ATS2020 - Assessment of Transversal Skills

D2.1.1: User and Technical Requirements for Learning Platform

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Assessment of Transversal Skills 2020
Website: http://ats2020.eu/

Table of Contents

1 INTRODUCTION

1.1 OVERVIEW OF PROJECT

The Assessment of Transversal Skills 2020 (ATS2020) project aims to provide teachers and students with an innovative learning model which supports the development and assessment of transversal skills embedded in teaching and learning. This model will be implemented and evaluated as part of a large-scale classroom pilot project leading to policy recommendations at both national and European levels. A key feature of the pilot implementation is the **provision of a range of tools and technologies for the assessment of these skills**, through the support of students' internal feedback and self-regulation as well the support of (external) formative assessment and feedback.

The selected tools and technologies need to be able to allow teachers and students (at a sufficiently large scale and diverse for valid conclusions) to collaborate and make evidence-based decisions while (re)designing instruction and learning. Evidence of learning will be gathered using an ePortfolio three-level ePortfolio process (repository, workspace and showcase) with an embedded continuous reflection cycle of "my learning". In addition, these tools need to be capable of providing a scoring/assessment system allowing for both internal (by the teacher or student) and external assessment (consortium). All the above need to be combined with monitoring/analytic tools allowing for different views and aggregations for various stakeholders (students, teachers, headmasters, parents, educational authorities, the researchers).
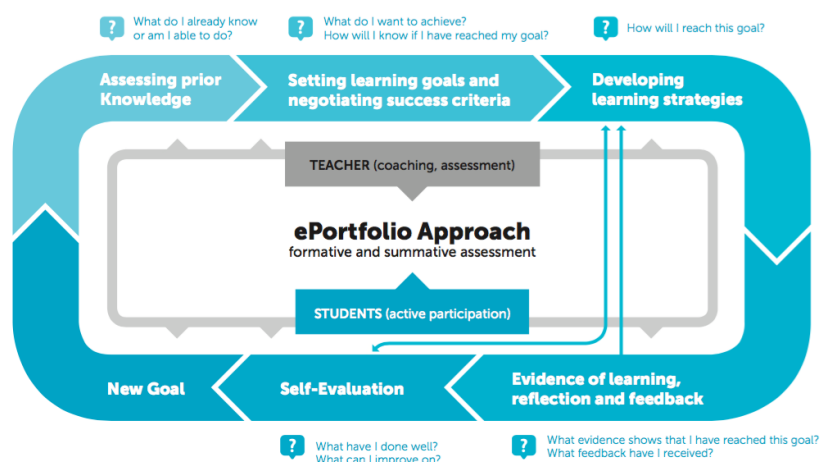
Figure 1: ePortfolio Approach for formative and summative assessment

1.2 PURPOSE OF THE DOCUMENT

The purpose of this document is to define the **User Requirements** (**UR**) for an online **Learning Platform** that will be used for student-centred learning and assessment and is required for the pilot implementation of the ATS2020 project. The User Requirements will serve as the basis for the system specifications of the platform, as the system will be developed in order to respond and cover the user requirements. This practice will aid in developing a successful tool.

2   USER REQUIREMENTS & METHODOLOGY ANALYSIS

2.1   OVERVIEW OF METHODOLOGY

Requirements' capture has two objectives: **find** the true requirements and **represent** them in a suitable way for users (i.e. students, teachers) and administrators. The term "true requirements" refers to those requirements that, when implemented will add the expected value to the users. By the latter, we mean in particular that the resulting description of the requirements must be understandable by users.

There are different starting points for capturing requirements. Concerning ATS2020, the first step was to review the state-of-the-art of existing web based tools, learning platforms and ICT-supported assessment methods, in order to provide the functional affordances for assessment processes as well as for tools supporting these processes in a learner-centred scenario (see deliverables 2.1 and 2.2). This may be used to provide the necessary input to define a product that is up to date with current technological and market trends and therefore useful and competitive.

Detailed system requirements are derived and used for the system design specifications, together with test plans and procedures necessary for implementation and validation. This identification of system requirements is based on **use cases**. Normally, a system has many types of users. Each type of user is represented as an **actor**. Actors use the system as they interact with use cases. A use case is a sequence of actions that the system performs to offer some results of value to an actor. All the actors and the use cases of a system make up a use-case model. During analysis and design, the use-case model is then transformed into a design model through an analysis model.

2.2   MANAGING REQUIREMENTS

It is important at this stage to set the Requirements **Management Plan** for the ATS2020 User Requirements identification and synthesis process. In this way the requirements identified are going to be properly recorded and organized, avoiding the risk of confusion and misunderstanding among the project team and the potential end users.

2.2.1   Important Requirements Concept

To apply requirements management skills to a project, certain requirements management concepts are useful for everyone on the project to understand. These include:

- Requirements types
- Multi-dimensional attributes

2.2.2   Identifying Requirement Types

The larger and the more intricate a system is, the more types of requirements appear. A requirement type is simply a class of requirements. By identifying types of requirements, teams can organize large numbers of requirements into meaningful and more manageable

groups. Establishing different types of requirements in a project helps team members classify requests for changes and communicate more clearly.

Usually, one type of requirement can be broken down, or decomposed, into other types. ePortfolio rules and vision statements can be types of high-level requirements from which teams derive user needs, features, and product requirement types. Use cases and other forms of modelling drive design requirements that can be decomposed to software requirements and represented in analysis & design models. Test requirements are derived from the software requirements and decomposed to specific test procedures. When there are thousands or even more instances of requirements in a given project, classifying requirements into types, makes the project more manageable.

For the ATS2020 project the following types of requirement are deemed as necessary:

- Features - FEAT

- Functional Requirements with Use Cases - UC

- Non-Functional Requirements – NONF

2.2.3   Identifying Multi-Dimensional Attributes

Each type of requirement has attributes, and each individual requirement has different attribute values. Requirements may be assigned priorities, identified by source and rationale, given a degree-of-difficulty designation, or associated with a particular iteration of the system. The requirement type and attributes for each type are defined for the entire project, ensuring usage consistency across the team. This way, even without displaying the entire text for each requirement, we can learn a great deal about each requirement from its attribute values. Within the scope of ATS2020 project the following attributes were considered necessary for each of the requirement types mentioned above:

- Attributes assigned to ATS2020 Features (see Table 1)

- Attributes assigned to ATS2020 Functional Requirements (see Table 2)

- Attributes assigned to ATS2020 Non-Functional Requirements (see Table 3)

Attribute	Description and Possible Values
Status	Tracks progress during definition of the project baseline and subsequent development. Set after negotiation and review by the partners. *Possible values*: ● **Proposed**: used to describe features that are under discussion but have not yet been reviewed and accepted by concerned partners. ● **Approved:** used to describe features that are deemed useful and feasible and have been approved by the partners. ● **Not Approved:** used to describe features not to be incorporated in the system specification.
Priority/Benefit	Ranking by relative priority or benefit to the end user, opens a dialogue between partners in order to decide to incorporate features proposed by any of the team members and/or users. *Possible values*: ● **Critical:** features that exist in the Initial Plan and are also important for

| | the ATS2020 overall functionality. All critical features must be implemented in the first release of the system, as they are high-priority requirements.
● **Important:** features that exist in the Initial Plan <u>or</u> are important for the ATS2020 overall functionality. All-important features are strongly desired but could be implemented in a next release.
● **Nice-to-have**: used for features that enhance competitiveness of the product. Based on the state-of-the-art of customer service systems. They are low-priority requirements and so they are desired but optional. |

Table 1: Attributes assigned to ATS2020 Features

Attribute	Description and Possible Values
Priority/Benefit	Ranking by relative priority or benefit to the users, in order to decide to incorporate functional requirements proposed by any of the users. *Possible values*: ● **Critical:** functional requirements which are highly important for the ATS2020 overall functionality. All critical non-functional requirements must be implemented in the first release. ● **Important:** functional requirements that are important for the competitiveness of the product, based on design guidelines, legal guidelines or the state-of-the-art of customer service systems. ● **Nice to have**: used for functional requirements that enhance competitiveness of the product. Nice to have requirements are mainly based on market research. ● **N/A**: used for use case steps that are initiated by actors.

Table 2: Attributes assigned to ATS2020 Functional Requirements

Attribute	Description and Possible Values
Status	Tracks progress during definition of the project baseline and subsequent development. Set after negotiation and review by the ATS2020 team. *Possible values*: ● **Proposed**: used to describe non-functional requirements that are under discussion but have not yet been reviewed and accepted by the team. ● **Approved:** used to describe non-functional requirements that are deemed useful and feasible and have been approved by the team. ● **Not Approved:** used to describe non-functional requirements to be incorporated in the system specification.
Priority/Benefit	Ranking by relative priority or benefit to the user, in order to decide to incorporate non-functional requirements proposed by any member of the team. *Possible values*: ● **Critical:** non-functional requirements that are highly important for the ATS2020 overall functionality. All critical non-functional requirements must be implemented in the first release. ● **Important:** non-functional requirements that are important for the competitiveness of the product, based on design guidelines, legal

| | guidelines or the state-of-the-art of customer service systems. |
| | ● **Nice to have**: used for non-functional requirements which enhance competitiveness of the product. Nice to have requirements are mainly based on market research. |

Table 3: Attributes assigned to ATS2020 Non-Functional Requirements

3 USER REQUIREMENTS IDENTIFICATION

To effectively provide products and services that meet users' real needs, it is necessary to identify and involve all types of users as part of the Requirements Modelling process. The potential users of the system are identified, ensuring that the stakeholder community represents them adequately.

3.1 OVERVIEW OF USERS

3.1.1 End – Users Profile

The End users are the **student** and **teachers** participating in the implementation plan of the ATS2020 project, and will be using the corresponding tools and services through a web based interface, using phones, tablets and PCs. Students are children between 10-16 years old with their respective teachers that have pre-registered to the ATS2020 project.

3.1.2 Administrators Profile

Global administrators of the system will be either from the Cyprus Pedagogical Institute (CPI) or the Danube University Krems (DUK) or both. Global administrators will have access to all features in the admin center of the platform and will be able to perform all tasks, including assigning other admin roles. Furthermore, the global administrators will be responsible for the supervision of the creation of any initial screens and content for the users, and for monitoring all user's interactions through web and learning analytics.

In addition, **regional administrators** (at least one person from each country participating in the project) will be assigned as user management administrators. The regional administrators will be able to manage user accounts, reset passwords, monitor services and support requests. They won't be able though to create other admin roles, or delete a global admin.
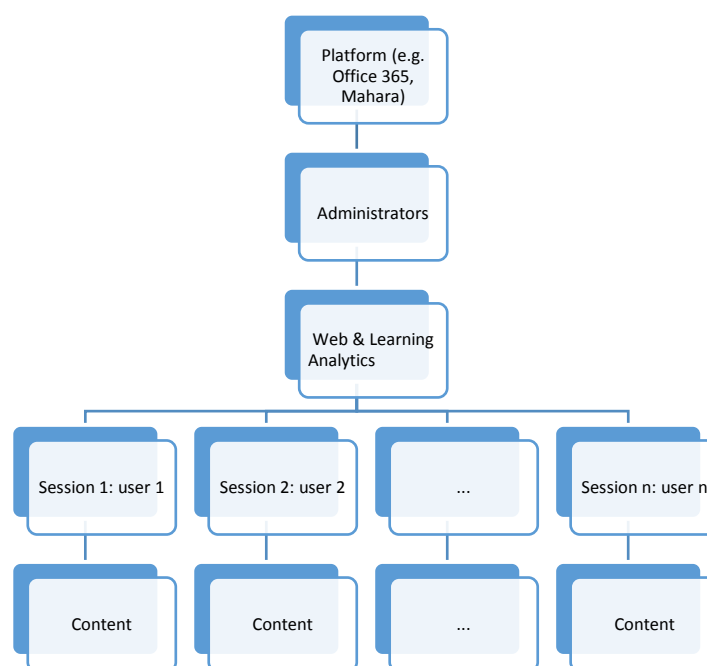
Figure 2: Overview of users

3.2   ATS2020 LIST OF FEATURES

This section summarizes the set of features, with their most essential attributes, that will be provided by the ATS2020 tool in order to respond to:

- the project imperatives identified,

- the needs expressed by the potential users and

- the Contract agreement signed with the European Union.

Requirements	Status	Priority/Benefit
FEAT 1: Database		
FEAT 1.1: The system shall incorporate a database with profiles of registered administrators.	Approved	Critical
FEAT 1.2: The system shall incorporate a database with profiles of students and teachers.	Approved	Critical
FEAT 1.3: The system shall maintain structured information regarding the End-user requests.	Approved	Nice to Have
FEAT 2: Data Input and Retrieval		
FEAT 2.1: The system shall provide access and data manipulation via a web interface	Approved	Critical
FEAT 2.2: The system shall provide the ability to add the profile of a newly registered user in the system's database.	Approved	Critical
FEAT 2.3: The system shall empower users to perform on-mobile and on-line queries through a specially designed and user friendly GUI (Graphical User Interface).	Approved	Critical

FEAT 2.4: The system shall provide the facility for email notification to the teachers and students	Approved	Critical
FEAT 2.5: The system shall provide login and password retrieval to the users automatically.	Approved	Critical
FEAT 3: User Interface		
FEAT 3.1: The system shall have a web interface.	Approved	Critical
FEAT 3.2: The user interface of the system shall be available in the languages of all countries participating in the project.	Approved	Critical
FEAT 4: User-Friendliness		
FEAT4.1: The system shall provide a user-friendly administrator and user interface through web and mobile software	Approved	Critical
FEAT4.2: The system shall allow the administrators to browse through analytics with ease and comprehension.	Approved	Important
FEAT 5: Help facilities		
FEAT 5.1: The system shall provide flexible and easy navigation for the administrator in manipulating the user Database.	Approved	Important
FEAT 5.2: The system shall provide help menu for the end user through the use of FAQ.	Approved	Important
FEAT 6: Interfacing with other systems		
FEAT 6.1: The system shall provide an interface for exporting existing information and analytics to other tools (spreadsheet)	Approved	Critical
FEAT 7: Ease of maintenance		
FEAT 7.1: The system shall assist the administrators in maintaining the content information in the Database.	Approved	Important
FEAT 7.2: The system shall assist the end-user to contact the ATS2020 regional or system administrator for any help	Approved	Important
FEAT 8: Availability		
FEAT 8.1: The system shall be available on a 24/7 basis.	Approved	Critical

Table 4: List of features

4   ATS2020 USER REQUIREMENTS SPECIFICATIONS

In this section we move on by defining more specific requirements that will need to be imposed on the solution so to build a system that conforms to those requirements and be certain that the system will deliver the features promised. In turn, since the features address one or more user needs, we will have addressed those needs directly in the solution.

In general, requirements can be categorized as functional or non-functional. **Functional requirements** express an action that the system should perform and usually define both the stimulus and the response, or input and output. They tend to be more dynamic and

often require more detail in order to clearly understand them. **Use Cases** are a powerful technique used for capturing and expressing detailed system behavior. **Non-functional requirements**, the most common type of requirement, identify the things that the system can do, usually in response to external input

4.1 DOMAIN GLOSSARY

Before moving on to the requirements specification it is important to define a common vocabulary. A glossary can be used to define important and common terms used by analysts (and other developers) when they describe the system. A glossary is very useful in reaching a consensus among developers regarding the definition of various concepts and notions and to reduce the risk of misunderstanding in general. The glossary terms used in this document are listed in the following table.

Glossary Term	Term Definition
Logon Screen	The screen where the user enters his/her user name and password in order to access the ATS2020 administration and user Tool.
Info Retrieval	The process through which users try to reach information and data they need.
Welcome Screen	This screen is displayed to the user after he/she has successfully registered and entered his/her details in the system.
Workflow	The tasks, procedural steps, organizations or people involved, required input and output information, and tools needed for each step in a process.

Table 5: Glossary of important terms

4.2 ATS2020 FUNCTIONAL REQUIREMENTS

4.2.1 Global View of ATS2020 Actors

Actor	Description
End user - Student	Is the end user of the system with access to his/her account and the common files or pages that other students or the teacher shares
End user - Teacher	Does all the above plus: he can control students, assign students in classrooms, monitor and change relevant content.
Regional Administrators (national Level)	Does all the above plus: coordinates specific networks of users or groups that have registered in the platform on national level, check and export system analytics.
System Administrator	Does all the above plus: is responsible for the database maintenance of the ATS2020 platform and the uninterrupted service that is offered.

Table 6: Actors

4.2.2   ATS2020 Use Case Models

UC 1: User registration

Brief Description: Register or activate the users account.

Flow of Events: The global or regional administrator logs in to the administration control panel and creates a new user with the appropriate characteristics. The user is then assigned to the appropriate profile (teacher or student) or/and is added to a specified group in order to be allowed accessing the appropriate sessions. The system then sends the corresponding login information back to the user via email and allows the accessing of the ATS2020 platform.

Technical issues: Important element for the registration process is the personal or work email address of the participant.
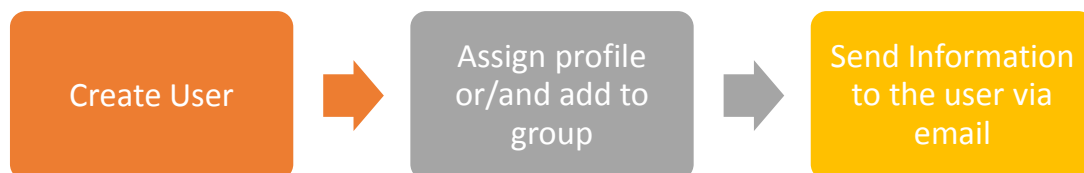
Figure 3: Workflow for user registration

UC 2: User Login and landing page

Brief Description: Define how users log in and what the first page they are viewing is.

Flow of Events: Users will be able to login to the platform through a web portal. The web portal must provide information (short description or link/s to other web page/s) about the terms and conditions for using the corresponding platform, and optionally about the project.

Once the user is logged in, he/she will be directed to the appropriate dashboard based on the users' profile, i.e. teacher or student. In the case this is not done automatically, there should be links to the teacher and student dashboards, accessible based on the user profile. Both, student and teachers' dashboard, need to provide information (short description or link/s to other web page/s) of the project and the partners participating.

The landing page must display the European Union emblem (flag) and to acknowledge the support received under the Erasmus+ programme of the European Union as described in details in the document "Guidelines for beneficiaries and other third parties".

Figure 4: Workflow for user login and landing pages

UC 3 -Teacher Dashboard:

Brief Description: This is the dashboard that only the teachers will have access to. The teacher will control all learning spaces and student activities from here.

Flow of Events: Teachers will be able to create and manage learning spaces, access various student and class activities from this dashboard. More specifically they will be able to:

- **Edit and display profile**: Teacher will be able to store in his Profile area contact and personal information, such as name, description, email, picture, blog address etc. This information can be edited, and the teacher will be able to select the information to be shared with others.

- **Create a new learning space for class**: Teacher will be able to create a new digital learning space for their classroom, select and invite registered students to that learning space, share educational content and assign activities, define areas for student collaboration and private space.

- **Manage class learning space:** Teacher will be able to manage learning spaces for different classes that has been previously created: add or remove students, add or remove other teachers, delete a learning space.

- **Manage assessments:** The teacher will be able to have an overview on students' assessment activities (self- and peer-assessment) as well as on pending and performed assessment tasks for/of her/himself.

- **Access file repository:** The teacher will have access to personal file repository in order to add, edit, store and share files. The capacity of the file repository will be defined by the system administrator.

- **Create teacher journal (My Learning)**: The teacher journal will be a personal digital workplace where the teacher can capture his learning, reflect on prior knowledge and set goals, set and describe strategies to follow, place artefacts to support learning, and finally reflect on the whole learning process.

- **Create teacher portfolio (ePortfolio):** The teacher portfolio is a digital workspace whereby he can showcase his competences, achievements and products. This workspace can be private or accessed by a wider audience, such as other teachers and students.

- **Communicate with others:** Teacher will be able to communicate with other teachers and students.

- **Contact regional administrator for support**: via a contact form or an email address.

Edit Profile	Create Learning Space for Class	Manage Class Learning Space	Manage Assessments
Access Repository	Create Journal	Create ePortfolio	Communicate

Figure 5: Main features of teacher dashboard

UC 4 -Student Dashboard:

Brief Description: This is the dashboard that only students will have access to. The student will control all his/her assignments and activities that his/her teacher defines.

Flow of Events: Students will be able to access their personal space and collaborate in class activities from this dashboard. More specifically they will be able to:

- **Edit and display profile**: The student will be able to store in his Profile area contact and personal information, such as name, description, email, picture, blog address etc. This information can be edited, and the student will be able to select the information to be shared with others.

- **Access file repository:** The student will have access to a personal file repository in order to add, edit, store and share files. The capacity of the file repository will be defined by the system administrator.

- **Create student journal (My Learning)**: The student journal will be a personal digital workplace where the student can capture his learning, reflect on prior knowledge and set goals, set and describe strategies to follow, place artefacts to support learning, and finally reflect on the whole learning process.

- **Create student portfolio (ePortfolio):** The student portfolio will be a dynamic digital workspace whereby students can capture their learning, their ideas, access their collections of work, reflect on their learning, share it, set goals, seek feedback and showcase their learning and achievements. At this level peers or teachers could provide feedback and formative assessment for learning.

- **Participate in learning space:** The student will be able to participate in learning spaces that he/she is a member of, access educational content and perform educational activities in groups or individually.

- **Manage Assessments:** The student will be able to manage assessments (self-assessment, peer-assessment & assessment by their teacher) by connecting them with their ePortfolio or including them there as artefacts,

- **Communicate:** Student will be able to communicate with teachers and other students
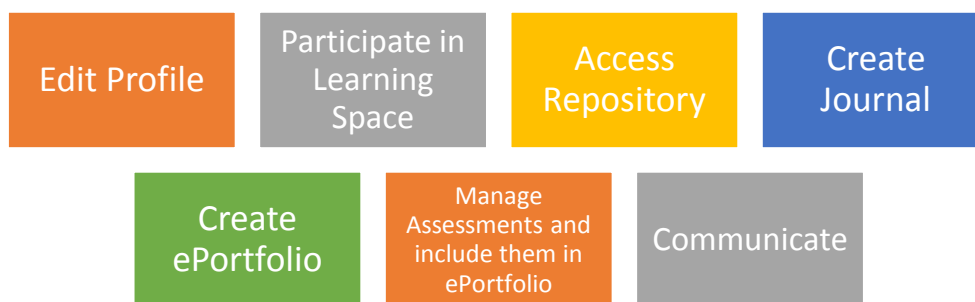
Figure 6: Main features of student dashboard

4.3   NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements are presented below to serve as supplementary specification to functional requirements. These requirements are used most typically to express some of the "attributes of the system" or "attributes of the system environment" elements of our elaborated definition. The below classification scheme helps us to focus on the ATS2020 system we are going to build.

4.3.1   Usability

Generic guidelines:

- The User Interface (UI) will minimize the use of large-sized graphics

- The UI will support a minimum resolution a user can have, depending on specific pc / mobile device

Consistency guidelines:

- The UI will be consistent within the site (web and mobile) - the same functionality will have the same aspect and layout throughout the site

- The UI will be consistent with usage standards – i.e. blue underlined links for links – to help the users' compensation on how the site works

Navigation Help:

- The UI will provide shortcut icons to most used services

- The UI will always provide tools for navigation to the previous session and parent page

- The UI will provide map for session navigation

Design Guidelines:

- The UI will avoid too many links in one page

- The UI will graphically and visually separate information groups

- The UI will avoid animation that distracts users from the content

Feedback Guidelines:

- The UI will provide tools for generic feedback

- The UI will provide a webmaster email to receive problem reports

Performance Capacity:

- The system will support hundreds simultaneous connections

- The main process power will be on cloud based system

4.3.2 Robustness / Reliability / Availability

Robustness / Reliability / Availability:

- The system availability will be near to 100 %.

- The service availability is relative to network, server and power supply availability.

- Network availability should be considered near hosting provider availability since cloud uses fail-safe equipment and redundancy.

- Power availability is considered 100% assuming uninterruptible power supply support exists on all hardware used by ATS2020 and the network providers.

4.3.3   Data and Security

Data Protection and Security

- The system must protect all stored data from misuse and must respect the rights of the data owners which are guaranteed by the European Union's (EU) Data Protection Directive 95/46/EC.

- The system must protect all personal data no matter where it is sent, processed or stored, even outside the EU, and therefore must comply with the EU standard contractual clauses (also known as the "Model Clauses").

- The users must be able to know how their data are processed, and this information must be available in a clear and understandable way.

- The users must have the "right to be forgotten": when a user no longer wants his data to be processed, and provided that there are no legitimate grounds for retaining it, the data will be deleted.

- Consent for processing the personal data of a child must be given or authorized by the holder of the parental responsibility over the child. The age threshold is for Member States to define within a range of 13 to 16 years.

- All system data must be backed up every 24 hours and the backup copies must be stored in a secure location which is not in the same building as the system.

- All external communications between the system's data server and clients must be encrypted.

Administrator Authorization:

- All administrator users accessing the system will be required to use passwords.

Security Levels:

- **Level 0 – System Administrator:** In this level the administrator can access everything, use all the software and see all the data traffic.

- **Level 1 – Regional Administrator:** In these level the administrator can view and manage the profiles of all users belonging in the network he/she is coordinating.

- **Level 2 – User operational control:** In this level the user will have a unique security key to be identified in the system.

Data Collection

- Data collected will be organized in a database. This database can be considered as a collection of referenced data that acts as a model of reality. Data that will be collected and anonymously transferred by using specific user-codes that will be reverse - referenced in the server. Only the system administrator will be able to access them.

4.3.4   Deployment

Availability to end-users and support staff:

- The system will be available to end-users via web and mobile browsers

- The system admin panel will be available to ATS2020 administrators via a web browser

4.3.5   Online User Documentation and Help System Requirements

Online Documentation

The system will provide user's manual in PDF format for the users to download.

4.3.6   Interfaces

User Interfaces:

- **Session content management:** All the relevant information about sessions and content inside will be updated through an administration web based panel.

- **User Analytics management:** This graphical user interface is used by system administrators for visual analytics information about sessions, users and the use of the system.

- **Learning Analytics:** Is the field associated with deciphering trends and patterns from educational big data, or huge sets of student-related data, to further the advancement of a personalized, supportive system of education. We need learning analytics that can use intelligent data, learner-produced data, and analysis models to discover information and social connections, and to predict and advise on learning (see Figure 7).
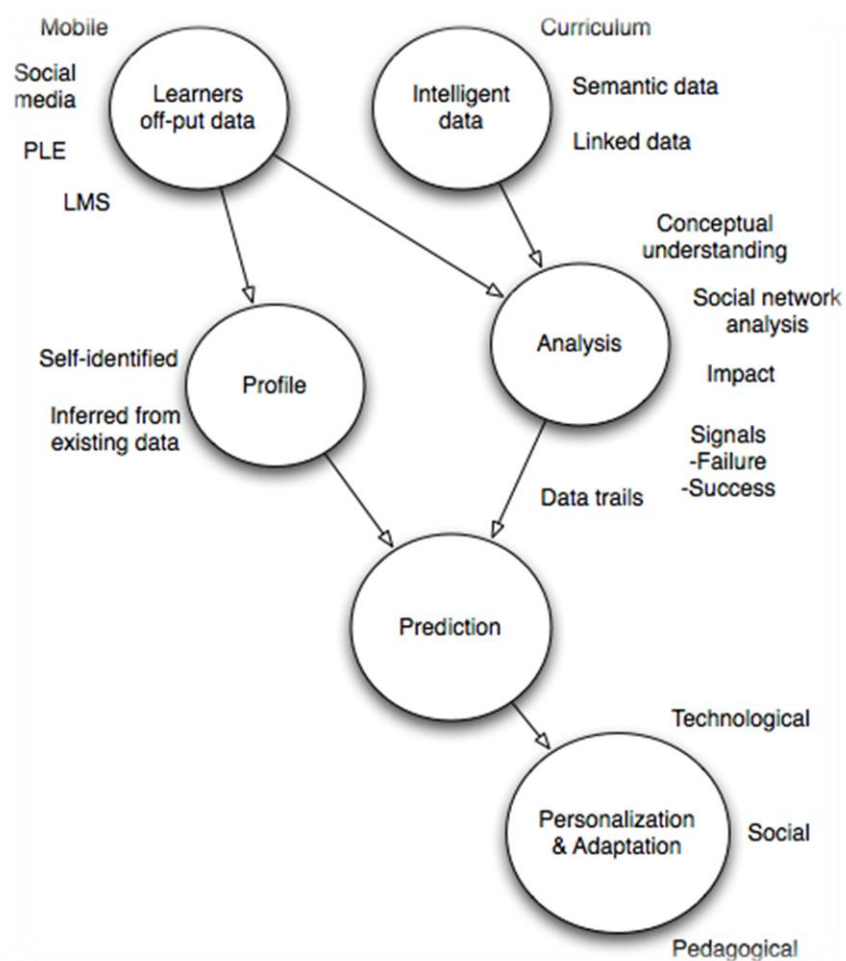
Figure 7: Example of process for Learning Analytics

4.3.7 Legal, Copyright and Other Notices

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    o **Cite the specific CC license the work is under**. If the work is being published on the Internet, the license citation links to the license on the CC website.

4.4   REQUIREMENTS ATTRIBUTE MATRICES

Requirements Attribute Matrices provide a hierarchical view of requirements, displaying parent/child relationships, prioritization and their respective attributes. Parent/child relationships between requirements of the same type are set, allowing for traceability to be established automatically. Prioritization of system requirements also allows the system's development team to identify points requiring special effort or attention. Prioritization also helps to resolve conflicting requirements.

4.4.1   Functional requirements attribute matrix

The following table outlines the functional requirements of the platform along with their attributes. More details of the functional requirements can be found in Section 4.2.

Requirements	Status	Priority/Benefit
UC1: User Registration	Approved	Critical
UC2: User Login and landing page	Approved	Critical
UC3: Teacher Dashboard	Approved	Critical
UC4: Student Dashboard	Approved	Critical

Table 7: Functional requirements attribute matrix

4.4.2   Non-functional requirements attribute matrix

The following table outlines the non-functional requirements of the platform along with their attributes. More details of the functional requirements can be found in Section 4.3.

Requirements	Status	Priority/Benefit
4.3.1 Usability		
Generic guidelines	Approved	Important
Consistency guidelines	Approved	Important
Navigation Help	Approved	Nice to Have
Design Guidelines	Approved	Nice to Have
Feedback Guidelines	Approved	Important
Performance Capacity	Approved	Important
4.3.2 Robustness / Reliability / Availability		
Robustness / Reliability / Availability	Approved	Critical
4.3.3 Data and Security		
Data Protection and Security	Approved	Critical
Administrator Authorization	Approved	Critical

Security Levels	Approved	Important
Data Collection	Approved	Important
4.3.4 Deployment		
Availability to end-users and support staff	Approved	Critical
4.3.5 Online User Documentation and Help System Requirements		
Online Documentation	Approved	Important
4.3.6 Interfaces		
User Interfaces	Approved	Critical
4.3.7 Legal, Copyright and Other Notices		
Creative Common License	Approved	Critical
Consumer Protection	Approved	Important

Table 8: Non-functional requirements attribute matrix

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