D9.1

EOSC Training Catalogue and Learning Platform specification

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Lead by **OpenAIRE**
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Abstract

This report outlines the functional specifications for the Training catalogue and for the online Learning Platform detailing functionalities and the main user actions. The specifications include clear identification of the main beneficiaries of the EOSC Training catalogue and Learning Platform with user stories examples and narratives. The main functional specifications for both catalogue and platform are illustrated with user flows narratives and diagrams.

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List of Abbreviations

Acronym	Definition
AAI	Authentication and Authorization Infrastructure
API	Application Program Interface
EOSC	European Open Science Cloud
GDPR	General Data Protection Regulation
GUI	Graphical User Interface
KH	Knowledge Hub
LMS	Learning Management System
OLX	Open Learning XML
PID	Persistent Identifier
RDA	Research Data Alliance
SCORM	Shareable Content Object Reference Model
SOC	Service Organization Control
VREs	Virtual Research Environments

1   Introduction

This report outlines the functional specifications for the EOSC Training Resource Catalogue and for the EOSC Learning Platform, detailing functionalities, and the main user actions. The specifications include clear identification of the main beneficiaries of the EOSC Training Resource Catalogue and Learning Platform with user stories examples and narratives. The main functional specifications for both Catalogue and Platform are illustrated with user flows narratives and diagrams.

The need for a Training Resource Catalogue was identified since there is currently no other centralised catalogue. There is a steadily increasing wealth of training resources, including those directly dealing with the EOSC, and these are not being properly managed. The objective here is to provide a centralised point of reference to access disparate training materials. Meanwhile, the Learning Platform will address another identified need that the EOSC ecosystem does not have a dedicated platform for learning how to use its resources. This is essentially a learning management system and will provide a means by which end-users (whether these are researchers, research support staff, or other interested parties) can easily seek learning content required to gain the skills to better use the EOSC. These two resources, the Training Catalogue and Learning Platform, are envisaged to be complementary and interoperable.

2 System overview

The functional specifications detailed in this report refer to the system design of two services that will be included in the EOSC Knowledge Hub, that are the EOSC Training Resource Catalogue and the EOSC Learning Platform (Figure 2.1: Main architecture of the EOSC Knowledge Hub).

EOSC Training Resource Catalogue is a catalogue of training resources pertinent to EOSC, which includes a database, advanced search interface and the availability of landing pages for encompassed training resources. The catalogue is open to all training resources that fulfil the onboarding procedures and rules of participation of training service providers, supporting metadata harvesting of external portals and registration of training materials.

EOSC Learning Platform is a learning management system of which the main components are an online learning platform with training courses, certification, a repository populated with openly available training materials, and a trainer's directory. The platform design incorporates a flexible and multi-module approach that supports online authoring tools and is fully interoperable with the EOSC Training Resource Catalogue.
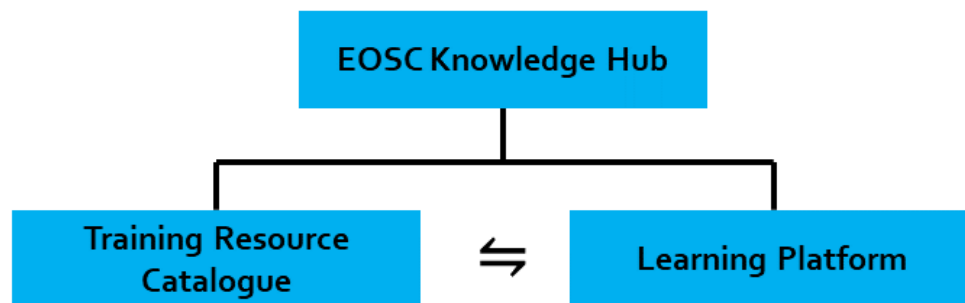
Figure 2.1: Main architecture of the EOSC Knowledge Hub

2.1 Functional overview

The main functionalities detailed in this specifications report are the following:

Table 2-1: EOSC Knowledge Hub main functionalities

EOSC Training Resource Catalogue functionalities	EOSC Learning Platform functionalities
- Search/browse training resources - Display of landing pages - Definition and management of a metadata set for Learning Resources, courses and/or curricula - Aggregation mechanism - PID schema - Registration and login (to access metadata records) - Manual content creation - Review process - Versioning - Feedback mechanisms - Support for different languages - User profile	- Learning Management System (LMS) – Users / Users Admin - E-learning authoring tool (technical specifications) - Standards for e-learning object packages (technical specifications) - User Experience (UX) - Search Engine - Learning Content Delivery and Learning Paths - Admin Dashboard - Help Centre - Trainers' Directory - Security (specifications)

2.2   Users' overview

The main beneficiaries of the EOSC Training Catalogue and the EOSC Learning Platform are the following categories of users/audiences outlined in *D10.1 EOSC Future Stakeholder Engagement & Communication Strategy and Plan*: EOSC Consumers, EOSC Providers and EOSC facilitators/intermediaries:

- EOSC Consumers:
  - Individual researchers;
  - Research communities;
  - Citizen scientists;
  - Commercial entities (private companies interested in using EOSC services).
- EOSC Providers:
  - Infrastructure training managers;
  - Trainers.
- EOSC Facilitators:
  - Research administrators;
  - Research funders and policy makers;
  - Librarians.

2.2.1   User stories

Below are some examples of learners, trainers, service providers, developers, and funder interactions with the EOSC Training Catalogue and the EOSC Learning Platform (reusing user stories from the Research Data Alliance Education and Training Interest Group Minimal Metadata Set Focus Group):

Learner User Stories: A learner could be someone in the workplace doing self-directed continuing professional development, or a student doing self-directed learning, e. g. in all cases looking for their own resources, not using resources provided by or suggested by a teacher or instructor. Learners are:

- searching for training for specific skills;
- looking for free courses on a specific topic;
- searching for specific type of learning resource, e.g., MOOC, self-study, webinar, Face to Face training opportunities;
- wanting to find materials from a course.

Trainer User Stories: A trainer could be an individual or group of trainers. They may be located in an educational or workplace environment. A trainer can be anyone providing training even if it is not their formal role. Trainers are:

- looking for training resources for their own training (reuse in broad sense);
- looking for existing modules to combine for a new course (reuse);
- looking for resources in a given language (reuse);
- wanting to share their materials.

Service Provider User Stories: In this context a service provider may be a training provider who produces training material or a third party who aggregates and makes training materials available e.g., a catalogue. Service providers are:

- wanting to promote their training resources;
- wanting to know where gaps are in subject coverage;
- wanting to provide an overview of training possibilities for their community.

Developer User Stories: A developer could be working independently or be working with a service provider. Developers are:

- wanting to add to or create web interface;
- wanting to import metadata into a different catalogue;
- looking to reuse data about open educational resources (OER) objects for different application.

Funder User Story: In the broadest sense a Funder is any organisation providing funding, e.g., a charity, a national research funder, an institution etc.

- Funder wanting to know which training resources have been created by a specific project.

Other user stories are addressed in the functional specifications below.

3 Functional specifications

To provide the intended capabilities of both the Training Catalogue and the Learning Platform, a list of functional specifications has been defined.

Since the objective of the functional specifications is to describe in detail the interaction between the user and the system(s), the approach of the 'user stories' has been chosen, serving as narrative statements to outline the main user actions. Indeed, it allows to link together functionality and user goals and often represents the most appropriate way and level of detail to facilitate easy planning.

3.1 Format

Each functional specification is described by the following fields:

- **Functional Specification ID:** the unique ID of the functional specification;
- **Functional Specification Name:** the name of the specification;
- **Functional Specification Priority:** the level of importance of the specification.

For each functional specification, each user requirement is described by the following fields:

- **User Requirement ID:** the unique ID of the user requirement;
- **User Requirement Name:** the name of the requirement;
- **User Requirement Priority:** the level of importance of the requirement;
- **Description**: the formal and detailed description of the user requirement;
- **Constraints and Assumptions:** the conditions under which a functional specification has meaning or not (if any), that are the potential considerations that could affect the functional design of the Training Catalogue and Learning Platform.

Each functional specification is recorded using the following format:

Table 3-1: Format for recording functional specification

Functional Specification ID	Functional Specification Name	Functional Specification Priority
User Requirement ID 1	User Requirement Name 1	User Requirement Priority 1
...	...	...
User Requirement ID n	User Requirement Name n	User Requirement Priority n

The assigned priorities are:

- **Mandatory**: functionalities that are fundamental for the systems;
- **Important**: functionalities that will make the systems more appealing to end users;
- **Interesting**: functionalities that will bring an added value to the systems, but their absence does not make the products less appealing to its potential users.

3.2 Functionalities

This chapter presents the functional specifications for the Training Catalogue first and then for the Learning Platform.

There are four types of catalogue users:

- **Guest user:** it can only access the public area and view/access the training metadata records;
- **Registered user:** it can modify its own profile data and create new training metadata records;
- **Reviewer:** it can review the created training metadata records;
- **Administrator:** it can access the admin area and perform all the functions related to the catalogue management.

3.2.1 Catalogue functionalities

3.2.1.1 Search/Browse training resources

Table 3-2: Search/Browse training resources

1	Search/browse training resources	Priority
1.1	User browses the Catalogue content by means of a web interface.	Mandatory
1.2	User runs basic search in the Catalogue content through existing metadata fields.	Mandatory
1.3	User runs advanced search in the Catalogue content through existing metadata fields.	Mandatory
1.4	User runs queries on the Catalogue content through existing metadata fields by using APIs.	Mandatory
1.5	User downloads the training resource metadata record by choosing the desired format.	Mandatory

- **Description**: The Catalogue search and browse functionalities will give access to the training resources included in the Catalogue. Users will be able to do keyword search, advanced search using Boolean operators and browse the Catalogue content both via web interface (human readability) and APIs (machine readability).
- **Constraints and Assumptions**:
    - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields.
    - There should be the possibility to expose the content of the Catalogue in different formats (e.g., XML, JSON, RDF, PDF, ZIP, etc.).

3.2.1.2 Display of landing pages

Table 3-3: Display of landing pages

2	Display of landing pages	Priority
2.1	User visits the home page of the Catalogue that allows to perform the main tasks on the training resources.	Mandatory
2.2	User visits the landing pages of each single training resources that include all minimum/mandatory metadata fields.	Mandatory

- **Description**: The Catalogue will provide an attractive and user-friendly landing page (the home page) that acts as aggregator of all resources and allows to perform the main tasks on the training resources (searching, browsing, ordering, and querying). Moreover, each training resource will be described in a well-structured way, with all its metadata fields, in a detail page that includes both static and dynamic content. Whenever possible, this detail page will also include the direct URL that links to the Learning Platform that stores the specific learning material and/or the direct URL to the original Training Catalogue and Learning Platform.
- **Constraints and Assumptions:** The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields (see Appendix A: Minimal set of metadata for learning resources).

3.2.1.3 Definition and management of a metadata set for learning resources, course and/or curricula

Table 3-4: Definition and management of a metadata set for learning resources, course and/or curricula

3	Definition and management of a metadata set for Learning Resources, courses and/or curricula	Priority
3.1	The administrator can define and manage an ad hoc metadata schema by using the GUI with the possibility to configure all aspects (title,	Mandatory

	tooltip, data type, accepted values, if it is multi-value, if it is optional/mandatory, etc.).	
3.2	The administrator can configure the accepted values of some metadata fields with a set of taxonomies, thesauruses and controlled vocabularies.	Important

- **Description**: The metadata schema should be flexible and customizable by means of the user interface, that is without the intervention of ICT experts (without intervening with the code). The metadata schema should be based on a standard that allows interoperability with other catalogues (both for ingestion and harvesting purposes). The training materials should be described and annotated with relevant keywords based as much as possible on taxonomies, thesauruses, and controlled vocabularies to have uniquely identified terms and hence high-quality and homogeneous information. This would decrease ambiguity and would also improve the discoverability feature of the Training Catalogue that helps users (and systems) identify the right resources for their needs. The metadata schema should include a set of minimum fields that are mandatory and required for the publication of the specific record (a minimal set of metadata for learning resources from the RDA Minimal Metadata for Learning Resources Focus of the Education and Training On Handling Of Research Data Interest Group is available in the Appendix A: Minimal set of metadata for learning resources).
- **Constraints and Assumptions**:
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields.
  - Community-validated guidelines and standards for metadata for training resources, courses and/or curricula must be defined. The choice of a minimum application profile, with the corresponding mandatory fields, could exclude some communities and we should try to be as inclusive as possible (here is where the flexibility of the metadata schema comes into play).
  - To guarantee reproducibility (users should be able to build upon each other's work), the metadata set cannot exclude metadata that allows citing the specific work (e.g., license, funding, acknowledgements, version, updates, etc.).

3.2.1.4   Aggregation mechanism

Table 3-5: Aggregation mechanism

4	Aggregation mechanism	Priority
4.1	The administrator harvests new metadata records about training resources from a set of pre-defined sources.	Mandatory
4.2	The administrator harvests updated metadata records about training resources from a set of pre-defined sources (scheduled job).	Mandatory
4.3	The administrator runs the validation procedure to start the harvesting.	Mandatory

- **Description:** The Catalogue will be an aggregator of pre-existing catalogues (a core concept behind EOSC Future is to benefit from current and pre-existing projects/initiatives to learn from and align with the benefits/conclusions of the other projects/initiatives) and, moreover, it should be a place in which to put training metadata records if users do not have a catalogue. The aggregation (harvesting) mechanism will allow automatic gathering of new and updated metadata records about training resources from a given set of pre-defined sources. This implies having a structured workflow that allows synchronising the Catalogue with these sources by using the corresponding protocol, such as the OAI-PMH, that is Open Archives Initiative Protocol for Metadata Harvesting, the de facto standard for metadata harvesting. To correctly harvest the metadata records, a list of harvesting requirements will be defined and used as guidelines for the potential providers. Examples of harvesting requirements: minimum metadata content, adopted metadata standard, unique identifiers usage, etc. All these requirements are part of the validation procedure that will follow each harvesting process (first time harvesting and updates for each provider) before the publication on the Catalogue. Furthermore, in

relation to the adopted harvesting protocol, a set of information must be provided to run the harvesting (e.g., the endpoint, the prefix, etc.).

- **Constraints and Assumptions:** According to the source metadata application profile, an ad hoc transformation that allows performing the mapping should be implemented.

3.2.1.5 PID Schema

Table 3-6: PID Schema

5	PID schema	Priority
5.1	User specifies the PID of the training resource in the metadata editor.	Mandatory
5.2	User runs browse queries on the Catalogue content by using PIDs.	Mandatory
5.3	User can use the PID verification functionality.	Interesting

- **Description**: The Catalogue should include the possibility to specify the persistent identifier (PID, DOI, etc.) of a specific training resource (when available, hence optional but highly recommended) being it a core requisite for making resources accessible and fulfilling the FAIR principles. Moreover, it is machine readable and helps also to avoid the problem of broken links. It would be interesting to provide the PID verification functionality.
- **Constraints and Assumptions:**
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields and the 'identifier' should be included in this set.
  - A check on the input validity should be performed.

3.2.1.6 Registration and login (to access metadata records)

Table 3-7: Registration and Login (to access metadata records)

6	Registration	Priority
6.1	User logs in the Catalogue by following the EOSC AAI procedures in order to perform specific actions on the training resources.	Mandatory
6.2	User can manage its own profile by changing bio info, pictures, etc.	Mandatory
6.3	User requests to have a specific role in the Catalogue (e.g., reviewer).	Important
6.4	The administrator assigns a specific role to a specific registered user.	Mandatory

- **Description**: The user registration and authentication should follow the EOSC AAI procedures allowing to use other authoritative authentication systems (e.g., Eduteams, ORCID, etc.) and it should be required only for specific actions (i.e., training resource creation, request for modification, request for deletion, feedback provision, etc.) since the Catalogue should be open to public with all the descriptive metadata (included the license information that allows to know the usage terms of the specific training resources).
- **Constraints and Assumptions:**
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields.
  - A set of roles must be defined in order to guarantee the appropriate rights on the different metadata records.
  - The support to the EOSC AAI must be considered in the user registration process.

3.2.1.7   Manual content creation

Table 3-8: Manual content creation

7	Manual content creation	Priority
7.1	User creates new training resource metadata records by following the metadata editor requirements and guidelines.	Mandatory
7.2	The administrator browses all training resource metadata records with the possibility to see the creator, the creation date, the status, etc.	Important

- **Description**: The Catalogue can be populated manually by users that do not have a space in which to store their training metadata records.
- **Constraints and Assumptions**: The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields and the user will acknowledge it in the metadata editor (red asterisks for mandatory fields, codelists for restricted values fields, etc.).

3.2.1.8   Review process

Table 3-9: Review process

8	Review process	Priority
8.1	The administrator specifies a set of validation rules needed to correctly publish a training resource metadata record.	Mandatory
8.2	The administrator invites a user to review a given training resource metadata record.	Important
8.3	The reviewer validates the training resource metadata records according to a specific set of validation rules by adopting an automatic approach (validation check algorithm) supported by a manual check.	Mandatory
8.4	The reviewer defines the result of the validation process and the system automatically notify it to the user author.	Mandatory

- **Description**: An editorial workflow is needed to create and publish training resources. The review process should consider the validation aspect both from the format point of view and from the semantic one.
- **Constraints and Assumptions:**
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields.
  - Community-validated quality criteria for training resources must be defined. In particular, a set of roles should be specified in order to guarantee the appropriate quality of the training metadata records.
  - A redactional workflow is needed to manage reviews and notifications.
  - The reviews only apply to manually added content since the list of harvested sources comes from the list of validated providers that have followed the onboarding rules.

3.2.1.9   Versioning

Table 3-10: Versioning

9	Versioning	Priority
9.1	User creates different versions of a specific training resource metadata record.	Mandatory
9.2	User can access to previous versions if problems arise during the updating of last version of a specific training resource metadata record	Important

- **Description**: The Catalogue will include the versioning functionality that allows to track and monitor the life-cycle of each manually added training resources so that users can access all the versions of a specific training resources.
- **Constraints and Assumptions:**
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields and 'version' should be included in this set.
  - When querying the Catalogue by means of APIs, only the last version should be harvested.

3.2.1.10 Feedback Mechanisms

Table 3-11: Feedback Mechanisms

10	Feedback mechanisms	Priority
10.1	The administrator specifies the main fields of the feedback form and chooses the rating type (from 1 to 10 rating, star rating, etc.).	Mandatory
10.2	User provides feedback about the Catalogue (general feedback).	Mandatory
10.3	User provides feedback about a given training resource metadata record (specific feedback) that will be subject to a moderation procedure before being published.	Mandatory
10.4	The system automatically sends an email to the administrator and to the training resource creator(s) when new feedback has been sent.	Important
10.5	The administrator manages the received feedbacks and moderates to publish appropriate positive/negative messages for both general and specific feedbacks.	Mandatory

- **Description**: The Catalogue will include the feedback mechanism that is very useful to understand needs, issues, missing features, etc. and that allows to improve the Catalogue itself and implement the changes accordingly. The feedback can be related to the whole Catalogue (considering hence catalogue-related functionalities) and to the specific training resources (considering the values of the metadata fields and hence by reporting errors or suggesting alternatives).
- **Constraints and Assumptions:**
  - Each landing page for each training resource metadata record will include a feedback section.
  - A redactional workflow is needed to manage feedbacks and notifications.
  - Users should be aware that once feedback has been left, she/he cannot modify it (the system should notify it before saving and sending the email to the administrator).
  - The training resources included in the Catalogue will be described using a set of minimum/mandatory metadata fields.

3.2.1.11 Support for different languages

Table 3-12: Support for different languages

11	Support for different languages	Priority
11.1	User can select a different language for the Catalogue user interface.	Interesting

- **Description:** The Catalogue will include the language functionality to allow users to select the language of the user interface (including the search interface).
- **Constraints and Assumptions:** The default language of the Catalogue is English.

3.2.1.12   User profile

Table 3-13: User profile

12	User profile	Priority
12.1	User can bookmark items of interest	Interesting

- **Description:** The Catalogue will include a user profile in which the user can find the items saved as of interest.
- **Constraints and Assumptions:**
  - Each landing page of training resources will include an option to bookmark the resource.
  - Only registered users in the Catalogue will be able to bookmark a resource.

3.2.1.13   User flows

In this section, the user flow related to three main functionalities of the Training Catalogue will be presented.

To illustrate the user flows, a narrative description of each use case will be specified. In particular, the description of the scenario will include: the name of the use case; the involved actor(s); the detailed description; what happens in case of successful completion (the default scenario) broken down into steps that illustrate the interaction between the actor(s) and the system; the potential alternatives; the list of pre and post conditions necessary for the scenario completion; the list of potential assumptions.

> The user flows will be updated as necessary during the development process of the Training Catalogue. To guarantee a collaborative work beyond this report, the Training Catalogue user flows can be updated at the following Wiki page:
>
> https://wiki.eoscfuture.eu/x/oQOK.

Functional Specification 3.1 - Definition and management of a metadata set for Learning Resources, courses and/or curricula.

- **Use case:** definition and management of the metadata set for learning resources.
- **Actor:** administrator.
- **Description:** the administrator defines and manages the metadata schema by using the GUI with the possibility to configure all aspects (title, tooltip, data type, accepted values, if it is multi-value, if it is optional/mandatory, etc.).
- **Successful completion**:

  1. The administrator, starting from the list of the already identified metadata fields (see Appendix A: Minimal set of metadata for learning resources), defines and manages the structure of the metadata set by specifying all the required information (title, tooltip, data type, accepted values, if it is multi-value, if it is optional/mandatory, etc.).

  2. The system validates the input for any errors in data entry.

  3. The system approves the metadata set submission and the metadata set is correctly updated.

- **Alternative**: The system rejects the metadata set submission, citing all the potential errors.
- **Pre-condition**: The administrator must be logged in and has to have the admin role in order to define and manage the metadata schema.
- **Post-condition**: The administrator receives a success message.
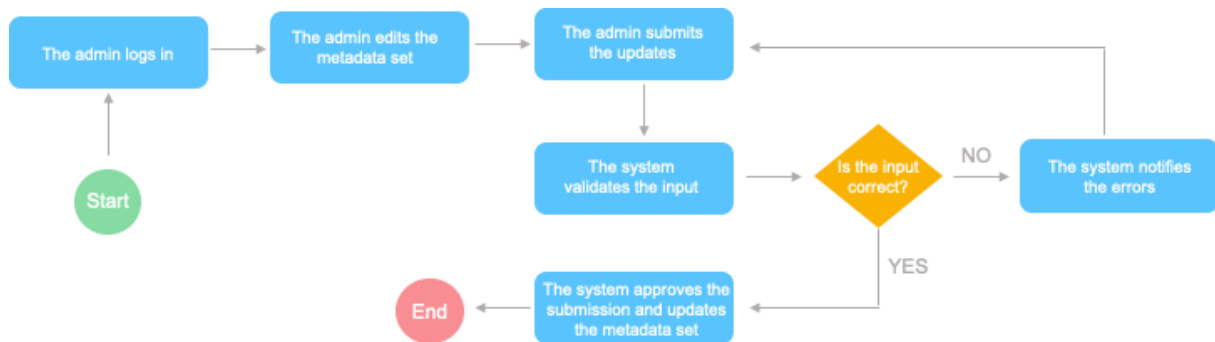- **Assumptions**: None.

Figure 3.1: User flow: Definition and management of a metadata set for Learning Resources, courses and/or curricula.

Functional Specification 4 - Aggregation mechanism (automatic harvesting)

- **Use case:** aggregation mechanism (automatic harvesting).
- **Actor:** administrator.
- **Description**: the administrator manages the list of harvested sources by using the GUI with the possibility to configure and set the different fields (node name, authoring info, protocol to be used, URL – endpoint of the node, possible search filters to be used during the harvesting, privileges for harvested records, possible validation to be performed before importing, possible transformation to be applied after the record import, etc.)
- **Successful completion**:

    1. The administrator creates a new harvesting source (or updates an existing harvesting source) by specifying all the mandatory fields.

    2. The system performs a quick test by harvesting maximum 10 records that follow the information/criteria provided by the administrator (validation procedure).

    3. The system approves the new harvesting source (or the updated harvesting source) and adds it to the list of available sources.

    4. The administrator can decide to perform a manual harvesting (only after clicking on a specific button the harvesting procedure for a specific node is run) or to schedule it with a given frequency and at a given time (to automatically gather new and updated metadata records about training resources).

- **Alternatives:**
    - If the system rejects the newly created/updated harvesting source, the validation procedure fails, and the list of encountered errors is provided.
    - If no records are found with the information provided by the administrator, the system notifies 'o records found'.
- **Pre-condition**: The administrator must be logged in and has to have the admin role in order to manage the harvesting sources.
- **Post-conditions**:
    - The administrator receives a success message after the test and can continue with the setting.
    - The (manual/scheduled) harvesting is performed and a report is generated/updated by the system that includes the main info of the source, the date of the run, and the corresponding harvested record. The user can download the report (export in CSV, PDF, etc.)
    - The system is correctly synchronized with the list of the harvesting sources.
- **Assumptions:**
    - The list of harvested sources comes from the list of validated providers that have followed the onboarding rules (See Chapter 4 Alignment with the EOSC Rules of Participation and EOSC Marketplace).
    - According to the source metadata application profile, an ad-hoc transformation that allows to perform the mapping should be implemented.
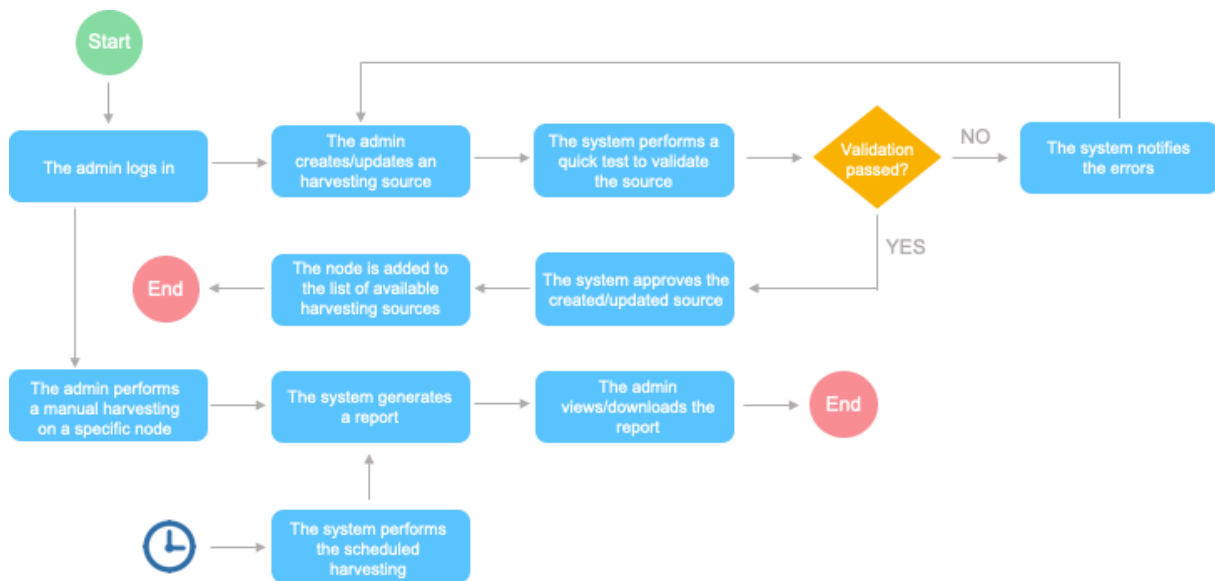
Figure 3.2: User flow: Aggregation mechanism (automatic harvesting)

Functional Specification 7.1 - Manual content creation

- **Use case**: manual creation of training metadata record.
- **Actor:** EOSC provider.
- **Description**: the EOSC providers that do not have a Training Catalogue to perform the automatic harvesting of the training resources can create new metadata records in a manual fashion. The metadata fields included and listed in the metadata editor of the Training Catalogue will be combined with appropriate tooltips to provide examples and guidelines for correct data entry. The created metadata records will be subject to a validation procedure before being published and discoverable within the EOSC Training Catalogue.
- **Successful completion:**
    1. The provider creates a new training metadata record (or updates an existing metadata record) by specifying at least the mandatory metadata fields.
    2. The system validates the submission and approves in case of zero errors.
    3. The metadata record is added as draft in the Catalogue.
    4. The administrator contacts the reviewer(s) to revise the content.
- **Alternatives:**
    - If the system rejects the newly created/updated metadata record, the validation procedure fails, and the list of encountered errors is provided.
    - If the review is not positive, the validation procedure fails, and the list of encountered errors is provided.
- **Pre-condition:** The provider must be logged in and has to have the editor role in order to manage the metadata records related to the training resources that she/he provided.
- **Post-conditions**:
    - The provider receives a success message after the record submission.
    - The provider is notified about the successful review.
    - The metadata record is added to the list of available and discoverable training resources.
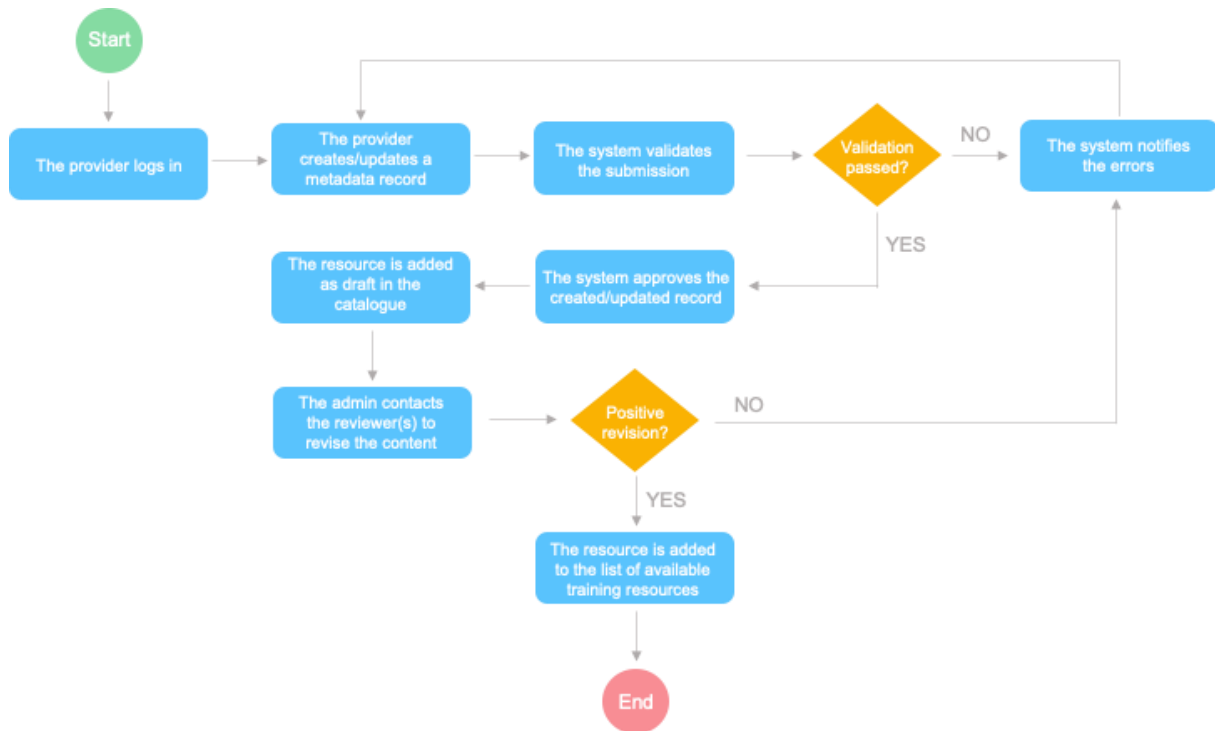- **Assumptions**: None.

Figure 3.3: User flow: Manual content creation.

3.2.2 Platform functionalities

This section focuses on the functionalities envisaged for the Learning Platform that will be developed. The main approach used to present such elements is the 'User stories' approach; all functionalities are presented from the perspective of a user accessing and using the platform, navigating through the learning management system and its pages, searching learning activities and products, and so on. There are, however, a few functionalities that, in consideration of their technical value, could not be presented in this same way. These functionalities, indicated in the relevant section with the title 'technical specifications', are therefore presented as per their respective technical characteristics and how these will be implemented in the platform development phase.

There are four types of platform users:

- **Guest user**: it can only access the public area and view/access the public training courses;
- **Registered user**: it can modify its own profile data and enrol to training courses;
- **Trainer/provider**: it can create new training courses;
- **Administrator**: it can access the admin area and perform all the functions related to the platform management.

3.2.2.1 Learning Management System (LMS)

Table 3-14: Learning Management System (LMS)

1	Learning Management System - Users	Priority
1.1	Users enjoy highly interactive eLearning experience thanks to a sharp User Interface UI (portal's layout, graphics, videos, icons, color palate and navigation scheme).	Mandatory
1.2	Users access multiple content types (text, audio, images, video, animation, VR, etc.).	Mandatory
1.3	Users work simultaneously on a variety of learning tools (video-conferencing, webinar, brainstorming, information sharing, whiteboards, etc.).	Mandatory
1.4	Users are prompted to VREs for learning activities.	Mandatory
1.5	Users interoperate with EOSC Training Resources Catalogue.	Mandatory

1.6	Users interact on collaborative dashboards for collaborative learning (share chapter assessments, study materials, course links and quizzes via live chats, instant messaging and forum boards).	Mandatory
1.7	Users learn using gamification techniques (progress level, scores, avatars, virtual currencies, gifts, real-time performance feedback, etc.).	Important
1.8	Users access reporting and evaluation tools (SurveyMonkey, etc.).	Important
1.9	Hearing debilitated/ visually impared/ outwardly hindered users are supported by sound portrayals, inscriptions and captions.	Interesting
1.10	Users access the platform on low bandwidth version.	Interesting
1.11	Users post and share learning progress on social networks.	Interesting
	Learning Management System - Admin	
1.12	The administrator effectively integrates all systems thanks to fully documented application program interface (API).	Mandatory
1.13	The administrator uploads different training products (facilitated, autonomous and blended; video lessons; Live online delivery).	Mandatory
1.14	The administrator generates reports (user registrations, learners' results, learners time on platform etc.).	Mandatory
1.15	The administrator interoperates with EOSC Training Resources Catalogue.	Mandatory
1.16	The administrator streamlines the course creation processes thanks to LMS course creation features.	Important
1.17	The administrator creates users groups.	Important

- **Description:**
    - The choice of an LMS that allows users to navigate easily through the Learning Platform, to move quickly around functionalities and access the course contents, entails that the learners' cognitive load is fully dedicated to the learning processes. In this sense, UI (User Interface) regards how the LMS guides users through the learning experience thanks to layout, graphics, icons, color palate and navigation scheme that effectively contribute to eLearning interactivity.
    - A second very important element that will guide the choice of the LMS is its flexibility and adaptability as well as its potential for integration and interoperability with other software and tools (supporting multiple content types, integrating with other learning tools, interoperating with reporting and evaluation tools). A specific added value for this project, would be the possibility of the LMS to interact with Virtual Research Environments (VREs).
    - Third group of important features for the LMS to use, concerns more strictly the learning experience per se. To this extent, the possibility to have collaborative dashboards for learners' collaborative learning, the implementation of gamification techniques and the possibility to generate reports will greatly enrich the interactivity and the users' learning experiences.
- **Constraints and Assumptions**: The choice of the right LMS is likely to impact on the usability and interactivity experienced by learners. Also, it usually comes with a cost; some LMSs (the most commercial and/or the more structured) for example, present costs based on the number of users. There are, however, open source LMS as well, and these could represent a choice with an eye to sustainability. These are therefore very important elements to keep into consideration. In addition, while most of the LMS would include the most important of the issues above, it becomes very specific when it comes to interoperability with VREs coupled with gamification techniques and tools. A great deal of reflections must therefore be dedicated to these considerations.

3.2.2.2   E-learning authoring tool (technical specifications)

Table 3-15: E-learning authoring tool (technical specifications)

2	E-learning authoring tool (technical specifications)	Priority
2.1	Enhance teamwork.	Mandatory
2.2	Easy to use and versatile.	Mandatory

2.3	Integrate interactivity and multimedia.	Mandatory
2.4	Branching and Navigation: navigate through the content with ease (branching divides and structures contents to make them more user-friendly).	Mandatory
2.5	Multiple distribution options (embed course in a website, set it within Intranet site or email it to people as a link. Direct link also means promoting course on social media or by direct message; and easily share courses with colleagues for review processes and testing).	Mandatory
2.6	Output work on any device.	Mandatory
2.7	Register/ingest metadata information into the EOSC Training Resource Catalogue.	Mandatory
2.8	Publishing capabilities to respond to different publishing needs (PDF, HTML5, Flash, and Microsoft PowerPoint).	Important
2.9	Instantaneous updates (making changes to live courses).	Important
2.10	Integrate a video editing software.	Important
2.11	LMS integration: LMS built in authoring tools can be a major asset.	Interesting

- **Description:**
  - The eLearning authoring tool is indeed another crucial aspect of any Learning Platform. Besides, the basic characteristics of usability, versality and possibility for integration with other software and tools, a very specific element that must be addressed is the possibility for an enhanced teamwork offer by the elected tool. The Subject Matter Experts that will be involved in the project work with dispersed learning teams, often in different countries. An authoring tool that includes a teamwork solution makes collaboration easy even if teams of colleagues are on different sides of the world. Instructional Designers, authors, and other reviewers can all access the same course in real time and make comments and suggest changes to the material instantly.
  - Along the same line, multiple distribution options and outputs that works on any device will also be important aspects to provide for.
  - Finally, rapid eLearning authoring tool (such as the iSpring Suite Max) will be considered for implementation.
- **Constraints and Assumptions:**
  - Some constraints that concern the eLearning authoring tool are: first and foremost, making sure that the selected authoring tool is compliant with the chosen LMS; second, its publishing capabilities and the possibility to make changes to live courses. All of these must be scrutinized also taking into consideration the fact that all functionalities must be ensured and run smoothly on different OS (Windows, Mac, Linux, etc.).
  - An additional constraint is the integration with the metadata standard that will be used in the catalogue (see Appendix A: Minimal set of metadata for learning resources). This same standard should in fact be applied to the e-learning contents created in the platform as well.

3.2.2.3   Standards for e-learning object packages (technical specification)

Table 3-16: Standards for e-learning object packages (technical specification)

3	Standards for e-learning object packages (technical specifications)	Priority
3.1	Learning Platform compatible with at least one of the 5 versions of SCORM currently available to ensure access to a wide variety of learning material.	Mandatory
3.2	Open Learning XML (OLX) Format	Mandatory
3.3	xAPI	Mandatory

- **Description:** SCORM (Shareable Content Object Reference Model) is a set of standards and technical specifications that enables e-learning course creators to create courses and share them across multiple platforms. SCORM allows content authors to distribute their contents to a variety of Learning Management Systems (LMS) and, more importantly, for an LMS to handle content from a variety of

sources. Five versions of SCORM are currently available, SCORM 1.2 and SCORM 2004 3rd Edition being the most widely used versions of SCORM today. It is extremely important that the Learning Platform is compatible with at least one of these to ensure access to a wide variety of learning material both now and in the future.

- **Constraints and Assumptions:** Creating SCORM compliant learning content is not a straightforward activity. SCORM objects can be hand-coded using HTML, JavaScript, and sometimes SWF files or also templates to make the process easier. Alternatively, SCORM authoring software can generate SCORM packages (easier process for non-technical users but can lead to bugs). For example, Moodle does not generate SCORM content; Moodle presents the content in SCORM packages to learners and saves data from learner interactions with the SCORM package. No SCORM authoring software is without bugs, and some have significant issues when used with Moodle. This circumstance must be taken in due consideration when choosing the LMS and the SCORM.

  In addition, how to create SCORM compliant learning content is also not widely available knowledge and foreseeing training on this activity should be considered.

3.2.2.4   User Experience (UX)

Table 3-17: User Experience (UX)

4	User Experience (UX)	Priority
4.1	Users enjoy flexible and multi-module approach that supports online learning needs (adaptive learning, customised courses, micro-learning and gamification).	Mandatory
4.2	Users access the platform in asynchronous mode (anytime, anywhere, any device).	Mandatory
4.3	Users access a multilanguage platform with a user-friendly navigation scheme.	Mandatory
4.4	Users log in the platform by following the EOSC AAI procedures in order to create and edit their personal profile (contact data, information about courses, exams, certificates, and more). Profile's info should be flexible and should reflect the user role (i.e., trainers will have a profile description that is different from the student profile).	Mandatory
4.5	Users self-enrol in learning courses.	Important
4.6	Users access their training history (all courses: in progress, completed, active, inactive, certificates, badges).	Important
4.7	User can search for a group/network and link to it and publish their personal profile to the group/network.	Interesting
4.8	Users receive courses recommendations (platform automatically recommends relevant courses to the users supporting them to choose an appropriate course as per their preference and capability).	Interesting
4.9	Users receive 'push notifications' and reminders, to help keep them on track and engaged throughout the learning process.	Interesting
4.10	Users are allowed free enrollment for a trial period (usually up to 7 days with temporary access to content).	Interesting

- **Description:**
  - It goes without saying that it is paramount to develop a user-friendly platform navigation scheme where learners can easily navigate themselves around the site, find relevant learning resources within just a few clicks and be engaged throughout the process. The possibility to have a multilanguage platform will definitely go in this direction while, at the same time, could open a number of different markets (e.g., countries) and audience levels.
  - In this section, all efforts must be made to make the users experience as quick, easy, and engaging as possible. Learners should be able to self-register with a quick and easy login (one step sign on) and be able to create and manage their own profile (contact data, information about courses,

exams, certificates, own training history and more). Same considerations go for what concerns the enrolment into courses.

- Extremely important would be the possibility to have an asynchronous access to self-paced courses (anytime, anywhere, any device) as well as a multi-device access and usage (mobile supports version) so to allow for training at any given time and location. On the same line, a low bandwidth version of the platform would increase the chances for continued involvement.
- On the learners' engagement side, opportunities for live online delivery, for peer-to-peer communication and social learning, and for creating users' groups will massively increase the use of the platform.

• **Constraints and Assumptions:** Learners' first experience to the platform must be spotless and must give them the idea that more is about to come. The EOSC AAI system to control access and authorisation for trainers, trainees and visitors that could also provide for free enrolment for a trial period, some course recommendations, and a few elements of inclusive eLearning (such as audio commands for visually impaired learners or written narratives) will constitute a plus for learners' engagement.

3.2.2.5 Search engine

Table 3-18: Search engine

5	Search engine	Priority
5.1	Users search and select courses (under the search results, find one featured course with a breakdown of its topics and instructors).	Mandatory
5.2	Users perform advanced search (view all the courses on a specific topic, use a filtering system and select only those with a specific rating or duration).	Mandatory
5.3	Users easily find a course in catalogue (type in the keywords in the search bar, the system offers results grouped by categories).	Important

• **Description:** Learners must be able to navigate to a page they are looking for in a few clicks be this a specific training activity, information on the course topics or details and qualifications of the trainers delivering the course. An advanced search bar should allow to select activities based on duration and course rating (should be this opportunity provided for in the platform).

• **Constraints and Assumptions:**
- The challenge here will be to develop a search scheme that hits the target in a quick and effective way.
- It is assumed that there will be two different search interfaces: one for the catalogue and the other for the platform. Moreover, a third integrated search interface will allow to query the EOSC Knowledge Hub to search in both systems.

3.2.2.6 Learning content delivery and learning paths

Table 3-19: Learning content delivery and learning paths

Functional Specification ID	Learning Content Delivery	Priority
6.1	Users access, for each course, to: learning objectives, course guide (handbook), video introduction, preparatory readings, interactive components (eLearning authoring tools), course activities, performance assessment (e.g., tests, quizzes, exams, online assignments), open Q&A forum (start new discussion, answer, comment, etc.), final test, completion certificate, resource person, external experts, links to other platforms.	Mandatory
6.2	Users enjoy a repository of openly available training materials.	Important

6.3	Users can subscribe for notifications and information about courses. Users may choose to receive email notifications about new courses, or have them automatically added to their preferred calendar application.	Interesting
	Learning Paths	
6.4	Users access learning paths with associated badges and certification schemes.	Important
6.5	Users receive suggestions for courses flow (courses available on platform – connected to create a learning scheme).	Important
6.6	Users are directed to further advanced learning.	Interesting
6.7	Users can rate courses.	Interesting

- **Description:** The platform Users Interface is another aspect that must run smoothly and without glitches. Users must be allowed an asynchronous access to contents and be able to manage all possible aspects through their profiles. Accessibility and interactivity here must be at their maximum. The platform and the training activities (courses, tutorials, seminars, etc.) developed and uploaded on the platform will be designed and structured to be taken as single activities as well as learning paths; i. e. groups of integrated learning products aimed at the achievement of a specific set of skills. Such set of skills, personalized for each user, will be identified based on users' preferences listed during their profile registration phase. Completion of learning paths will result in the achievement of the associated badges and certification schemes. The platform (via the AI course recommender detailed above) will suggest a variety of courses flow (courses available on platform – connected to create a learning scheme).

- **Constraints and Assumptions:** The constraint here could be structuring a clear repository of many openly available training materials; a seamless mind-map would be crucial. Similarly, it will be extremely important that, during the courses design phase, these training materials are organized in a way that supports learning paths with the creation of the related associated badges and certification. Courses and learning activities will have to be structured in an organic way from the onset to fall under a specific learning path.

3.2.2.7 Admin dashboard

Table 3-20: Admin dashboard

7	Admin Dashboard	Priority
7.1	The administrator manages learners for all types of learning (enrollment, forums, student communities, virtual classrooms), create content libraries, personalize and create contents.	Mandatory
7.2	The administrator can: manage and track courses, manage users accounts, import records, group users, create statistics and reports and send notifications.	Mandatory

- **Description:** The platform will allow for different login roles. The administrator should be able to perform all the actions listed above.
- **Constraints and Assumptions:** One constraint may concern the possibility to launch events on the platform. Its interoperability with other tools as mentioned in the section above should make this circumstance easier.

3.2.2.8 Help centre

Table 3-21: Help centre

8	Help centre	Priority
8.1	Users' access Getting Started section.	Mandatory
8.2	Users receive How To tutorials (great asset in getting learners up to speed with how to use the platform).	Mandatory
8.3	Users get answers to FAQ.	Important

8.4	Users get in touch with the team by email.	Important

- **Description:** The Help Centre will provide for a Getting Started section and for How To tutorials. Similarly, a list of FAQs will be developed. The possibility to allow Users to get in touch with the platform team and/or trainers by email will also be a plus.
- **Constraints and Assumptions:** None.

3.2.2.9   Trainers' directory

Table 3-22: Trainers' directory

9	Trainers' Directory	Priority
9.1	Platform registered users and the administrator access trainers' directory page and enjoy access to their profile (personal data, background, expertise, experiences, courses developed, contact details, etc.).	Mandatory
9.2	External users (not registered to Platform) access trainers' directory page but get limited access to trainers' profile (no personal data, no contact details).	Mandatory
9.3	All users and the administrator can search the directory based on name, topic, domain/discipline, expertise.	Mandatory
9.4	Trainers and the administrator access courses repository where they can download/upload and review materials.	Important
9.5	Trainers and contributors and the administrator access CoP (Community of Practice for Training Coordinators) where they can exchange knowledge, experiences, materials, etc.	Important

- **Description:** The trainers' directory lists experienced trainers and educators that have contributed to the training resources (materials and courses) that populate the platform. The trainers create a profile with personal data that links to personal pages on e.g., LinkedIn, ORCID and describes their experience in training and links to the courses and training resources they have contributed to the platform. The directory can be searched based on e.g., topic, domain. Trainers can be contacted by platform registered users, other trainers and contributors and the administrator. The directory improves the visibility of trainers and provides background information on the courses listed that the trainers provide.
- **Constraints and Assumptions:** Only trainers involved in delivering courses and creation of training resources in the platform can be listed.

3.2.2.10   Security (specifications)

Table 3-23: Security (specifications)

Functional Specification ID	Security (technical specifications)	Priority
10.1	Secure storage of information and contents	Mandatory
10.2	Safety standards: Service Organization Control (SOC) 2 certification, the EU's General Data Protection Regulation (GDPR) compliance, or ISO 27001 with Certification Europe.	Mandatory
10.3	Role-based access to training materials and competence records (e.g., courses, assignments, exams, attendance, marks, certifications).	Mandatory
10.4	Learning/learners' records backups.	Mandatory

- **Description:** Firstly, the platform must ensure different access levels to materials, records and data based on the users' various roles as assigned by the platform administrator. Secondly, it should provide the possibility to create backups for learners' records and profiles, to retrieve data that could be erroneously lost. Finally, all these data as well as all information and contents uploaded on the platform should be securely stored according to the most relevant current safety standards.

- **Constraints and Assumptions:** None.

3.2.2.11   User flows

In this section, the user flows related to a selected number of the main functionalities of the platform as listed in the previous section are presented and examined in depth, to provide a narrated simulation of the practical experience of a potential user of the platform.

The three main functionalities of the Learning Platform selected for this exercise are:

- 2.8 - Publishing capabilities to respond to different publishing needs (PDF, HTML5, Flash, and Microsoft PowerPoint).
- 6.1 - Users access to course and related learning contents.
- 9.1 - Platform registered users and the administrator access trainers' directory page and enjoy access to their profile (personal data, background, expertise, experiences, courses developed, contact details, etc.),
  and
  9.2 - External users (not registered to Platform) access trainers' directory page but get limited access to trainers' profile (no personal data, no contact details).

To illustrate the user flows, a narrative description of each use case will be specified. In particular, the description of the scenario will include: the name of the use case; the involved actor(s); the detailed description; what happens in case of successful completion (the default scenario) broken down into steps that illustrate the interaction between the actor(s) and the system; the potential alternatives; the list of pre and post conditions necessary for the scenario completion; the list of potential assumptions.

> The user flows will be updated as necessary during the development process of the Learning Platform. To guarantee a collaborative work beyond this report, the Training Catalogue user flows can be updated at the following Wiki page:
>
> https://wiki.eoscfuture.eu/x/owOK.

Functional Specification 2.8 - Publishing capabilities to respond to different publishing needs

- **Use case:** eLearning authoring tool publishing mechanism (different formats).
- **Actor:** Course author/instructional designer.
- **Description:** The course author/instructional designer manages the creation of the course interactive component. The course author/instructional designer develops the interactive component, namely the lessons, using the chosen authoring tool. When the development is completed, shares the file with the content experts or the subject matter experts for review. Not all contents experts have access to licenses of eLearning authoring tool. This software must therefore give the possibility to publish the document in a variety of formats (PDF, HTML5, Flash, Microsoft PowerPoint, LibreOffice) so that it can be open and reviewed on different machines.
- **Successful completion**:

  1. The course author/instructional designer creates a new interactive component/lesson following the indications of the content experts or the subject matter experts.

  2. The eLearning authoring software allows for the publication of the interactive component in format PDF, HTML5, Flash, and Microsoft PowerPoint.

  3. The interactive component document can be opened and reviewed on all machines even without the eLearning authoring tool software.

- **Alternatives:** If the software rejects the creation of the document in PDF, HTML5, Flash, and Microsoft PowerPoint format, only the instructional design can access the developed interactive component and the review by the content experts is impossible.

- **Pre-condition:** The course author/instructional designer has to get a license for the use of the eLearning authoring tool.
- **Post-conditions:**
    - The instructional designer successfully creates interactive components in format PDF, HTML5, Flash, and Microsoft PowerPoint.
    - Content experts and subject matter experts can correctly open the file on their machines and review the document.
    - The reviewed version is correctly saved, and the instructional designer can correctly open it and proceed to the revision of the draft.
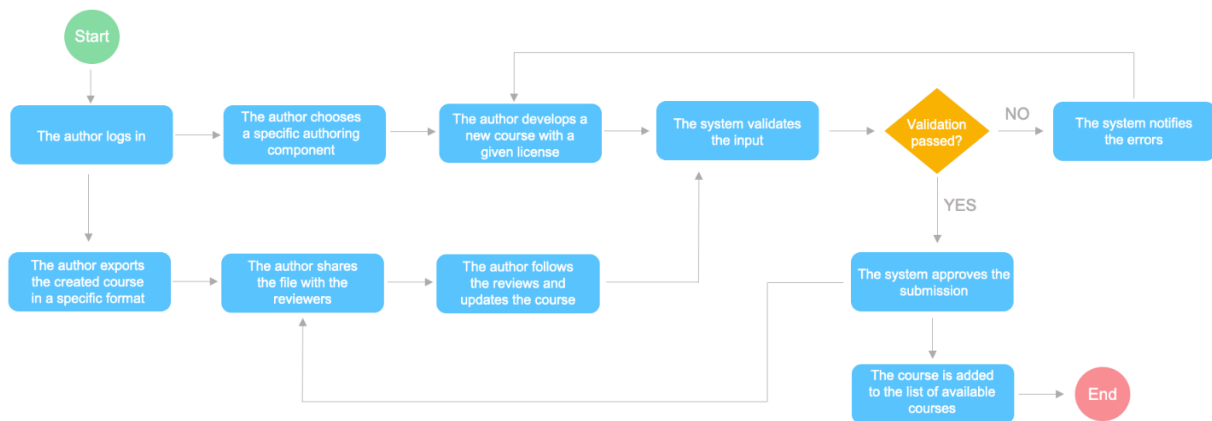- **Assumptions:** None.

Figure 3.4: User flow: Publishing capabilities to respond to different publishing needs

Functional Specification 6.1 - Users access to course and related learning contents

- **Use case:** Course and related learning contents access
- **Actor:** User
- **Description:** The user, in each course, gets access to a predefined set of learning materials, interactive components, open Q&A forum, final test and completion certificate. Further, the user can provide feedback through a specific form and receives information and contact details about the course resource person and external experts.
- **Successful completion:**

    1. The user, clicking on the selected resource, is prompted to the course page where he/she finds the list of training materials arranged by introduction to the course (course guide, LOs, video introduction and preparatory readings); by lessons (interactive components, discussion forum, activities, and self-assessment test); and by evaluation (final test and completion certificate).

    2. By successfully completing one lesson of the course is prompted to the following one.

    3. By completing all lessons and passing the final test (with the pre-set mark), finishes the course and gets the completion certificate.

- **Alternative:** The system does not move to the following lesson and/or does not issue the completion certificate, if not all materials for that lesson are studied and/or if the user does not get the required minimum mark during the final test.
- **Pre-condition:** The user has to be logged in and has to enrol into the course in order to access the course page.
- **Post-condition:** The user receives a completion certificate.
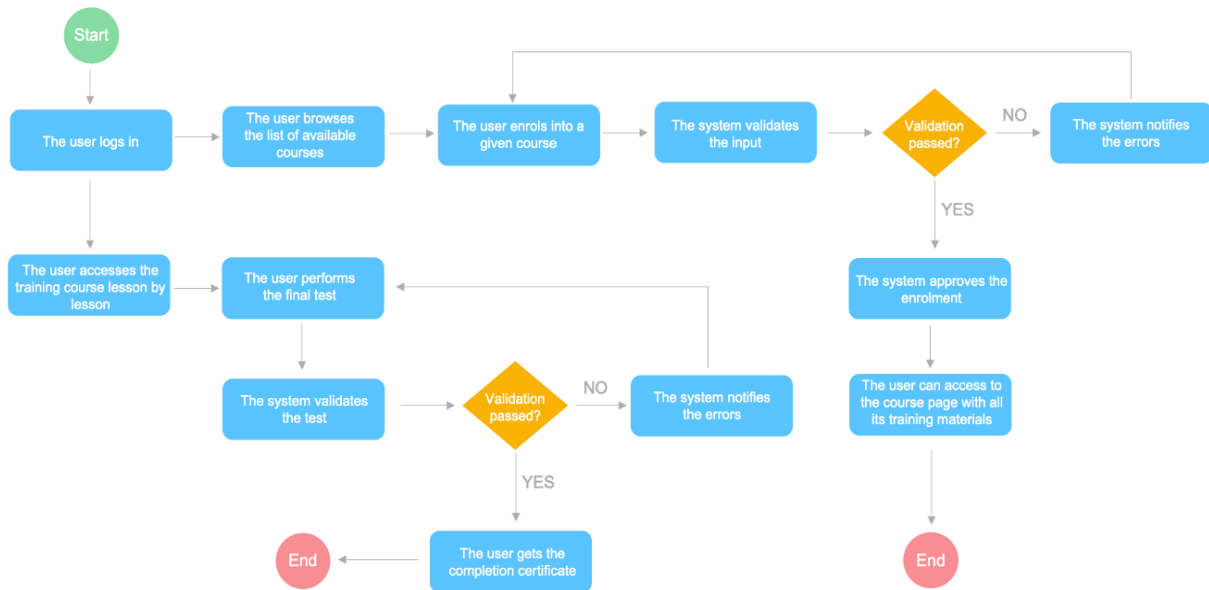- **Assumptions:** None.

Figure 3.5: User flow: Users access to course and related learning contents.

Functional Specifications 9.1 and 9.2 - Access to trainers' directory page for Platform registered users and Administrator vs. External users

- **Use case:** Access to trainers' directory page.
- **Actor:** Platform registered users, the administrator, and External users.
- **Description:** Platform registered users and the administrator get full access to the trainers' directory page and see their profile (personal data, background, expertise, experiences, courses developed, contact details, etc.); external users – those not registered to Platform – get access to the trainers' directory page but get limited access to the trainers' profile. In particular, external users do not access personal data and contact details of the trainers.
- **Successful completion:**

    1. The users, after completing the registration to the platform, and the administrator access trainers' full profiles (personal data, background, expertise, experiences, courses developed, contact details, etc.).

    2. The external users – those that access the platform but choose not to create a profile – see the trainers' directory with their names, expertise, courses developed and so on but do not see contact details and personal data of the trainers and cannot contact them.

- **Alternatives:** None.
- **Pre-condition:** The users and the administrator must create a personal profile and be logged in, to access the full trainers' directory.
- **Post-conditions**: None.
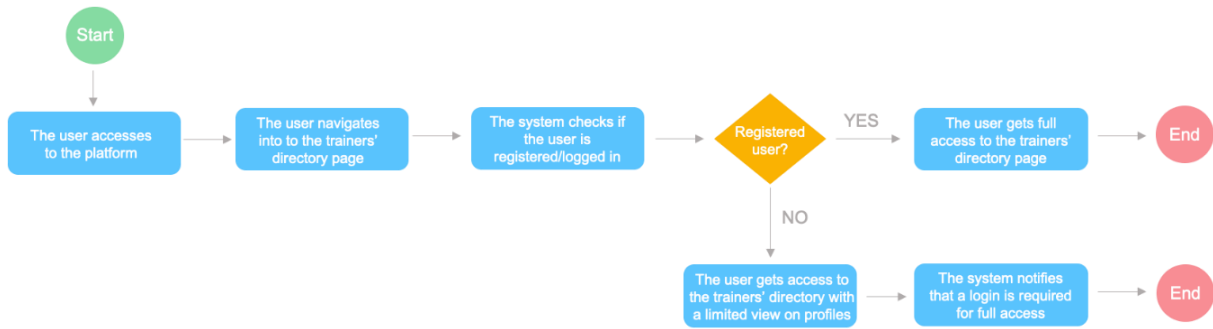- **Assumptions:** None.

Figure 3.6: User flow: Access to trainers' directory page for Platform registered users and Admins vs. External users.

4 Alignment with the EOSC Rules of Participation and EOSC Marketplace

Following the Rules of Participation of EOSC and defined minimal set of rights, obligations and accountability of training service providers, workflows for onboarding training providers in the EOSC Portal will be set up.

This activity will also co-create a checklist for quality assurance in line with relevant certification schemes and minimum requirements for EOSC training providers, such as materials review policies, prerequisites, continuous improvement based on feedback, responsibilities, etc.

> The roadmap for alignment with the EOSC Rules of Participation and EOSC Marketplace is described and will be updated in the following living Wiki page, publicly available for consultation and feedback:
>
> https://wiki.eoscfuture.eu/x/8gOK.

5 Release plan

The Training Resource Catalogue and the EOSC Learning Platform will be released for testing, assessment, and refinement via a number of BETA releases (M14, M16, M18, M20) and pilots during the project duration, aiming to have the first version of the catalogue in production by month 18 (September 2022) and the beta version of the platform also by month 18.

Training Resource Catalogue

The first BETA release of the Training Resource Catalogue is planned to be realized by month 14. For this first phase the available functionalities will be:

- Search/browse training resources;
- Display of landing pages;
- Definition and management of a metadata set for Learning Resources, courses and/or curricula;
- Registration and login (to access metadata records);
- Manual content creation;
- PID schema.

The second BETA release (M16) will address the issues from the first BETA version and will provide the following additional functionalities:

- Aggregation mechanism;
- Review process;
- Versioning;
- User profile.

Production version will be made available by month 18 and at least two updates will be made available until the end of the project, which will include, apart from including the comments from the pilots and tests, the following functionalities:

- Feedback mechanisms;
- Support for different languages;

Learning Platform

The first BETA release of the Training Resource Catalogue is planned to be realized by month 16. For this first phase the available functionalities will be:

- Learning Management System (LMS) – Users / Admin;
- E-learning authoring tool (technical specifications);
- Standards for e-learning object packages (technical specifications);
- Admin Dashboard.

The second BETA release (M18) will address the issues from the first BETA version and will provide the following additional functionalities:

- User Experience (UX);
- Search Engine;
- Learning Content Delivery and Learning Paths;
- Help Centre.

Production version will be made available by month 20 and at least two updates will be made available until the end of the project. For this phase the available additional functionalities will be:

- Trainers' Directory;
- Security (specifications).

The release plan presented here will continue to be developed in the course of the development of the Training Catalogue and Learning Platform, according to the needs and in collaboration with the Work Package 5, in the following Wiki page:

https://wiki.eoscfuture.eu/x/zAOK.

6 Appendix A: Minimal set of metadata for learning resources

A minimal set of metadata for learning resources was defined by the RDA Minimal Metadata for Learning Resources Focus of the Education and Training on Handling of Research Data Interest Group.

The following table, containing the minimal set of metadata for learning resources, is publicly available in the following Wiki page at https://wiki.eoscfuture.eu/x/zwOK, to be updated according to the needs that could be identified during the development of the Training Catalogue.

Table 6-1: RDA Minimal Metadata for Learning Resources customized for the EOSC training resources

Name	Definition	Type[1]	Usage notes, allowed values, examples, other constraints
Title	The human readable name of the learning resource.	TEXT (1000)	**Notes**: It should be transcribed from the learning resource itself or the descriptive metadata found on the resource landing page. If no title exists, the provider should create it. If the resource exists in more than one language, a separate record should be created for that version. **Allowed values**: Should be Unicode and allow for diacritics. **Example**: 'CESSDA Data Management Expert Guide' **Constraints**: Not repeatable
Abstract/ Description	A brief synopsis about or description of the learning resource.	TEXT (2000)	**Notes:** The description can include the relationship of this resource to others, if applicable, e.g., a part within a series or collection, and the existence of translations of the resource into other languages. **Allowed values**: Should be Unicode and allow for diacritics **Example**: 'A guide designed by European experts to help social science researchers make their research data Findable, Accessible, Interoperable and Reusable (FAIR).' **Constraints**: Not repeatable
Author(s)	The name of entity(ies) authoring the resource.	TEXT	**Notes:** Authors should be listed in the order presented on the resource or on the descriptive metadata on the landing page of the resource. Multiple authors should be listed with commas between the names. Names should include given or first name and family or surname, and a personal identifier such as an ORCID, if available. Some input systems may offer separate fields for each of these identifying items. **Allowed values**: Should be Unicode and allow for diacritics **Example**: 'CESSDA Training Team' **Constraints**: Repeatable
Primary Language	The language in which the resource was originally published or made available.	TEXT (2)	**Notes:** If the resource exists in more than one language, that information can be included in the Abstract/Description term. A second record should be created, if possible, for the other language versions of the resource. **Allowed values**: String composed by a code as defined by the code set ISO 639-1:2002 **Example**: 'en' **Constraints**: Not repeatable
Keyword(s)	The keyword(s) or tag(s) used to describe the resource.	TEXT (100)	**Notes**: Keywords may be single words or phrases that characterize what the resource is about. Ideally, the keywords come from a controlled vocabulary of terms that are curated and structured to represent the specific nature of the collection of learning resources, e.g., by subject domain, data format and/or data type. In a web or searchable catalogue / web environment for learning resources, keywords are important to the search engine optimization (SEO) strategy of

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[1] https://www.w3schools.com/sql/sql_datatypes.asp

			the environment, and are used in conjunction with resource titles, descriptions and other educational information such as target audience to improve the findability of the resource on the web or within the catalogue / registry. Keywords are sometimes called 'tags' in non-academic environments. **Allowed values**: Free text or keywords from a given vocabulary. **Example**: data management, data preservation, data discover **Constraints**: Repeatable
License	A license document that applies to this content, typically indicated by URL.	TEXT (100)	**Notes:** The license is used to represent and classify data access policies related to the training resource. It can be a short label indicating the license (e.g., CC BY 4.0) or a full label (e.g., Creative Commons Attribution 4.0 International) or the complete definition (e.g., The data are available under the Creative Commons Attribution 4.0 International Public License (https://creativecommons.org/licenses/by/4.0/). **Allowed values**: Free text or keywords from a given vocabulary, e.g., the NERC Vocabulary Server (NVS), http://vocab.nerc.ac.uk/collection/L08/current/ **Example**: 'Creative Commons Attribution 4.0 International' **Constraints**: Not repeatable
Version Date	The version date for the most recently published or broadcast resource.	DATE	**Notes**: This date may relate to either the publication of a new version of a resource or the modification date of an original version. If the original version of a resource is changed significantly, it may be better to create a new description of the newer version rather than change the version date, especially if the older version of the resource will continue to be made available (similar to a new 'edition' of a published entity). **Allowed values**: Date Format: YYYY-MM-DD IETF RFC3339	ISO 8601; To indicate a date range, follow the RKMS-ISO8601 standard for depicting date ranges. **Example**: '2020-11-12' **Constraints**: Not repeatable
URL to Resource	The URL that resolves to the learning resource or to a 'landing page' for the resource that contains important contextual information including the direct resolvable link to the resource, if applicable.	TEXT (1000)	**Notes**: As this value is intended to at least specify where a resource exists and the mechanism for retrieving it at a resolvable location, it should follow the syntax of URL: http://www.domainname.com/folder-name/web page-file-name.htm. The URL could also point to a 'landing page' for the resource that could include other contextual information, especially if the resource is related to others such as a member of a set or collection of resources. Ideally, the URL would also be a persistent identifier (PID) that provides a long-lasting reference to the resource such as those created and supported by PID systems such as Digital Object Identifiers (DOIs) or Archival Resource Keys (ARKs). **Allowed values**: URL syntax **Example**: 'https://www.cessda.eu/Training/Training-Resources' **Constraints**: Not repeatable
Resource URL Type	The designation of identifier scheme used for the	TEXT (40)	**Notes**: It represents the type of the URL of the resource, that is the used scheme (e.g., Web Address URL, DOI, ARK, etc.). **Allowed values**: Ideally the values used will come from a controlled vocabulary, e.g., the related IdentifierType from DataCite at: https://schema.dataci

	resource URL.		te.org/meta/kernel-4.2/doc/DataCite-MetadataKernel_v4.2.pdf **Example**: 'DOI' **Constraints**: Not repeatable
Target Group (Audience)	The principal user (s) for which the learning r esource was designed.	TEXT (40)	**Notes**: It indicates the target group(s) for which the training resource has been designed and implemented. **Allowed values**: free text (or codes from an existing vocabulary) **Example**: 'Data centre staff' **Constraints**: Repeatable
Learning Resource Type	The predominant type or kind that characterizes the learning resource.	TEXT (40)	**Notes:** Different metadata schemes employ this element to indicate other factors regarding the learning resource type. For instance, LOM indicates the potential educational use(s) or type(s) of content associated with the LR, see example below. LRMI uses a concept scheme. Other values are indeed relevant only to its format or genre (diagram, figure, graph, index, slide, table, narrative text). The vocabulary terms are defined as in the OED: 1989 and as used by educational communities of practice. **Allowed values**: Ideally, this list of types should come from a controlled vocabulary that is actively maintained and curated. **Example**: 'Narrative text' **Constraints**: Not repeatable
Learning Outcome(s)	The descriptions of what knowledge, skills or abilities students should acquire on completion of the resource.	TEXT (1000)	**Notes**: It indicates the learning outcomes after the completion of the training resource. **Allowed values**: free text **Example**: 'At the end of this course the participants will be able to make their research data Findable, Accessible, Interoperable and Reusable (FAIR).' **Constraints**: Repeatable
Access Cost	The potential cost associated to the learning resource.	TEXT (8)	**Notes**: It indicates if the learning resource has an access cost. **Allowed values**: yes, no, maybe with recommendation that further explanation of 'Maybe' goes in the Description field for 'It depends' or 'It changes' explanations). **Example**: 'no' **Constraints**: Not repeatable
Expertise Level	Target skill level in the topic being taught.	TEXT (40)	**Notes:** It indicates the expertise level required for the specific learning resource. **Allowed values**: free text (or codes from an existing vocabulary e.g., beginner, intermediate, advanced, etc.) **Example**: 'beginner' **Constraints**: Not repeatable

Source: Adapted from
https://docs.google.com/spreadsheets/d/1eyNtXjanwQb_nFfM4CJjEb2bMsEZIE4fd4DKnlPKBMc/edit#gid=0