labour market analytics • AI services to extract skills from user profiles • Skills gap analysis tools • Matchmaking services • Learning assessment 	<ul style="list-style-type: none"> • Personalized upskilling recommendations • Job application success metrics • Up-to-date analytics on skills demand

for a wider range of positions			
--------------------------------	--	--	--

User Flows

In the context of user flows, a dedicated flow has been envisioned for each of the user stories described in section 5.2. Nonetheless, these user flows may change during the second phase of the use case.

User flow 1

The first user flow targets a university student. For such a user, the user flow will be composed of the following steps:

1. The user logs into the LMS's use case business layer user interface.
2. The user browses for available projects offering skills development, targeting the manufacturing industry.
3. The user finds the use case's project through the projects catalogue of the platform, reads the description of the project and explores the different offers of the project.
4. The user clicks on "Use this offer" to access the offer that will evaluate their current skill level.
5. The user uploads the necessary information to the service (latest CV, background information and manufacturing subdomain(s) where the skills would be applied).
6. The user consumes the results of the service and clicks on "Use this offer" from one of the recommended learning tutorial services.
7. Upon completion of the learning path, the user is rewarded with a certificate of completion and available job recommendations are presented through the platform.

User flow 2

The second user flow targets an employer (a company from the manufacturing industry), who is interested in upskilling their employees to enhance their productivity and efficiency.

1. The user logs into the LMS's use case business layer user interface.
2. The user browses for available projects offering learning paths for upskilling in areas such as AI, digital twins, and industrial automations, since they are interested in enhancing their workers' understanding of industrial automated intelligent systems.
3. The manufacturer identifies the LMS use case and explores available services connected to the project.

4. The manufacturer uses the service of the project for skills matchmaking by inserting the current profile of the employees who need upskilling and selects the digital skills that workers need to obtain.
5. The manufacturer to increase the potential of successfully upskilling employees, engages with employees to use one of the skills gap analysis tools of the project to better pinpoint their skills gaps.
6. The LMS project then recommends learning paths for each employee, and employees engage with the content to gain new skills on advanced digital technologies.

User flow 3

The third user flow follows the third user story of a person who is currently unemployed and would like to learn about job opportunities in manufacturing, evaluate their skills level and find suitable training material to land a job in industrial informatics.

1. The user logs into the LMS's use case business layer user interface.
2. The user browses for available projects that offer analytics on available job opportunities in manufacturing in the data analytics domain
3. The user identifies the LMS use case project in the platform and clicks on "Use this offer".
4. From inside the project, the user finds the service that evaluates their background, which they press to upload their CV.
5. The service analyses the CV of the user and identifies their background and prompts the user to select the domain they are interested in working in, where the user selects industrial informatics.
6. The project then presents the available training material that fits the needs of the user with the order they should be consumed.
7. The user clicks on "Use this offer" in the training materials and consumes it.
8. Upon consumption, they are presented with a certificate of completion, and the platform provides recommendations for potential job applications based on the score the users collected upon completion of the training material.

Data Flows

In the LMS use case of the DS4Skills project, the data flow envisioned is illustrated in Figure 1.

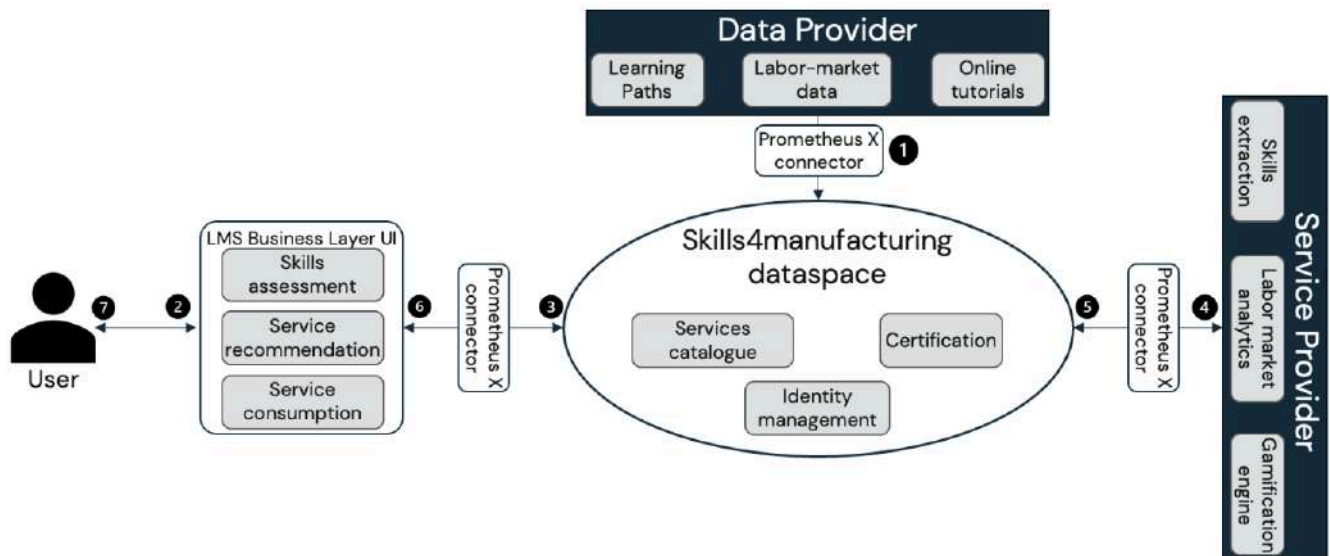


Figure 1. Envisioned data flow of the LMS use case.

The data flow initiates from the data providers. The data providers register their data in the skills4manufacturing dataspace using the Prometheus X (PTX) connector. They provide learning paths, labour-market data, online training tutorials, YouTube tutorials, learning courses and other training material to the LMS use case project set up in the VISION TRUST platform (step 1).

The user to consume the training material first accesses the user interface of the LMS's use case business layer and begins by assessing their skills on a specific domain of their choice (step 2). This is done by providing their CV to the platform, which, through the PTX connector, is transferred to a service of the use case, provided by a service provider (steps 3 and 4). Their current skills level is assessed by a skills extraction service, and the evaluation, along with recommendations on learning paths (recommendation service), are provided back to the user interface via the PTX connector (steps 5 and 6), to be finally consumed by the user (step 7).

With their skills assessed, the user selects one of the recommended learning paths (step 2), which then prompts the dataspace via the PTX connector to provide to the user with the learning content (steps 3, 6, and 7). Upon completion, the use case business layer platform triggers the gamification engine via the PTX connector (steps 3 and 4), which provides certification and completion badges back to the user (steps 5, 6 and 7).

It should be pointed out that this data flow may differ in terms of which of the registered services in the dataspace the user may use. Depending on the different user flows empowered by the LMS use case, the user may select to first explore available job offers using the labour-market services of the dataspace. Such options do not drastically change the data flow in the use case, however, they change the type of data communicated between the different steps. These aspects will be further clarified during Phase 2 of the use case.

Potential risks identification and mitigation measures

During the first phase of the use case, the following risks have been identified, which, however, may be updated throughout the DS4Skills project.

Potential risk description	Risk mitigation measure
Collection or sharing of sensitive user data, potentially breaching GDPR	Users will have to provide explicit consent to upload any kind of data. User data will be anonymised before using any of the analytical services
Low uptake of the use case project by students or employees due to complexity	Gamification aspects will be embedded in the LMS project on the VISION TRUST platform to enhance user engagement
AI-based services for skills extraction misclassify users' ability, leading to subpar learning content suggestions	AI services provided via the VISION TRUST platform will be tested with CVs containing information on diverse backgrounds to identify the best-performing ones.
Manufacturers are reluctant to share real job descriptions, reducing the labour-market analytics value	The risk has already been mitigated since labour-market data will mainly come from highly tested services of the VISION TRUST platform
Available training material may not align directly with the needs of the manufacturing domain	LMS's long collaboration with manufacturers will ensure that skills material is carefully curated for developing skills that fit the targeted domain
Emerging EU regulations on AI transparency or data spaces could require platform modifications	Relevant legislations will be regularly tracked, and the VISION TRUST platform's modularity ensures that AI services included can be easily replaced in the future

Ethical aspect

The use case adopts a responsible, lawful, and human-centred approach to skills data management and AI-based decision support, fully aligned with European ethical principles for trustworthy AI. Fairness and non-discrimination are addressed by ensuring that AI services for skills extraction, gap analysis, and learning recommendations do not disadvantage users based on age, gender, educational background, employment status, or institutional affiliation. Skill profiling and matching are based strictly on competencies, learning objectives, and labour-market requirements, while bias risks are mitigated through testing AI models on diverse CVs and user profiles. Transparency and explainability are ensured by providing users with clear information on how their data are processed, how skill gaps are identified, and why specific learning paths or job recommendations are proposed. Recommendation logic, skills taxonomies, and analytics outputs are presented in an understandable form, allowing learners, educators, and employers to interpret results and make informed decisions.

Privacy, safety, and security are fundamental design principles, with GDPR-compliant data handling, explicit user consent, anonymisation of personal data where applicable, and secure data exchange through trusted data space connectors. Finally, human-centricity and human oversight are maintained by enabling users to review, contest, and refine AI-generated recommendations, while educators and employers retain full control over curriculum design, training validation, and recruitment decisions.

1.3.2 Testing Plan

Testing Scope

This testing scope defines the functionalities, features, and technical components that will be validated during the WP3 testing phase of the Manufacturing Skills Forecasting and Matching use case. The objective of the testing activities is to ensure that the use case operates correctly from both a user and a data space perspective, covering all personas, user stories, user flows, and data flows defined during the design phase.

The scope includes learner-facing, employer-facing, and data space level functionalities. Learner-facing functionalities target university students and workforce participants who are currently unemployed. These functionalities include skills onboarding through manual input and CV upload, AI-based skills extraction and classification, skills gap analysis against labour market requirements, personalised learning pathway generation, and monitoring of learning progress and certification. These elements explicitly implement the user stories related to learners seeking relevant manufacturing training and are exercised through the student and job-seeker user flows, where user data is submitted, processed via AI services, and returned as structured recommendations through the data space.

Employer-facing functionalities target the manufacturing sector. These functionalities focus on the assessment of employee skills, identification of skills gaps at workforce level, recommendation of targeted upskilling and reskilling pathways, and provision of aggregated analytics to support workforce planning. These aspects correspond to the employer user stories and are exercised through the employer user flow, where employee profiles and task requirements are combined with skills analytics and training data retrieved via the data space infrastructure. These learner-facing functionalities are exposed to end users through a Moodle-based business layer, which consumes learning content and recommendations via the data space infrastructure.

To add to, user-facing functionalities, the testing scope includes all core data space components required to support secure and interoperable operation of the use case. This includes the deployment and operation of the PTX connector, registration and discovery of data and service offers through the catalogue, enforcement of consent and access control mechanisms, and secure data exchange via the VisionsTrust platform. These components are common across all personas and user flows and are essential for validating compliance with data sovereignty and interoperability requirements.

Table 1 provides a structured overview of the main functional areas covered by the testing scope and their relationship to personas, user flows, and data flows.

Table 1 Overview of main functional areas

Functional area	Personas involved	User flows exercised	Data flows involved
Skills profiling and onboarding	Students, unemployed workforce	Student flow, job-seeker flow	CV and profile data submission, storage, and processing
Skills extraction and gap analysis	Students, unemployed workforce, employers	Student flow, job-seeker flow, employer flow	Profile data transfer, AI processing, result delivery
Learning recommendation and tracking	Students, unemployed workforce	Student flow, job-seeker flow	Training data retrieval, progress and certification data
Employer skills analytics	Manufacturing employers	Employer flow	Employee data, analytics results
Data space infrastructure	All personas	All flows	Secure data exchange via PTX and VisionsTrust

Testing activities will also explicitly address the value and added value services delivered by the use case. This includes assessing the relevance and usefulness of the generated skills gap analyses, the appropriateness of recommended learning pathways for manufacturing roles, and the practical value of employer-facing analytics in

supporting workforce upskilling decisions. These aspects are critical for validating that the use case delivers meaningful benefits beyond technical correctness.

The organisation of testing follows a structured approach that combines functional validation, data exchange verification, performance assessment, usability evaluation, and security and compliance checks. Functional testing ensures that each user flow can be completed successfully and produces the expected outputs. Data-related testing verifies reliable and error-free data exchange across the data space. Performance testing evaluates system responsiveness under realistic user loads. Usability testing assesses user satisfaction and clarity of results, while security testing focuses on consent enforcement and protection of personal data. Indicators such as successful scenario execution rates, response times, user satisfaction scores, and absence of critical security issues are used to ensure comprehensive coverage of both user experience and technical implementation.

The execution of the testing plan is based on several assumptions and constraints. It is assumed that core building blocks, including the PTX connector, catalogue, consent management, and contract negotiation mechanisms, are available and stable during the testing phase. It is further assumed that representative learner profiles, training content, and labour market data are accessible from consortium partners. Constraints may arise from limited availability of real users for usability testing, evolving maturity of AI-based analytics services, or partial availability of external data sources. These factors may affect the scale and timing of testing activities and will be addressed through staged testing, use of representative datasets, and iterative refinement of test scenarios.

Testing Environments

The testing activities for this use case will be conducted within the DS4Skills data space infrastructure, as illustrated in **Figure 1**, with a particular focus on validating secure and interoperable data exchange through VisionsTrust and the Connector (PDC). The testing environment reflects the operational conditions under which the Manufacturing skills forecasting & matching use case is expected to function during real deployment and includes all core components required for data sharing, service orchestration, and user interaction.

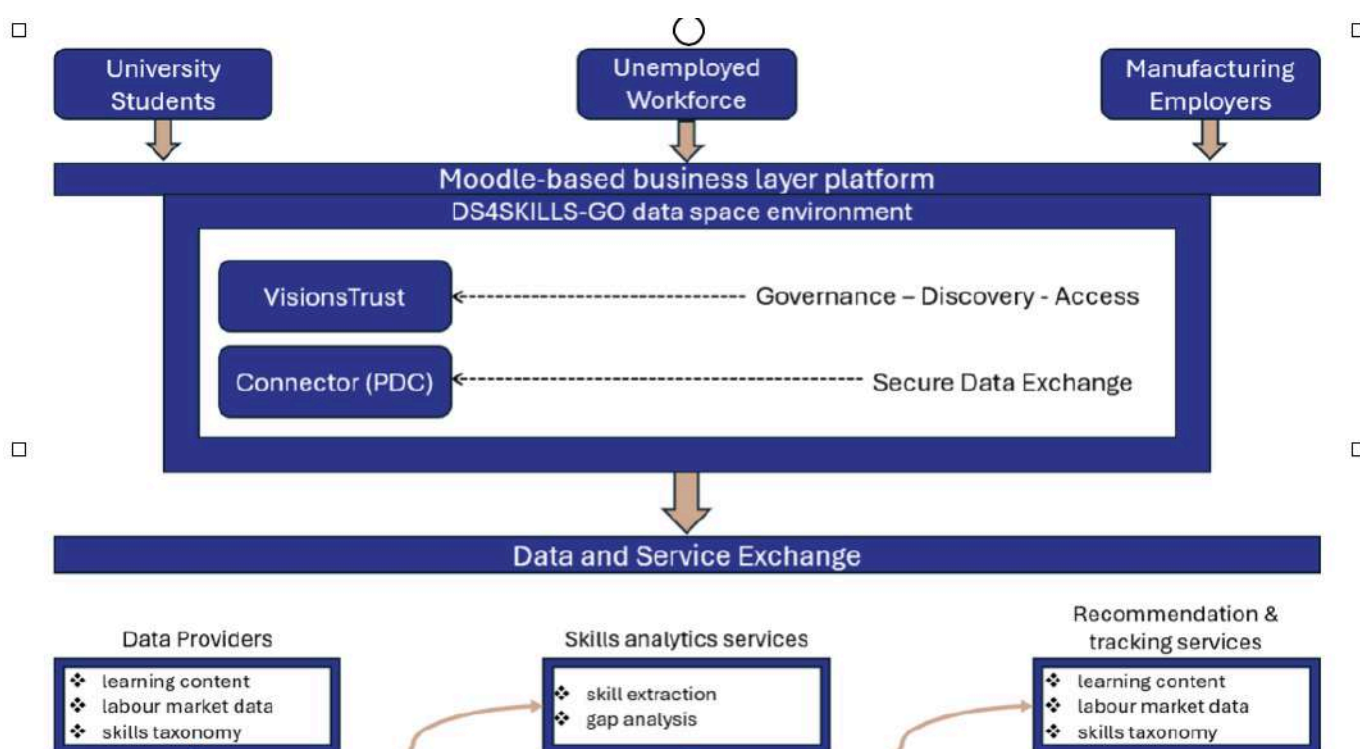


Figure 1 Testing environment and data exchange overview for the Manufacturing skills forecasting & matching use case

VisionsTrust will serve as the central environment for testing data space interactions, including the discovery of data and service offers, access control, and contractualization between participating stakeholders. All participating data providers and service providers involved in the use case will register their assets within VisionsTrust, enabling controlled access to learning content, labour market data, and skills analytics services. Testing within this environment will verify that registered assets can be correctly discovered, accessed, and consumed in accordance with agreed permissions and governance rules.

The Connector (PDC) will be used as the primary mechanism for secure data exchange between the different components of the use case. Testing activities will validate the correct deployment and operation of the connector, including the transmission of learner profiles, CV data, skills analytics results, and training recommendations between data providers, service providers, and the use case application. Particular attention will be given to ensuring that data transfers are reliable, traceable, and compliant with data sovereignty and GDPR requirements.

Where applicable, a dedicated portal or business-layer user interface associated with the use case will be included in the testing environment. This portal will be used to simulate real user interactions for learners and employers, enabling end-to-end testing of user flows from data input to result consumption. Testing through the portal will ensure that user-facing functionalities are correctly integrated with the

underlying data space infrastructure and that responses received via the connector are accurately presented to end users.

In addition to the core data space infrastructure, the testing environment will also include a Moodle-based learning management system developed and maintained by LMS. This Moodle environment will be used to host and deliver selected training content, learning paths, and educational resources associated with the use case. Testing activities will validate the correct integration of the Moodle platform with the data space services, ensuring that learning recommendations generated through skills analytics services can be seamlessly linked to and consumed within the LMS-managed learning environment. This setup supports realistic validation of the end-to-end learning workflow, from skills gap identification to training content delivery.

Overall, the testing environment is designed to replicate realistic operational conditions, ensuring that technical interoperability, data exchange, and user interaction are jointly validated within the DS4Skills ecosystem.

End Users

The testing of the Manufacturing Skills Forecasting and Matching use case will involve representative end-user groups corresponding to the personas defined during the design phase. These end users have been selected to ensure that the testing activities accurately reflect real usage conditions and validate the relevance, usability, and effectiveness of the use case for its intended audience.

The primary end-user groups include university students, members of the workforce who are currently unemployed, and representatives of manufacturing companies. University students are typically between 20 and 25 years old and are enrolled in engineering, mathematics, economics, or related studies. They possess strong theoretical knowledge but limited practical experience in advanced manufacturing and Industry 4.0 technologies. Their participation in testing focuses on validating skills profiling, skills gap analysis, personalised learning recommendations, and learning progress tracking.

A second group of end users consists of individuals who are part of the workforce but not currently employed. These users are generally over 25 years old and are motivated to acquire new or enhanced skills to improve their employability in manufacturing-related roles. Their involvement in testing targets the effectiveness of skills assessment, alignment of recommendations with labour market needs, and the clarity and usefulness of suggested upskilling pathways.

The third end-user group includes representatives from manufacturing companies, specifically steel and automotive manufacturers. These users typically hold planning, production management, or human resources roles and are responsible for workforce development and upskilling strategies. Their participation in testing is aimed at validating employer-facing functionalities such as employee skills assessment,

aggregated skills gap analytics, and the relevance of recommended training content for operational and strategic workforce planning.

Testing activities will involve enough participants from each end-user group to allow meaningful evaluation of functional correctness, usability, and perceived value. End users will interact with the use case through the business-layer portal and associated services, executing predefined user flows that reflect real operational scenarios. Their feedback and interaction data will be used to assess user satisfaction, system usability, and alignment of outputs with user expectations.

All end-user testing will be conducted in compliance with applicable data protection and consent requirements, ensuring that personal data is processed only for testing purposes and in accordance with the governance framework defined for the DS4Skills project.

Testing Tools

The testing activities for this use case will be supported by a combination of technical, usability, performance, and security testing tools selected to ensure comprehensive validation of both user-facing functionalities and data space operations. The choice of tools reflects the need to assess correctness, interoperability, performance, usability, and compliance within the DS4Skills ecosystem.

For data exchange and interoperability testing, tools provided within the VisionsTrust technical space will be used to validate the correct operation of the Connector (PDC) and the associated data sharing mechanisms. These tools will support the verification of connector deployment, data transmission reliability, and compliance with agreed access control. In addition, API testing tools will be used to validate service interfaces involved in skills profiling, skills analytics, and learning recommendation workflows, ensuring that requests and responses conform to expected schemas and that data is correctly exchanged between providers and consumers.

Usability and user experience testing will be conducted using a combination of browser-based analysis tools and end-user feedback mechanisms. These tools will be used to assess ease of use, clarity of information presentation, accessibility, and overall user satisfaction for learners and employers interacting with the portal or business-layer interface. The focus will be on evaluating whether users can successfully complete the defined user flows and whether the outputs such as skills gap reports and learning recommendations are understandable and actionable.

Performance testing tools will be employed to measure system responsiveness under realistic usage conditions. These tools will be used to monitor response times for skills extraction, skills gap analysis, and recommendation services, as well as to assess system behaviour under concurrent user access. Performance measurements

will be correlated with the indicators defined in the testing scope to ensure that the platform meets acceptable response time thresholds.

Security and compliance testing will be supported by vulnerability scanning and security assessment tools to identify potential weaknesses in data handling, access control, and communication channels. These tools will be used to verify that personal data is protected during storage and transmission, that consent mechanisms are correctly enforced, and that no critical security vulnerabilities are present during testing.

Overall, the selected testing tools enable a systematic and repeatable evaluation of functional correctness, data exchange reliability, performance, usability, and security, ensuring that the use case can be validated against both technical and user-centric requirements defined for the WP3 testing phase.

Testing Execution Plan

The testing execution plan defines the scenarios, responsibilities, and sequencing of activities required to validate the Manufacturing Skills Forecasting and Matching use case during the WP3 testing phase. The execution is designed to ensure full coverage of all personas, user stories, user flows, and data flows identified during the design phase, while also validating the correct operation of the supporting data space infrastructure.

Testing will be scenario-based and end-to-end in nature. Each scenario corresponds to one or more user stories and is executed by following the associated user flow from initial user interaction through data processing and result delivery. Scenarios are structured to validate both functional behaviour and non-functional aspects such as performance, usability, and data exchange reliability.

Testing Scenarios

The primary testing scenarios are derived directly from the defined personas and user flows. Learner-centric scenarios focus on university students and workforce participants who are currently unemployed, validating skills onboarding, skills gap analysis, and personalised learning recommendations. Employer-centric scenarios focus on manufacturing companies and validate employee skills assessment, workforce-level skills gap analytics, and training content matching. Cross-cutting scenarios address data exchange, interoperability, and security aspects that apply to all personas.

Table 2 provides an overview of the main testing scenarios and their coverage.

Table 2 Main testing scenarios

Scenario	Persona(s)	User flow	Scope of validation
Learner skills profiling and onboarding	Students, unemployed workforce	Student flow, job-seeker flow	Profile creation, CV upload, data storage

Scenario	Persona(s)	User flow	Scope of validation
Skills gap analysis and recommendations	Students, unemployed workforce	Student flow, job-seeker flow	Skills extraction, gap identification, learning path generation
Learning progress and certification	Students, unemployed workforce	Student flow, job-seeker flow	Progress tracking, certification issuance
Employer workforce skills assessment	Manufacturing employers	Employer flow	Employee profiling, skills gap dashboards
Employer training recommendations	Manufacturing employers	Employer flow	Training content matching, analytics
Data exchange via data space	All personas	All flows	PTX connector operation, secure data transfer
Security and consent enforcement	All personas	All flows	Consent handling, access control, GDPR compliance

Each scenario includes validation of the corresponding data flows, ensuring that data is correctly transmitted between data providers, AI services, and the use case application through VisionsTrust and the Connector (PDC).

Responsibilities for Test Execution

The execution of testing activities will be a shared responsibility between the use case leader and the involved consortium partners. The use case leader will coordinate the overall testing process, define detailed test cases for each scenario, and consolidate results. Data providers and service providers will be responsible for validating the correct operation of their respective components, including data availability, service responsiveness, and interface compliance. End users participating in testing will execute predefined user scenarios through the portal or business-layer interface and provide structured feedback on usability and perceived value.

Technical partners involved in the data space infrastructure will support the deployment and monitoring of the Connector (PDC) and VisionsTrust services, ensuring that data exchange and governance mechanisms function as expected throughout the testing phase.

Timeline and sequencing of testing activities

The execution of testing activities is aligned with the overall DS4Skills use case timeline and is scheduled to take place during Phase 3 of the project, following the completion of design and integration activities in the earlier phases. The sequencing of testing activities follows a structured and incremental approach to ensure technical stability, functional correctness, and meaningful user validation.

The testing phase begins with preparatory activities, including the finalisation of test scenarios, validation of data availability, and verification of the readiness of core building blocks such as the Connector (PDC), catalogue, and consent management mechanisms. This preparation phase ensures that all technical prerequisites are in place before execution begins.

Functional and data exchange testing is conducted first, focusing on the validation of end-to-end user flows for learners and employers. During this stage, skills profiling, skills gap analysis, learning recommendation, and employer analytics functionalities are tested together with secure data exchange through VisionsTrust and the Connector (PDC). This phase verifies that all services interact correctly and that data flows operate as designed.

Following functional stability, performance and scalability testing is carried out under realistic usage conditions. This stage evaluates system responsiveness, service latency, and behaviour under concurrent access, ensuring that the platform meets acceptable performance thresholds defined for the use case.

Usability testing with representative end users is conducted once functional and performance requirements are met. Learners and employer representatives execute predefined scenarios through the business-layer portal and provide structured feedback on ease of use, clarity of results, and perceived value of the services. This phase may be iterative, allowing improvements to be incorporated based on user feedback.

Security and compliance testing is performed throughout the testing phase, with dedicated validation of consent enforcement, access control, and protection of personal data. Vulnerability assessments and governance checks ensure compliance with GDPR and data space requirements before final validation.

The results of all testing activities are consolidated at the end of the testing phase to assess overall readiness of the use case, identify residual risks, and define corrective actions where necessary. This phased and sequenced approach ensures controlled execution, traceability of results, and alignment with the overall DS4Skills project timeline.

Building Blocks

The Manufacturing Skills Forecasting and Matching use case relies on a chain of core data space building blocks to enable secure, interoperable, and governed data exchange between all participating stakeholders. These building blocks provide the technical and governance foundation required to support the user flows, data flows, and services validated during the WP3 testing phase.

At the core of the building block chain is the Connector (PDC), which is used to enable trusted and controlled data exchange between data providers, service providers, and the use case application. The connector is responsible for handling the transmission of learner profiles, CV data, skills analytics results, learning

recommendations, and employer-related information, ensuring that data is exchanged securely and in compliance with data sovereignty requirements.

The Catalogue building block is used to register and discover available data assets and services within the data space. All learning content, labour market data, and skills analytics services involved in the use case are made discoverable through the catalogue, allowing authorised participants to identify and access relevant resources during testing and operation.

Consent and contract management building blocks are employed to ensure that data access and usage are governed according to agreed rules and user permissions. These components enforce consent provided by learners and employees, manage access rights for employers and service providers, and ensure that data sharing complies with GDPR and project-specific governance policies.

Contact and identity-related building blocks support the identification and authentication of participating organisations and users within the data space. These components enable reliable interaction between stakeholders and support accountability and traceability throughout the data exchange process.

Together, these building blocks form an integrated chain that underpins all user interactions and data flows of the use case. Their correct operation is essential for validating functional behaviour, data interoperability, governance compliance, and trustworthiness during the WP3 testing phase.

Governance

The Manufacturing Skills Forecasting and Matching use case generates, shares, and stores personal data as part of its normal operation. Personal data is processed to enable skills profiling, skills gap analysis, personalised learning recommendations, and employer-facing analytics related to workforce upskilling and reskilling.

The personal data involved includes learner and employee profile information such as educational background, professional experience, self-reported skills, career goals, and learning preferences, as well as information derived from CV uploads. This data is stored within the use case environment and exchanged with authorised services through the data space infrastructure to support skills analytics and recommendation processes.

All processing of personal data is governed by strict data protection and data sovereignty principles in line with GDPR requirements. Data collection and processing are limited to what is necessary to fulfil the objectives of the use case, ensuring compliance with the principle of data minimisation. Personal data is processed only for clearly defined purposes related to skills assessment, training recommendation, and workforce development.

Consent management plays a central role in the governance framework of the use case. Learners and employees provide explicit consent before their personal data is

collected, stored, or shared. Consent specifies the scope and purpose of data usage and can be withdrawn at any time. Data sharing with employers or service providers is permitted only when appropriate consent has been granted and access rights are clearly defined.

Personal data is protected through secure storage and transmission mechanisms. Data exchanged between participants is transferred via the Connector (PDC), ensuring secure and controlled communication between data providers and service providers. Access to personal data is restricted to authorised parties and is enforced through identity, access control, and contract management mechanisms implemented within the data space.

Transparency and user control are integral to the governance approach. Users are informed about how their data is processed and have the right to access, correct, or request deletion of their personal data in accordance with applicable regulations. All governance activities are aligned with the policies and rules defined by the VisionsTrust platform, ensuring consistent and compliant data handling throughout the use case lifecycle.

1.4 CSC Use Case : Supporting Student Mobility and Lifelong Learning

1.4.1 Use case description, value and goal

The goal of the use case is to improve the discoverability of learning opportunities in European university alliances and reduce the manual workload by transferring the learning opportunity data automatically through the skills data space instead of by manual means, as is currently commonplace. The existing learning opportunity data will be enriched using AI-based data space services. At least ESCO classification is expected to be included but potentially others as well, depending on suitable data space services available. For example, advanced digital skills neighbourhoods developed in the LEADSx2030 programme. These will improve discoverability of the learning opportunities within the European university alliances and help students contextualise potential studies. The use case aligns with the goals of the national Digivisio 2030 programme in Finland and will also connect to a repository being implemented as part of that programme.

The use case will implement connectors to the data space from both two student information systems currently in use in Finland, called Peppi and SisU. This will serve as a demonstration and greatly ease connection to the data space for all Finnish HEIs. In addition to this, a data-consuming data space connector will be implemented. Other European university alliance partners, as well as anyone else seeking to utilise the data, can use this as a model for connecting their systems into the data space and start receiving learning opportunity data.

In the long run the target is to find an interoperable and standardised solution for European HEIs to exchange data to support international mobility. This links with the use case one of the eight use cases in the European Higher Education Interoperability Framework as defined by the European Digital Education Hub.

Use Case partners

Data providers

A data space connector will be integrated into the two student information systems currently in use in Finland: Peppi and Sisu. The use case is demonstrated with at least one HEI partner for each of the two system. The connector will provide learning opportunity data into the data space. To start with, this will be provided in the national HEDS (Higher Education Data Schema) schema, however, in the future this would be converted into ELM format for greater interoperability in Europe.

Service providers (=data consumers)

The learning opportunity data will be enriched by an AI-powered data space services that will analyse and add ESCO classifications and potentially other relevant enriching information.

A consuming data space connector will be integrated into a national learning opportunity repository for receiving the data. This will also serve as a model for how other European university alliance partners could connect to the data space and start receiving the data.

Use Case functionalities

The use case is building foundations for the use of Finnish learning offer data in the skills data space. Having the learning offer data available could be useful in multiple different ways.

Specifically, the aim in planning this use case has been transferring learning opportunity data from Finnish HEIs to other HEIs both in Finland and elsewhere in Europe. This could ease or completely automate this information exchange within European university alliances thus greatly improving the maintainability of the alliance portal pages showcasing the learning offer available in different alliances. This use case however does not include the integration of data space connectors in the alliance portal pages, only making the data available for this purpose and a demonstration of how it could be done.

ESCO classification of the learning offer using a data space AI-powered service will also improve findability of the learning opportunities within the alliances. Other classification services and other enrichment services will also be considered.

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
Learning Opportunity Data Availability	Measures real data contribution from HEIs national repository into the ecosystem.	Count of study units- at least 1000	Number of learning opportunities (such as study unit) in the repository that can be filtered or searched in the Skills Data Space	KPI to be examined during the testing phase.
ESCO-Enriched Learning Opportunities	Experience on how AI-generated ESCO classifications work	Count of study units- at least 10	Number of learning opportunities (such as study unit) used in testing of AI-generated ESCO classifications	KPI to be examined during the testing phase.
Interoperability Across Finnish HEIs	Demonstrates broader adoption and scalability within Finland.	Number of HEIs - at least 2	Number of HEIs whose student information system (Peppi or Sis) is able to utilize services of the Skills Data Space.	KPI to be examined during the testing phase.
Accuracy/Usefulness of AI Classification (Light Measure)	Simple, non-technical way to evaluate AI classification quality.	At least 50 %	Percentage of ESCO suggestions accepted by administrative users during validation	KPI to be examined during the testing phase.
Interoperability	Adoption of data space - common KPI to all in the project	At least one data service	Number of datasservices integrated in the data space.	KPI to be examined during the testing phase.

Personas, user stories, user flows, data flows

Personas

Name	Demographic/Background	Goals/motivations
Lucas	Student in a non-Finnish European university	Wishes to make use of the learning opportunities in the European university alliance his university is part of
Challenges/Frustrations	How can we help	Recap
Finding relevant learning opportunities is difficult due to learning descriptions in Europe not being standardised and information not necessarily being available in his native language	Learning opportunities can be classified using a standard multi-lingual classification ESCO making it easier to understand what is being offered	Help potential students in European university alliances with discovering and understanding the learning opportunities on offer

Name	Demographic/Background	Goals/motivations
Anna	Academic administration responsible for European university alliance connections	Wishes to list the learning opportunities available in European university alliance partner institutions in her university's own study guide or online portal
Challenges/Frustrations	How can we help	Recap
Collecting the learning opportunity data involves emailing all contacts within the alliance and then processing the data they send as email attachments	By integrating the systems into the skills data space, the learning opportunity data can be transferred in a machine-readable format and be included in the relevant systems automatically, thus letting Anna use her skills in other more productive ways than copying data from email attachments.	Automate a tedious task Anna had to do and enable her to be more productive

Name Petri	Demographic/Background Academic administration responsible for maintaining course unit descriptions	Goals/motivations Wishes to add ESCO classification to descriptions of course units available in the university
Challenges/Frustrations There is a large number of potentially fitting ESCO classes. Finding and selecting suitable ones in a list is time consuming	How can we help By using an AI-based classification service in the data space to automatically suggest ESCO classes suitable for the course unit	Recap Help with or semi-automate a tedious task Petri needs to regularly complete

User stories

User stories	Data needed	Services needed	Data produced or added value services
<p>As a student in a European university</p> <p>I want to find suitable formal learning opportunities that I can include in my degree</p> <p>so that I can include in my degree learning opportunities that align with studies</p>	<p>Learning opportunity data from other European universities</p> <p>Descriptive data about the learning opportunities that the student is able to understand</p>	<p>Data providers for the learning opportunities.</p> <p>Services that add standard ESCO classification to the descriptions.</p>	
<p>As a member of academic staff</p> <p>I want to include learning opportunities from European university alliance partners in the online study guide of my university</p> <p>so that students in my university are able to find the learning opportunities available elsewhere in Europe</p>	<p>Learning opportunity data from other European universities in machine-readable format</p>	<p>Data providers for the learning opportunities</p>	
<p>As a member of academic</p>	<p>Course unit</p>	<p>AI suggested</p>	

<p>I want to add ESCO classification to an existing course unit in the student information system of my university</p> <p>so that students in my university and elsewhere are better able to find the course unit</p>	<p>description from the university</p>	<p>ESCO classes that fit the course description</p>	
---	--	---	--

User Flows

This use case builds the foundations for transferring learning opportunities from Finnish universities to the skills data space and onwards. The use case is only implementing the part where Finnish universities can send the information, not the receiving end. These user flows will not be realised until also the receiving end exists and makes use of the available information. These user flows are examples of how the receiving end could make use of the available information.

Adding ESCO classification to learning opportunities in student information system (Peppi or Sisu)

- An administrative user in a Finnish university uses the student information system and navigates to a course unit they wish to enrich with ESCO classification.
- The user clicks a button to start AI-assisted ESCO classification.
- After a few seconds, the user is presented with AI-suggested ESCO classes for the course unit.
- The user reviews the presented ESCO classes and selects the relevant ones.
- The user saves the new information. The course unit now includes ESCO classification.

Adding learning opportunity data into a university alliance portal

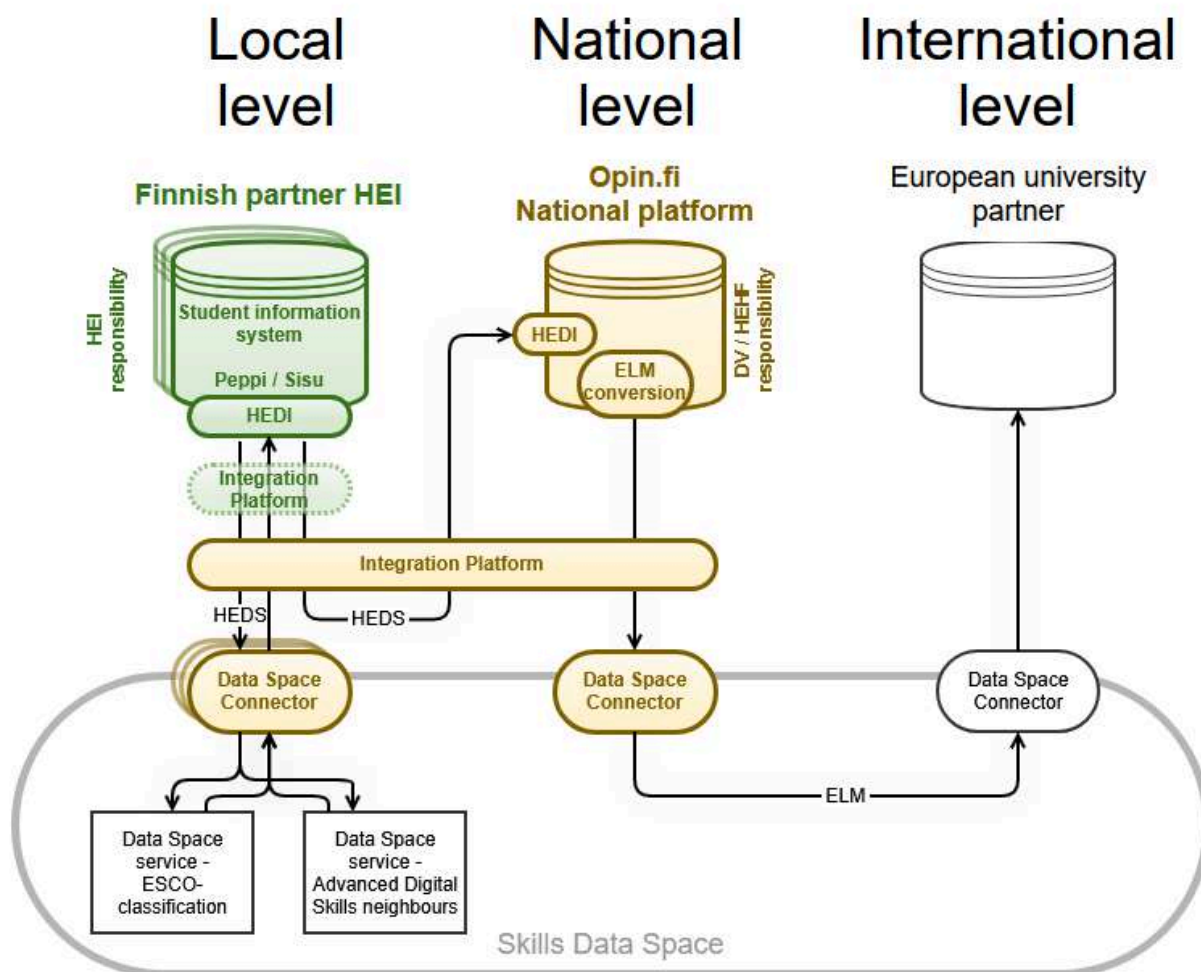
- An administrative user in a Finnish university, in the university's own administrative user interface, marks one of the university's learning opportunity as being available for students in the university alliance
- The data space integration in the university's system automatically transfers the learning opportunity data via the data space to the university alliance portal
- Information about the learning opportunity is automatically added to the university alliance portal
- The administrative user may optionally go verify that the information has been transferred correctly by finding the learning opportunity in the portal

Note that the user story this flow is based on is more about how a previous user flow has been simplified. Before the user would have had to send the information by email or similar means and another user would have had to manually copy and enter it in the university alliance portal. Now this process is automated and not much needs to be done by any user.

Finding learning opportunities in university alliance portal

- A student user navigates to the portal page of the university alliance their university is part of.
- The student navigates to learning opportunity catalogue in the portal.
- The student filters learning opportunities using ESCO classification. ESCO classes are presented in the native language of the user regardless of the language of the learning opportunities.
- The student is presented with learning opportunity search results which are filtered using ESCO classification and thus relevant to them.
- The student can select the learning opportunity they are interested in and find out more information about it and potentially enrol in it.

Data Flows



Potential risks identification and mitigation measures

- Lack of resources to validate the AI-based classifications.
- AI-based classifications do not provide good enough quality.
- Lack of engagement from users taking part in the pilot.
- Not enough resources allocated to complete the pilot.

Ethical aspects

- In this use case, no personal data is processed. The data to be transferred and handled consists of information about study offerings (to be defined more precisely with higher education institutions), which is generally open and publicly available.

- The use case does not involve automated recommendations or decision-making.
- The use case must comply with the requirements of the EU Artificial Intelligence Act for public sector organizations:
 - o AI use must be transparent
 - o users must be informed when AI is applied to classify or enrich study offering data.
- Good governance also requires:
 - o a thorough documentation of AI usage,
 - o a risk assessment to anticipate potential sources of error and misuse.
- Any data classified or enriched with AI assistance must be reviewed by the higher education institution before it is displayed to users alongside study offering information.

1.4.2 Testing Plan

Testing Scope

The goals of the use case is to enable Finnish HEIs to start utilising the services in the skills data space and to bring the Finnish learning offer available for other data space users in Europe. Making the Finnish learning offer available is handled through the national higher education platform Opin.fi and the data and service platforms backing it, which have been produced as part of the national Digivisio 2030 programme. Every HEI in Finland, also those not taking part in this use case, send or will eventually send their learning offer data to [Opin.fi](https://opin.fi) platform, thus this is the most effective way to bring all this data in the skills data space. Connecting the individual HEIs to the dataspace, so that they are able to use services in the data space, will also partly be managed by Opin.fi, to make the connection process as easy as possible for individual HEIs. (See the data flows picture in the use case description.)

These two aspects of the use case, connecting the national level and the local level, require several data space connectors serving different stake holders but managed centrally by the national higher education platform Opin.fi. Testing will largely focus on ensuring that this arrangement of managing the data space connectors, and the connections between the systems, work as planned. in the scope of this use case, there will be few if any end-user-facing and data-space-connected services where testing the end user experience could be performed.

Some data space services will however be used as a demonstration of how the HEIs can make use of the data space. The services chosen for this focus on enriching the learning offer data, in particular AI-assisted ESCO-classification from learning opportunity descriptions. The functioning and accuracy of this needs to be tested.

Following aspects of the use case will be tested:

1. The HEI data space connectors and the connection between that and the centrally managed Opin.fi integration platform
 - The integration platform gives more flexibility in connecting HEI systems to the data space. The first step is to get the connectors and the connection to the integration platform working well
2. The connection from the HEI systems to the centrally managed Opin.fi integration platform and all the way to the data space
 - The goal is for each HEI to be able to use data space services. If the previous step has been completed, then connecting the HEI systems to the integration platform should make the data space services available for use for the HEIs
 - Learning offer data from the HEI system will be sent to the data space for AI-assisted enrichment (e.g. ESCO-classification) and some data should be received back. In the scope of this use case, there may not be a user interface for receiving the data, but it should come back at least to the central integration platform
 - In the use case there are three HEIs involved representing two different student information system vendors. These all need to be tested to make sure that the solution can, after the project, be extended to cover all HEIs in Finland
3. Central management of all the different data space connectors
 - In the use case, Opin.fi will manage their own data space connectors and all the HEI data space connectors. This arrangement needs to be tested
 - Will each individual HEI be able to make use of data space connectors via this arrangement. Can the VisionsTrust platform practically support this arrangement of data space users
4. Connection from Opin.fi platform to its specific data space connector
 - This will also go through the Opin.fi integration platform, but it is assumed that connection to that is handled outside the scope of this use case
5. Accuracy of the AI-assisted learning offer enrichment
 - In the case of ESCO-classification, it needs to be assessed, how well the AI-generated classification matches the test data. Similar assessment needs to be done for other data space services that are included in the use case
 - Note that the use case does not include a user interface for reviewing the AI-generated classification that could be tested

Implementation of the transfer of the learning offer from Finnish HEIs to the national Opin.fi platform is not part of this use case, nor is the testing of this. In case this is not functioning within the time span of the DS4Skills project, placeholder data will need to be used at the national Opin.fi level for some of the testing of this use case.

Testing Environment

Systems involved in the testing are:

- HEI student information system, either Peppi or Sisu
- The integration platform of the national Opin.fi platform.
 - In the context of data space services used by the HEI
 - And in the context of Finnish learning offer data being offered to the data space
- HEI specific Data space connectors deployed and integrated with the above integration platform
- Opin.fi Data space connector also integrated with the above integration platform
- VisionsTrust platform for managing the connectors and contracts of relevant parties
- Test data space user and connector for the purpose of making use of the offered Finnish learning offer data

End Users

The use case will not produce services offered directly to end users, thus no end user testing groups are required for testing.

Some subject experts, such as academic staff, will be required for the evaluation of the precision of the ESCO-classification and other similar enrichment. This evaluation will not be conducted within an end user facing system however but instead "offline".

Testing Tools

Evaluation of the ESCO classification, and other similar AI-assisted enrichment, will require the user of a tool where the generated classification can be reviewed and the accuracy recorded. The exact nature of how this is to be done will be decided later, but at its simplest, it could simply be a spreadsheet.

Some parts of the Opin.fi platform may not be complete enough for testing within the time span of DS4Skill-GO project and mock data or systems may need to be used in their place

Testing Execution Plan

Testing phase	Details	Success criteria	Responsibility
Integration platform ↔ HEI PDC	Test the integration and connection between the two systems	Test message sent to the integration platform is received by the PDC which then sends the data to a data space service. Return data is observed at the integration platform	Digivisio

Testing phase	Details	Success criteria	Responsibility
HEI System ↔ Integration platform	Test the integration and connection between the two systems	The HEI system can send data to the integration platform and the data can be observed there by means of log messages or a similar mechanism	Each HEI separately
HEI System ↔ Data space service	Make sure that data space services can be used from within the HEI system	Data space data flow can be triggered from the HEI system and relevant data is passed to the data space service. Some data is received back at least to the point of the integration platform. The returned data needs to be saved in a file or somehow be made available for quality assessment.	Each HEI separately with assistance from Digivisio and coordination from CSC
Data space enrichment service accuracy	Assess the quality of the AI-generated enrichment data	Use the data saved, or otherwise observed, in the previous step and assess the quality of the AI-generated enrichment data. It must be possible to practically conduct the assessment. The relevancy of the generated classification should be at least X %.	HEIs collectively with coordination from CSC
Central management of data space connectors and contracts.	Test whether data space connections can be centrally managed for all Finnish HEIs instead of everyone doing it separately.	Opin.fi needs to be able to centrally manage the data space connectors and necessary data space contracts on behalf of the HEIs. The HEIs still need the ability to select the data space services they wish to use. This needs to be practical so that the process could be extended to cover all Finnish HEIs. VisionsTrust platform needs to be able to handle this setup. Opin.fi integration platform needs to be able to handle this setup.	Assessment of the practicability of the arrangement: HEIs, Digivisio and CSC together Opin.fi integration platform capability: Digivisio VisionsTrust platform capability: VisionsTrust, Digivisio and CSC
Integration platform ↔ Opin.fi PDC	Test the integration and connection between the two systems	Static test data fed to the integration platform can be requested from the data space through the PDC.	Digivisio
Opin.fi ↔ Data space	Make sure that data space services can request Opin.fi data	Learning offer data in Opin.fi platform can be requested from the data space through the PDC.	Digivisio

Building Blocks

In the use case, the following building blocks will be used

Building block	Purpose
Connector	For connecting HEI systems and Opin.fi platform to the dataspace.
Catalog	For advertising the offered data from Opin.fi to other dataspace users. For evaluating how well the catalog building block can handle the arrangement where Opin.fi represents multiple HEIs.
Contracts	For enabling the use of data space services that enrich the learning offer data, for example ESCO-classification.
Empowering data sovereignty with the consent/ contracts negotiating agent	The use of data space services require the negotiation of contracts. The arrangement where Opin.fi represents multiple HEIs may require special handling in this building block. Consent agent is not required in this use case as no personal data is involved.

Governance

The use case will not involve personal data. Only data about learning opportunities in Finnish HEIs.

1.5 UOC Use Case : Skills-driven Higher Education Institutions

1.5.1 Use case description, value and goal

The Skills-driven Higher Education Institutions is a dataspace use case for developing a data framework to provide insights into students' experiences and skills, assess innovative learning models, and support the educational community in evaluating training effectiveness and satisfaction.

The UOC (Universitat Oberta de Catalunya – *Open University of Catalonia*) aims to be a university that, connected in a network with other universities around the world, promotes the construction of a global knowledge space. The UOC innovates in its own educational model that focuses on the student, offering quality and personalized training, to promote their competitiveness and contribute to the progress of society.

In this context, for the UOC, data is a fundamental asset and a key element in expanding the limits of lifelong learning through the strategic application of learning and skills analytics and the opportunities offered by technologies such as Artificial Intelligence (AI).

To achieve this, The UOC has been implementing their own data strategy for building a data ecosystem to observe and improve educational systems and processes and contributes to understanding and modelling lifelong learning itineraries and educational experiences. On top of that, the UOC is providing two main services:

- **Teaching & learning feedback and continuous improvement:** the data is shown to instructors and faculty staff, to innovate and improve the quality of teaching and learning process in a continuous way.
- **Student advising services:** advising services for students to achieve labour market professions and skills.

The value of this use case is to combine both, learning data & skills data to provide a more **skills-driven institution**. In online (Open) universities like UOC most of the students are workers at the same time and they are more interested in skills achievement than in academic completion.

In line with the previous value proposition, UOC is the coordinator of the OpenEU European University Alliance. OpenEU is an Alliance of the Open Universities in Europe with the aim to create a pan-European Open University. Therefore, the relevance of skills for Open Universities and how to advise lifelong learning students to achieve the labour market skills, is one of the big topics in the Alliance.

The specific goals to achieve are:

1. Add skills data dimension to Higher Education Institutions.

The assumption is that by adding skills data and services from DS4Skills, institutions can gain better insights into both quality of learning and learning path, taking into account skills goals and needs.

2. Improve insights through learning analytics and skills analytics.

The assumption is that by enriching and sharing learning and skills datasets, both education & training institutions and labour market organizations can gain better insights and make more informed decisions.

3. Improve the datasets to be FAIR (Findable, Accessible, Interoperable and Reusable) by collaboration with skills data providers and standardizing datasets using recognized formats like ESCO (for skills) and European Learning Model (for education).

The assumption is that by standardizing datasets using recognized formats and procedures, organizations can collaborate with existing DS4Skills services and data providers (see business model regarding this use case).

Use Case Partners

Data providers

The use case main datasets are:

- **Learning data (e.g. academic portfolio, subjects and classrooms):** data about structured and curated educational resources and activities such as programs, courses and learning activities, and their relationship with specific learning goals to achieve or skills and knowledge to acquire.

Learning programs, the set of subjects for each program and the set of learning outcomes for each subject according to **ELM** (European Learning Model). This data is collected and used internally at the UOC. To explain and promote Skills-driven approaches at Higher Education Institutions, will publish anonymized and synthetic datasets and provide services explained below.

- **Learning experiences data (from Learning Management Systems):** data about activities and interactions through learning platforms. Students acquire knowledge, skills and attitudes using these platforms.

Learning experience dataset based on 1EdTech **Caliper** and ADL **xAPI** from online classrooms. This data is collected and used internally at UOC. To explain and promote Skills-driven approaches at Higher Education Institutions, will publish anonymized and synthetic datasets and provide services explained below.

- **Skills and labour market data (from skills data providers):** data obtained through DS4Skills such as job portals, career websites, social business networks, public statistics, and governmental sources. This data provides information about the types and levels of jobs and the skills required, and whether they are increasing or decreasing.

Service providers (=data consumers)

- **Academic and career advice service:** As we mentioned before, at UOC we are running two separate services (Student career advising service and Teaching & learning feedback and continuous improvement service), at the same time, the DS4Skills is providing a good range of services that can be combined to provide service chains. The UOC will develop a set of microservices serving data that could be combined with the existing DS4Skills services to enrich the insights in both worlds, skills analytics and learning analytics. These insights can be

integrated into both UOC internal services to enrich them. See examples of possible microservices below:

- **Skills to professions service:** A service that links skills to potential profession pathways. This service may be available in the DS4Skills catalogue, or it can be internally developed using the UOC's academic and career advisory service as a basis.
- **Professions to academic programs service:** A service that provides academic programs to achieve professional careers. This service is based on our internal academic and career advisory service and supported by our available data resources. Depending on the type of data resource, this service is distributed through two additional services:
 - **Academic Program data service:** This service provides structured data, in ELM format, of academic programs that we offer (see Learning data dataset in the Data Providers section).
 - **Academic Subject data service:** Giving a specific academic subject, this service provides related experience data of teaching and learning activity for this subject (see Learning experiences dataset in the Data providers section).

See below an example of an academic and career advice service to improve or to complement our internal career service:

The UOC internal career advice service is mainly addressing the UOC's students. The students provide information about the skills they want to achieve, and the service is returning a recommendation of the programs offered at the UOC that match with these skills.

A program is a set of subjects structured in a study plan. The UOC has, into the SIS (Student Information System), all the information about study plans and subjects and is gathering - every time that students are running courses - all the interactions between the students and the LMS (Learning Management System). The Academic Program data service and Academic Subject data service, described above, are exposing this data to the DS4Skills data space.

Combining these two services with other services from DS4Skills, such as recommendation services, UOC will be able to provide a deep level of recommendations. Instead of just recommending programs to enroll, students can receive recommendations at subject level (see Testing Plan for details).

The approach behind these deep level recommendations is that, instead of just providing potential programs recommendations, UOC can give, for each program, the study plan structure to recommend study itineraries according to the student skills demand. Simultaneously, we can calculate students' efforts for each potential subject to enroll. This is possible through the experience data provided (students interactions

within the virtual classrooms). Thus, we can classify subject size effort (e.g. S, M, L and XL) based on the type and quantity of interactions (experience data) gathered in previous semesters.

Use case functionalities

- Matching skills and learning outcomes at both program and subject level.
- Explore and recommend learning paths to specific skills or professions thanks to the previous matching (skills analytics).
- Transform internal learning data to standard formats like ELM, 1EdTech Caliper and ADL xAPI.
- Discover insights to promote the design and re-design of courses and learning activities taking into account both learning and skills data (learning analytics).
- Discover skills-driven insights for decision-makers such as lecturers, program directors and policymakers.

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
KPI_UOC_1	Internal Operational impact	Skills analytics & Learning analytics	Number of queries to the use case data	Number of departments and units using the use case data
KPI_UOC_2	Internal Academic impact	Skills-driven course design and re-design	Number of faculty staff using the use case data	Rate of courses potentially adapted based on use case data
KPI_UOC_3	External impact	Skills-driven Higher Education Institutions	Number of interest in the use case from DS4Skills data space Rate of FAIR data in the use case	Number of interests in the use case from Higher Education Institutions

Personas, user stories, user flows, data flows

Personas

Name	Demographic/Background	Goals/motivations
<i>Marta (Ms)</i>	<ul style="list-style-type: none"> • <i>Age 30</i> • <i>Student at UOC</i> • <i>Cares about her professional and academic development</i> 	<ul style="list-style-type: none"> • <i>She wants to keep her professional skills up-to-date at the same time she is developing a career</i> • <i>She wants to discover relevant trainings within the academic programs she is involved</i>
Challenges/Frustrations	How can we help	Recap
<ul style="list-style-type: none"> • <i>She doesn't know which skills are related with specific subjects within the academic programs</i> • <i>She doesn't know how to identify potential skills gaps compared to existing job market and academic offers</i> 	<ul style="list-style-type: none"> • <i>Advice her about skills gaps and ideal learning path</i> • <i>Match her with specific itineraries within academic programs taking into account her personal life constraints and efforts per subject</i> 	

Name & pic	Demographic/Background	Goals/motivations
<i>Pau (Mr)</i>	<ul style="list-style-type: none"> • <i>Age 40</i> • <i>Instructor at UOC</i> • <i>Cares about teaching process and research</i> 	<ul style="list-style-type: none"> • <i>He wants to teach his students providing high quality learning activities close to labour market needs</i> • <i>He wants to take into account, for teaching, not only learning outcomes but also professional skills</i>
Challenges/Frustrations	How can we help	Recap
<ul style="list-style-type: none"> • <i>He doesn't know which skills are related with his</i> 	<ul style="list-style-type: none"> • <i>Provide to him the skills related to subjects and learning</i> 	

<p><i>subjects and the learning outcomes</i></p> <ul style="list-style-type: none"> • <i>He doesn't know his students' professional interests learning outcomes</i> 	<p><i>outcomes</i></p> <ul style="list-style-type: none"> • <i>Provide to him the most common students professional interests for each subject</i> 	
--	---	--

<p>Name & pic</p> <p>Maria (Ms)</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • <i>Age 45</i> • <i>Program Director</i> • <i>Cares about teaching process and research</i> 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • <i>She wants to design and redesign programs taking into account skills</i> • <i>She wants to provide program offers to acquire not only learning outcomes but also professional skills</i>
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • <i>She doesn't know which skills are related with her program and the program learning outcomes</i> • <i>She doesn't know most common learning paths for each professional skills acquisition</i> 	<p>How can we help</p> <ul style="list-style-type: none"> • <i>Provide to her the skills related to programs and learning outcomes</i> • <i>Provide to her the most common learning paths to acquire professional skills</i> 	<p>Recap</p>

<p>Name & pic</p> <p>Jordi (Mr)</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • <i>Age 50</i> • <i>Student advisor</i> • <i>partial time contract, he has a lot of knowledge in professional career, he is a professional, still</i> 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • <i>He wants to advice students about better learning path and next subjects to enroll</i> • <i>He wants to advice taking into account students' skills</i>
---	--	--

	<i>working in the labour market</i>	<i>needs, students' life constraints and available students' efforts</i>
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • <i>He doesn't know which skills are related with programs and subjects and to learning outcomes</i> • <i>He doesn't know students' professional interests, life constraints and available efforts</i> 	<p>How can we help</p> <ul style="list-style-type: none"> • <i>Provide to him the skills related to programs and subjects and to learning outcomes</i> • <i>Provide to him the most common students professional interests, life constraints and available efforts</i> 	Recap

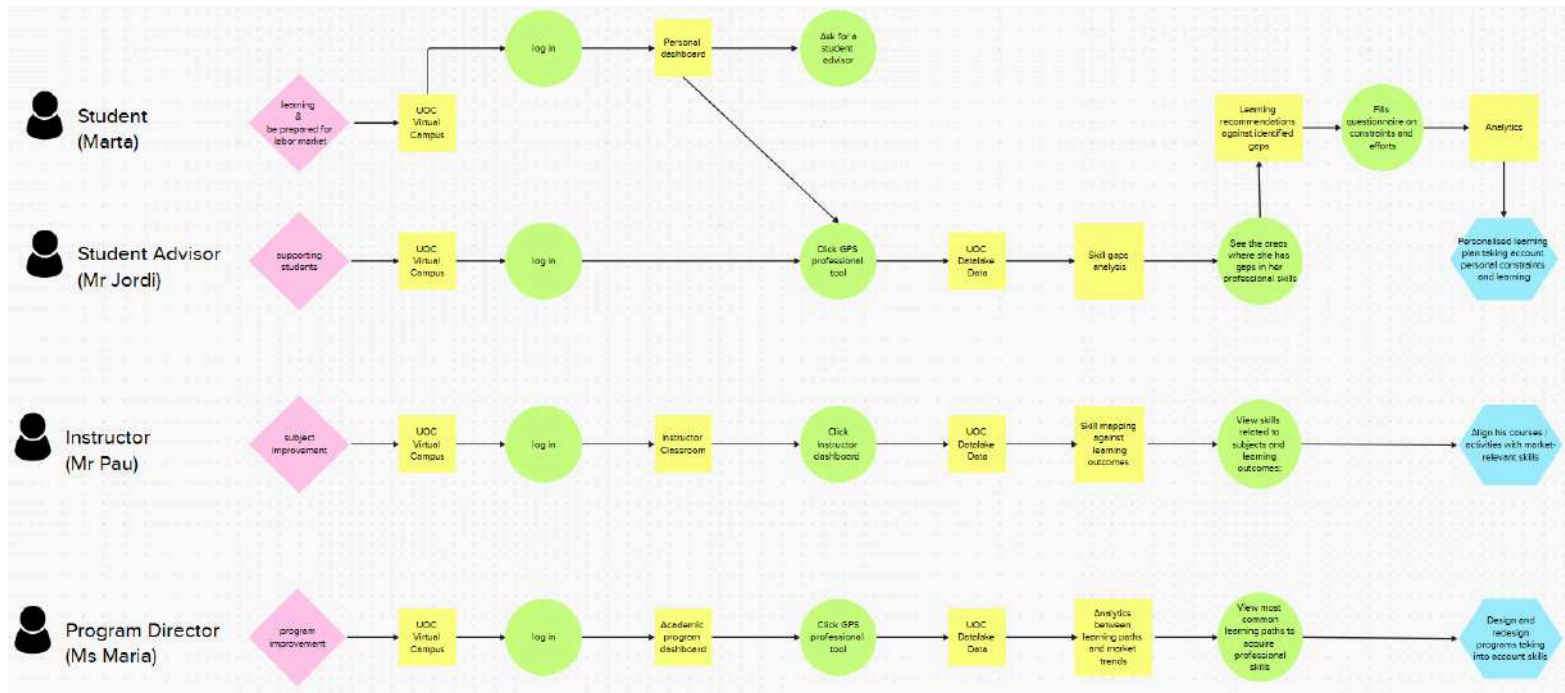
User Stories

User stories	Data needed	Services needed	Data produced or added value services
<p>As a student</p> <p>I want to get a personalized learning path to fill my skill gaps</p> <p>So that I can gain the skills to develop my career</p>	<p>Course catalog data;</p> <p>Skills & learning outcomes matching data</p>	Dataset providers	Learning path recommendations (academic & career advice service and anonymization and synthetic data services)
<p>As a student advisor</p> <p>I want to recommend personalized learning path to students to fill their skill gaps</p> <p>So that students can gain the skills to develop their career</p>	<p>Course catalog data;</p> <p>Skills & learning outcomes matching data</p>	Dataset providers	Learning path recommendations (academic & career advice service and anonymization and synthetic data services)
<p>As a program director</p> <p>I want to design and redesign my program, aligning learning outcomes with skills</p>	<p>Program data;</p> <p>Skills & learning outcomes</p>	Dataset providers	Matching skills datasets and learning outcomes (academic & career advice service and

<p>So that I can provide a more skill-driven approach to my program</p>	<p>matching data</p>		<p>anonymization and synthetic data services)</p>
<p>As a program director</p> <p>I want to see a program dashboard and do learning analytics to gain insights about my program</p> <p>So that I can make decisions and improve my program</p>	<p>Program data; Learning & teaching data (learning experience data)</p>	<p>Dataset providers</p>	<p>Dashboards & learning analytics procedures (academic & career advice service and anonymization and synthetic data services)</p>
<p>As an instructor (teacher)</p> <p>I want to design and redesign my subject, aligning learning outcomes with skills</p> <p>So that I can provide a more skill-driven approach to my subject</p>	<p>Subject data; Skills & learning outcomes matching data</p>	<p>Dataset providers</p>	<p>Matching skills datasets and learning outcomes (academic & career advice service and anonymization and synthetic data services)</p>
<p>As an instructor (teacher)</p> <p>I want to see a subject dashboard and do learning analytics to gain insights about my subject</p> <p>So that I can make decisions and improve my subject</p>	<p>Subject data; Learning & teaching data (learning experience data)</p>	<p>Dataset providers</p>	<p>Dashboards & learning analytics procedures (academic & career advice service and anonymization and synthetic data services)</p>

User Flows

The use case KPIs are validated internally at UOC using our internal skills and profession advice service called GPS professional, as is shown in the following user flows.

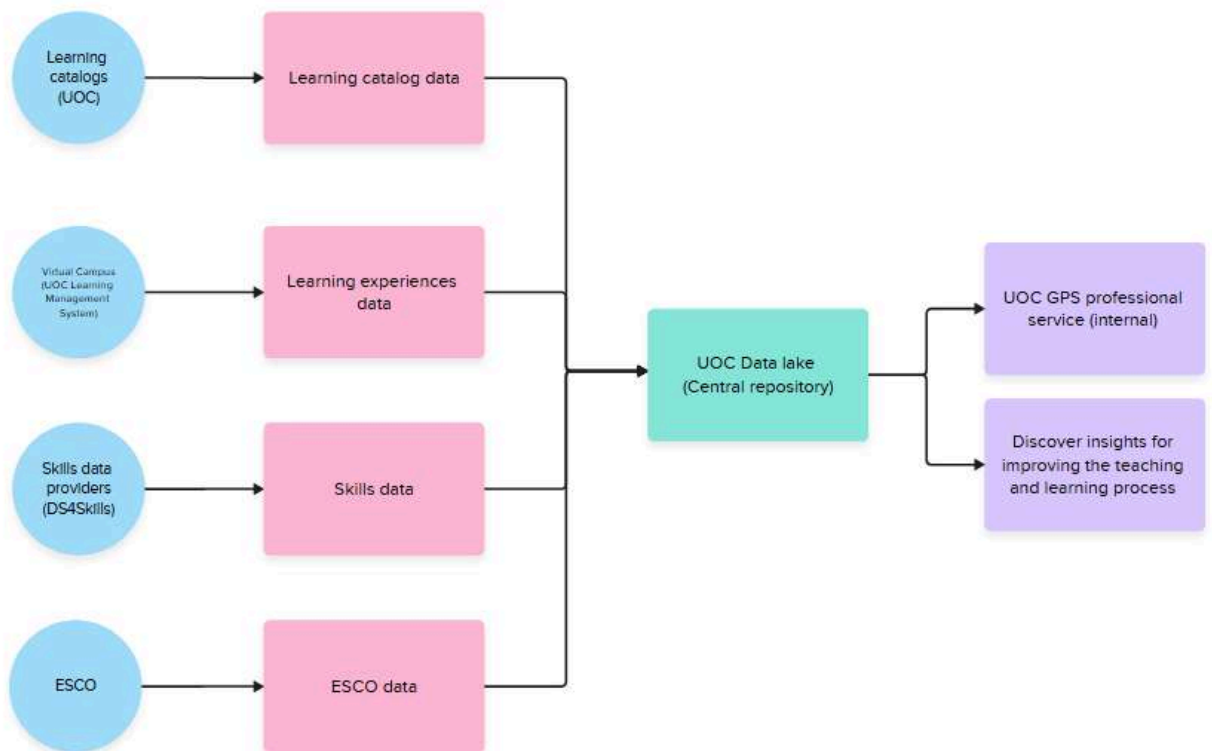


See Mural User Flows here:

<https://app.mural.co/t/visions4007/m/visions4007/1740566121180/f042f016174907f9f08889e762e0438745616439>

Data Flows

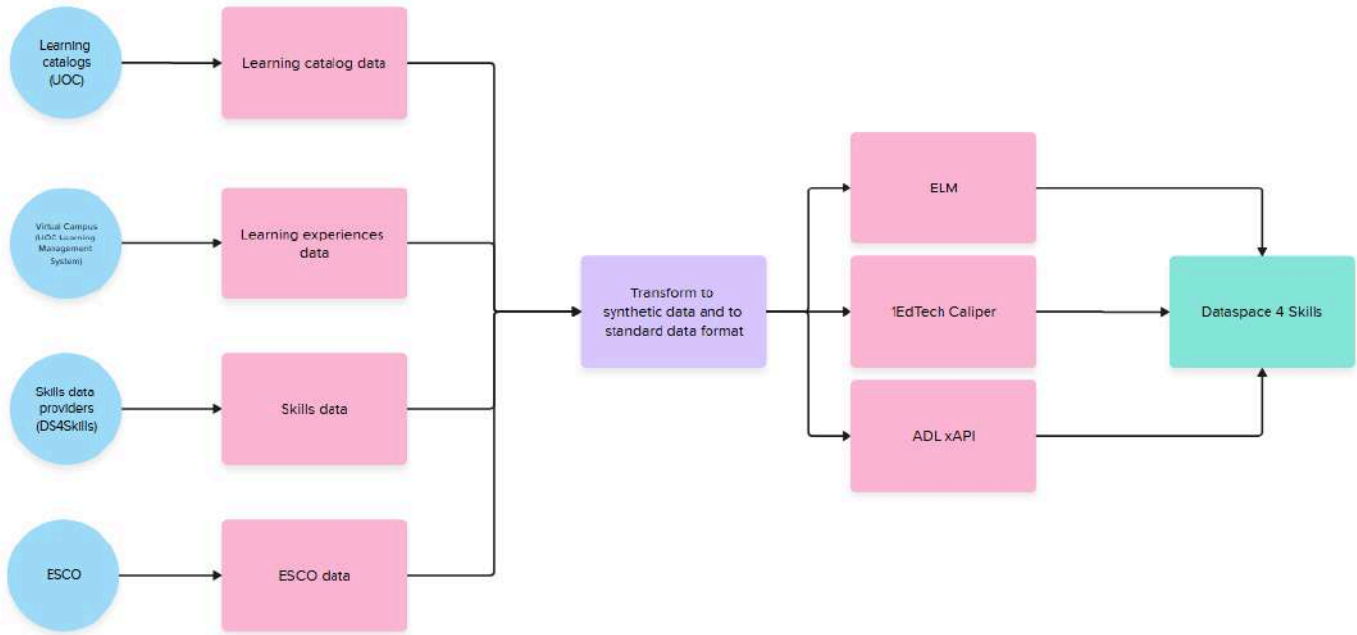
UOC
DATAFLOW
UOC internal services using data from DS4Skills

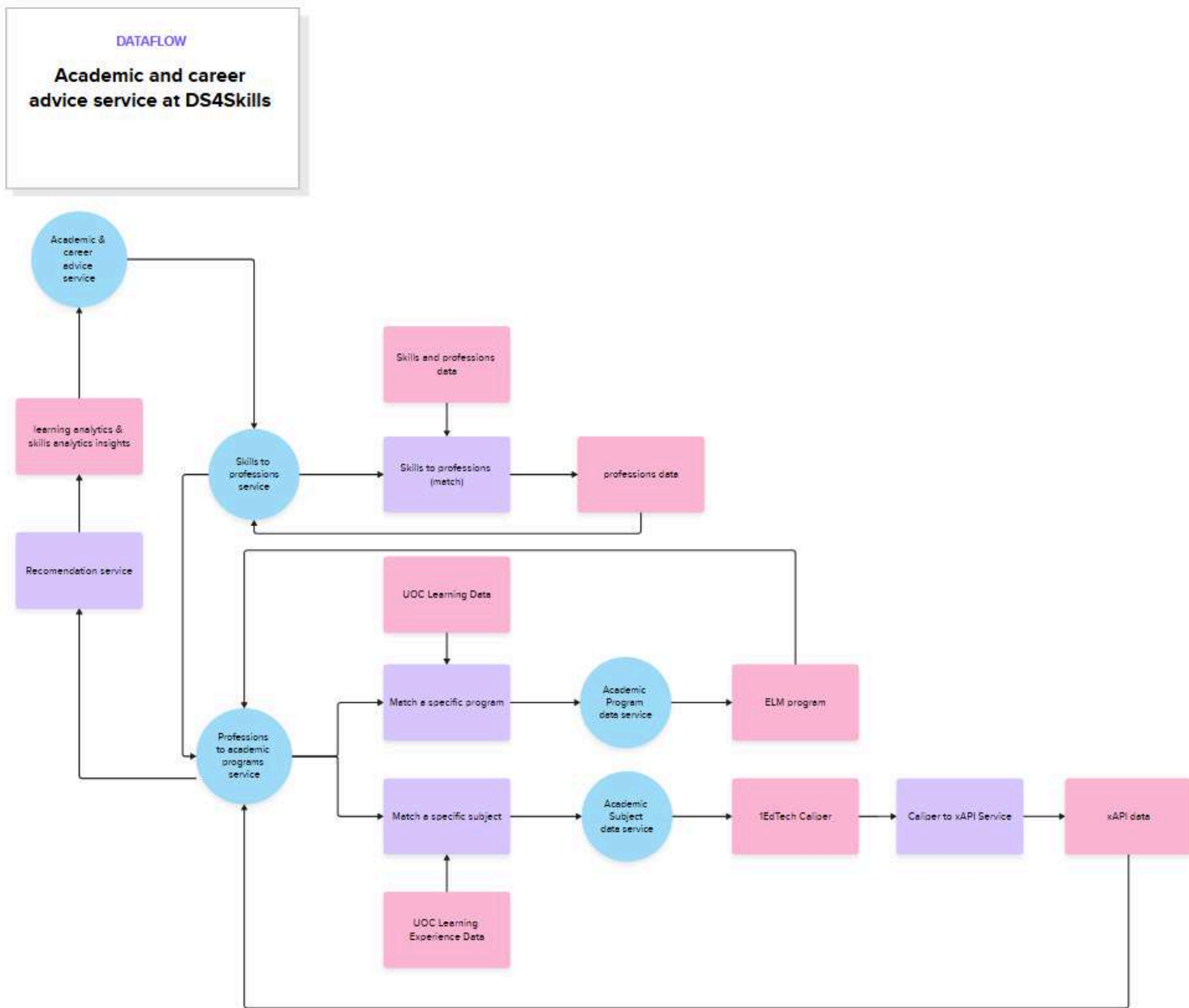


UOC

DATAFLOW

**Publication of synthetic
FAIR learning data to
DS4Skills**





See Mural Data Flows here:

<https://app.mural.co/t/visions4007/m/visions4007/1740566121180/f042f016174907f9f08889e762e0438745616439>

Potential risks identification and mitigation measures

Risk	Description	Mitigation measures
Lack of understanding	There is a risk for use case comprehension if you are not playing with the datasets provided.	The data space itself is a great way to access the data and do some experiments. The use case is providing free access to

		synthetic data, avoiding any data protection issue, to promote discovery processes for deep understanding.
Lack of applicability	The UOC is applying the use case internally and can be relayed into other higher ed institutions. But gathering data needs technology and some standards in place.	The use case is also providing documentation of all the needed gathering processes and used tools to facilitate institutions adoption.
Data protection	The UOC is gathering all data according to GDPR requirements and using this data to improve students' success and teaching and learning quality. The UOC is not allowed to share all this data.	Before sharing, all datasets are anonymized and transformed to synthetic data according to GDPR rules, the data protection agreements of the project, and the data contracts defined.

Ethical aspects

1. Fairness and Non-Discrimination

The UOC provides DS4Skills with learning datasets and services that are anonymized and transformed into synthetic data in order to proactively minimize potential biases and prevent any discriminatory effects. These datasets are designed following the FAIR principles (Findable, Accessible, Interoperable and Reusable), ensuring transparent, standardized, and equitable access to data. This approach aims to demonstrate how Higher Education Institutions can safely combine their internal learning data with external skills' data. Synthetic data is the way to publish data as a Higher Education Institution, rather than an individual university. This means that a recommendation provided from UOC is also a valid recommendation for a same program of another Higher Education Institution, to preserve the right of students to decide where to study.

2. Transparency and Explainability

The UOC informs students and professors about how academic and skills datasets are collected, anonymized, and used, ensuring clear and understandable communication of data-handling processes. In addition, all the datasets published in the DS4Skills data space follow the FAIR principles and are accompanied by a data contract - a clear definition of rights and obligations - that all the data consumers need to subscribe a contract before accessing the data.

3. Accountability and Responsibility

The UOC establishes clear responsibilities for data quality and accountability for data-driven outcomes, applies strict GDPR-compliant data governance, and ensures full traceability of all data processing and transformations. As a research and experimental project at the UOC, the

DS4Skills proposal has been reviewed and approved by the UOC's [Research Ethics Committee \(REC\)](#).

4. Accuracy and Validity

The UOC has implemented its own data strategy to build a data ecosystem that ensures the quality, reliability, and governance of its data assets. To support this strategy, the UOC have a Data Office Department to verify and the application of the data strategy across the institution. The DS4Skills project is running within the UOC's Data Office to guarantee regular updates of academic and skills datasets, as well the validation of synthetic datasets to establish data accuracy, preserve statistical properties, and avoid identification risks.

5. Privacy, Safety, and Security

The UOC collects and processes all datasets in full compliance with the General Data Protection Regulation (GDPR), the project's data protection agreements, and the defined DS4Skills data contracts. All data processing activities follow the UOC's institutional Privacy Policy and are supervised by the UOC's [Data Protection Office \(DPO\)](#). Since not all data can be shared with the federated Data Space, the UOC anonymizes and transforms all datasets into synthetic data before any sharing, ensuring protection of privacy, and secure data governance, and ethical data use.

6. Public Good and Sustainability

The UOC aims to be a university that, connected in a global network of universities, promotes the construction of a worldwide knowledge space. For the UOC, data is a fundamental asset and a key element. Within the DS4Skills project, the UOC shares updated education datasets through the federated DS4Skills data space.

A federated Data Space like DS4Skills contributes significantly to the Public Good by establishing a secure, transparent, and human-centric data ecosystem. Its design prioritizes data control, meaning data owners retain full control over their digital assets and can grant or revoke consent for data usage. Sharing data via federated Data Space allows sensitive information, such as educational and skills data, to be exchanged responsibly for collective benefits - like improving quality of the public services, analyzing skills gaps, and creating better educational outcomes - without the risk of unfair exploitation or compilation.

Regarding Sustainability, the federated Data Space architecture promotes a long-term data economy. By enabling data sharing without centralizing data onto a single platform, DS4Skills reduces dependencies on technology providers and fosters a distributed, interoperable infrastructure that is more robust and resilient to single points of failure. This interoperable infrastructure, which adheres to EU legislation (such as GDPR and the DGA), ensures ethical and legal compliance by design, which is vital for the trust and operational stability of the data ecosystem.

7. Human-Centricity and Human Oversight

The UOC ensures that all data processing, anonymization, and synthetic data generation activities related to the project are carried out under full human oversight. These processes executed by UOC are not automated by pre-existing Artificial Intelligence (AI) tools, instead, they are performed and supervised by a data engineer under a formal contractual agreement specifically for the DS4Skills project. This approach guarantees full responsibility and traceability for our project data transformations, ensuring that human judgment guides the handling of sensitive data.

1.5.2 Testing Plan

Testing Scope

1.1 Consumption of skills datasets from the DS4Skills Data Space

UOC services consume skills and labour market datasets published in the DS4Skills Data Space in order to support skills analytics and learning analytics.

- **Functionality:**
 - UOC services can discover, access, and consume skills and labour datasets from the DS4Skills Data Space via the PDC.
- **Features:**
 - Discovery of skills and labour datasets through the DS4Skills catalogue.
 - Secure access to datasets via data contracts and PDC.
 - Integration of skills data into UOC services.
- **Testing Method:**
 - Integration Testing: Verify successful access and ingestion of skills datasets via the PDC.
 - Interoperability Testing: Verify semantic and technical compatibility between DS4Skills datasets and the UOC services.
 - Data Validation Testing: Verify data completeness and semantic consistency.
- **Dependency on partners:**
 - YES. DS4Skills skills and labour market data providers and PDC.
- **Assumptions & Constraints:**
 - Internal deadlines and coordination with other UOC departments (that needs skills) may affect planning and execution requirements.

1.2 Provision of UOC datasets and services to DS4Skills Data Space

UOC publishes academic and learning experience datasets and services to the DS4Skills Data Space using recognized standards and taking into account data privacy issues.

- **Functionality:**
 - UOC provides structured academic and learning experience data, as well as data access services, to data and service consumers within the DS4Skills Data Space.
- **Features:**
 - Publication of learning data in ELM format.
 - Publication of learning experience data in 1EdTech Caliper and ADL xAPI formats.
 - Publication of UOC services, including:
 - Academic Program Data Service (ELM-based).
 - Academic Subject Data Service (learning experience data).
 - Application of data contracts, access control mechanisms, and FAIR metadata.
- **Testing Method:**

- o Schema Validation Testing: Verify compliance with ELM, Caliper, and xAPI specifications.
- o Integration Testing: Verify that DS4Skills data and services consumers can successfully access to the UOC datasets and services.
- o Access Control Testing: Verify correct enforcement of data contracts and permissions.
- Dependency on partners:
 - o YES. VisionsTrust, PDC and DS4Skills data and service consumers.
- Assumptions & Constraints:
 - o Internal deadlines and coordination with other UOC departments may affect planning and execution requirements.
 - o Contract agreements with consumers.

1.3 Provision of combined services within the DS4Skills Data Space

UOC services are combined with DS4Skills services to create end-to-end service chains supporting academic and career recommendations.

- Functionality:
 - o Combined service chains support skills analytics and learning analytics with learning path recommendations.
- Features:
 - o Integration of skills and labour market datasets with UOC academic datasets (ELM).
 - o Combination of:
 - Skills to professions services.
 - Professions to academic programs services.
 - Academic Program and Subject data services.
 - o Execution of recommendation workflows that provide:
 - Program level recommendations.
 - Subject level learning itineraries.
 - Estimated student effort per subject based on learning experience data.
- Testing Method:
 - o End-to-End Testing: Verify full service chain execution across various providers.
 - o Functional Testing: Verify and consistency of recommendations.
 - o User Acceptance Testing: Verify that services meet expectations of students, advisors, and program directors.
- Dependency on partners:
 - o YES. VisionsTrust, PDC and DS4Skills service providers. Alignment of data usage policies and ethical frameworks is required to avoid licensing or privacy incompatibilities.
- Assumptions & Constraints:
 - o Internal deadlines and coordination with other UOC departments may affect planning and execution requirements.
 - o Contract agreements with providers.

1.4 Internal processing of UOC data prior to publication

UOC internally processes academic and learning experience data before publishing into the DS4Skills Data Space.

- **Functionality:**
 - Internal data pipelines ensure data quality, standardization, anonymization and compliance with privacy and ethical requirements prior to data sharing.
- **Features:**
 - Data extraction from internal UOC informational platform (Snowflake).
 - Anonymization and synthetic data generation to comply with GDPR requirements and UOC's ethical protocol.
 - Transformation of datasets into ELM and 1EdTech Caliper formats.
 - Technology readiness, privacy, security, and ethical compliance checks before publication.
- **Testing Method:**
 - Unit Testing: Verify each data transformation and anonymization, and synthetic data generation step.
 - Privacy & Security Testing: Verify GDPR compliance and absence of personal or sensible data.
 - Data Quality Testing: Verify accuracy, consistency and reusability of transformed datasets.
- **Dependency on partners:**
 - NO. Fully managed within the UOC.

Testing Environment

The data exchange testing will be conducted through VisionsTrust, the Connector (PDC) and potentially your portal.

The testing environment for the UOC use case includes UOC products & informational platform data processing and the connectivity and use of the DS4Skills Data Space infrastructure (VisionsTrust & PDC). The environment is tested to validate secure data exchange, interoperability, and service chaining.

Data exchange testing will be conducted using VisionsTrust and the PDC, ensuring secure and controlled communication between UOC informational platform and DS4Skills data and service consumers. UOC informational platform and recommendation services will be used to validate data consumption and usage.

Testing Goals

- Validate secure and interoperable data exchange between UOC informational platform and the DS4Skills Data Space via VisionsTrust and the PDC.
- Validate the correct publication and consumption of UOC datasets and services using recognized standards (ELM & 1EdTech Caliper).
- Validate the correct operation of combined service chains integrating the UOC and DS4Skills services to support skills and learning analytics.

End Users

This test plan, developed during 2026, does not include a production environment. Testing activities will be carried out with the different development teams, while user testing will be conducted on prototypes or non-production environments, applying user-centered design methodologies and techniques. User testing will be conducted for each user story.

Testing Groups (<i>Persona and user stories</i>)	Number of Users	User Profiles	Methodology
STUDENT (Marta) As a student I want to get a personalized learning path to fill my skill gaps So that I can gain the skills to develop my career	5 students from UOC	Similar to Marta's persona profile. Different genders.	Qualitative study based on usability testing, observing real users interacting with our products.
STUDENT ADVISOR (Jordi) As a student advisor I want to recommend personalized learning path to students to fill their skill gaps So that students can gain the skills to develop their career	5 student advisors from UOC	Similar to Jordi's persona profile. Different genders.	Qualitative study based on usability testing, observing real users interacting with our products.
PROGRAM DIRECTOR (Maria) As a program director (user story 1) I want to design and redesign my program, aligning learning outcomes with skills So that I can provide a more skill-driven approach to my program (user story 2) I want to see a program dashboard and do learning analytics to gain insights about my program	5 programs directors from UOC	Similar to Maria's personal profile. Different genders.	Qualitative study based on usability testing, observing real users interacting with our products.

So that I can make decisions and improve my program			
<p>INSTRUCTOR (Pau)</p> <p>As an instructor (teacher)</p> <p>(user story 1)</p> <p>I want to design and redesign my subject, aligning learning outcomes with skills</p> <p>So that I can provide a more skill-driven approach to my subject</p> <p>(user story 2)</p> <p>I want to see a subject dashboard and do learning analytics to gain insights about my subject</p> <p>So that I can make decisions and improve my subject</p>	5 instructors from UOC	Similar to Pau's personal profile. Different genders.	Qualitative study based on usability testing, observing real users interacting with our products.

Testing Tools

- **VisionsTrust Tech space** - to test the Connector and data transfer between partners.
- **Postman** - to test APIs that give access to data.
- **Performance Testing Tools:** to load test functional behavior and measure performance.
- **User Testing Tools:** User testing tools help evaluate product usability by gathering feedback through moderated/unmoderated sessions.

Testing Execution Plan

Reporting Metrics

For the testing plan, we have 5 main topics that we want to test in 4 different scenarios:

1 Functional Test

- **Metric:** Successful test of all features available on the UOC.
- **Pass Criteria:** 90% of functionalities tested must pass.

2 Data Sharing Test

- **Metric:** Successful exchange of data between UOC, PDC, and all services.
- **Pass Criteria:** 90% of data exchanges were completed without error.

3 Performance Test

- **Metric:** Response time under user load.
- **Acceptable Load:** <20 seconds response with a max. user load of 10 users at the same time.
- **Pass Criteria:** 90% of actions return a response.

4 Usability Test

- **Metric:** User satisfaction score.
- **Pass Criteria:** >60% of users rate the platform positively.

5 Data Privacy Test

- **Metric:** Privacy Impact Assessment (PIA).
- **Pass Criteria:** Data protection compliance to PIA.

Testing Scenarios

Scenario 1: Academic Career Advisory Service

- **Metric:** Functional, Data Sharing, Performance, Usability, Data Privacy.
- **Responsible:** UOC, Partners and Test Users.
- **Objective:** Ensure students can ask for academic recommendation to gain the skills to develop their career.
- **Personas:** Marta (student); Jordi (student advisor).
- **User Story:**
 - “As a student, I want to get a personalized learning path to fill my skill gaps so that I can gain the skills to develop my career.”
 - “As a student advisor, I want to recommend personalized learning path to students to fill their skill gaps so that students can gain the skills to develop their career”.
- **User Flow:** Service access (log-in) → Skills and learning analytics engine → Display recommendation
- **Data Flow:** Input from the student → UOC informational platform processing → Results displayed

Scenario 2: Skills-driven insights & institution improvement

- **Metric:** Functional, Data Sharing, Performance, Usability, Data Privacy.
- **Responsible:** UOC, Partners and Test Users.
- **Objective:** Gain insights, make decisions and improve quality.
- **Persona:** Pau (instructor); Maria (program director).
- **User Story:**
 - “As an instructor, I want to design and redesign my subject, aligning learning outcomes with skills so that I can provide a more skill-driven approach to my subject.”

- “As an instructor, I want to see a subject dashboard and do learning analytics to gain insights about my subject so that I can make decisions and improve my subject.”
- “As a program director, I want to design and redesign my program, aligning learning outcomes with skills so that I can provide a more skill-driven approach to my program.”
- “As a program director, I want to see a program dashboard and do learning analytics to gain insights about my program so that I can make decisions and improve my program.”
- **User Flow:** Dashboard access → Skills and learning analytics engine → Display insights
- **Data Flow:** Dashboard interaction → UOC informational platform processing → Insights displayed

Scenario 3: Data Exchange Through VisionsTrust and PDC

- **Metric:** Functional, Data Sharing, Performance, Data Privacy.
- **Responsible:** UOC and Partners.
- **Objective:** Ensure secure and accurate data exchange between UOC, VisionsTrust, and partner services.
- **Persona:** All
- **User Stories:**
 - “As a student, I want to get a personalized learning path to fill my skill gaps So that I can gain the skills to develop my career.”
 - “As a student advisor, I want to recommend personalized learning path to students to fill their skill gaps so that students can gain the skills to develop their career”.
- **User Flow:** Profile input → Data transmission via PDC → Receipt by partner services.
- **Data Flow:**
 - UOC informational platform datasets → anonymization & standardization process → PDC → VisionsTrust offer
 - VisionsTrust offers → PDC → UOC informational platform processing → UOC internal services

Scenario 4: Data Privacy Testing for external data sharing

- **Metric:** Data Privacy.
- **Responsible:** UOC.
- **Objective:** Test compliance with GDPR and ensure data protection.
- **Persona:**
- **User Story:**
- **User Flow:**
- **Data Flow:** UOC informational platform datasets → anonymization process → external data sharing

Scenario	Functional	Data Sharing	Performance	Usability	Data Privacy
Scenario 5.2.1: Academic Career	90% of functionalities tested must pass	90% of data exchanges were completed without error	90% of actions return a response	>60% of users rate the platform positively	Data protection compliance to PIA

Advisory Service					
Scenario 5.2.2: Skills-driven insights & institution improvement	90% of functionalities tested must pass	90% of data exchanges were completed without error	90% of actions return a response	>60% of users rate the platform positively	Data protection compliance to PIA
Scenario 5.2.3: Data Exchange Through VisionsTrust and PDC	90% of functionalities tested must pass	90% of data exchanges were completed without error	90% of actions return a response	—	Data protection compliance to PIA
Scenario 5.2.4: Data Privacy Testing for external data sharing	—	—	—	—	Data protection compliance to PIA

Timeline for Testing Activities

Testing Topic	Responsible	Duration	Start Date	End Date
1.Functional Tests <ul style="list-style-type: none"> ● Preparation ● Execution ● Analysis 	Developers	~1 month	n.a	n.a
2.Data Sharing Tests <ul style="list-style-type: none"> ● Preparation ● Execution ● Analysis 	Developers	~3 weeks	n.a	n.a
3.Performance Tests <ul style="list-style-type: none"> ● Preparation ● Execution ● Analysis 	Developers	~1 month	n.a	n.a

Testing Topic	Responsible	Duration	Start Date	End Date
4. Usability Tests in UOC <ul style="list-style-type: none"> • Preparation • Execution • Analysis 	Test users	~3 months	n.a	n.a
5. Data Privacy Tests <ul style="list-style-type: none"> • Preparation • Execution • Analysis 	Data Privacy Office	~1 month	n.a	n.a

Building Blocks

In this Use Case, we plan to use core Building Blocks as described [here](#).

- Connector.
- Catalog.
- Contract.
- Consent.
- Empowering data sovereignty with the consent/contracts negotiating agent.

Governance

This use case does not generate, share, or store real personal data within the DS4Skills Data Space. We process academic and learning experience data internally. Prior to any data sharing within the DS4Skills Data Space, all datasets are fully anonymized or replaced with synthetic data, ensuring that no personal data is exposed.

Key governance and compliance considerations include:

- **Data Anonymization and Synthetic Data:** Only anonymized and synthetic datasets are published to the DS4Skills Data Space, preventing the identification of individual students.
- **Data Minimization:** Only the data required to support skills and learning analytics is shared.
- **Data Privacy:** Data protection principles are applied throughout the internal data transformation pipelines, in line with GDPR requirements.
- **Internal Access Control:** Any processing of real personal data remains within UOC informational platform and is subject to internal institutional governance, legal, and ethical frameworks.
- **Data Sharing Governance:** Data access within the DS4Skills Data Space is managed through data contracts, consent mechanisms, and the VisionsTrust governance framework.

In addition, the use case follows the governance rules and data-sharing principles defined by the VisionsTrust and the DS4Skills Data Space, and the internal UOC ethical protocol for the DS4Skills project.

1.6 Athumi-IMEC Use Case : Bridging Data Spaces – Exploring Interoperability between Athumi and DS4Skills

1.6.1 Use case description, value and goal

The DS4Skills project aims to demonstrate how data spaces for skills-related information can be interconnected and extended through concrete use cases. While most use case leaders adopt a scenario where they consume or contribute data and services within the existing VisionsTrust/DS4Skills ecosystem, Athumi proposes a complementary approach.

As a data intermediary and trusted data governor in Flanders, Athumi has developed its own ecosystem with a unique architecture, legal framework, and governance model for personal data exchange — including a strong focus on data subject consent, eIDAS-compliant authentication, and centralized contract management. However, Athumi currently operates independently from the broader European data space initiatives.

This use case explores how the **Athumi ecosystem and the DS4Skills ecosystem can be linked**, while **retaining their respective autonomy in terms of governance, identity management, and consent capture**. The intention is not to integrate deeply into each other's systems, but to identify and realise **minimal viable interoperability** that enables meaningful cross-ecosystem value.

By bridging the Athumi and DS4Skills ecosystems, this use case contributes to:

- **Avoiding European fragmentation:** Demonstrating how distinct but compatible data spaces can interoperate without enforcing architectural conformity;
- **Cross-border visibility:** Enabling Flemish data and services to be discoverable at European level — and vice versa — without duplicating efforts or compromising governance;
- **Foundation for scalability:** Preparing the ground for future data flows and service collaborations between ecosystems, without rushing into full technical or legal integration.

Use Case partners

Data providers

For the development of this use case, Athumi can provide access to the following data sources:

- **LED:** Learning and Experience Certificate Database, owned by AHOVOKS, the Agency for Higher Education, Adult Education, Qualifications and Study Grants of the Flemish Government. This database contains among others diplomas and degrees.
- **Student attestation** database by AHOVOKS.

Service providers (=data consumers)

As the use case mainly focuses on connecting a national data ecosystem with the data space, and the need or role for service providers is unclear, they have not (yet) been selected. A comprehensive view of the roles needed for the use case is provided in the Personas and user stories and flows section.

Use Case functionalities

Interoperability Focus Areas

The use case explores several tracks for interoperability, starting from minimal viable federation and potentially progressing toward deeper integration, depending on technical feasibility, legal compatibility, and budgetary constraints:

- **Ecosystem Interoperability**

One key focus area is ecosystem interoperability through the establishment of a federated catalogue. This approach aims to facilitate mutual discoverability of actors and datasets across both ecosystems. The primary emphasis lies on metadata exchange rather than full data integration or harmonization of governance models. The objective is to achieve minimal viable interoperability, enabling a functional connection without requiring deep structural changes to either ecosystem.

- **Consent and contract model mapping**

Given that this use case involves sharing access to personal data of citizens, data subject consent management represents a critical component of the interoperability research. The exploration will develop two parallel user journeys to understand how consent flows operate in each ecosystem. The first follows "the Athumi way," where the consent process is triggered from within the data user's application, consistent with Athumi's established practices. The second follows "the VisionsTrust way," where the trigger originates from the Personal Data Intermediary (PDI), utilizing the Prometheus-X consent building block.

The primary objective is to ensure that consent granted through either pathway remains interoperable across both ecosystems, and that consent management

functions – including the ability to revoke access – can be executed seamlessly through both VisionsTrust's PDI and Athumi's Access Management Application.

Achieving this level of interoperability will require detailed consent model mapping to identify commonalities, bridge technical and procedural gaps, and ensure that both systems can recognize and honor consent decisions made in the other ecosystem while maintaining compliance with GDPR requirements.

KPIs (quantitative)

KPI Name	Description	Target / Goal
Federated Catalogue Prototype	Development of a minimal viable solution for catalogue federation between Athumi and DS4Skills-GO.	<ul style="list-style-type: none"> Working prototype demonstrating metadata discoverability. number of offers in the Athumi / VisionsTrust catalogues
Consent Model Mapping	Documentation and implementation of consent interoperability between both ecosystems, covering both "Athumi way" and "VisionsTrust way" user journeys.	<ul style="list-style-type: none"> Documented consent model mapping report identifying commonalities and gaps. Demonstration of bidirectional consent: consent granted in one ecosystem is recognized in the other. Proof that consent management (revocation) works in both VisionsTrust PDI and Athumi's Access Management Application.

Personas, user stories, user flows, data flows

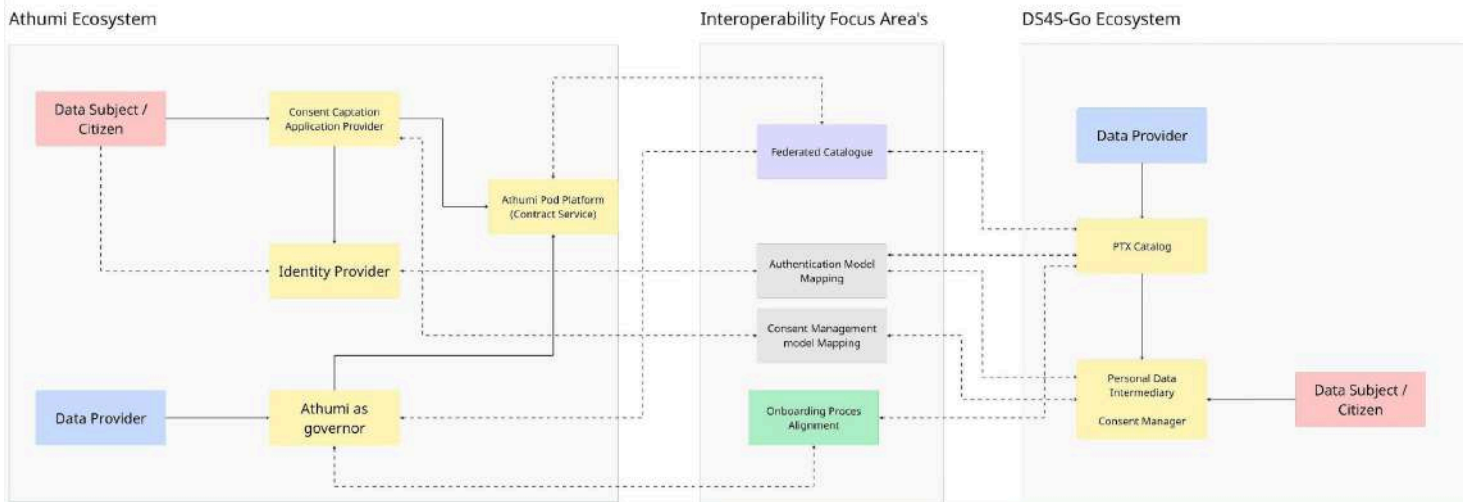
This section outlines the key roles within the Athumi ecosystem, their responsibilities, and how they compare to similar roles within the DS4Skills framework. Understanding these distinctions is critical to evaluating interoperability opportunities and constraints between the two ecosystems.

Role	Description	Responsibilities	Specific Features	Difference with DS4Skills
Data Subject (Citizen)	Subject of personal data	Approves or revokes access; manages access	eIDAS High authentication paired with WebID	

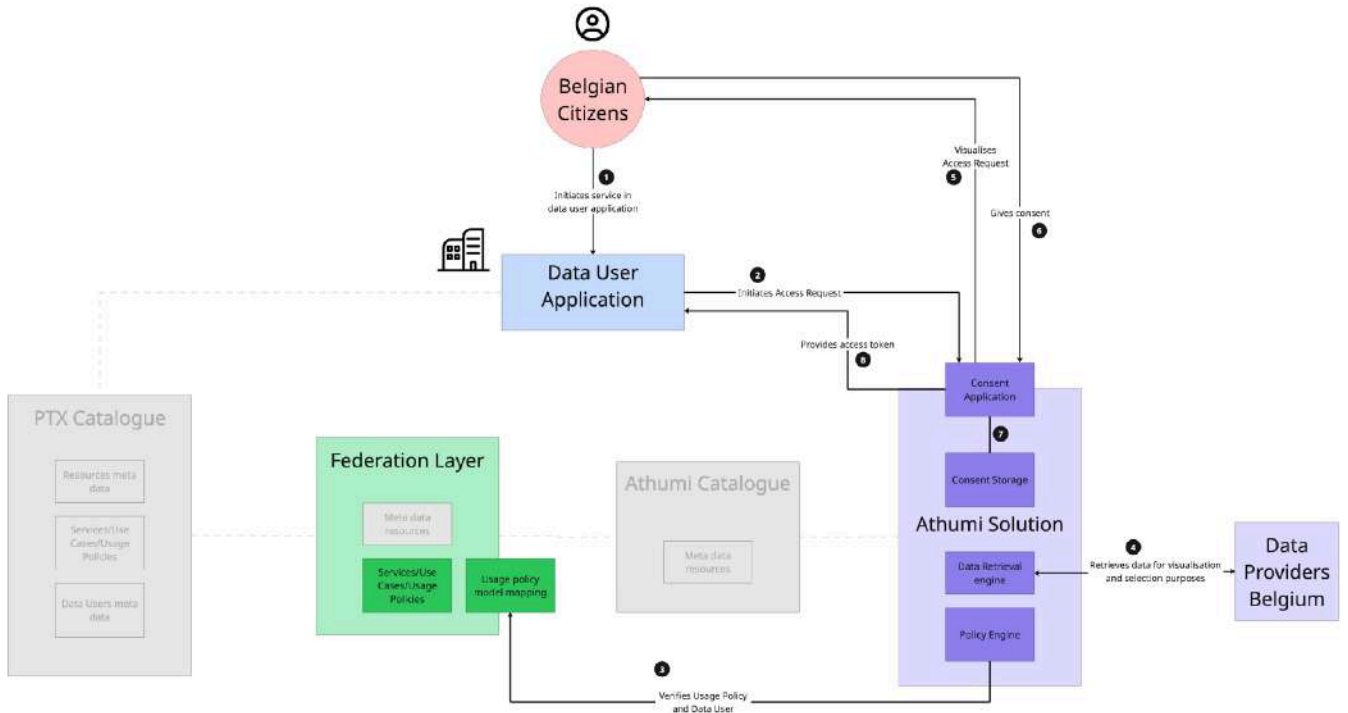
Data Provider	Entity offering data (e.g., diploma register)	Supplies data under Athumi governance contracts	Governed by Athumi contracts and compliance rules	
Data User	Entity consuming data (e.g., HR service)	Requests access, consumes data post-consent and contract approval	Whitelisting; strong onboarding & validation	DS4Skills has open self-service registration
Athumi as Governor	Trusted intermediary managing the ecosystem	Key responsibilities: <ul style="list-style-type: none"> • Draft and manage contracts • Ensure GDPR compliance • Validate access requests • Manage identity of both citizens and applications (not of the consent app) • Oversee legal framework enforcement 	Centralized governance; strict onboarding & validation	DS4Skills relies on decentralized self-managed governance (no central governor) Comparable to PDC
Identity Provider	Authenticates citizens and applications	Provides verified digital identity (eIDAS High compliant) for access control	Based on national eID or itsme authentication	DS4Skills allows lower-assurance ID providers; focus on convenience over assurance
WebID Provider	Manages digital identifiers for citizens	Issues and maintains WebIDs; links WebID to official identifiers (INSZ)	High-assurance identity mapping; linkage to government ID	DS4Skills uses custom Data Space ID, often username/password
Consent Captation Application (CCA) Provider	Provides the application where consent is captured	Hosts and manages the consent UI flow for data subjects	eIDAS High compliance; citizen-facing consent management	DS4Skills PDI integrates consent within participant app or iframe through the secured

				channels of the PDC
Athumi as Access Management Application Provider	Manages access request handling	Facilitates control over access approvals and revocation	Integrated with Athumi identity management; fine-grained access control	
Data Attestation Service Provider	Provides official attestations about data	Validates and signs claims about data authenticity (e.g., diplomas)	Trusted source certification; issuance of verifiable credentials	DS4Skills uses metadata self-declaration ; limited attestation services

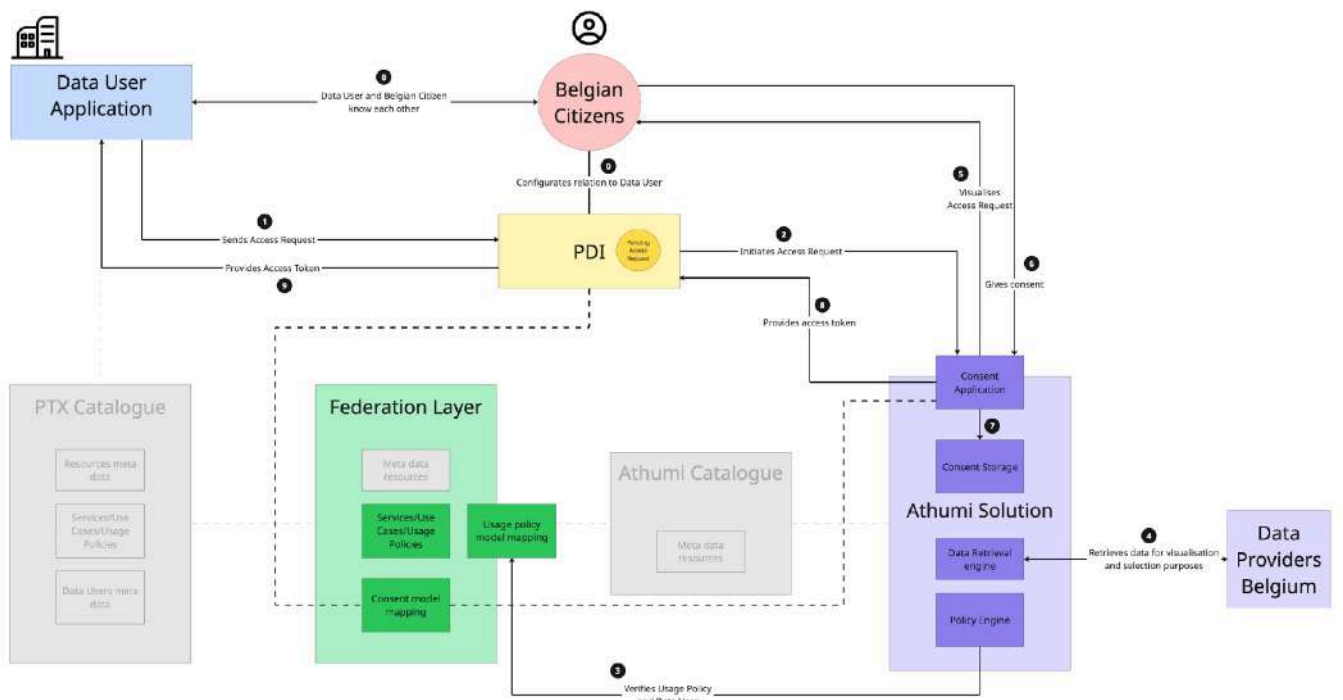
Interoperability between both ecosystems



Giving consent via Athumi Flow



Giving consent via PDI Flow



Potential risks identification and mitigation measures

Risk	Description	Mitigation Measures
Technical incompatibility	Federation between catalogue systems or ID models is not feasible due to architectural differences.	Early-stage technical feasibility analysis and minimal viable prototyping.
Governance misalignment	Governance principles (e.g., consent, authentication) are too divergent to allow operational interoperability.	Focus on discoverability-only federation; scope deeper integration only if alignment proves feasible.
Increased complexity for users	Cross-ecosystem interoperability may create confusion or friction for end users.	Maintain high UX standards; prioritize seamless integration with existing citizen workflows.
Regulatory constraints	Legal compliance issues arise when bridging ecosystems with different authentication and consent standards.	Involve legal teams early; ensure interoperability designs adhere to GDPR and eIDAS requirements.
Budget limitations	Deeper exploration (e.g., full authentication alignment) may exceed available budget.	Prioritize phases: start with minimal federation; plan for extended exploration based on funding availability.
Over-complication of onboarding	Attempts to streamline onboarding may conflict with Athumi's compliance and security standards.	Focus on selective automation without compromising core governance principles.

Ethical aspects

1. Fairness and Non-Discrimination

This use case does not introduce automated decision-making or AI-based profiling of individuals. Athumi's role is limited to enabling secure and consent-based access to authoritative educational data, without interpreting, scoring, or ranking individuals.

Fairness is primarily ensured through Athumi's governance framework and its role as a **recognised data intermediary service provider**, applying uniform access rules and consent mechanisms to all data subjects, regardless of background or profile. Access to data is strictly driven by explicit consent from the data subject and predefined contractual conditions, preventing discriminatory treatment at the level of data sharing.

2. Transparency and Explainability

Transparency is a core design principle of the Athumi ecosystem and is preserved in this use case. Data subjects are clearly informed about:

- which data is requested,
- by which data user,
- for which purpose,
- and under which legal and contractual conditions.

Consent flows—both via the Athumi Consent Captation Application and via the VisionsTrust PDI—are designed to make data usage understandable, traceable, and auditable for citizens, ensuring that individuals remain fully aware of how and why their data is accessed.

3. Accountability and Responsibility

Clear accountability is maintained by preserving the autonomy of both ecosystems. Each ecosystem remains responsible for:

- its own governance model,
- identity management,
- consent handling,
- and compliance with applicable regulations.

Within the Athumi ecosystem, roles and responsibilities are explicitly defined: Athumi acts as the central governor, ensuring GDPR compliance, contract management, and access control, while data providers and data users remain accountable for data quality and lawful use within agreed purposes.

4. Accuracy and Validity

The use case relies on authoritative, government-backed data sources, such as diploma and student attestation databases managed by the Flemish Government. This ensures a high level of data accuracy and validity at the source.

During the testing phase, no real personal data is used. All tests are conducted with mock or synthetic data that mirrors real-world structures and scenarios, reducing the risk of inaccuracies affecting real individuals while still enabling realistic validation of interoperability mechanisms.

5. Privacy, Safety, and Security

Privacy protection is a foundational element of this use case. Personal data is never shared without explicit, revocable consent from the data subject, in full alignment with GDPR principles such as data minimization, purpose limitation, and transparency.

Strong authentication mechanisms (eIDAS High) are maintained on the Athumi side, and no lowering of security standards is introduced for the sake of interoperability.

From a security perspective, the use case adheres to Athumi's existing technical and organizational measures, including secure environments, strict onboarding of data users, and controlled access management. The use of mock data during testing further mitigates privacy and safety risks.

6. Public Good and Sustainability

This use case contributes to the public good by addressing European data space fragmentation and exploring sustainable interoperability patterns between national and European ecosystems. Rather than enforcing full technical or governance alignment, it demonstrates how ecosystems can cooperate while respecting sovereignty, legal frameworks, and existing investments.

By enabling trusted reuse of verified educational data, the use case supports broader societal goals such as fair access to education-related services, fraud reduction, and improved mobility within the European labour market.

7. Human-Centricity and Human Oversight

The use case is explicitly human-centric. Citizens remain fully in control of their personal data at all times, with the ability to grant and revoke consent through interfaces they understand and trust.

No automated decisions affecting individuals are taken without human involvement. Human oversight is embedded at multiple levels:

- citizens actively decide on data sharing,
- Athumi performs manual validation and governance oversight of data users,
- and interoperability designs are reviewed by domain experts during the exploratory phase.

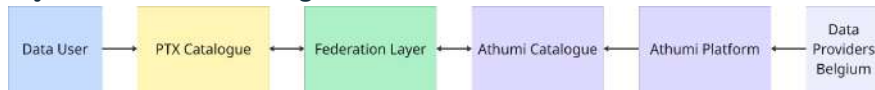
This ensures that technological experimentation does not override human values, autonomy, or fundamental rights.

1.6.2 Testing Plan

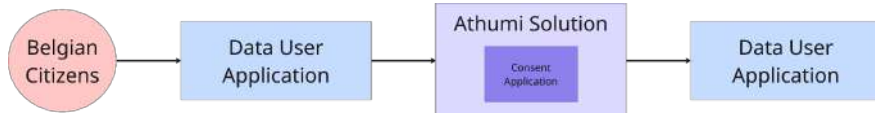
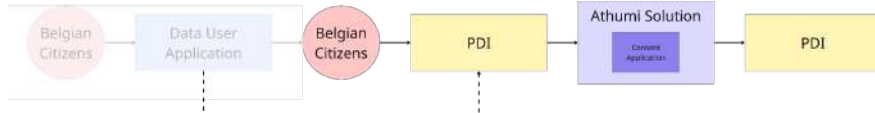
Testing Scope

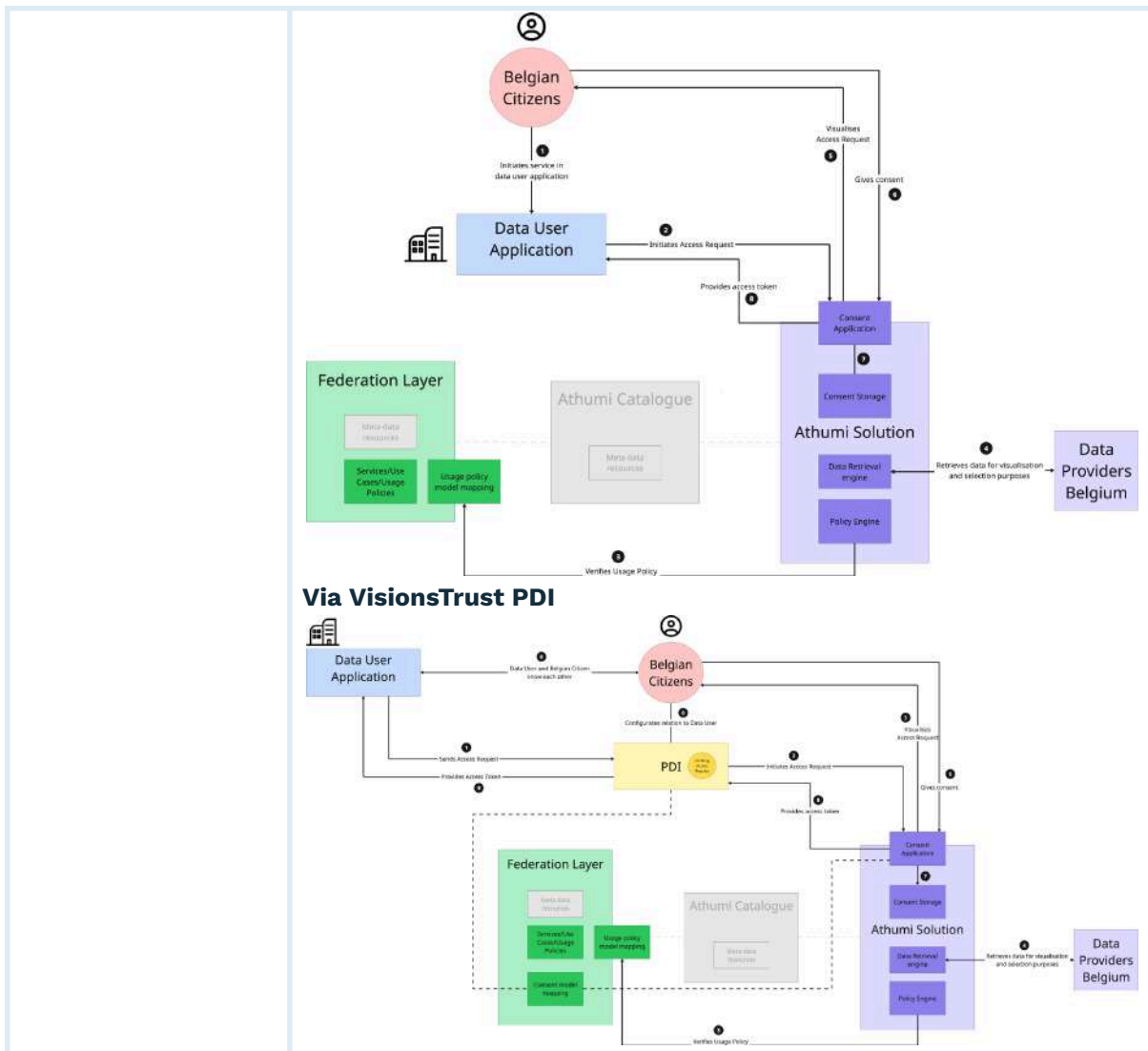
Functionalities

1. Federated Catalogue Discovery

Component	Catalogue federation layer between Athumi and VisionsTrust catalogues
Feature	Cross-catalogue metadata search and discovery
Personas involved	Data Provider (publishing metadata), Data User (discovering datasets), Catalogue Administrators
User story	As a Data User in the DS4Skills ecosystem, I want to discover educational credentials available through Athumi, so that I can request access to relevant data
User flow	Data User → VisionsTrust Catalogue → Federation Layer → Athumi Catalogue → Display results
Data flow	<p>Metadata query from data user → PTX Catalogue → Federation Layer → Athumi Catalogue</p> 

2. Cross-Ecosystem Consent Management

Component	Athumi CCA, VisionsTrust PDI, Athumi AMA
Feature	Consent capture, consent propagation, consent revocation
Personas involved	Data Subject/Citizen, Data User, Data Provider
User story	<ul style="list-style-type: none"> As a Citizen, I want to give consent via my preferred interface (Data User App or VisionsTrust PDI), so that my educational data can be shared with employers As a Data User, I want to verify that consent has been granted before accessing data, regardless of which system captured the consent
User flow	<p>Via Data User Application</p>  <p>Via VisionsTrust PDI</p> 
Data flow	<p>Consent request → Authentication → Consent decision → Consent storage → Consent delivery</p> <p>Via Data User Application</p>



Tests on aspects relating to the value of our products

1 Avoiding European Fragmentation Value

Value proposition:

Demonstrating how distinct but compatible data spaces can interoperate without enforcing architectural conformity.

How we'll test:

- Technical validation: Verify that both ecosystems maintain their independent governance, authentication, and consent models while still achieving functional interoperability
- Measurement indicators:
 - Both catalogues remain independently operational (no forced migration or convergence)

- Athumi continues using eIDAS High + WebID; VisionsTrust continues using VisionsTrust ID + username/password
- Each ecosystem's governance rules remain autonomous and enforceable
- Federation layer operates without requiring (significant) architectural changes to either platform

2 Cross-Border Visibility Value

Value proposition:

Enabling Flemish data and services to be discoverable at European level — and vice versa.

How we'll test:

- Discoverability testing: Measure whether Flemish educational credentials (diploma's, student attestations) become discoverable from VisionsTrust/European data space.
- Measurement indicators: Number of Athumi data sources visible in VisionsTrust catalogue post-federation

Success criteria:

- 90% of relevant datasets discoverable across ecosystems
- Zero duplication of data (single source of truth maintained)

3 Foundation for Scalability Value

Value proposition:

Preparing the ground for future data flows and service collaborations between ecosystems, without rushing into full technical or legal integration.

How we'll test:

- Minimal viable interoperability validation: Assess whether the federation approach is extensible and can support future use cases beyond the pilot

Success criteria:

- Federation layer architecture documented and proven as reusable pattern
- Technical feasibility validated for future expansion (additional data types, additional ecosystems)

Assumptions and constraints

Assumptions:

- Both Athumi and VisionsTrust test environments are available and stable
- Test data (mock data, mock data user) is available in sufficient quantity
- Trust relationship between Athumi & VisionsTrust is established theoretically
- eIDAS authentication can be simulated in test environment

Constraints:

- Data availability: Real student data cannot be used; synthetic/anonymized data must be generated that represents realistic scenarios

Testing Environment

The data exchange testing will be conducted through VisionsTrust, the Connector (PDC) and potentially your portal.

VisionsTrust, Connector (PDC): test environment to be provided by Visions.

Athumi CCA & AMA: pre-production environment at <https://ama.test-athumi.eu/> with own test user accounts (keycloak).

Mock Data User Application: hosted by imec.

Federation Layer: to be decided.

End Users

Given the exploratory nature of this interoperability use case and the complexity of coordinating test environments across two ecosystems, we will conduct controlled testing with a limited number of internal participants who will simulate different user personas.

This is *not* end-user acceptance testing, but rather functional validation testing to verify that the technical integration works as designed.

Mock Persona 1: Recent Graduate, Ismail

- Simulated by: Athumi mock citizen
- Test focus: Consent flows

Mock Persona 2: HR Manager, Rob

- Simulated by: Mock Data user application
- Test focus: Data access requests, catalogue search

Testing Tools

Athumi CCA & AMA

- Automatic Unit Testing: Java/Kotlin testing frameworks (JUnit, Mockito, Kotest,...)
- Automatic Integration Testing: Java/Kotlin testing frameworks (TestContainers, MockMVC,...)
- Functional Integration Testing: manual via test scripts
- Load/Performance Testing: statistics via Grafana monitoring

Federation Layer :

- To be decided, possibility of using <https://opentelemetry.io/> (performance), and the EU Interoperability Test Bed or POSTMan (functional).

Testing Execution Plan**Functionality 1: Federated Catalogue Discovery****FCD-001: Data User Discovers Athumi Datasets via VisionsTrust****Persona:** Rob (HR Manager - Data User)**User Story:** As a Data User in the DS4Skills ecosystem, I want to discover educational credentials available through Athumi, so that I can request access to relevant data**Preconditions:**

- Athumi catalogue contains LED database metadata (diplomas)
- VisionsTrust catalogue is operational
- Federation layer is configured and running
- Mock Data User Application has access to VisionsTrust catalogue

Test Steps:

- Rob performs search query "Belgian university diplomas" in VisionsTrust catalogue
- VisionsTrust catalogue forwards query to Federation Layer Federation
- Layer queries Athumi catalogue Athumi catalogue returns matching metadata (LED database)
- Federation Layer maps Athumi metadata format to VisionsTrust format
- VisionsTrust catalogue returns combined results to Mock Data User Application

Expected Results:

- Search completes within [x] seconds
- Results include at least one Athumi dataset (LED database)
- Metadata is complete (title, description, data provider, access conditions)
- Metadata format is correct for VisionsTrust display

FCD-002: Catalogue Federation Handles Athumi Unavailability**User Story:** As a Data User, I want the system to remain functional even when one catalogue is unavailable**Preconditions:**

- VisionsTrust catalogue operational
- Athumi catalogue simulated as unavailable (network timeout or 503 error)

Test Steps:

- Rob performs search query in VisionsTrust catalogue

- Federation Layer attempts to query all catalogues
- Athumi catalogue request times out or returns error
- VisionsTrust catalogue returns results successfully
- Federation Layer returns partial results with error notification

Expected Results:

- VisionsTrust results are delivered
- Clear error message: "Athumi catalogue temporarily unavailable"
- No system crash or complete failure
- Error logged for monitoring

FCD-003: Data Provider Publishes Metadata and Verifies Discoverability

Persona: Athumi (Data Provider)

User Story: As a Data Provider, I want to publish new credentials and verify they're discoverable across ecosystems

Preconditions:

- Athumi has catalogue admin interface
- Federation Layer is synchronizing metadata

Test Steps:

- Athumi publishes new credential type "Diploma" to Athumi catalogue
- Metadata propagates to Federation Layer
- Rob searches from VisionsTrust side for "Diploma"
- New credential appears in search results

Expected Results:

- New metadata visible in VisionsTrust search within 5 minutes
- Metadata complete and accurate
- Discoverable via relevant search terms

Functionality 2: Cross-Ecosystem Consent Management

CEC-001: Consent via Data User Application (Athumi Way)

Persona: Ismaïl (Citizen - Recent Graduate) + Rob (HR Manager - Data User)

User Story: As a Citizen, I want to give consent via the Data User Application flow, so that my diploma can be shared with an employer

Preconditions:

- Ismaïl is a Belgian citizen
- Mock Data User Application is onboarded in Athumi
- Database contains Ismaïl's data
- Consent Captation Application (CCA) is operational

Test Steps:

- Ismaïl initiates consent flow in Data User Application
- Ismaïl authenticates (simulated eIDAS High via Keycloak)
- Athumi Policy Engine verifies usage policy
- Athumi Data Retrieval Engine retrieves data
- Consent Captation Application visualises Access Request, Ismaïl reviews request details in CCA
- Ismaïl clicks "Grant Consent"
- Consent recorded in Athumi with timestamp and scope
- Consent propagates to VisionsTrust (Federation Layer)
- Mock Data User Application receives consent confirmation

Expected Results:

- Complete flow executes successfully
- Consent visible in both Athumi AMA and VisionsTrust
- Data access only granted after consent

CEC-002: Consent via VisionsTrust PDI

Persona: Ismaïl (Citizen - Recent Graduate)

User Story: As a Citizen, I want to initiate data sharing from my PDI, so that I control when and what I share

Preconditions:

- Ismaïl has access to VisionsTrust PDI (mock account)
- Prometheus-X consent building block is operational
- Data User and Citizen have an established relationship in VisionsTrust PDI

Test Steps:

- Data User Applications sends Access Request to Ismaïl via VisionsTrust PDI
- Ismaïl initiates consent flow in VisionsTrust PDI
- Ismaïl authenticates (simulated eIDAS High via Keycloak)
- Athumi Policy Engine verifies usage policy
- Athumi Data Retrieval Engine retrieves data
- Consent Captation Application visualises Access Request, Ismaïl reviews request details in CCA
- Ismaïl clicks "Grant Consent"
- Consent recorded in Athumi with timestamp and scope
- Consent propagates to VisionsTrust (Federation Layer)
- VisionsTrust PDI receives consent confirmation
- Mock Data User Application receives consent confirmation via VisionsTrust PDI

Expected Results:

- Citizen-initiated flow successful
- Consent recognized by Athumi
- Consent delivered to Mock Data User Application

- Consent visible in both PDI and Athumi AMA

CEC-003: Consent Revocation via Athumi AMA

Persona: Ismaïl (Citizen)

User Story: As a Citizen, I want to revoke consent via Athumi, so that data access is immediately terminated everywhere

Preconditions:

- Active consent exists (from CEC-001 or CEC-002)
- Mock Data User Application has accessed data previously

Test Steps:

- Ismaïl logs into Athumi AMA
- Ismaïl views list of active consents
- Ismaïl identifies consent for Mock Data User Application
- Ismaïl clicks "Revoke Consent"
- System asks for confirmation
- Ismaïl confirms revocation
- Revocation recorded in Athumi
- Revocation propagates to VisionsTrust
- Mock Data User Application attempts to access data
- Access denied with error: "Consent has been revoked"
- Ismaïl verifies revocation in VisionsTrust PDI (consent status = "Revoked")

Expected Results:

- Revocation propagates to both systems
- Data access immediately blocked
- No residual access anywhere
- Revocation visible in both Athumi AMA and VisionsTrust PDI

CEC-004: Consent Revocation via VisionsTrust PDI

Persona: Ismaïl (Citizen)

User Story: As a Citizen, I want to revoke consent from my PDI, so that data access is immediately terminated everywhere

Preconditions:

- Active consent exists (from CEC-001 or CEC-002)
- Mock Data User Application has accessed data previously

Test Steps:

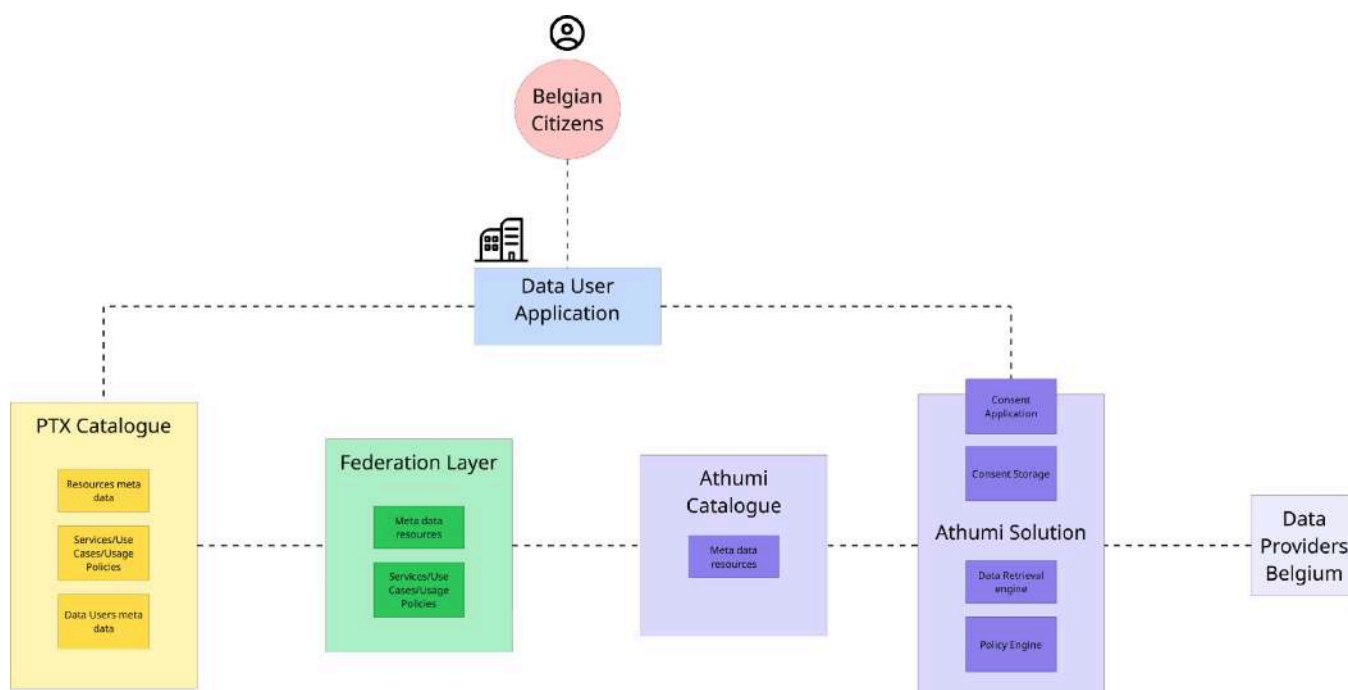
- Ismaïl logs into VisionsTrust PDI
- Ismaïl views list of active consents
- Ismaïl identifies consent for Mock Data User Application

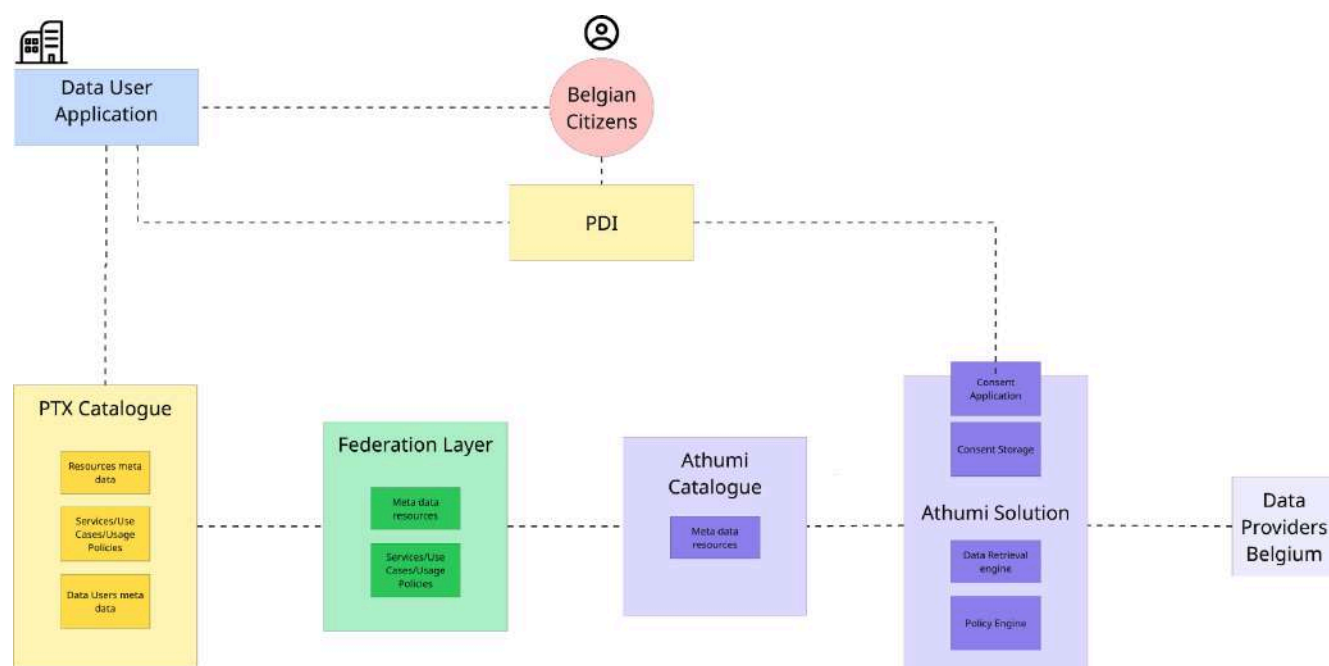
- Ismaïl clicks "Revoke Consent"
- System asks for confirmation
- Ismaïl confirms revocation
- Revocation recorded in VisionsTrust
- Revocation propagates to Athumi
- Mock Data User Application attempts to access data
- Access denied with error: "Consent has been revoked"
- Ismaïl verifies revocation in Athumi AMA (consent status = "Revoked")

Expected Results:

- Revocation propagates to both systems
- Data access immediately blocked
- No residual access anywhere
- Revocation visible in both Athumi AMA and VisionsTrust PDI

Building Blocks





Governance

Personal data scope in the testing phase

For the purposes of this use case, no real personal data is generated, shared or stored.

All test scenarios within this use case will rely exclusively on:

- Mock or synthetic data, representing education and skills data (e.g. diplomas, attestations),
- Mock identities and test user accounts, used to simulate authentication and consent flows,
- Simulated consent records, created solely for functional validation.

As such, the testing activities themselves do not constitute processing of personal data under GDPR, and no real data subjects are involved.

Relevance for production use

While our use case does not involve personal data, the architecture, user flows and governance model being tested are explicitly designed for production scenarios in which personal data is processed.

In a real-world deployment, this setup would handle:

- Personal education and skills data linked to identifiable individuals,
- Consent decisions given and revoked by data subjects,
- Cross-ecosystem data sharing requests initiated by data users (e.g. employers or service providers).

Governance is embedded by design in Athumi's platform, meaning that Athumi's governance framework is applied automatically when a use case is deployed in a production context.

Athumi's governance approach for personal data handling

Athumi operates as a neutral and trusted data intermediary, with an established governance framework that applies whenever personal data is processed in production environments.

This governance is organised through two complementary bodies:

- **Board of Directors**
The Board of Directors provides strategic oversight and ensures that Athumi's activities—including the handling of personal data—remain compliant with legal, regulatory and ethical obligations. It supervises risk management, data protection compliance and alignment with Athumi's public-interest mission. (see: <https://athumi.be/en/about-us/board-of-directors>)
- **Advisory Committee**
The Advisory Committee brings together independent experts and stakeholders who advise on policy, societal impact and responsible data use. It provides guidance on topics such as data governance, interoperability between data spaces and the ethical handling of personal data in cross-sector and cross-border contexts. (see: <https://athumi.be/en/about-us/advisory-committee>)

These governance structures ensure that, when the tested setup is deployed in production, personal data is:

- Processed only on the basis of explicit, informed consent from the data subject,
- Shared in accordance with data minimisation and purpose limitation principles,
- Fully revocable, with consent withdrawal enforced across connected ecosystems,
- Handled in compliance with GDPR and applicable national and European regulations.

1.7 Mylia-Badgebox Use Case : Digital Fusion Skills Assessment and Upskilling Tool for Workforce

1.7.1 Use case description, value and goal

Critical thinking is recognized as a life skill, a fundamental component of creativity and innovation, and a key professional competency for organizations worldwide. This is why we decided to focus on creating a tool that helps managers and employees explore their approach to this and other related skills, to prepare them for challenging organizational situations that must be addressed in an innovative and critical way.

After years of working within organizations and alongside the people operating in them, Mylia believes it essential to prepare current and future managers to think critically and reflect on their roles and responsibilities toward people and society, as well as the purpose and moral, economic, and even ecological consequences of their actions.

In today's economic scenario, it is increasingly important to focus on developing individuals within organizations who position themselves as critical thinkers. Only in this way will they not only influence the competitive advantage of companies but also demonstrate their leading role in society. This becomes even more significant in a scenario where machines are increasingly spreading into decision-making and organizational processes, influencing—and sometimes replacing—people in cognitive processes, not just in production-related tasks.

Use case partners

Data providers

Users assessment produced by our internal developed platform: data will be constituted by skill analysis and management behaviour mapping. The application will be able to provide such data in anonymized and aggregated form to third services interested in skill analytics, skill mapping and job role distribution.

- Number of skills declared
- Analised behaviours (5 or more behavioural dimensions)
- Job role, as per ESCO (European Skills, Competences, Qualifications and Occupations) ontology
- Work experience, constituted by the number of year the subject has being working in the declared role.

Providers of the aforementioned data will be the Mylia-Badgebox application, that will be connected to the Skills Data Space through the official VisionTrust Connector.

To implement the use case, it will be necessary to have a sample of approximately 500 subjects (managers, senior and junior employees) who are willing to complete a questionnaire to calibrate the tool.

The subjects will be reached both through DS4Skills marketplace platform and through our internal connection network.

We are looking for other providers mainly for skills, job profiles and analytics forecast.

Service providers

Providers	Functionality
Open Badge Factory (or similar)	<p>Producing certificates to list the assessment and the skills of the users.</p> <p>This service will be used to create a badge and provide it to the user that goes through our application assessment. The Badge will list the user capabilities related to its job role.</p>
Learning Experience Passport (ComPas or Similar)	<p>Track and list all online and offline courses attended by the user.</p> <p>This service will be used to hold all the data related to the user's learning experiences.</p>
National Skills Observatory	<p>Providing Upskilling Paths to users that went through the assessment platform.</p> <p>Data from this service will be provided to the end users, as a recommended route or pathway to improve user capabilities for the declared job role.</p>

Use case functionalities

General Functionalities

1. Productivity Improvement

- Human-Machine Interaction: Optimize the use of technologies to increase operational efficiency and reduce downtime.
- Soft Digital Skills: Improve collaboration and communication within virtual teams, increasing overall productivity.

2. Innovation and Development

- Human-Machine Interaction: Promote the adoption of new technologies and innovative processes, improving the ability to adapt to market changes.
- Soft Digital Skills: Encourage creativity and problem-solving in digital environments, fostering innovation.

3. Training and Personal/Employee Development

- Human-Machine Interaction: Identify the skills necessary to work effectively with new technologies and develop targeted training programs.

- Soft Digital Skills: Assess and improve employees' transversal digital competencies, such as virtual team management and online collaboration.

4. Employee Satisfaction and Retention

- Human-Machine Interaction: Create a safer and more satisfying work environment by reducing repetitive workloads and improving interaction with technologies.
- Soft Digital Skills: Promote a collaborative and supportive work environment, improving employee satisfaction and reducing turnover.

5. Market Competitiveness

- Human-Machine Interaction: Improve the efficiency and quality of products/services offered, increasing the company's competitiveness.
- Soft Digital Skills: Develop advanced digital competencies that allow the company to respond quickly to market needs and maintain a competitive advantage.

Service Functionalities

- National job roles distribution and related skills comparison with European scenario
- Visualization of relationship between skills and behaviour related to managing profiles
- Skills analytics, matching skills, missing skills for the job-role
- Upskilling paths.

Web Interface	Admin page	<ul style="list-style-type: none"> ● Accessible only by admin users ● Additional functions ● Full access to data ● Analytical dashboards
	Registration / Login / Homepage	<ul style="list-style-type: none"> ● Initial profiling required? (Manager, Senior Employee, Jr Employee)
	Questionnaire / Assessment page (with instructions)	<ul style="list-style-type: none"> ● Basic assistant for filling out
	Result page	Graphic output (to be defined).

Backend	Informed consent management (Vision Trust Consent Management Tool)
	User profiling
	Admin services
	Normal user services
	External Service API connection
	Data Space Connector

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
KPI_UC_ADE_1 -Users	Number of single users registering and applying to our services during testing phase	500	Total number of users	At least 2
KPI_UC_ADE_2 - Non-mandatory Services	Number of services to integrate (non-mandatory) that the data space offers	2	Total number of connected services	At least 2 Skills Data Space Services linked to the internal developed application.
KPI_UC_ADE_3 - Behaviours	Dimensions behaviour analysed	Enough data for job behaviour and skills analytics		At least 4 dimensions analysed through the skills and assessment process

Personas, user stories, user flows, data flows

Personas

Name	Demographic/ Background	Objectives	Challenges	Motivations	Tool Permissions
Elisa	<ul style="list-style-type: none"> Age: 50 Role: Head of 	Create innovative models and solutions for customer	Create a standard methodology to measure Fusion Skills that can guide strategic	Take on a reference role in guiding innovation in the field of	ADMIN

	Innovation		choices for the evolution of Individuals and Organizations.	Development and Training.	
Marco	<ul style="list-style-type: none"> Age: 49 Role: IT manager in a large company 	Optimize the use of technologies to improve team operational efficiency and reduce downtime	Manage a geographically distributed team and ensure everyone has the necessary skills to use new technologies	Wants to improve team productivity and promote the adoption of new technologies	USER / Profiled as Manager
Laura	<ul style="list-style-type: none"> Age: 40 Role: Employee Training and Development Manager 	Identify the skills needed to work effectively with new technologies and develop targeted training programs.	Assess and improve employees' transversal digital skills, such as virtual team management and online collaboration.	Wants to create a collaborative and supportive work environment, improving employee satisfaction and reducing turnover.	USER / Profiled as Senior Employee
Giovanni	<ul style="list-style-type: none"> Age: 28 Role: Specialist in innovation and technological development 	Promote the adoption of the new technologies and innovative processes, improving the company's ability to adapt to market changes	Encourage creativity and problem-solving in digital environments.	Wants to foster innovation and keep the company competitive in the market.	USER / Profiled as Junior Employee

Name	Demographic/Background	Goals/motivations
<i>Elisa</i>	<ul style="list-style-type: none"> Age 50 Head of Innovation & Learning Design 	<ul style="list-style-type: none"> Create innovative models and solutions for the Development and Training of organizations.

	<p><i>Function</i></p> <ul style="list-style-type: none"> • <i>Degree in Organizational Psychology and specialization in Innovation Management</i> 	<ul style="list-style-type: none"> • <i>Take a leading role in guiding innovation in the field of Development and Training</i>
<p>Challenges/Frustrations</p> <ul style="list-style-type: none"> • <i>Create a measurement standard for Fusion Skills that can guide strategic choices for the evolution of individuals and organizations.</i> • <i>Raise awareness among users regarding the effective use of enabling technologies.</i> 	<p>How can we help</p> <ul style="list-style-type: none"> • <i>Provide technological tools and develop a user experience that encourages the adoption of these tools.</i> 	<p>Recap</p> <p>Elisa, 50, is Head of the Innovation & Learning Design Function with a focus on Innovation Management. Her goal is to develop innovative models for training and become a point of reference in the sector. Her challenges include creating standards to measure Fusion Skills and raising awareness on the effective use of technologies. She can be supported by providing technological tools and a user experience that favors their adoption.</p>

<p>Name & pic</p> <p>Marco</p>	<p>Demographic/Background</p> <ul style="list-style-type: none"> • <i>Age: 49</i> • <i>IT Manager in a large company</i> • <i>STEM degree and professional background in IT</i> 	<p>Goals/motivations</p> <ul style="list-style-type: none"> • <i>Manage a geographically distributed team and ensure everyone has the skills needed to use new technologies.</i> • <i>Wants to improve team productivity and promote adoption of new technologies.</i>
---	--	--

Challenges/Frustrations	How can we help	Recap
<ul style="list-style-type: none"> Fully understand the characteristics and real fields of application of the technologies useful to support his function in the company. Manage a geographically distributed team and ensure that everyone has the necessary skills to use new technologies. 	<ul style="list-style-type: none"> Provide managerial skills useful to facilitate the adoption of new digital tools. Provide technical skills that, mixed with managerial ones, place him as a possible evangelist and "tech angels" within his organization. 	<p>Marco, 49, is an IT Manager in a large company, aiming to optimize the use of technologies to improve operational efficiency. He wants to better manage a distributed team and promote the adoption of new technologies. His challenges include understanding the real technological applications and ensuring team training. He needs to be supported with managerial and technical skills to become a technology evangelist in his company.</p>

Name	Demographic/Background	Goals/motivations
<p>Laura</p>	<ul style="list-style-type: none"> Age 40 Responsible for performance systems, employee development and training Master's degree in HR management 	<ul style="list-style-type: none"> Identify the skills needed to work effectively with new technologies and develop targeted change management and training programs. Wants to create a stimulating and collaborative work environment that enhances the role of the person in interacting with new technologies, improving employee satisfaction and reducing turnover.

Challenges/Frustrations	How can we help	Recap
<ul style="list-style-type: none"> • <i>Understand how to manage organizational impacts related to the processes of adopting new technologies in the company.</i> • <i>Frustration: understand how to communicate effectively with the company's IT function.</i> 	<ul style="list-style-type: none"> • <i>Provide information and data useful for developing targeted change and training programs within your organization.</i> 	<p>Laura, 40, is Head of Performance, Development and Employee Training Systems, with a Bachelor's and Master's Degree in HR Management. Her goal is to identify the skills needed to use new technologies and develop change management programs, creating a stimulating work environment. Her challenges include managing the organizational impact of digitalization and dialogue with IT. She asks to be supported with data and information for targeted training programs.</p>

Name	Demographic/Background	Goals/motivations
<p><i>Giovanni</i></p>	<ul style="list-style-type: none"> • <i>Age 28</i> • <i>Specialist in innovation and technological development, for data analysis and process optimization</i> • <i>Recent graduate in STEM subjects, at his first work experience in a structured company.</i> 	<ul style="list-style-type: none"> • <i>Operatively use new technologies and processes useful for streamlining processes in order to make the company more competitive on the market.</i> • <i>Wants to work in an agile work environment, which can reduce workloads and areas of inefficiency</i>

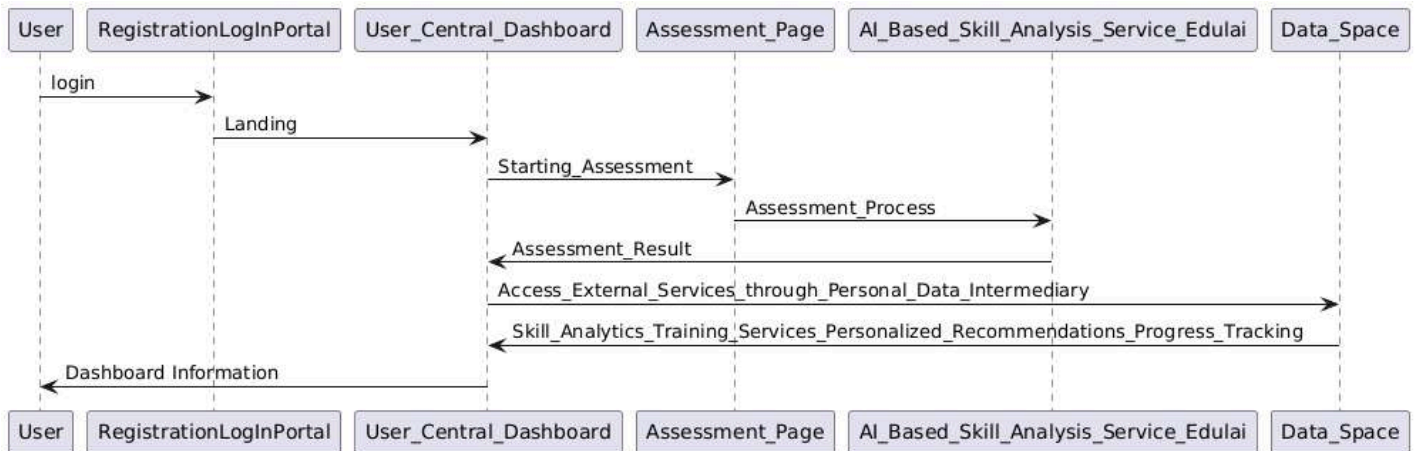
Challenges/Frustrations	How can we help	Recap
<ul style="list-style-type: none"> • <i>Quickly acquire the soft skills needed to interact effectively with all other company functions;</i> • <i>Encourage the use of new technological tools within your work team, supporting their adoption by colleagues.</i> 	<ul style="list-style-type: none"> • <i>Support him with appropriate platforms that can facilitate his role in supporting strategic and operational decision making for his organization.</i> 	<p>Giovanni, 28, is a specialist in innovation and technological development, a recent graduate in STEM subjects and at his first experience in a structured company. He wants to implement new technologies to optimize processes and improve company competitiveness, working in an agile environment. His challenges include acquiring soft skills to interact effectively with other functions and promoting the adoption of new tools. He asks to be supported with platforms that facilitate strategic and operational decision-making.</p>

User stories

User stories	Data needed	Services needed	Data produced or added value services
<p>As a <i>Head of Innovation</i></p> <p>I want to check my skills</p> <p>So that I can check if I have all I need to perform well in my role.</p> <p>I want to assess my managing behaviours</p> <p>So that I can check for any shortcoming and upskill myself to improve it.</p>	<p>Soft Skills assessment data</p> <p>Job profile characterization data</p> <p>Upskilling paths & courses list</p>	<p>Dataset providers</p>	<p>Soft skills assessment and related managing behaviour mapping</p> <p>Upskilling paths and recommendations.</p>

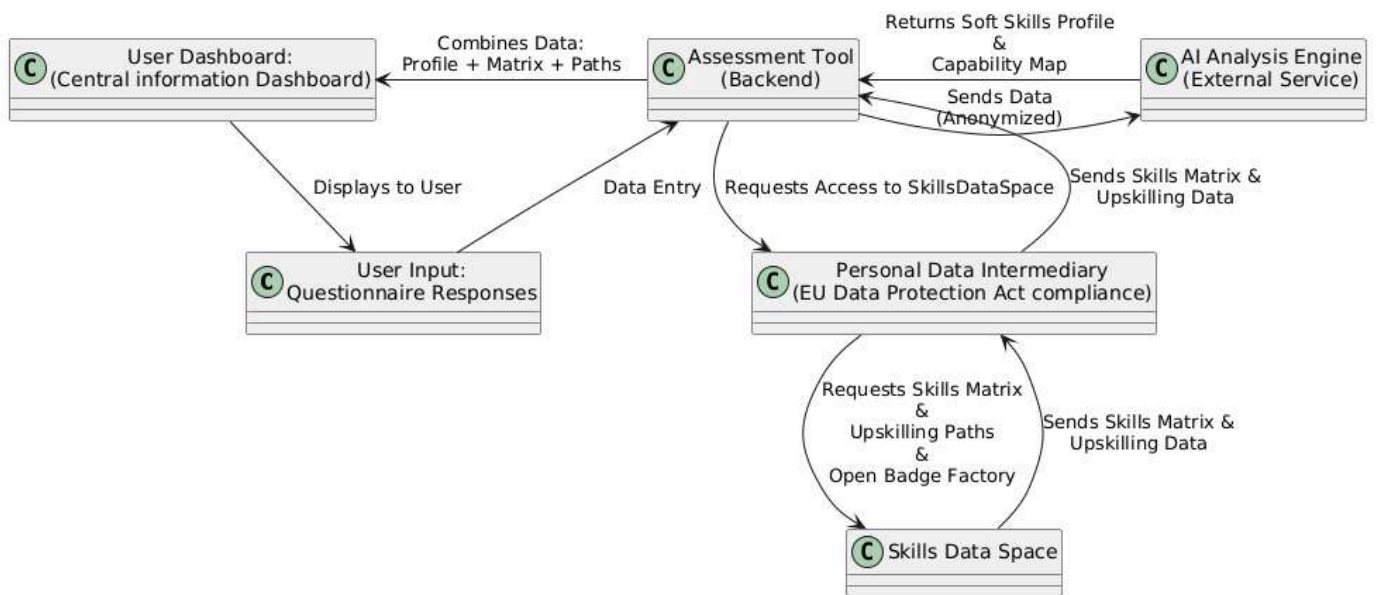
<p>I want to analyse my job skills</p> <p>So that I can map them against people with the same role/job profile.</p>			
<p>As a IT Manager</p> <p>I want to check my soft skills and verify I have all I need</p> <p>So that I can upskill myself and improve my managing capabilities.</p> <p>I want to assess my managing behaviours</p> <p>So that I can have an overview of what skills I need to obtain a better role.</p>	<p>Soft Skills assessment data</p> <p>Job profile characterization data</p> <p>Upskilling paths & courses list</p>	<p>Dataset providers</p>	<p>Soft skills assessment and related managing behaviour mapping</p> <p>Upskilling paths and recommendations</p>
<p>As a <i>Responsible for performance systems, employee development and training</i></p> <p>I want to check my management soft skills</p> <p>So that I can work on my most lacking capabilities to improve my performance in team counselling.</p>	<p>Soft Skills Assessment data</p> <p>Upskilling paths & courses list</p>	<p>Dataset Providers</p>	<p>Soft skills assessment and related managing behaviour mapping</p> <p>Upskilling paths and recommendations</p>
<p><i>As a Specialist in innovation and technological development, for data analysis and process optimization</i></p> <p>I want to gain insight on which soft skills I can learn to best complement my technical profile.</p> <p>so that I can improve my career.</p>	<p>Soft Skills assessment data</p> <p>Upskilling paths & courses list</p>	<p>Dataset Providers</p>	<p>Soft skills assessment and related managing behaviour mapping</p> <p>Upskilling paths and recommendations</p>

User Flows



Data Flows

- Personal Data store
- Skills analytics data
- Labour market data



Potential risks identification and mitigation measures

Risk	Description	Mitigation measures
lack of understanding	There is a risk for use case comprehension if you are not playing with the data sets provided.	The data space itself is a great way to access the data and do some experiments. The use case is providing free access to synthetic data avoiding any data protection issue to promote discovery processes for deep understanding.
lack of applicability	The Use Case Leader is applying the use case internally and can be relayed in other higher ed institutions. But gathering data needs technology and some standards in place.	The use case is also providing documentation of all the needed gathering processes and used tools to facilitate institutions adoption.
Data protection	The Use Case Leader is gathering all data according to GDPR requirements and using this data to improve students' success and teaching and learning quality. The Use Case Leader is not allowed to share all this data.	Before sharing, all data sets are anonymized and transformed to synthetic data according to GDPR rules, the data protection agreements of the project, and the data contracts defined.

Ethical aspects

1. Fairness and Non-Discrimination

Adecco Group is one of the world's leading employers, and therefore we have both the responsibility and the opportunity to make a difference by offering equal employment opportunities to everyone and promoting cultural change.

With this in mind, we are committed to constantly building an inclusive environment where every individual can grow and where differences are not only respected but also valued as an integral part of our projects.

We do not tolerate any form of discrimination against employees, collaborators, or candidates based on gender, sexual orientation, health conditions, age, ethnicity, social or economic background, religion, or political opinion. For us, it is essential to ensure fair treatment for every person at every stage of their professional journey, starting from the selection process.

It is within this context that we carry out our daily work to guarantee gender equality.

Specifically, Adecco Formazione is certified for gender equality. [certificate-signed \(4\).pdf](#)

There is also a Gender Equality Policy, which includes Mylia, aimed at outlining the principles, objectives, and guidelines that define the organization's commitment to gender equality and the promotion of diversity. - [Politica-Parita-di-Genere.pdf](#)

2. Transparency and Explainability

The use case provides clear information to users about the purpose of the assessment, the types of data processed (skills, behaviours, job role, seniority), and how these data are used to generate analytics, recommendations and badges. Explanations will be offered in accessible language at key steps (onboarding, questionnaire, results page), clarifying how specific answers influence the resulting skill maps, behaviour profiles, upskilling paths and credentials.

Users will receive an interpretable graphical output of their assessment, accompanied by textual explanations highlighting which behavioural dimensions and skill gaps led to given recommendations. Any algorithmic logic used to compare profiles (e.g. against national or European job role distributions) will be described at a high level, and users will be informed whenever external services (such as National Skills Observatory or learning passport providers) contribute to a recommendation

3. Accountability and Responsibility

Accountability for data collection, consent, and lawful processing rests with the use case leader and the organisations operating the Mylia–Badgebox platform, in line with GDPR and project data protection agreements. The VisionTrust Connector and Consent Management Tool will be used to track user permissions, making it auditable which data have been shared, with which services, and for which purposes.

Roles and responsibilities will be clearly defined among all partners: the platform provider is responsible for data quality, secure storage and anonymisation; external services (e.g. badge issuer, learning passport, National Skills Observatory) are responsible for the correctness of their outputs and compliance with their own legal and ethical obligations. Governance procedures will be established to handle incident reporting, user complaints, requests for rectification or deletion, and to periodically review the ethical and organisational impacts of the use case.

4. Accuracy and Validity

The assessment tool will be calibrated on a representative sample of approximately 500 managers, senior and junior employees to ensure that behavioural dimensions and skill indicators are meaningful for the targeted roles. Continuous validation activities will check the reliability of the questionnaire, the robustness of behaviour mappings, and the relevance of recommended upskilling paths, including comparisons with national and European job role distributions.

Data used for analytics (number of skills declared, behaviour dimensions, ESCO-based job role and work experience) will be regularly checked for completeness, consistency and plausibility, and mechanisms will be provided for users to correct inaccurate profile information. Where synthetic or anonymised data are used for experimentation within the data space, quality criteria will ensure that these datasets still reflect realistic distributions and relationships between skills, roles and behaviours.

5. Privacy, Safety, and Security

The use case processes personal data related to skills, behaviours, job roles and work experience, which will be handled in accordance with GDPR and the DS4Skills project's data protection framework. Informed consent will be collected and managed via the VisionTrust Consent Management Tool, enabling users to understand and control which data are shared with which services, and to withdraw consent at any time.

All data transmitted to the Skills Data Space and external services will be minimised to what is strictly necessary and, where possible, pseudonymised or anonymised, especially for analytics and benchmarking. Technical and organisational measures (secured APIs, role-based access, restricted admin interfaces, logging and monitoring) will protect against unauthorised access, misuse or data breaches, while clear procedures will cover incident response and user notification if a security issue occurs.

We have a robust framework of IT protocols and standards in place that complies with COBIT. Our Global Data Protection Policy also places particular emphasis on the personal data we process, which we handle in full compliance with applicable laws. In June 2016, we launched an e-learning module as part of our ACE programme to train our employees globally on the importance of data protection and how to apply these principles in their daily work.

6. Public Good and Sustainability

The Company is strongly positioned to navigate the effects of megatrends and technological transformation, ensuring that individuals are equipped for the evolving job market. Through this commitment, the Adecco Group strives to enhance lives and foster a more inclusive, sustainable, and future-ready workforce. [the-adecco-group-annual-report-2024.pdf](#)

Integrity and compliance are the foundation of sustainable, responsible business management that can have a positive impact on society.

This means that:

- We act in compliance with laws and regulations, the Code of Conduct, company policies, and guidelines
- We operate transparently with our colleagues and all our stakeholders.
- We contribute to an inclusive work culture based on the principles of respect and dignity.
- We continuously train ourselves on integrity and compliance, data privacy, diversity & inclusion, IT security, health and safety.

- We have established the Adecco Compliance & Ethics Line (ACE) and the Group Compliance Reporting Office, which allow us to promptly report any behaviors, even alleged, of misconduct that we become aware of in the course of our duties.

As a Group, we strive to identify, manage, and respond to ESG risks and opportunities, while honoring our public commitments—such as those to the United Nations Global Compact—and ensuring full transparency by reporting on the most significant KPIs.

Di anno in anno rinnoviamo il nostro impegno per ridurre i consumi e l’impatto sull’ambiente, controllando ogni aspetto della nostra organizzazione, dalle miglia aeree percorse all’uso della carta, dai computer acquistati al chilometraggio delle auto aziendali.

Year after year, we renew our commitment to reducing consumption and environmental impact by monitoring every aspect of our organisation, from air miles travelled to paper use, from computers purchased to company car mileage.

For this reason, we participate, together with our global organisation, in the Carbon Disclosure Project and centralise the measurement of our CO2 emissions through the “myclimate” database, which: helps us reduce our environmental impact; shows where improvements can be made; indicates priorities in terms of daily operations.

We are committed to becoming a zero-emissions organisation by 2030, reducing our CO2 emissions by 50% and using virtuous offset practices for the remainder. In addition, we are working to update the types of emissions considered in the calculation algorithm to include previously undetected sources, such as strategic data centres and commuting.

Following an extensive stakeholder engagement process on best practices and expectations, a new Group Environmental Policy was signed in 2023 and a specific Environmental Policy document was approved at local level (available at this [link](#)).

7. Human-Centricity and Human Oversight

The solution is designed as a decision-support and reflection tool for managers and employees, not as an automated decision-making system that determines career or employment outcomes. Users remain in control of how they interpret and act on the results; recommendations about upskilling and development paths are suggestions intended to support human judgement, not to replace it.

Human oversight is ensured at several levels: HR and learning professionals can contextualise the analytics, discuss results with employees, and adapt training plans; managers can review their own and their team’s assessments in light of organisational strategy and individual aspirations. The focus on critical thinking, fusion skills and reflective practice is meant to empower users to question, challenge and improve both the technological tools and the organisational decisions that rely on them.

1.7.2 Testing Plan

Testing Scope

Tested Functionalities, Features, and Components

The testing phase will focus on several layers of the application, ranging from the user interface to backend data space integration.

1. Core Functionalities and Features

- **Assessment and Mapping:** Testing the tool's ability to perform skill analysis and management behaviour mapping. This includes the questionnaire/assessment page and the graphic output on the result page.
- **Upskilling and Recommendations:** Validating the integration with the National Skills Observatory to provide recommended upskilling routes based on identified skill gaps.
- **Certification:** Testing the issuance of digital badges through the Open Badge Factory to list user capabilities.
- **Tracking:** Ensuring the Learning Experience Passport correctly tracks and lists a user's online and offline learning history.

2. Technical Components

- **Web Interface:** Testing the Admin page (accessible only by admins for data access and dashboards), the Login/Registration flow, and the Questionnaire/Results pages.
- **Backend & Connectivity:** Testing the VisionsTrust Consent Management Tool for GDPR compliance, the Data Space Connector, and the External Service API connections.

3. Relation to Personas, User Stories, and Flows

- **Personas & User Stories:** Testing ensures that Admin users can access analytical dashboards to create innovation models, while high-seniority and middle-seniority users can assess soft skills and obtain upskilling paths to improve team productivity and change management. Low seniority users will test the flow for identifying soft skills to complement their technical profile.
- **User Flows:** The test will validate the sequence from portal entry to login, initial profiling, assessment completion, and finally receiving upskilling recommendations.
- **Data Flows:** Testing will verify the flow of anonymised and aggregated skill data from the Mylia-Badgebox application through the VisionsTrust Connector into the Skills Data Space.

Testing phases

- Phase 1 (Feb 2026): Assessing algorithm will be tested on a restricted user base, retrieved within project partners personnel (about 100 single users)
- Phase 2 (starting in March 2026): Online Alpha and Beta Testing of the application, linking Data Space services and remote access.

KPIs

- About 500 single users testing the platform and the functionalities.
- At least 4 Data Space services linked to the platform developed.

Testing Environment

The data exchange testing will be conducted through VisionsTrust, the Connector (PDC) and potentially your portal. (BadgeBox)

- VisionTrust, Connector: to be provided by Visions
- Management Practice Board - pre-production environment with own test user accounts + test environment of the questionnaire

End Users

- Number of Users: 500
- User Profiles: 4
- Persona and user stories from Use Case Description

Testing Tools

- Automatic Unit Testing: Laravel testing framework (PHP Unit-PEST)
- Automatic Integration Testing: Laravel testing framework (PHP Unit-PEST)
- Functional Integration Testing: manual via test scripts
- Load/Performance Testing: statistics via Grafana monitoring

Testing Execution Plan

Persona	End-to-End Scenario Focus	Key Functional Tests (User Stories & Flows)	Key Data Flow Tests
Elisa – Head of Innovation (ADMIN)	Strategic, admin and analytics use of the assessment tool for innovation, fusion skills and	<ul style="list-style-type: none"> - Admin registration/login, role set to ADMIN, access only to admin area and dashboards. - Complete full skills and behaviour assessment 	<ul style="list-style-type: none"> - Store Elisa’s assessment data (skills, ≥4–5 behaviour dimensions, ESCO role, experience) in internal data store with admin flag. - Anonymise and aggregate

Persona	End-to-End Scenario Focus	Key Functional Tests (User Stories & Flows)	Key Data Flow Tests
	organisational development.	<p>(ESCO Head of Innovation, years of experience) and view detailed results and peer comparison.</p> <ul style="list-style-type: none"> -Use admin dashboards to explore aggregated analytics (skills distribution, behaviour dimensions, job roles, KPIs). -Request upskilling paths and validate recommendations and learning plan export to Learning Experience Passport. - Trigger badge issuance based on assessment thresholds and verify badge content and visibility in profile. 	<p>her data into global dataset and export to Skills Data Space via connector, respecting consent.</p> <ul style="list-style-type: none"> - Exchange data with National Skills Observatory for upskilling paths (missing skills and ESCO role out, paths back). - Send badge creation request to badge service and persist badge ID/URL associated with Elisa's account.
Marco – IT Manager (Manager profile)	Managerial use of the tool to optimise team productivity, technology adoption and virtual collaboration.	<ul style="list-style-type: none"> - Register/login as USER profiled as Manager and complete manager-specific assessment (human-machine interaction, soft digital skills). - View results including strengths, weaknesses and missing skills for the manager role. - Access team-level aggregated analytics (average scores, gaps) without personal-level data. - Request upskilling paths oriented to management and digital collaboration 	<ul style="list-style-type: none"> - Persist Marco's assessment data (skills, behaviour dimensions, ESCO IT manager role, experience) and manager/team relationships if modelled. - Use his data in anonymised form for benchmark and team analytics; ensure no re-identification from dashboards. - Share anonymised indicators to Skills Data Space only when consent is active. - Exchange data with National Skills Observatory for

Persona	End-to-End Scenario Focus	Key Functional Tests (User Stories & Flows)	Key Data Flow Tests
		<p>and send selected items to Learning Experience Passport.</p> <ul style="list-style-type: none"> - Verify consent flow: give/withdraw consent and observe impact on sharing and benchmarking. 	<p>manager-relevant upskilling paths and propagate selected courses to Learning Experience Passport.</p>
<p>Laura – Employee Training and Development Manager (Senior Employee)</p>	<p>HR and training-oriented use of the tool for skills mapping, training design and employee development.</p>	<ul style="list-style-type: none"> - Register/login as USER profiled as Senior Employee with HR/Training ESCO role. - Complete assessment focused on fusion skills, change management and transversal digital skills. - View results highlighting organisational and training implications (priority skills/gaps for her role). - Generate and filter upskilling paths (e.g. by type, cost, duration if available) and export selected paths to Learning Experience Passport. - Access HR-oriented dashboards showing aggregated skills and behaviour analytics by job role and seniority, with export of reports. 	<ul style="list-style-type: none"> - Capture Laura’s assessment data and tag as Senior Employee/HR profile for segmentation in analytics. - Aggregate her and others’ data into organisation-level views and share anonymised datasets with Skills Data Space according to consent. - Send role and gap data to National Skills Observatory, receive upskilling paths and persist them as recommendations. - Synchronise selected courses and completions with Learning Experience Passport for training history tracking.
<p>Giovanni – Junior Specialist in Innovation and</p>	<p>Early-career use of the tool to understand soft-skills gaps and career development options.</p>	<ul style="list-style-type: none"> - Register/login as USER profiled as Junior Employee with appropriate ESCO role. - Complete junior-tailored assessment focusing on 	<ul style="list-style-type: none"> - Store Giovanni’s assessment results and profile as Junior Employee, ensuring they feed into role-based benchmarks.

Persona	End-to-End Scenario Focus	Key Functional Tests (User Stories & Flows)	Key Data Flow Tests
Technological Development (Junior Employee)		core soft skills, collaboration and agility. - View a simplified, clear result page emphasising “soft skills that complement your technical profile”. - Request “career insights” to see how improving certain skills may support progression toward senior or managerial roles, with suggested learning paths. - Validate usability aspects (onboarding tips, tooltips, clarity of language) supporting quick adoption.	- Include his (anonymised) data in aggregated datasets used for peer comparison and labour-market analytics. - Use his missing skills and ESCO role in calls to National Skills Observatory to retrieve suitable entry-level and progression-oriented upskilling paths. - Optionally send recommended or completed courses to Learning Experience Passport to build his learning history over time.

Building Blocks

- Marketplace
- Personal Data Intermediary (User Data Control Tool - VisionTrust)
- Remote Survey Service (EduLai)
 - Chiamato tramite API
 - Dati di accesso anonimizzati
 - Formato dati restituito
- BadgeBox Backend modules
 - User Authenticator/Registration with JWT
 - Database – MySQL Relational database
- Frontend interface

Governance

1. Personal data Gathering Methodology

The use case is gathering all data according to GDPR requirements and using this data to improve students' success and teaching and learning quality. Gathered data will not be shared.

Before sharing, all data sets are anonymized and transformed to synthetic data according to GDPR rules, the data protection agreements of the project, and the data contracts defined.

Test scenarios:

- o User Id -> unique identifier that will allow user to access external services without providing a mean of identification
- o User Personal Data -> the application will collect the personal data, without sharing it with external services and Data Space
- o User Role-related Data -> consist of numeric data, related to user role seniority. Cannot allow single user identification.

2. Data Scope and Control

Single user is always controlling data availability and transferability through the VisionTrust Personal Data Intermediary.

Within the application data flow, the user is controlling and eventually enabling each data transmission to Data Space and external services.

The use case is providing documentation of all the needed gathering processes and used tools to facilitate institutions adoption. Anonymized and aggregated data will be used internally to gain analytics and intelligence on market trajectories.

1.8 AFP-Tralalère Use Case : When Media Data Meets Education – Empowering Media Literacy

1.8.1 Use case description, value and goal

Problem Statement

In today's age of information overload, young people are **constantly** exposed to **content of uncertain origin and quality** — whether on social media, messaging apps, or mainstream platforms. **Disinformation** and **misinformation** spread rapidly, exploiting emotional reactions and cognitive shortcuts, while young users often lack the tools needed to assess the reliability of what they see. Although many educational initiatives promote media literacy, these **programs are often static, disconnected** from current events, and difficult to adapt or personalize. Moreover, they rarely take full advantage of **high-quality verified content** produced by trusted media sources.

Our Solution

This use case, co-developed by **Agence France-Presse (AFP)** and **TRALALERE**, aims to strengthen media and information literacy through an interactive, personalized, and news-connected learning experience.

By leveraging **AI-driven tools** and accessible, engaging **multimedia experiences**, we will help users critically analyse information based on **trusted sources**.

Connected to the **Trusted European Media Dataspace (TEMS)**, the project relies on verified content to deliver **contextualized and up-to-date media literacy learning**. It promotes **critical thinking, ethical data sharing, and AI-supported personalization of educational pathways**.

By combining technological innovation with a pedagogical approach, this initiative provides real added value for students, educators, media organizations, digital and

media literacy stakeholders, and public institutions.

Use case partners

Data providers

Types of Data

The detailed data specifications will be provided later, once we have identified the data required for fact-checking and, among these, those that need to be automatically retrieved.

That said, we can already outline some preliminary lists:

Generic data related to methodology – since this evolves rapidly:

- Terminology and definitions
Example: [AFP Fact-Checking Handbook](#)
- Fact-checking websites, own fact-checking dataset provided by AFP and, where available, their APIs
Examples: [Climate Watch Data](#), [Our World in Data](#), [InVID Verification Plugin](#)
- Reference reports
Example: <https://perma.cc/L9XF-LGB6>
- Identified trusted third parties (collectives, partner journalists, etc.)

Data related to the facts to be verified:

- URL of the article or social media post
Example: <https://perma.cc/CNC5-X4F9>
- Timestamp of publication
Example: 16/10/2025
- Tags
Examples: “Artificial Intelligence”, “War in Ukraine”, “Climate”, etc.
- Elements to be analysed (texts, photos, videos, illustrations, audio comments, etc.)
Example: [Archived image](#)
- Possible source of the report or alert
Examples: [ClaimReview Project](#), [Meta Fact-Checking Help Center](#)
- Any previous reports produced by fact-checkers
Example: [AFP Fact-Check Report](#)

Data collected by Tralalere:

- **Usage data**
Examples: number and profiles of users, learning paths consulted, etc.

- **Impact data**

Examples: “Before and After” questionnaires

Service providers

Types of Services Produced by Tralalere

- **AI Agents:** AI agents will be developed to identify key elements of fact-checking on current news topics, following AFP’s established methodology. These agents will generate learning sequences in the form of missions, based on structured pedagogical guidelines.
- **AI-Based Video Generation:** On demand, the agents will convert fact-checking content, which rights of use is secured, into video format using text-to-speech tools and automated narration engines.
- **Educational Content Generation:** TRALALERE will develop interactive educational pathways, dynamically generated from real-time news content and verified facts.

Key Partners Involved in this Use Case:

- **Agence France-Press (AFP)** is the main provider of fact-checking materials, news articles, photos, videos, infographics, and audio content. AFP also produces educational video tutorials and coordinates access to other media partners within the TEMS and TAM ecosystems.
- **TRALALERE**, as an experienced EdTech provider, contributes an existing serious game engine (*InfoHunter*) and expertise in the design of pedagogical structures, serious game mechanics, and adaptive learning scenarios. TRALALERE will lead the design and integration of educational logic, content mapping, and AI-driven learning path generation.
- **Technical partners** (such as **Visions** or **Startin’blox**) are already involved in facilitating content exchange and interoperability between **TEMS** and **DS4Skills**, and can provide the connection layer required for this educational use case.

This core group of actors from the media, technology and EdTech sectors ensures a rich, reliable, and pedagogically exploitable content flow — essential for large-scale dynamic educational content generation.

Use case functionalities

Our use case revolves around key features:

- providing teachers with tools to support their approach to media and information literacy education;
- providing media professionals with tools and visual support valuable in their initiatives against misinformation.

The tools made available in this framework will include:

- interactive digital learning pathways
- an AI-powered assistant for fact-checking training
This approach will rely on the processing, transformation, and enhancement of content, particularly from AFP.

KPIs (quantitative)

KPI name	Description	Target value or goal	Performance indicators	Results / impact indicators
Number of educational scenarios generated	Number of interactive learning paths dynamically created from verified AFP content	5-10 scenarios for the PoC phase	Count of AI-generated scenarios per month.	Demonstrates scalability and adaptability of content generation through DS4Skills-TEMS interconnection.
Active user engagement (students & teachers)	Measures participation and engagement of users (students completing missions, teachers integrating tools).	500-1,000 students and 20-30 teachers during PoC.	Number of active sessions, completion rates of learning paths.	Increased adoption of media literacy tools in schools; validated pedagogical integration.
Improvement in media literacy skills	Evaluates learners' ability to identify misinformation and critically analyse content.	+25% improvement between pre/post assessments.	Scores from "Before/After" questionnaires and in-game evaluation.	Demonstrated impact on critical thinking and media literacy skills.
AI agent accuracy and relevance	Measures the quality and pedagogical relevance of AI-generated recommendations and missions.	≥80% positive validation by teachers or experts.	Teacher/expert review scores; qualitative feedback.	Trust in AI as a pedagogical assistant and validation of ethical AI use in education.
Interoperability success rate (DS4Skills ↔ TEMS)	Measures successful data exchange and format compatibility between the two data spaces.	≥95% successful data transfers.	Log of interoperability tests and API response rates.	Proof of concept of cross-data space educational integration.
AI-based video generation performance	Efficiency of text-to-speech and automated narration for learning videos.	Average generation time < 2 min per video.	Number of videos generated and average processing time.	Demonstrates feasibility of scalable and trusted AI-driven educational content production.

User satisfaction	Overall satisfaction of teachers and students with the platform and content.	≥85% satisfaction rate.	User surveys, qualitative feedback.	Strong user acceptance and readiness for large-scale deployment.
Educational impact reach	Measures how far the solution can be deployed within and beyond pilot schools.	3-5 pilot schools (PoC), extensible to 50+ schools.	Number of institutions onboarded.	Broad educational adoption across European contexts.
Ethical and secure data management compliance	Ensures ethical use of data and AI transparency.	100% compliance with DS4Skills and TEMS governance standards; with European regulation (GDPR, AI Act, DGA)	Data governance audit results.	Trustworthy model for ethical data sharing between education and media sectors.

Personas, user stories, user flows, data flows

Personas

Persona 1 : Marie - Teacher	
Demographic/Background	38 years old, high school French and Media Literacy teacher. 10+ years of experience. Works in a public school in Paris. Claire has a passion for educating students on the importance of media literacy but feels limited by outdated educational tools and lack of personalized resources.
Goals/motivations	<ul style="list-style-type: none"> - Provide students with the tools to critically analyze media content. - Integrate current news and real-life case studies into the curriculum. - Engage students with interactive content to make learning more dynamic.
Challenges/Frustrations	<ul style="list-style-type: none"> - Current media literacy programs are too static and don't address the fast-changing nature of media. - The lack of easily adaptable resources for diverse student needs. - Difficulty in maintaining student engagement with traditional lecture-based teaching methods.
How can we help	<ul style="list-style-type: none"> - Offer dynamic, interactive tools like InfoHunter, powered by real-time news and AI-based personalized learning paths. - Provide resources tailored to current media events, making learning more relevant and engaging. - Enable personalized learning based on students' interests and progress.
Recap	Claire is an experienced teacher who needs engaging, up-to-date tools for teaching media literacy. Our platform, with AI-driven learning paths and real-world examples, helps her create a dynamic and interactive learning environment for her students.

Persona 2 : Ben - Teacher	
Demographic/Background	26 years old, newly graduated middle school ,history and geography teacher. Recently started his teaching career and works in a public middle school in Lyon. Highly motivated but still adjusting to classroom management and teaching strategies.
Goals/motivations	<ul style="list-style-type: none"> - Develop students' critical thinking and media literacy skills. - Integrate modern, interactive teaching tools into the classroom to engage students. - Build a more dynamic and relevant curriculum that adapts to current media and information trends.
Challenges/Frustrations	<ul style="list-style-type: none"> - Lacks experience in creating engaging, dynamic learning paths and sometimes struggles with class management. - Needs tools that are easy to implement and do not require a lot of preparation. - Finds it difficult to create personalized learning experiences for diverse student needs.
How can we help	<ul style="list-style-type: none"> - Provide an easy-to-use, interactive platform (InfoHunter) that offers pre-built learning paths and missions. - Offer teacher training and support to help Ben integrate media literacy effectively in his lessons. - Provide customizable content that adapts to his students' learning pace and interests.
Recap	Ben is a motivated but new teacher who seeks engaging, easy-to-integrate teaching tools for media literacy. Our platform will give him a dynamic, ready-to-use tool that requires minimal preparation and is adaptable to his classroom needs.

Persona 3 : Sofia - Informal Education Facilitator	
Demographic/Background	30 years old, facilitator of informal workshops for teenagers. Works in community centers and non-formal educational settings. Has experience leading digital literacy workshops but no formal teaching credentials. Sofia is highly motivated by empowering young people to become critical consumers of media.
Goals/motivations	<ul style="list-style-type: none"> - Equip young people with the skills to navigate and critically assess digital media. - Create engaging, hands-on activities that help participants learn by doing. - Foster a deeper understanding of digital tools and how they can be used ethically.
Challenges/Frustrations	<ul style="list-style-type: none"> - Lack of structured, educational content to build her workshops around. - The varying levels of media literacy among participants, making it difficult to tailor content. - Limited time and resources to create personalized learning experiences for each participant.
How can we help	<ul style="list-style-type: none"> - Provide ready-to-use, interactive learning paths that can be adapted to informal settings. - Offer AI-driven content that adapts to the participants' progress and needs. - Enable Sofia to easily track participant progress and provide more targeted support.
Recap	Sofia leads informal education workshops and needs tools to engage young people with media literacy in a practical, hands-on way. Our platform will provide dynamic, customizable content that supports her workshop goals and adapts to the participants'

	needs.
--	---------------

Persona 4: Leo, 12 years old	
Demographic/Background	12 years old, middle school student. Active social media user (despite the legal age of 13 years old) but has a limited understanding of how to assess the reliability of the information he sees. Frequently engages with YouTube, Instagram, and TikTok, where he encounters both entertaining and sometimes misleading content.
Goals/motivations	<ul style="list-style-type: none"> - Learn how to distinguish between credible and false information online (à travers son enseignant/animateur) - Understand how misinformation spreads on social media. - Become more aware of the potential manipulation in the media.
Challenges/Frustrations	<ul style="list-style-type: none"> - Finds it difficult to identify fake news or biased content. - Often believes sensationalized stories because they align with his emotions or what he wants to believe. - Struggles with sorting out useful information from the noise on social media.
How can we help	<ul style="list-style-type: none"> - Provide interactive and fun learning paths that teach him how to evaluate and question the media he consumes. - Offer examples from social media and YouTube, so the learning feels relatable and relevant.
Recap	Lucas needs an engaging and interactive way to learn how to critically evaluate the content he sees on social media. Our project will offer him real-time, relatable content that helps him understand how to spot misinformation and make better media choices.

Persona 5: Lena, 14 years old	
Demographic/Background	14 years old, middle school student. Active on social media, especially TikTok and Instagram, where she follows her favorite influencers, but often feels overwhelmed by the amount of information she sees. She is curious about the world around her, particularly interested in trends, pop culture, and current events, but she has difficulty knowing what to trust online.
Goals/motivations	<ul style="list-style-type: none"> - Understand how to check if the information I see on social media is true. - Learn to identify reliable sources of information and avoid fake news. - Be able to participate in conversations about current events without feeling like I might spread false information.
Challenges/Frustrations	<ul style="list-style-type: none"> - Struggles to differentiate between true and false information, especially when posts or videos go viral quickly. - Finds it challenging to identify credible sources, especially when influencers post information without verification. - Often feels confused when she sees multiple contradictory versions of the same story online.
How can we help	- Provide an engaging, interactive learning tool that helps Camille understand how to

	<p>verify news and check the credibility of sources.</p> <ul style="list-style-type: none"> - Use reliable, real-world examples from social media to show how misinformation spreads. - Offer simple, easy-to-understand tips and quizzes that teach her how to assess the reliability of online content.
Recap	<p>Lena needs help navigating the vast amount of information she encounters on social media. Our platform will help her develop the skills to evaluate content critically, ensuring she can make informed decisions about the media she consumes and shares.</p>

Persona 6: Alma, 15 years old	
Demographic/Background	15 years old, high school student (10th grade). Very active on TikTok, Instagram and Snapchat. She follows influencers in fashion, lifestyle, gaming and pop culture news. She has already created a few videos but hasn't found her audience yet. Alma dreams of becoming an influencer because she loves expressing herself and sharing her interests.
Goals/motivations	<ul style="list-style-type: none"> - Learn how to create engaging and authentic content. - Understand essential publishing rules (sources, copyright, credibility). - Gain visibility and recognition within her community. - Publish trustworthy content to avoid being accused of spreading rumors or fake news.
Challenges/Frustrations	<ul style="list-style-type: none"> - Difficulty distinguishing between viral trends and verified information. - Lack of technical knowledge (editing, sourcing, good practices). - Fear of being criticized or ridiculed if she shares something incorrect. - Impatience: she wants fast progress but doesn't know where to start.
How can we help	<ul style="list-style-type: none"> - Provide interactive learning paths based on real verified news to help her understand how to recognize reliable information before sharing it. - Offer an AI-powered fact-checking assistant to guide her step-by-step when she hesitates about a video, a post, or a viral trend she wants to use.
Recap	<p>Alma wants to create reliable content and become an influencer. Our solution helps her quickly learn how to verify information, avoid misinformation traps, and publish responsibly.</p>

Persona 7: Max, 17 years old	
Demographic/Background	17 years old, senior high school student, very interested in politics and current events. Maxime often follows news outlets, political debates, and documentaries, but he struggles with the credibility of the sources he reads. He is becoming more aware of how some media outlets are biased or agenda-driven.
Goals/motivations	<ul style="list-style-type: none"> - Learn how to better assess the reliability and bias of news sources. - Understand the difference between opinion pieces and factual reporting. - Develop a more critical approach to news, especially concerning political issues.
Challenges/Frustrations	<ul style="list-style-type: none"> - Finds it hard to navigate the complexity of political news and different media biases. - Tends to follow news outlets that align with his personal beliefs, which limits his

	perspective. (Algorithm and filter bubble) - Feels frustrated by the polarized nature of media and the lack of objective reporting .
How can we help	- Provide tools to help Maxime analyze the sources, bias, and credibility of political news. - Offer comparative exercises where he can explore different viewpoints on the same topic. - Introduce AI-supported learning paths that challenge him to think critically and evaluate sources from different perspectives.
Recap	Maxime is passionate about current events but struggles with recognizing media bias. Our platform will provide him with the tools to critically assess political news and help him become more discerning in the way he consumes media.

Persona 8: Tim, 21 years old	
Demographic/Background	<i>21 years old, young journalist, just graduated, interested in political news, sports and gaming, starting first job in a local newspaper, Southern France. He is very active on Instagram, TikTok, Discord and Reddit.</i>
Goals/motivations	<ul style="list-style-type: none"> • Learn how to build a trustful sources network on Social media • Verify images posted by sources to be quoted in his articles • Propose to start fact-checking activities in his media • Project of joining a Media literacy association to visit schools
Challenges/Frustrations	Unexperienced in sourcing and digital investigation , despite he did the AFP Digital courses. He is the youngest in the newsroom. There is no possibility to get trained by his colleagues.
How can we help	<ul style="list-style-type: none"> • Provide guidance to work on a daily basis • Reinsure him to start fact-checking • Provide trustful sources, and guidelines to build own sources
Recap	<i>Tim is a young journalist, lacking experience to handle info circulating online.</i>

Persona 9: Laura, 35 years old	
Demographic/Background	Laura is an experienced fact-checking specialist working for an independent Spanish fact-checking organisation. She is highly active on social media, promoting verified content produced by her team. In addition, she is a member of a media literacy association that collaborates with schools, secondary schools, and local institutions.
Goals/motivations	<ul style="list-style-type: none"> • Reach new audiences and generate additional revenue through an AI-driven tool that converts written fact-checks into engaging video content. • Access digital tools that support media literacy initiatives
Challenges/Frustrations	<ul style="list-style-type: none"> • Limited impact of written fact-checking compared with video content. • Need for a trusted AI video generation solution. • Difficulty in establishing an ethical and independent business model for fact-checking. • Explaining fact-checking processes to a broad audience.

How can we help	<ul style="list-style-type: none"> • Provide an AI video generator with editing controls and respect for intellectual property rights. • Offer an attractive AI tool specifically designed for fact-checking. • Enable monetisation of fact-checking content, either as a trusted source or as ready-to-publish material
Recap	As a senior fact-checking expert, Laura aims to enhance the impact and value of fact-checking through innovative, ethical, and audience-focused solutions.

User Stories

User stories	Data needed	Services needed	Data produced or added value services
<p>Marie (Teacher)</p> <ul style="list-style-type: none"> • As a high school teacher, I want to integrate real-time news stories into my lessons, so that my students can analyze current events and learn how to evaluate information as it unfolds. • As a teacher passionate about media literacy, I want to use an AI-driven platform that generates personalized learning paths for my students, so that I can address each student's learning needs and help them become better critical thinkers. 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be analysed)</p>	<p>Educational Content Generation</p> <p>AI Agents</p>	<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p> <p>Impact data ("Before and After" questionnaires)</p>
<p>Ben (Teacher)</p> <ul style="list-style-type: none"> • As a new teacher, I want easy-to-use tools that help me teach media literacy to my students, so that I can introduce critical thinking in a simple and effective way without being overwhelmed by the technology. • As a teacher with limited experience, I want to receive clear, step-by-step guidance on how to incorporate media literacy into my lessons, 	<p>Educational Content (learning paths)</p>		<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p> <p>Impact data ("Before and After")</p>

<p>so that I can feel confident and prepared when teaching my students about the importance of evaluating news.</p>			questionnaire s)
<p>Sofia (Educator)</p> <ul style="list-style-type: none"> As an informal educator, I want to provide interactive workshops that help young people learn to identify misinformation, so that they become more confident in evaluating media in their everyday lives. As an informal learning facilitator, I want an engaging tool that allows me to teach critical media literacy in a hands-on way, so that I can make learning about misinformation fun and memorable for young participants. 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be analysed)</p>	<p>Educational Content Generation</p> <p>AI Agents</p>	<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p> <p>Impact data ("Before and After" questionnaire s)</p>
<p>Leo, 12 years old</p> <ul style="list-style-type: none"> As a young student, I want to learn how to identify fake news on social media, so that I can better understand and filter out unreliable content that I come across every day. As a young student, I want to play an interactive game that helps me analyze news stories, so that I can have fun while learning to think critically about the information I consume. 	<p>Educational Content (learning paths)</p>		<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p>
<p>Lena, 14 years old</p> <ul style="list-style-type: none"> As a young girl, I want to learn how to verify if the news I see on Instagram and TikTok is true, so that I can confidently share accurate information with my friends and avoid spreading fake news. As a 14-year-old social media user, I want to get tips and tools to check if influencers or posts are credible, so that I can feel more secure when 	<p>Educational Content (learning paths)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be</p>	<p>AI Agents</p>	<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p>

consuming content and avoid being misled by biased or unreliable sources.	analysed)		
Alma, 15 years old <ul style="list-style-type: none"> • As a young content creator, I want to learn how to verify information before sharing it, so that I can avoid spreading misinformation and protect my credibility. • As an aspiring influencer, I want access to simple tools and guidance to improve my content creation, so that I can grow my audience and publish responsible and trustworthy content. 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be analysed)</p>	AI Agents	Usage data (number and profiles of users, learning paths consulted, etc.)
Max, 17 years old <ul style="list-style-type: none"> • As a politically engaged teenager, I want to learn how to identify media bias in news articles, so that I can form my own opinion based on facts rather than being influenced by one-sided sources. • As a high school senior, I want to analyze news stories from multiple perspectives, so that I can better understand complex political issues and make informed decisions. 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be analysed)</p>	AI Agents	Usage data (number and profiles of users, learning paths consulted, etc.)
Tim, 21 years old <ul style="list-style-type: none"> • As a young journalist starting with a local news outlet, I want to learn how to verify images I see online on a news I am working on, so that I can mention them or not in my article. • As a regular user of social network and member of gaming communities, I want to be trained to fact check so that I can provide media literacy workshops, and share my knowledge 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post,</p>	<p>Educational Content Generation</p> <p>AI Agents</p>	<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p> <p>Impact data ("Before and</p>

<p>within my communities.</p>	<p>Timestamp of publication, Tags, Elements to be analysed)</p>		<p>After" questionnaire s)</p>
<p>Laura, 35 years old</p> <ul style="list-style-type: none"> ● As an independent fact-checking specialist, I want to convert our written fact-checking production into engaging video, So that I can enhance the impact of our fact-checks among a wider audience ● As an independent fact-checking specialist, I want to monetise our fact-checking content/data as a trusted source for technology companies, So that I can enhance its value and secure funding for our fact-checking activity. ● As a member of a media literacy network, I want to access an engaging and trusted AI tool, So that I can explain fact-checking mechanisms to wider and young audiences. 	<p>Educational Content (learning paths)</p> <p>Generic data related to methodology (tools, reports, etc.)</p> <p>Data related to the facts to be verified (URL of the article or social media post, Timestamp of publication, Tags, Elements to be analysed)</p>	<p>Educational Content Generation</p> <p>AI Agents</p>	<p>Usage data (number and profiles of users, learning paths consulted, etc.)</p> <p>Impact data ("Before and After" questionnaire s)</p>

User Flows

Example User Journey — Teacher (Marie, for example)

- **User “Teacher (Marie)”** → Logs into the project website or platform (user account access).
- **Channel** → Was informed through her **DASEN/DANE**.
- **Portal** → Arrives on the resource page with an overview of available educational learning paths.
Clicks on **“Educational Path”** → Accesses a **list of ready-to-use pedagogical pathways** on various topics.
Or clicks on **“AI Tool”** → Accesses the AI assistant that guides her through the verification of a piece of information.
- **Product page** → Selects a **learning path or the AI agent**.
- **Analysis page** → **Detailed view of the interactive learning path** with key pedagogical information and the option to download the teacher guide / page explaining how to use the AI assistant.

- Clicks on **“Start the learning path / Start the AI agent”** → The learning session begins and students can interact.
- Returns to the resource page.

Example User Journey — Student (Lena, for example)

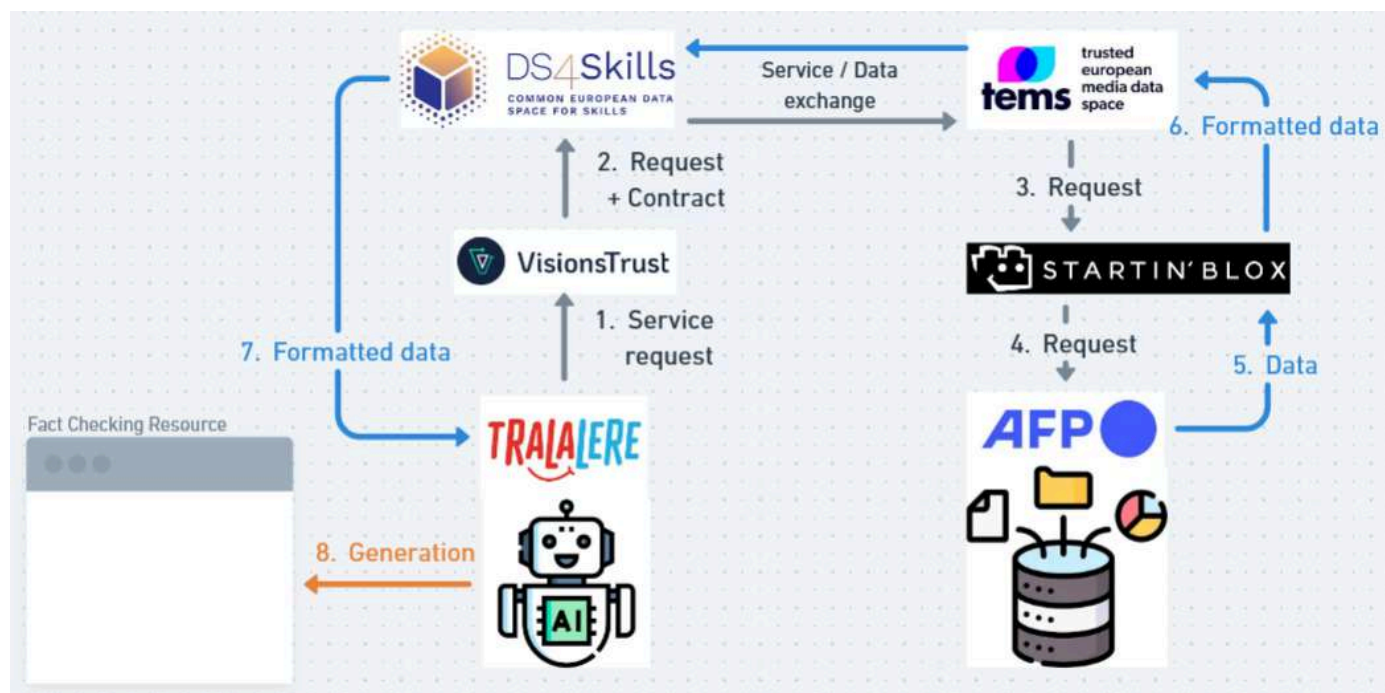
Still to be defined at this stage.

Potentially, Lena will use the AI assistant during a classroom session, guided by her teacher.

User flow example: Laura, independent fact-checker

- **Log in to the platform** → The fact-checker accesses the AI video generation SaaS platform using secure credentials.
- **Upload or select written fact-check** → The user either upload or select a text-based fact-check from their existing library
- **Select video format** → The user chooses a preferred video format (either 16:6, 1:1; 4:5; 9:16)
- **Customise script and visual elements** → The platform automatically generates a draft script and storyboard based on the text. The fact-checker reviews and edits the scripts, adds visual effects (animation, infographics, etc.), chooses images or video snippets.
- **Add voiceover and captions** → The fact-checker selects an AI-generated voice or uploads its own audio. Captions are automatically generated and can be edited for accuracy.
- **Preview the video** → The user previews the full video, checks timing, visuals, and compliance with editorial standards.
- **Apply Intellectual Property settings** → Watermarks, copyright notices, and licensing options are added to protect content.
- **Export and publish** → The video is delivered and exported in the desired format. It can be published directly to social platforms or downloaded for distribution.

Data Flows



Potential risks identification and mitigation measures

1. Technical Risks

Risk: Platform performance issues

Mitigation measures:

- Conduct regular load testing to simulate a high number of users and assess platform stability under heavy usage.
- Preventive maintenance: implement regular maintenance protocols to identify and fix issues before they affect users.
- Continuous optimization of the platform and codebase to ensure fast response times and a smooth user experience.

Risk: Data security issues (e.g., personal data breaches)

Mitigation measures:

- GDPR compliance to ensure all user personal data is protected.
- Encryption of personal data and implementation of strong security measures (firewalls, two-factor authentication, etc.).
- Regular security audits performed by experts to identify and address vulnerabilities.

Risk: Incompatibility with certain devices or browsers

Mitigation measures:

- Cross-platform testing to ensure compatibility with the most commonly used browsers and devices (computers, tablets, smartphones).
- Mobile-first optimization to ensure the experience on mobile is as seamless as on desktop.
- Clear communication with users regarding recommended devices and browsers.

Risk: Sustainability of tools and models for AI agents**Mitigation measures:**

- Use open-source models.
- Continuous monitoring.

2. Editorial and Pedagogical Risks**Risk: Lack of engagement from end users (students, teachers)****Mitigation measures:**

- Personalization of learning paths: integration of interactive learning journeys adapted to user needs, interests, and levels (co-designed with pilot classrooms).
- Immediate feedback and gamification: provide real-time feedback and include gamified elements to maintain engagement.

Risk: Difficulty for teachers to use the tool effectively**Mitigation measures:**

- Provide practical guides to support onboarding and resource use.
- Continuous technical and pedagogical support: dedicated assistance team to answer teacher questions.
- Teacher ambassadors to share best practices and feedback.

Risk: Resistance to change from users (teachers)**Mitigation measures:**

- Thoughtful UX and instructional design.
- Early user involvement through pilot classrooms.
- Alignment with national curriculum standards.

Risk: Relevance of generated content**Mitigation measures:**

- Human validation at each step proposed by the AI agent.
- Double human verification.

Risk: Cognitive accessibility and disability inclusion**Mitigation measures:**

- Follow accessibility frameworks (e.g., WCAG/RGAA).
- Constitute a representative test panel.
- Ensure compatibility with assistive tools (TalkBack, VoiceOver, etc.).
- QA testing including accessibility review (internal Tralalere expertise).

Risk: Lack of localized or multilingual content**Mitigation measures:**

- Integrate multilingual support from the start (e.g., French, English, Spanish, etc.) to ensure the product is accessible to all users.
- Build partnerships with local actors to provide culturally relevant content in a second phase.
- Monitor user feedback on localization needs and country-specific content expectations.

Risk: Inaccurate or insufficient usage and impact data**Mitigation measures:**

- Optimize data collection tools: implement robust tracking systems to record all relevant interactions and regularly verify data accuracy (e.g., time spent, clicks,

completed learning paths).

- Representative sampling: ensure collected data reflects the full range of users (teachers, students, partners), not a single subgroup.
- Combine quantitative and qualitative feedback: number of completed paths, test results, interviews, and teacher or student feedback.
- Continuous data analysis: conduct regular reviews to detect inconsistencies and adjust collection as needed to ensure reliable measurement of performance and impact indicators.

Ethical aspects

This use case, co-developed by TRALALERE and Agence France-Presse (AFP), has been designed in **full alignment with European ethical principles for data and artificial intelligence**. Ethical considerations are embedded by design throughout the project, from data sourcing and AI development to pedagogical deployment and user interaction.

The use case complies with the governance frameworks of DS4Skills and the Trusted European Media Dataspace (TEMS), as well as with relevant European regulations, including the GDPR, the AI Act, the Data Governance Act (DGA) and the Data Service Act (DSA). The ethical approach is structured according to the seven core ethical dimensions defined by DS4Skills.

1. Fairness and Non-Discrimination

The use case is designed to ensure **fair and non-discriminatory access** to media and information literacy education for a **wide diversity of users**, including teachers, students, informal educators, journalists, and fact-checking professionals.

AI systems and data management practices are **carefully designed to avoid bias and unequal treatment**. Learning paths and AI-generated recommendations are **based exclusively on verified journalistic content and established fact-checking methodologies**, and do not rely on personal opinions, sensitive personal attributes, or protected characteristics such as gender, ethnicity, political orientation, or socio-economic background.

Particular attention is paid to potential biases originating from data sources. The project relies on professional editorial standards and trusted media providers, and includes continuous monitoring mechanisms to identify and mitigate thematic, geographic, or contextual biases. Accessibility standards (WCAG/RGAA) and multilingual perspectives are integrated to ensure inclusivity across different educational contexts and European audiences.

2. Transparency and Explainability

Transparency is a core principle of the use case, both in data usage and in AI-supported processes.

Users are clearly informed when artificial intelligence is used to generate educational content, recommendations, or videos. The origin of content (verified media sources, fact-checking materials, or trusted third parties) is **explicitly indicated**, and the pedagogical logic behind learning paths is made understandable to educators and professionals.

Users are also informed about **how their data is collected, processed, and used**. Data handling follows FAIR principles (Findable, Accessible, Interoperable, Reusable), ensuring traceability, interoperability, and controlled reuse. Transparency is further reinforced through educational content that explains fact-checking methodologies themselves, enabling learners to understand not only outcomes, but also verification processes.

3. Accountability and Responsibility

Clear accountability and responsibility structures are defined across all partners involved in the use case.

- **AFP** is responsible for the editorial quality, reliability, and methodological soundness of journalistic and fact-checking content.
- **TRALALERE** is responsible for reliability of the AFP content's, other sources' use, pedagogical design, AI-driven learning path generation, and user experience.
- **Technical partners** are responsible for secure interoperability, data exchange, and alignment with DS4Skills and TEMS governance frameworks.

Responsibility for data quality, AI outputs, pedagogical relevance, and security is clearly allocated. Governance mechanisms ensure that accountability is maintained throughout the data lifecycle, from content ingestion to AI-supported transformation and educational use.

4. Accuracy and Validity

Accuracy and validity are essential, given the educational mission and societal impact of the use case.

The system relies **exclusively on verified data**, trusted media sources, and established fact-checking frameworks. **AI agents are designed to support** structuring, adaptation, and pedagogical contextualisation of content, but do **not generate facts** autonomously **or replace human** judgment.

Given the rapidly evolving nature of news and information, particular attention is paid to **temporal and contextual validity**.

Human validation, expert review, and teacher feedback loops are integrated to continuously assess the relevance and correctness of AI-generated outputs.

5. Privacy, Safety, and Security

The use case **fully complies with GDPR and European data protection requirements.**

Key measures include data minimisation, pseudonymisation or aggregation of usage and impact data where possible, secure authentication mechanisms, and encryption of data both in transit and at rest. Regular security audits and monitoring are conducted to identify and mitigate potential vulnerabilities.

The project operates within **trusted European data spaces**, benefiting from secure infrastructures, controlled access rights, and robust governance mechanisms. **Special care is taken when minors are involved: no sensitive personal data is collected, and educational use is mediated by teachers or facilitators.**

6. Public Good and Sustainability

The primary objective of the use case is to **serve the public good by strengthening media literacy, critical thinking, and democratic resilience against misinformation.**

The project contributes to **empowering young citizens, supporting educators and journalists in their public service missions, and fostering ethical data sharing between the media and education sectors.** Secure data reuse and interoperability are promoted in line with European public interest objectives.

From a sustainability perspective, the use case builds on existing infrastructures (DS4Skills and TEMS), **favours open standards where possible, and supports scalable and reusable educational models** that can be deployed across diverse European contexts over the long term.

7. Human-Centricity and Human Oversight

The use case is explicitly human-centric. Artificial intelligence is used as a support tool to enhance education and media literacy, not as a substitute for human expertise or decision-making.

Meaningful human oversight is ensured at all critical stages, particularly by domain experts such as teachers, educators, journalists, and fact checkers. Users retain control over how content is selected, adapted, validated, and deployed.

The design prioritises human agency, empowerment, and trust, encouraging learners to actively analyse, question, and reflect on information rather than passively consume automated outputs. **This approach aligns with European ethical AI principles and reinforces responsible and trustworthy use of AI in education and media.**

1.8.2 Testing Plan

Testing Scope

1. Features linked to UX/UI

- Teachers and Students profile creation
- Onboarding
- Navigation inside pages, courses and resources
- Functionality and Features:
 - To be defined and detailed during the design phase
- Testing Method:
 - Unit Testing: Test each input field for correct data handling and validation.
 - Usability Testing: Ensure ease of navigation and clear field instructions.
- Dependency on partners:
 - NO

2. Features linked to the debunking Assistant

- Functionality:
 - Chat with Agents
 - Store the different steps of debunking
 - Accessibility
- Features:
 - Trig pre-defined prompts to AI agents
 - LLM generation
 - Ability for students to save or bookmark recommendations
 - Media description for RGAA
- Testing Method:
 - Test profiles and associated courses to validate results and output.
 - UI Testing: Verify if the result is easy to read and interact with.
- Dependency on partners:
 - Asynchronous : get methodology and steps from AFP courses
 - Asynchronous : get data from AFP items

3. Features linked to the AI video generation engine

- Functionality:
 - scenario generation
 - background generation
 - character selection
 - character animation
 - video editing
 - Transcription (RGAA)

- Features:
 - Link between AI agent and dataset (backgrounds, characters)
 - Ability for the staff to supervise the générations
- Testing Method:
 - Test AI outputs.
 - UI Testing: Verify if it is easy to interrupt and modify AI generation.
 - Content: Compare to the original fact check and flag any inconsistency, or mistaken
- Dependency on partners:
 - Asynchronous : get data from AFP items

Testing Environment

Testing Goals

- Ensure **AI agents** effectively seamlessly integrates **partner data**.
- Confirm the **data exchange via VisionsTrust, Connector (PDC), and the portal** is secure, reliable, and compliant with all data governance requirements.
- Debunking assistant : Provide a unified and user-friendly experience for students, teachers, and schools, leveraging insights from all integrated services.
- AI video generation engine : Provide a unified and user-friendly experience for AFP staff, leveraging insights from all integrated services.

End Users

1. Test group for technical verifications :

Testers:

- 1 Project manager for Tralalere and 1 for AFP
- 1 Technical developer from Tralalere, Visions and Startin'blox

2. Test group in the first iteration:

Testers: Approximately 10 testers divided into 2 categories to test Persona scenarios.

- 2 teachers
- 5 students (12-15 years old)
- 5 journalists (included fact checkers)

3. Personas

For the POC we want to concentrate on 2 User Personas 5 Lena and Personas 9 Laura.

Testing Tools

Connector Testing

1. **VisionsTrust Tech space** - to test the Connector and data transfer between partners
2. **Postman** – to test APIs that power data services

Usability, Accessibility, and Performance Testing

3. **NumEcoDiag** (Chrome DevTools) – to test performance, accessibility
4. **axe DevTools** - for accessibility testing

Testing Execution Plan

Work in progress.

Building Blocks

The use case will use the Prometheus-X Core Components: Catalogue, Contract and Connector augmented with the Data Space Interoperability Framework to ensure interoperability with TEMS and EDC.

Governance

The use case does not process personal data.

2 Relationship between DS4SKILLS and EDGE SKILLS

As originally planned, there is a strong connection between DS4SKILLS and EDGE SKILLS. Each DS4SKILLS use case is using VisionsTrust as the data intermediary which operates Building Blocks and data space from EDGE SKILLS.

During the Phase 2 design, each DS4SKILLS Use case leaders presented their Use Cases to the EDGE SKILLS service and data providers during a workshop. The objective of this workshop was to start the selection and contractualisation of providers through the data intermediary platform.

Link to VisionsTrust: <https://visionstrust.com/> and to EDGE SKILLS Building Blocks <https://prometheus-x.org/building-blocks/>

Use Cases	Core Prometheus-X Building Blocks	Key Additional / Specific Components
LIST: Mind the Gap	<i>Focus on Data Privacy & Consent</i>	Anonymisation, Consent/Data Handling Process for Personal Data (CVs, Job Offers)
Scheer: Strategic Workforce Learning	Connector, Catalog, Contract, Consent	Consent/Contract Negotiating Agent, Data Value Chain Tracker (Utility), Distributed Data Visualization (Utility)
LMS : Manufacturing skills	Connector, Catalogue, Contract Management, Consent Management	Contact/Identity-related Building Blocks
CSC: Student Mobility	Connector, Catalog, Contracts	Consent/Contracts Negotiating Agent (Note: Consent Agent for personal data not required)
UOC: Higher Education	Connector, Catalog, Contract, Consent	Consent/Contracts Negotiating Agent
Mylia-Badge box: Digital Fusion Skills	<i>Project-Specific Application Components</i>	MarketPlace, Personal Data Intermediary (VisionTrust), Remote Survey Service (Edulai), BadgeBox Backend Modules (Auth/DB), Frontend Interface
AFP-Tralalère: When Media Data Meets Education – Empowering Media Literacy	<i>Catalogue, Contract and Connector</i>	Data Space Interoperability Framework to ensure interoperability with TEMS and EDC

Technical considerations:

- **Interoperability:** Although we have 1 data intermediary at this stage, the objective is to add more data intermediaries through the project. For example, we are connecting with Athumi, Data Space TEMS, and we organise the governance to allow the data interoperability. We will rely upon the DSIF for the larger interoperability across different data spaces.
- **Maintenance:** the data space will define the rules and governance standards to be used. And after each data intermediary will maintain its own solution.

3 EU Datasets

During the first year of the project, initial consultation meetings were conducted with the European Union. These engagements featured presentations on the business value and operational focus of two DS4SKILLS use cases (from LIST and CSC, utilizing ESCO) and one use case from the EDGE SKILLS project (imc).

The core objectives established for these meetings were:

1. To define the methodology for integrating EUROPASS and other EU-owned tools into the DS4Skills project ecosystem.
2. To formulate agendas for prospective meetings with EUROPASS, to present project advancements from DS4Skills to DS4Skills-GO, and to investigate the feasibility of an EUROPASS-led, EU-wide use case.
3. To identify potential synergies with the Union of Skills initiative.

The discussions held, particularly those involving LIST and EUROPASS, were productive and are scheduled for continuation in the subsequent phase of the project.

Conclusions

This comprehensive report confirms the successful completion of the initial Phase 1 (Initiation) and Phase 2 (Design) for all eight DS4SKILLS use cases, including the full definition of their detailed descriptions and testing plans. This milestone establishes a robust framework for the data space implementation.

The immediate strategic focus now shifts to Phase 3 (Testing), where the use cases will not only validate their technical functionality but also critically advance the development and refinement of their dedicated business and governance models. This is essential to ensure the long-term sustainability and scalability of the Data Space for Skills. Following successful validation, the project will move into Phase 4 (Deployment), marking the final stage of transitioning the validated concepts into operational, value-delivering solutions across the EU.