



D4.1 Studying abroad - Use Case Definition & Requirements

Document Identification			
Status	Final	Due Date	30/04/2020
Version	1.0	Submission Date	30/04/2020

Related WP	WP4	Document Reference	D4.1
Related Deliverable(s)	D4.2, D4.3, D4.4, D2.1, D2.4	Dissemination Level (*)	PU
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Keywords:

Studying abroad, enrolment to higher education, study grant, diploma recognition

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This document is issued within the frame and for the purpose of the DE4A project. This project has received funding from the European Union's Horizon2020 Framework Programme under Grant Agreement No. 870635. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the European Commission.

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Document History			
Version	Date	Change editors	Changes
0.1	4/02/2020	Alberto Crespo (Atos) Javier Presa (Atos)	Initial version of ToC
0.3	10/02/2020	Atos & Pilot Leaders	Approx. lengths discussed, structure agreed
0.4	06/03/2020	UJI, JSI, MIZŠ	Content for Chapters 3, 4.1 and 4.3
0.5	12/03/2020	UM	Content for Chapter 4.3
0.6	18/03/2020	UM, JSI	Corrections to Chapters 4.1, 4.3
0.7	25/03/2020	BOSA, JSI, UJI	Content for Chapters 4.1, 4.2, 4.3, and 6
0.8	08/04/2020	BOSA, JSI, UJI, UM	Content to Chapters 4.2, 4.3, and 5
0.85	14/04/2020	BOSA, JSI, MPTFP-SGAD, UJI, UM	Version for internal review
0.95	27/04/2020	BOSA, JSI, UJI, UM	Addressed comments from the Internal review
1.0	29/04/2020	ATOS	Quality review for submission

Quality Control		
Role	Who (Partner short name)	Approval Date
Deliverable leader	Tomaž Klobučar (JSI)	28/04/2020
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List of Acronyms

Abbreviation / acronym	Description
CEF	Connecting Europe Facility
CRUE-TIC	Conference of Rectors for Spanish Public Universities
DC	Data Consumer
DE4A	Digital Europe for All
DG CNECT	Directorate-General for Communications Networks, Content and Technology
DG EAC	Directorate-General for Education, Youth, Sport and Culture
DID	Decentralized Identifier
DIGIT	Directorate-General for Informatics
DP	Data Provider
EAR	European Area of Recognition
eID	Electronic identity
EBP	European Blockchain Partnership
EBSI	European Blockchain Services Infrastructure
EC	European Commission
ECTS	European Credit Transfer System
EDCI	European Digital Credentials Infrastructure
eduGAIN	Education Global Authentication Infrastructure
EHEA	European Higher Education Area
eIDAS	Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC
eID4U	eID for University
EIF	European Interoperability Framework
EIRA	European Interoperability Reference Architecture
EMREX	Enable smooth Mobility and Recognition of External qualifications
ENIC-NARIC	European Network of Information Centres - National Academic Recognition Information Centres
ESC	European Student Card
ESI	European Student Identifier
ESSIF	European Self-sovereign Identity Framework
ESMO	eIDAS-enabled Student Mobility
EU	European Union
EUPL	European Union Public Licence
EWP	Erasmus Without Paper
eVŠ	Central evidence system for higher education in Slovenia
FWB	Fédération Wallonie-Bruxelles
GDPR	General Data Protection Regulation
HEI	Higher Education Institution

ICT	Information and Communication Technologies
IdP	Identity Provider
LED	Flemish database of certificates of learning and of professional competence
MS	Member State
MoSCoW	Must have, Should have, Could have, and Won't have
NREN	National Research and Education Network
OOP	Once-only Principle
RIA	Research and Innovation Action
SP	Service Provider
SDG	Single Digital Gateway
SDGR	Single Digital Gateway Regulation
SEAL	Student and Citizen Identities Linked
SP	Service Provider
SPOC	Single Point of Contact
SSI	Self-sovereign Identity
STORK 2.0	Secure Identity Across Borders Linked 2.0
UC	Use Case
UNED	National Distance Education University
VC	Verifiable Credential
W3C	World Wide Web Consortium
WP	Work Package

Executive Summary

The Studying Abroad pilot of the “Digital Europe for All” (DE4A) project aims at demonstrating in practice the benefits for different European Higher Education Area stakeholders of realizing across borders the principles of Once Only and Digital-by-Default. By the combination of three use cases (Application to public higher education, Applying for study grant, and Diploma recognition) it will prove the optimal process/procedure for students of the participating three Member States (Belgium, Slovenia, and Spain) for registration and eventually applying for a student grant as well as for studies recognition.

This document defines the scope of the pilot, establishes its functional boundaries, includes pilot main objectives, sets specific pilot technical and business goals, and presents a preliminary identification of corresponding pilot success criteria suitable to assess them. The central part of the document is the detailed specification of the three use cases and corresponding (functional and non-functional) requirements. An overview of the infrastructures and initiatives relevant for the pilot, e.g. the eIDAS infrastructure, European Digital Credentials infrastructure, or European Blockchain Services infrastructure (EBSI), is given first to show what already exists in the participating Member States and which building blocks and other initiatives’ results will be explored for reuse by the pilot. For each use case, the relevant actors are then identified and the required and available data for evidence exchange is analysed.

Apart from the project partners from the three participating countries, the procedures require other data consumers and data providers to be involved, for example regional governments, Ministries, regional agencies, institutions involved in the diploma recognition procedure, etc. Analysis also shows little overlapping of the mandatory and optional data required by the procedures between the participating Member States and even between different regions in one Member State. Ministries and higher educational institutions are the main sources of identification and academic data of the students, while examples of evidence necessary for the three procedures include diploma and diploma supplement, data on completion of secondary education, certificate of language proficiency, and data on income and household situation.

The use cases are described through (a) user journeys presented from a student point of view, (b) preconditions, main-flow steps, and postconditions, and (c) a list of functional and non-functional requirements. Specifics of the existing procedures in Belgium, Slovenian, and Spain are also provided. The three use cases have different levels of complexity and can be implemented by various communication patterns. While the selection of the appropriate patterns for applications to higher education and applications for study grants will be decided later in collaboration with the “WP2 – Architecture vision and framework” work package, it is currently envisioned that self-sovereign identities, preferably based on EBSI, will be validated in the Diploma recognition use case. As recognized diplomas and other credentials for qualification recognition are required evidence for the other two procedures, linkage of the use cases will also be explored.

Several political, legal, technical, and organizational issues still need to be resolved before the three procedures can be validated in production environment. Examples of such challenges include lack of notified identification schemes in Slovenia, required changes of operation of institutions that are not part of the DE4A project, maturity of the building blocks and relevant infrastructures, such as EBSI, and necessary changes in national legislations.

The results constitute the basis for the next Studying Abroad pilot planning phase, providing information relevant for a pilot management plan and coordination of the different pilot partners involved in each use case. They will also serve as major input to other DE4A activities, in particular WP2 – Architecture vision and framework (requirements are a starting point for joint development of Project Start Architecture, underlying blockchain support framework and later towards technical

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architectures and interoperability solutions toolbox), WP3 – Semantic interoperability solutions (requirements feeding semantic interoperability framework and corresponding semantic solutions - components/tools- needed to support the pilot), and WP5 – Common component design & development (requirements relevant for identification of features for products and components and later for their technical design and common specifications). The identified legal and organisational barriers are also relevant to WP7 - Legal and ethical compliance and consensus building and WP6 - Sustainable impact and new governance models.

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1 Introduction

1.1 Purpose of the document

Deliverable D4.1 is the first publicly delivered document of the DE4A Studying Abroad pilot. It serves not only the purpose of describing and defining the concrete objectives of the three use cases corresponding to specific SDGR fully online procedures (Application to public higher education, Applying for study grant, and Diploma recognition) and services to be piloted, but also to establish the functional and non-functional requirements that data consumers, data providers, and the common infrastructure of DE4A must fulfil, adequately classified in different categories and priority levels.

D4.1 defines the scope of the pilot, including pilot main objectives and specific pilot goals suitable to be transformed into pilot success criteria, establishes its functional boundaries, and proposes technical and business goals. The description of the use cases and shared common services includes actors and detailed activity flow diagrams. For each Member State and in consideration of existing infrastructures, resources and services to be used across borders, a preliminary identification of required and available electronic data is provided in view of the respective evidence exchange required by the corresponding procedure. Success criteria for each goal are also identified and the way in which they align with technical and business objectives is explained. These aspects constitute the basis for the next pilot phase of Pilot Planning, providing information relevant for a pilot management plan and coordination of the different pilot partners involved in each use case.

The requirements and functional flows also serve as major input to other future DE4A activities, in particular WP2 – Architecture vision and framework (requirements are a starting point for joint development of Project Start Architecture, underlying blockchain support framework and later towards technical architectures and interoperability solutions toolbox), WP3 – Semantic interoperability solutions (requirements feeding semantic interoperability framework and corresponding semantic solutions -components/tools- needed to support the pilot), and WP5 – Common component design & development (requirements relevant for identification of features for products and components and later for their technical design and common specifications). The document also identifies legal, political and organizational barriers (WP6 - Sustainable impact and new governance models) and reflects on the relevant legal principles, such as preview and consent (WP7 - Legal and ethical compliance and consensus building).

1.2 Structure of the document

This document is divided into seven main sections and four annexes:

- ▶ Chapter 1 – The current section that describes the purpose and structure of the document and provides a glossary.
- ▶ Chapter 2 – It gives an overview of the basic information about the DE4A project.
- ▶ Chapter 3 – Here, the pilot context is presented, including motivation behind the pilot, EU policies and initiatives of strategic relevance that are supported by it, and high-level introduction to the three use cases. The main pilot-specific business and technical goals and success criteria are further given, as well as the common criteria that the services piloted must adhere to.
- ▶ Chapter 4 – The most important part of the document, where each of the three use cases is specified in more details. First, the existing infrastructures relevant for the pilot are described, e.g. the eIDAS infrastructure, European Digital Credentials infrastructure, and European Blockchain Services Infrastructure. For each use case, the relevant actors are then identified and the required and available data for evidence exchange is summarized. The use cases are described through (a) user journeys presented from a student point of view, (b) preconditions, main-flow steps, and postconditions, and (c) a list of functional and non-functional requirements for different actors.

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- ▶ Chapter 5 – This section offers an initial summary of political, legal, semantic, and technical challenges relevant to the pilot.
- ▶ Chapter 6 – It gives examples of existing services that will be customized, integrated and piloted for cross-border evidence exchange in the project.
- ▶ Chapter 7 – The main body of the document concludes with an overview of the main conclusions reached in the document, and description of the future steps.
- ▶ Annex 1 – First annex provides functional and non-functional requirements classification scheme and notation for the requirements identifiers.
- ▶ Annex 2- Specific data requirements of the involved Member States and data consumers in Use case 1 are summarized.
- ▶ Annex 3 – Specific data requirements of the involved Member States and data consumers in Use case 2 are summarized, as well as process flows of the Member States that will not act in UC#2 as data consumers.
- ▶ Annex 4 - Specific data requirements of the involved Member States and data consumers in Use case 3 are summarized, as well as process flows of the Member States that will not act in UC#2 as data consumers.

1.3 Glossary adopted in this document

Term	Definition
Competent authority	Any Member State authority or body established at national, regional or local level with specific responsibilities relating to the information, procedures, assistance and problem-solving services covered by the SDG Regulation
Credential	A set of one or more claims made by an issuer
Cross-border user	A user in a situation which is not confined in all respects within a single Member State
Data Consumer country	A country where Data Consumer (service provider) is located
Data Provider country	A country where Data Provider is located
Decentralized Identifier	In the sense of VCs, a DID is a portable URL-based identifier associated with an entity (e.g. person, organisation). The association between the DID and the entity is provided through entity's public key (e.g. eID). They primarily based on decentralized digital identities. Thus, they enable the controller of a DID to prove control over it and to be implemented independently of any centralized registry, identity provider, or certificate authority. DIDs are associate a DID document, in this case with a VC
Electronic identification	The process of using person identification data in electronic form uniquely representing either a natural or legal person, or a natural person representing a legal person
Electronic identification means	Material and/or immaterial unit containing person identification data and which is used for authentication for an online service
Evidence	Any document or data, including text or sound, visual or audio-visual recording, irrespective of the medium used, required by a competent authority to prove facts or compliance with procedural requirements referred to in point (b) of Article 2(2) of the SDG Regulation
Higher Education Institution	An establishment providing higher education and recognised by the competent authority of a Member State as belonging to its system of higher education

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Term	Definition
Holder	In the sense of VC, it is the entity, which holds the VC or to whom the VC is issued.
Issuer	In the sense of VC, it is the entity, which created the VC, stating with it that the future holder of it has some competences. The Issuer digitally signs the VC, thus proving its validity.
Once Only Principle	The public administrations should ensure that citizens and business can supply the same information only once to a public administration and administrations should be able to retrieve and share this data to serve the user, in accordance with data protection rules
Person, Natural	A natural person is a citizen of the Union or a human residing in a Member State
Procedure	A sequence of actions that must be taken by users to satisfy the requirements, or to obtain from a competent authority a decision, in order to be able to exercise their rights as referred to in point (a) of Article 2(2) of SDGR
Public service	It embraces both the bodies providing services and the services of general interest they provide
Scenario	One typical way in which a system is used or in which a user carries out some activity
Self-sovereign identity	A concept for managing user identity where a user owns and controls her identity without the intervening administrative authorities. The identity is transportable and allows the user to make claims which can include personal data or attributes, and even information about the user which was asserted by others
SSI-Wallet	An entity capable of securely storing data that belongs to a single natural person, legal person, or thing – the “owner” of both the data and the wallet
Use case	A specification of one type of interaction with a system. One use case may involve several scenarios (usually a main success scenario and alternative scenarios)
User	User is anyone who is a citizen of the Union, a natural person residing in a Member State or a legal person having its registered office in a Member State, and who accesses the information, the procedures, or the assistance or problem-solving services, referred to in Article 2(2) of the SDGR, through the gateway
Verifiable credential	A digital representation of a physical credential (e.g. driver licence) with the addition of cryptographic material such as digital signatures, which makes the credentials more tamper resistant and trustworthy. VCs based on their type, as their physical counterpart, hold several claims about the holder (e.g. can drive a car), stated by a competent authority (e.g. formal institution). VCs are based on the W3C standards (https://www.w3.org/TR/vc-data-model/)
Verifiable presentation	Something an entity can put forward as evidence of certain attributes or properties, or as evidence of a permit, attestation, or authorization he/she/it received from one or more issuers
Verifier	In the sense of VC, it is the entity, which verifies the claims of the VC

2 Project Overview

2.1 Project Identification

Project acronym	DE4A
Project title	Digital Europe for All
Project type	RIA
Call	H2020-SC6-GOVERNANCE-2019
Topic	DT-GOVERNANCE-05-2018-2019-2020 New forms of delivering public goods and inclusive public services
Contract	870635
Project start date	01-01-2020
Estimated end date	31-12-2023
Estimated total time	36 Months

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3 Overall Pilot Scope

Motivation

Learning mobility (consisting of going abroad to study or undertake training) is one of the most successful European programmes (underpinned by the **Bologna process and the European Higher Education Area**) and it is directly aimed at the younger generations, who are also “digital natives”, and thus they expect to be serviced digitally and fast. DE4A will enable them to reap the **benefits of borderless digital services, education and living** [1]. Europe has around 4,000 higher education institutions, with over 19 million students [2] and 1.5 million staff. According to available statistics [3], procedures like submitting an initial application for admission to public tertiary education are likely to involve a large number of annual cross-border transactions: nearly 700,000 EU citizens were enrolled in a university in another Member State in 2016. In total, at least 1.6 million students were undertaking tertiary level studies in a Member State other than that of their origin in 2016.

Europe 2020, the EU's growth strategy for the coming decade, highlights **higher education as key policy area where collaboration between the EU and Member States can deliver positive results for jobs and economic development**. Specific aims included “enhancing mobility, promoting the use of joint and double degrees and facilitating the recognition of qualifications and periods of study” [4]. A key policy issue for Member States and higher education institutions is to “better exploit the potential of ICTs to enable secure exchange of evidence for the registration in foreign higher education institutions, as well as applying for study grants and obtaining recognition for academic and other types of studies”.

Despite the many European (cross-border) efforts, the administrative burden for students is still very complex due to the extremely diverse pre-requisites to each European system. This is the case for both the European diversity on electronic identification and trust services, as well as for data stored in national educational data repositories on students (personal and certification data). The semantic and legal challenges for the interchange of evidences, homologation and transpose of grades are also significant and noteworthy. Regarding the recognition of studies achievements (including ECTS credits), a **significant amount of time and money is spent for this process over and over, every day**. For instance, recent stakeholder consultations indicate that “recognition procedures are often slow, left to the discretion of individual institutions, not sufficiently transparent and may impose extra cost to a student” [5]. Especially in a cross-border European scenario (an academic from e.g. Spain hires in Slovenia), **the level of trust in the presented documents and the way to “understand” the certificates is not easy**. Currently, **the process of issuing documents, where attestation is required as well, the transfer of the information and of course the provision of additional information is cumbersome and time consuming**. Further, the level of trust in the overall process with respect to information quality could be improved.

The pilot applications will use eIDs to initiate fully online administrative procedures whereby a citizen claiming to possess a specific qualification can have that claim validated or register to a foreign academic institution and/or apply for a study grant, having assurance of the cross-border exchange of evidence between competent authorities under the explicit request of the user when necessary.

Strategic EU policies and initiatives

The Single Digital Gateway Regulation (SDGR) lists in Annex II several procedures that citizens should be able to access and complete fully online. From the studying (education) domain, all procedures that are included in the list will be piloted in DE4A:

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SDGR Procedure	DE4A Studying Abroad pilot use case
Applying for a tertiary education study financing, such as study grants and loans from a public body or institution	Use case 2: Applying for study grant
Submitting an initial application for admission to public tertiary education institution	Use case 1: Application to public higher education
Requesting academic recognition of diplomas, certificates or other proof of studies or courses	Use case 3: Diploma recognition

In addition to the SDGR, the envisaged activities in the pilot are aligned with EU-wide strategic policies and documents like the eIDAS Regulation [6], the Digital Single Market Strategy [7], the eGovernment Action Plan 2016-2020 [8], Europe 2020 [9], the Tallinn ministerial declaration for e-Government development [10], as well as with Higher Education initiatives like the EHEA [11] (including the “Mobility strategy 2020 for the European Higher Education Area”), Bologna Process [12], ENIC-NARIC Networks [13] and Agenda for the modernisation of Europe’s higher education systems [14].

Already in 1997 the Lisbon Recognition Convention (Convention on the recognition of qualifications concerning higher education in the European region) [15], drafted jointly by Council of Europe and UNESCO, aimed at facilitating the recognition granted in one country in another country. In May 2018, the European Commission published a proposal for a Council Recommendation on promoting automatic mutual recognition of higher education and upper secondary education diplomas and the outcomes of learning periods abroad [16]. The Council adopted the Recommendation in November 2018 [17]. With this Recommendation, EU Member States make a commitment to take steps to introduce automatic recognition of higher education and upper secondary education diplomas without having to go through a separate recognition procedure by 2025.

The Diploma Supplement plays a particularly important role in relation to cross border higher education provision and the recognition of academic qualifications [18]. It provides a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the student named on the original qualification (e.g. diploma) to which this supplement is appended. The Diploma Supplement builds on and includes the use of other common transparency tools such as learning outcomes and ECTS (European Credit Transfer and Accumulation System) [19].

The European Commission also set a goal in the Digital education action plan that by 2025, all students in mobility should be able to have their national identity and student status recognised automatically across the EU Member States, including access to university services when arriving abroad (e.g., study materials, subscription services, libraries). The learners should also be enabled to identify themselves in “line with the once-only principle” and secure exchange and verification of learner data should be allowed [20]. The European Student Card Initiative aims at developing an “online one-stop-shop through the Erasmus+ Mobile App for students to manage all administrative steps related to their mobility period” [21].

Blockchain technology-based services have a prominent role in the future EU plans. So far, 28 Member States, Norway, and Liechtenstein have joined the European Blockchain Partnership (EBP) to cooperate with the European Commission in the establishment of a European Blockchain Services Infrastructure (EBSI) [22] that will support the delivery of cross-border digital public services. Of particular relevance for a project like DE4A is that the main objective of EBSI is to start operating EU-wide blockchain-based services and to promote the use of EBSI in “virtually” every domain of the public sector, which can benefit from blockchain technology. In 2019, the Member States selected four specific uses cases to be implemented on EBSI. The most important use cases for the Studying

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Abroad pilot include the European Self Sovereign Identity Framework (ESSIF) and the Diplomas use case. The first will allow users to create and control their own identity across borders without relying on centralised authorities, while the Diplomas use case covers the semantics of the European cross-border education credentials backed with the EBSI infrastructure. European Commission is developing a Europass framework for digitally signed credentials [23] that describe students' skills and their achieved learning outcomes. European Digital Credentials Infrastructure (EDCI) [24] will implement that framework.

The DE4A project has already established bi-directional collaboration with the EBSI/ESSIF and Diplomas representatives and aims to re-use the EBSI infrastructure in this pilot, to align with and incorporate to the extent relevant and feasible approaches in ESSIF and Diplomas use case and to enrich with our piloting experience such parallel running initiatives and the broader ones.

Finally, uptake of relevant results and establishing of relevant synergies with CEF (ESMO [25], SEAL [26], MyAcademicID [27], eID4U [28], STUDIES+ [29]) and Erasmus+ projects (EMREX [30], Erasmus Without Paper [31], European Student Card [32]), in particular in relation to the DG CNECT and DG EAC joint efforts for "Moving Forward the European Student Card Initiative" is being considered throughout the pilot.

Studying abroad pilot use cases

Three use cases will be piloted within DE4A in the educational domain: Application to higher education, Applying for a study grant, and Diploma/Certs/Studies/Professional Recognition. The combination of these use cases will prove the optimal process/procedure for students of the participating three Member States (Belgium, Slovenia, and Spain) for registration and eventually applying for a student grant as well as for studies recognition. Academic institutions and national administrations involved in the pilot will be both providers, such as issuers of qualifications or giving proof of a person's experience, and consumers of these attributes through the cross-border services. Trusted electronic channel for retrieving the evidence will reduce time and effort of the involved participants and decrease the chance of mistakes since existing trustworthy data doesn't have to be manually re-used repeatedly. The students will also not need to translate the evidence request from the DC to a request to the DP by themselves. Overall contribution by these use cases to learning mobility will generate long-lasting benefits, i.e. in terms of letting citizens develop key competences and experiences which are crucial for an active participation in society and in the labour market, as also highlighted in the mid-term evaluation of the Erasmus+ programme [35] that showed the mobility of learners foster their confidence, independence, social integration and the creation of a sense of European identity.

The three use cases are logically linked to each other, as the recognized diplomas from Use case #3 are examples of evidence required when a student applies to public higher education (Use case #1) or for a study grant (Use case #2). At later stage of the pilot, feasibility of linking UC#3 with UC#1 or UC#2 will be explored.

Use case #1: Application to Public Higher Education

The first use case focuses on the procedure of submitting an application for admission to public tertiary education institutions. The goal is to enable foreign students to get access, in a digital-by-default and once-only manner (with secure and GDPR-compliant exchange of electronic evidence), to fully on-line remote registration/enrolment/admission administrative procedure offered by universities and other bodies, e.g. Ministries of Education, of participating Member States using their eIDs (e.g. thanks to the CEF eID Building Block) as trust-enabler for cross-border authentication in procedures for the admission and pre-registration of foreign student. These procedures are traditionally burdensome in terms of time and human resources and students can be discouraged to apply by the complexity of procedures. Potential uses of eSignature and eTranslation building blocks will be explored as well for providing data integrity, authenticity, and multilinguality. The Member

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states involved will use (and develop further when feasible) available single points of access at different levels of public administration (e.g. national, regional) for applicants to manage higher education application data (e.g. to submit a digital application to any public educational institution, using eID).

The Members States and institutions involved in this use case as data consumers or data providers are: Slovenia (JSI, MIZŠ, UM) and Spain (MPTFP-SGAD, UJI).

Use case #2: Applying for Study Grant

This use case focuses on the administrative procedure of applying for a tertiary education study financing. Often in connection to the previous use case UC#1, a student may also apply for a study grant from a public institution in a foreign Member State to be accomplished following Once-Only and Digital-by-Default principles. If the university applicant wished to obtain a study grant, the admissions office / competent authority would likely ask for proof of their identity e.g. using CEF eID for cross-border remote authentication (or a self-sovereign academic identity derived from or linked to such officially recognized identity), proof of their grades, and of their household and financial situation.

The Members States and institutions involved in this use case as data consumers or data providers are: Belgium (BOSA), Slovenia (UM), and Spain (MPTFP-SGAD, UJI).

Use case #3: Diploma/Certs/Studies/Professional Recognition

This use case focuses on the cross-border procedure of recognition of academic and professional studies in order to facilitate the use of such information by government and other sectors, e.g. job agencies. The use case envisions the storing, sharing, verification and managing of student certificates in a digital manner, more precisely with VCs, using the benefits of the decentralization and the principles of self-sovereignty, distributed ledger technology (e.g. blockchain) and/or distributed files storage systems (e.g. IPFS), thus related building blocks and infrastructures (e.g. EBSI infrastructure or possible existing blockchain platforms such as EduCTX [33]). The certificates in the VC can be of the following types: study diplomas, finished courses, and non-official certificates. Managing and awarding students with the digital certificates will be processed by each MS university officials and stored in a GDPR compliant manner using cryptographic principles. The principle will enable the cross-border sharing and verification of students' digital certificates.

The Members States and institutions involved in this use case as data consumers or data providers are: Belgium (BOSA), Slovenia (JSI, MIZŠ, UM), and Spain (MPTFP-SGAD, UJI).

3.1 Pilot Main Objective and Business and Technical Goals

The Studying Abroad pilot focuses primarily on a specific category of persons in Europe: Higher Education students with virtual or physical mobility needs in the European Higher Education area.

The main objective of the pilot is **to facilitate the mobility of European students across the European Higher Education Area**, based on **paperless procedures** enabled by the widespread **cross-border use of eIDAS-compliant electronic identification and authentication schemes**. The pilot will also **enhance data exchange** among national portals/websites of Higher Educational institutions. The pilot follows a pragmatic approach with the ultimate ambition to become an embodiment of the SDGR Studying Life Events in real-life environments and targeting real groups of users, in order to validate and explore different aspects of the DE4A environment and platform, including innovative technologies.

Both European Higher Education federations/National Research and Education Networks and policy makers will be supported in understanding the implications of integrating with and using DE4A technical system for the cross-border automated exchange of evidence and application of the 'once-only' principle and of blockchain technology for multiple activities within education. The pilot use

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cases will prove technical viability of functional requirements and also gauge the performance and degree in which non-functional requirements can be accommodated.

The pilot-specific business and technical goals include:

- Building cross-border education services that support the once-only principle, paperless procedures, and the use of electronic identities;
- Reducing administrative burdens in higher education by re-using evidence from trustworthy sources;
- Support of the use of self-sovereign identities in higher education, based on innovative vendor independent blockchain framework (e.g. EBSI / ESSIF);
- Defining (functional) requirements for the OOP-infrastructure, different functional service patterns and semantic interoperability as well as technical requirements for national services that must connect to the OOP-infrastructure;
- Validating the OOP infrastructure with tangible benefits realization and adhering to common pilot principles of Use, Value, Learning and Adoption;
- Promoting the OOP within the Member States (higher education institutions and public administration).

The project will simplify the cross-border user interaction with the selected educational procedures, systems and platforms and demonstrate in practice the benefits for different stakeholders of realizing across borders the principles of Once-Only and Digital-by-Default. It will also increase the uptake and use of the eID digital service infrastructures by facilitating the access of citizens to public services across borders with their own electronic identities.

Different actors (students, data providers, data consumers, higher education institutions) will benefit from the integrated cross-border procedures and the once-only principle. Students will be able to complete successfully the procedures from anywhere using only their electronic identities and digital credentials (provided procedure-specific conditions are also fulfilled).

The organisations providing the procedures (enrolment to higher education, study grants offering) will increase the security level of their services and reduce manual validation work by relying on academic evidence from trustworthy sources. Secure user authentication will be transparent to the service providers, as trusted identity providers will perform it. Administrative burdens of the service providers will also be reduced, saving time and associated costs.

3.2 Technical Common Criteria

From a technical perspective, services piloted in DE4A must adhere to the following common criteria, taken from the main underlying EIF Interoperability Principles as presented in EIRA v3.0.0 (p.65) [34] and also matching “DE4A Principles” (see Chapter 7 in DE4A D2.1 “Architecture Framework”):

- **Openness** – The services should be based on open source software technologies to avoid a lock-in effect and allow fast adaptation to the business needs.
- **Transparency** – All pilot-related procedures should be traceable and transparent for all the stakeholders involved and interoperability supported on availability of interfaces to systems and data.
- **Reusability** – The procedures should depend on already existing building blocks (e.g. CEF), standards, and infrastructure.
- **Technological neutrality and data portability** – The service infrastructure should not depend on vendor-specific technologies or too specific technical implementations but rather re-use open source software, which further enables the ease of data sharing/free movement of data.
- **User-centricity** – Users’ needs, and requirements should guide the design and development of the services leading as well to user empowerment. The services must also offer an

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acceptable degree of usability and preferably comply with commonly accepted standards in that area. Users should be given control when managing their educational credentials, like diplomas or achievements.

- **Inclusion and accessibility** - Inclusion is about enabling everyone to take full advantage of the opportunities offered by new technologies to access and make use of the piloted services, overcoming social and economic divides and exclusion. Accessibility ensures that people with disabilities, the elderly and other disadvantaged groups can use the services at service levels comparable to those provided to other citizens.
- **Security and privacy** - Availability, integrity and confidentiality of data exchanged through the common infrastructure must be guaranteed. It is extremely important for the success of the pilot to respect the rights of the users on this aspect and ensure compliance with national and European regulations, for example GDPR.
- **Administrative simplification** – The piloted procedures should simplify administrative processes of public administrations and Higher Educational Institutions with tangible reduction of administrative burden.
- **Effectiveness and efficiency** – The piloted procedures should produce the intended result and enable the students to accomplish their goals in the best possible manner and with the least waste of time and effort.

3.3 Pilot Success Criteria and Relation to DE4A Piloting Principles

3.3.1 List of Success Criteria

The success of the project, at the end of the piloting phase, will be evaluated through concrete, measurable and objective results. These results will be used to demonstrate that both the technical and business objectives of the pilot have been met.

The analysis mentioned will be made in terms of four different perspectives or piloting principles:

- **Use:** measurable results related to the use of the procedures piloted and usability of the implemented cross-border once-only procedures does the interoperability model/solution work; which barriers are being encountered);
- **Learning:** whether the pilot helps to prepare the stakeholders for the future (i.e. collecting and distributing lessons learned/ creating feedback loops);
- **Value:** whether the pilot improves efficiency or effectiveness of the students and organizations involved (e.g. do the data consumers and data providers experience added values, such as administrative burden reduction);
- **Adoption:** whether the pilot facilitates the process where a Service Provider (Data Consumer) or Data Provider introduces new IT tools provided by the pilot to support a (new) way of working. Adoption is limited to the adoption by service and data providers that will be part of the pilot. Adoption is not merely focused on whether a provider was finally able to introduce/integrate with DE4A but rather on all the possible lessons to be learned from this process.

The criteria will be measured over time using (Specific, Measurable, Attainable, Relevant, Time-bound) metrics of quantitative and of qualitative nature depending on the specific criteria and the nature of results produced by the pilot but they are different from them.

The initial list of criteria includes:

- Real education services are developed, successfully connected, and piloted as fully online cross-border procedures to the DE4A interoperability infrastructure by the respective pilot partners;

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- Required evidence according to common/standardized data models is provided from trustworthy sources and in secure manner;
- Evidence can be exchanged across borders in an electronic structured format;
- Administrative burdens for the pilot Data consumers, Data providers, and students are reduced in all procedures;
- The take-up of self-sovereign identities in the academic community is facilitated based on fruitful collaboration with the EBSI and ESSIF initiatives among others;
- Control is given to students when managing their education credentials;
- Online procedures are performed in the best possible manner and with the least waste of time and effort.

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4 Use Case Functional Specifications and Requirements

This section specifies in detail the three use cases and identifies their technical requirements corresponding to an initial multi-disciplinary analysis based on information from internal and external project sources available at the time of the writing of this deliverable; iterative analysis and design decisions considering organisational and legal constraints will lead to further refinements and may result as well in further requirements and use case adjustments as deemed necessary for actual piloting. Before detailed specifications are provided, a summary of business roles of the participating organisations and existing infrastructures in their Member States is provided. The first table gives an overview of the Member States and project partners involved in the pilot either as data providers or data consumers, while the second table shows which infrastructure required for the Studying Abroad pilot use cases already exists in Belgium, Slovenia, and Spain. Details about the organisations' roles can be found in the description of each of the three use cases, while existing infrastructures are presented in Section 4.1.

Table 1: Business roles of participating organisations

	UC#1		UC#2		UC#3	
	Data provider	Data consumer (Service Provider)	Data provider	Data consumer (Service Provider)	Data provider	Data consumer (Service Provider)
Belgium*	/	/	BOSA	BOSA	BOSA	BOSA
Slovenia	MIZŠ, UM, JSI	MIZŠ, UM, JSI	UM	UM	UM	UM, MIZŠ, JSI
Spain	MPTFP-SGAD, UJI	UJI	MPTFP-SGAD, UJI	/	MPTFP-SGAD, UJI	/

*BOSA will act as the federal service integrator¹

Table 2: Summary of existing infrastructures

	Belgium	Slovenia	Spain
eIDAS	Node: CEF eID 1.4.3 Notified schemes: Belgian eID Scheme FAS / Itsme® (LoA: High)	Node: CEF eID 2.3.1 Notified schemes: /	Node: CEF eID 2.3.1 Notified schemes: Spanish ID card (LoA: High)
EBSI	Partner	Partner; EBSI node at UM	Partner
Europass/EDCI	No	Yes	Yes
European Student Card	No	No	Yes

¹ A standard way of communicating will have to be agreed between the federal service integrator and the Belgian communities to ensure semantic/technical interoperability.

4.1 Overview of Relevant Existing Infrastructures

The following section gives an overview of the existing infrastructures that are relevant for the Studying Abroad pilot. As some of the presented infrastructures, e.g. eIDAS, are relevant for more than one use case it was decided not to repeat the information at each use case description, but to make a general overview here. The decision which infrastructure will be used in implementing which of the piloted procedures will be made at the later stage as part of the Project Start Architecture development.

4.1.1 eIDAS infrastructure

The eIDAS infrastructure consists of a number of interconnected eIDAS nodes, which can either request or provide cross-border authentication. Several Member States have already notified their electronic identification schemes where citizens can get secure electronic identities that are recognized by other Member States.

Belgium

The eIDAS connector is already in place in Belgium. The Belgium eIDAS node is based on the CEF eIDAS-node software version 1.4.3. In Belgium, the eID Scheme FAS / Itsme® has been notified with high level of assurance.

Slovenia

Slovenian eIDAS node in production was established in 2018 at Ministry of Public Administration. It is based on the CEF eIDAS-node software version 2.3.1, and is at the time of writing this document connected to eight countries: Belgium, Croatia, Estonia, Germany, Italy, Luxembourg, Portugal, and Spain.

The Ministry is running as well a test eIDAS node that is also based on the version 2.3.1 of the reference implementation and is currently connected to 10 Member States.

The central student evidence service eVŠ at Ministry of Education, Science and Sport is currently being integrated with the eIDAS node in production.

Slovenia has not notified yet its identification scheme (it is planned to be notified in 2022), so there are no official Slovenian electronic identities that other Member States have to recognize. Nevertheless, there exists a central authentication and e-signature system SI-PASS, where users can authenticate using different eIDs, having different trust assurance levels of the identification means.

Spain

Connection to the eIDAS node for all public administrations is done through the national central ID system, Cl@ve 2.0, which includes eIDAS as one of the available identity providers (IdPs). Cl@ve 2.0 follows a specification derived from eIDAS. Universities connect to eIDAS through a specific proxy deployed at RedIRIS, the national NREN. This proxy supports protocol translation, providing easy access support to EduGAIN compatible SPs from the national identity federation.

4.1.2 European Digital Credentials Infrastructure

European Commission, Directorate-General for Education, Youth, Sport and Culture (DG EAC) is developing a Europass framework for digitally signed credentials aimed at fostering the adoption of verified, trustworthy digital certificates, and at promoting the recognition of qualifications, competences and skills acquired. European Digital Credentials Infrastructure (EDCI) [24], underpinned by building blocks including eIDAS components, will perform the implementation of the framework. EDCI is a set of standards, services and software that allows institutions to issue digital, tamper-proof qualifications and other learning credentials within the European Education Area. A Europass learning credential describes that the owner has certain skills or has achieved certain learning outcomes through formal, non-formal or informal learning context. The EDCI Data Model

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[36] is an extension of the W3C Verifiable Credentials Data Model [37] and a Europass Credential is a type of W3C Verifiable Credential.

4.1.3 European Blockchain Services Infrastructure

European Blockchain Services Infrastructure (EBSI), according to EC, is a joint initiative from the European Commission and the European Blockchain Partnership (EBP) to deliver EU-wide cross-border public services using blockchain technology. The EBSI will be materialised as a network of distributed nodes across Member States (the blockchain), leveraging an increasing number of applications focused on specific use cases. The Commission will operate a minimum number of EBSI nodes at European level and the Member States will operate EBSI nodes at a national level. All the nodes will be able to create and broadcast transactions that will update the ledger. In 2020, EBSI will become a CEF Building Block, providing reusable software, specifications and services to support adoption by EU institutions and European public administrations.

EBSI can be leveraged with a blockchain-based dedicated application for the student's certification sharing and verification process, as mentioned in the high-level Use case 3 introduction – continuing the work of the project EduCTX, which is based on a consortium run blockchain network. EBSI is optionally relevant for UC#3 in the case that the “issuer” or the “holder” of a VC will identify himself or herself with a decentralized identifier (DID), which is based on the ESSIF.

4.1.4 National Diplomas Registries

Belgium

In Belgium, education is a matter managed by the communities: the Flemish community, the French-speaking community, and the German-speaking community. BOSA has contacts with all communities and will function as a service integrator and a single point of contact.

The Flemish community has an authoritative source that contains all diplomas and official evidence pieces on qualifications (based on work experience). This database is called LED. The LED contains documents as of 2002. There are web services available to expose the data in this authoritative source as well as the possibility to log onto in with a Belgian identification method (Belgian eID, Itsme, app, SMS or token) to consult its own documents.

The French-speaking community is currently building an authoritative source, DADI, which will contain all diplomas for their community. This source should be in test phase by June 2020.

The German-speaking community has no (digital) authoritative source containing all diploma information yet.

Slovenia

In Slovenia, the ENIC-NARIC (European Network of Information Centres - National Academic Recognition Information Centres) national centre run under the Slovenian Ministry of Education, Science and Sport (MIZŠ), represents a network of information centres responsible for diploma recognition. It collects data about the Slovenia and foreign countries' education systems (at the moment, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia, Russia, Ukraine and United Kingdom). The individuals submit their application for diploma recognition to the centre, in which they must provide a copy of their diploma, based on which they receive a formal opinion (decision) on whether their foreign diploma will be recognized or not.

Another public infrastructure run by the Ministry of Education, Science and Sport is the eVŠ service, which provides students with important information regarding higher education in Slovenia (e.g. their student status, application for study programmes, required conditions for changing study programmes, etc.). The platform offers students to apply for a study programme (all three Bologna levels) at any higher education institution in Slovenia and confirm their applications with digital

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signatures or other credentials with SI-PASS e-signature service. The eVŠ service also contains information about all students studying at one of the Slovenian higher education institutions.

Spain

Ministry of Education and Vocational Training offers a national register for University and non-University degrees and studies completed in the Spanish National Education System. Access and verification can be done through this nation-wide registry.

Also, CRUE-TIC (Conference of Rectors for Spanish Public Universities) offers an intermediation service, integrated with the National Interoperability platform maintained by Ministry of Economic Affairs and Digital Transformation – General Secretariat for Digital Administration (MAETD-SGAD, former MPTFP-SGAD, current partner in DE4A project as Member State coordinator). This service allows obtaining information about a student's enrolment in a specified academic year, with information about the University, degree and centre, and a summary of credits enrolled or economic situation of the enrolment.

Currently, UJI is not connected to the CRUE-TIC service and the connection is not envisaged in short term.

4.1.5 EMREX

The EMREX (Enable smooth Mobility and Recognition of External qualifications) [30] project was born near the end of the STORK 2.0 project, and shared some common interests, despite being completely independent initiatives. It aimed at transferring student records and diplomas between administrations for cross-country enrolment and transfer of students. The infrastructure followed the same topology as STORK 2.0 and later eIDAS: a network of national endpoints that would act as brokers for the national institutions. The data would be exchanged through redirections and under the user's control. The main outcome, that has started to be adopted by other projects was the successful development and introduction of a student record exchange format in XML, the ELMO document format, which allows to represent both displayable and tabulated information for automated treatment. Other projects, like Erasmus Without Papers have adopted it for their own data portability needs.

4.1.6 ESMO

The ESMO (eIDAS-enabled Student Mobility) [25] project starts from the same base and idea as eID4U described below (see Section 4.1.7): keys are the importance of domain specific attribute exchange and the establishment of a common exchange infrastructure, but with a different approach and strategy. ESMO identified the difficulties of service providers and data providers to adhere to the eIDAS extensions of the SAML2 protocol, as well as the difficulties that extending the eIDAS node functionality would suppose. To mitigate them, ESMO aimed at developing a multipurpose proxy tool, (the ESMO Gateway), that would be able to interact between all the relevant actors by supporting multiple protocols and unbound attribute aggregation. A series of deployed gateways could form a support exchange network for the domain specific attributes and mediate between the SPs and the eIDAS nodes and academic DPs. This way, the eIDAS nodes would benefit from it but at a minimal impact, and the SPs and DPs could use their native protocols to connect, minimising the integration and maintenance costs.

4.1.7 eID for University

The main goals of the CEF eID4U (eID for University) project [38] [39] were to include higher educational institutions and trusted learner data sources in the eIDAS infrastructure and enable the infrastructure for learner cross-border electronic identification. The project has:

- modified the DIGIT reference implementation of the eIDAS node v1.4.3 to support academic attributes. The new version of the code has been published under the European Union Public

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License (EURL) and it is publicly available at <https://github.com/eID4U/eIDAS-node>. The modification provides a proof-of-concept how to transfer sector specific attributes through the eIDAS nodes, but it has not been yet included in the eIDAS specification or adopted by any national eIDAS nodes in production;

- defined XSD (XML Schema Definition) schemes for the academic attributes. The namespaces defined by eIDAS and Europass were used when possible;
- integrated several academic attribute providers in Italy, Austria, Spain, Portugal, and Slovenia with the eIDAS node, and
- established registration services for Erasmus+ student exchange. The services are connected to the preproduction eIDAS nodes in Italy, Spain, and Portugal, and to the eID4U eIDAS node in Slovenia. Examples of the enrolment service in production include <https://apply-eid4u.polito.it> and <https://erasmus-eid4u.dit.upm.es/erasmus>.

4.1.8 European Student Card

The European Student Card (ESC) [32] project defines a centralised platform to allow students to exchange academic information between universities that adhered to the project. The students are provided with smart cards, named European Student Cards that can be used for authenticating them in various services at service providers (e.g. library, restaurant, etc.). Usually, the student card is issued when a student is enrolled in an institution, when his application has been accepted and when he paid for the admission fees. Each student is assigned a unique European Student Identifier (ESI), which is valid only during the studies. A student enrolled in two HEIs will have two ESIs and two student cards. European Student Card is currently present in 11 European countries (Albania, Czech Republic, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal, Spain).

4.1.9 Erasmus Without Paper

This project, along others like the Online Learning Agreement and the Erasmus Student App, aims at digitalising the Erasmus+ programme student exchange application and other administrative procedures.

Being mostly institution-to-institution procedures not involving the user, the developed infrastructure follows the opposite approach than eIDAS or any of the above-described projects. Participating institutions export a series of APIs for data access and procedure calling that can be called by any other participating institution. The institution will implement then the procedures internally, to deal with the student, and just do cross-institution calls when required.

For small institutions where it would not be cost-effective to connect their information systems to the EWP network, they have developed a central dashboard application, which is connected to the network, and allows institutions officials to register and manage the Erasmus processes for their students manually.

4.2 Use Case “Application to Public Higher Education” (UC#1)

The first use case focuses on the procedure of submitting an application for admission to public higher education institutions. The use case is defined as a generic procedure that could potentially cover not just applications to the undergraduate (1st Bologna cycle), graduate (2nd Bologna cycle) and doctoral studies (3rd Bologna cycle), but also the Erasmus mobilities. While the whole use case is analysed it should be noted that refined analysis and design decisions considering organisational and legal constraints may result in scope adjustments for actual piloting.

4.2.1 Actors Identification (DPs, DCs, end users) and Partners Involved

The following actors have been identified for UC#1:

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Student: main subject of the action and owner of data; the student accesses the application service to apply for an admission to higher education in another Member State.²

Data consumer (DC): an institution where students apply to public higher education. Data consumers can be ministries (e.g. Ministry of Education, Science and Sport in Slovenia), regional governments, or universities.

Data provider (DP): an institution that manages data that go beyond the minimum identification data and provides evidence on academic achievements, such as certificate of completion of secondary education, diploma, or certificate of language proficiency. Again, data providers can be ministries, regional governments, or universities.

Identity provider (IdP): issues electronic identification means and authenticates users.

The service providers and competent authorities and primary registers for the countries involved (Slovenia, Spain) in UC#1 include:

Table 3: UC#1 – Data providers and consumers

UC#1		
	Data provider	Data consumer (Service Provider)
ES	Regional Government, National Distance Education University, UJI Ministry of Education and Vocational Training (MEFP)	UJI
SI	Ministry of Education, Science and Sport, UM, JSI	Ministry of Education, Science and Sport, UM, JSI

Slovenia

All candidates who wish to enrol into Slovene higher education system must submit an application online through the eVŠ system (<https://portal.evs.gov.si/prijava/?lang=en>) at Ministry of Education, Science and Sport. The candidates with foreign degree qualifications must then, according to the Assessment and Recognition of Education Act in Slovenia, undergo a procedure for the recognition of those qualifications. The procedure depends on the level of the enrolled programme and is currently not performed in an electronic way. The eVŠ system sends information about the selected candidates (the selection process can take a few months) to higher educational institutions where the candidates can then enrol.

The eVŠ system provides academic data, such as degrees, year of study, or study programme, for all students who are studying at one of the Slovenian higher education institutions. HEIs feed the eVŠ system with information on study programmes, finished studies and obtained degrees, students who quit the programme, achieved ECTS for the past year, etc. Additional details about temporary achievements during a school year, e.g. marks at exams, are currently available only in the university information systems (these details are not required for the application procedure).

² Use case is defined as a generic procedure that could potentially cover the Erasmus mobilities, but has not been analysed specifically for that. It was decided not to do so because Erasmus mobilities are governed by institution-to-institution learning agreements and point-to-point exchange of evidence. Other initiatives are developing online solutions to automate and generalise this process (EWP, OLA), so despite following their developments, double work will be avoided. In any case, our analysis covers more complex cases, so most probably Erasmus would be just a sub-case that could be handled through the SDGR infrastructure, requiring probably just some governance model updates.

In the eVŠ system, the data about students can be accessed over a WSDL-defined web service at <https://portal.evs.gov.si/ws/vsz/1.0> and exchanged through SOAP messages. The service allows fine-grained access control (entity and attribute based) to be able to define what data an entity has access to and for what purpose. The following attributes are available through the web service in a structured form: id, name, surname, address, student status, enrolment data, year, study program, and information about the higher education institution.

Spain

In Spain, a user (both Spanish citizen and foreign student) applies (pre-enrols) at the beginning of the process at the regional government department of education (see for example an online service at <https://appweb.edu.gva.es/preinscripcion/>). Foreign students (both EU and non-EU) have to obtain beforehand a certificate at UNED (National Distance Education University) that certifies the level of degree equivalence and a final mark in comparison with national studies. UNED offers an online procedure to request for this equivalence certificate and to pay the process fees (<https://accesoextranjeros.uned.es/home>), but the issued certificate is not accessible from regional governments or universities in an automated, interoperable way and must be provided by the students in the pre-enrolment process as a digital document. Regional government provides the application results info to the universities (e.g. UJI) where the user finally enrolls to the study programme.

Universities serve as primary source of academic data for this use case, as university is the place where access exams are taken and reviewed, so the results are registered there and delivered to the regional government for it to do the rankings and sort the access requests for the students. This information, in the future and to better follow the OOP should be delivered through a service to a national central gateway, but it is very specific data for the Spanish access rating system, so it is uncertain whether this should be exported through a cross-border data gateway.

The following data services are provided through the Spanish national Data Intermediation Platform:

Name of service	Description	Response type
Query of Non-University Degrees by Documentation	The information provided by the non-university degree service is a list of the non-university degrees of the title holder consulted	Structured-XML
Query of University Degrees by Documentation	The information provided by the university degrees service is a list of the university degrees of the title holder consulted	Structured-XML
Query of Non-University Degrees by Affiliation Data	The information provided by the service is a list of the title holders and their non-university degrees that matches with the made consultation	Structured-XML
Query of University Degrees by Affiliation Data	The information provided by the service is a list of the title holders and their university degrees that match with the made consultation	Structured-XML
Query of the Data of a Non-University Degree	The information provided by the service is the data referring to the number of non-university degree matching with the made search	Structured-XML
Query of the Data of a University Degree	The information provided by the service is the data referring to the number of university degree matching with the made search	Structured-XML
Scholarship Status Query	The Scholarship Status Query service allows to obtain information on whether a person is registered as a scholarship holder during the course of a particular year	Structured-XML
Schooling Consultation	This service provides if a student is in school and the centre where he is, also providing the course and type of study (Primary, Secondary, Baccaulaureate) that they are taking	Structured-XML

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Name of service	Description	Response type
Consultation of University Registration Data	This service provides the list of university registrations of a citizen available in each of the Spanish Universities	Structured-XML

4.2.2 Required and Available Data for Evidence Exchange

This subsection describes common mandatory and optional evidence data required for the Application to higher education procedure. The tables include identification information and the information about past achievements that foreign students need to provide when enrolling to higher education in another Member State (e.g. information on completion of secondary or undergraduate studies). The tables do not describe the information that also needs to be provided by the users, but it is not stored in any of the data sources or known by competent authorities, e.g. the information on the desired study programme, such as selected higher education institution, selected programme, selected courses etc. The evidence can be (the same applies also to the other two use cases):

- Digitalisation of paper-based evidences not machine-readable
- Evidence as electronic document with prefixed structured contents allowing some machine-readable capabilities
- Evidence as electronic document with machine-readable metadata
- Evidence as datasets with prefixed data schemas fully machine-readable

The results of the Deloitte's Study on Data Mapping for the cross-border application of the Once-Only technical system SDG that surveyed academic evidence in other EU Member States show that there is still low overlapping between the attributes that compose academic evidence in different Member States. The study for example found correspondence rate between 44% and 100% (with mean average of 76%) for the diplomas and only between 0% and 60% (with mean average of 25%) for the secondary education completion evidence [40]. Examples of identified evidence, relevant to UC#1, that can be located abroad and which is lawfully issued by a competent authority, include [40]:

- Copy of certificate of completion of secondary education
- Certificate confirming that country's secondary education completion certificate entitles the applicant to entry in country's universities
- Certificate confirming the country and curriculum of the secondary education system attended by the applicant
- Certificate of full attendance of the last two classes of secondary education
- (Certified) copy of university diploma recognised in Member State of origin giving access to studies/work
- Evidence of language proficiency, if applicable

The tables have been prepared on the basis of the analysis of the Spanish and Slovenian service requirements, which can be found in Annex II. Data will be subsequently refined and extended in the next steps of the pilots' lifecycle in collaboration with the DE4A technical work packages of architecture, semantics and common components design and development.

Table 4: UC#1 – Common Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Primary name or given name of a person	Anna	M
Family name	Full family or surname of a person	Smith	M
Gender	Gender (options: male, female)	F	M
Date of birth	The date on which a person was born	2001-04-23	M

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Name	Description	Example value	Mandatory / Optional
	or officially has been deemed to be born, written in the form yyyy-mm-dd		
Place of birth	Place of birth of a person	Brussels	O
Country of birth	Name of a country where a person was born	Belgium	M
Citizenship	Country name of the person's nationality	Belgium	M
Address	Permanent address of a person; It usually comprises a name/number, street, town and county/state/province.	20 oak street, Castellón, Spain	M

Table 5: UC#1 – Common Mandatory and Optional Academic Data for Procedure - Completion of Secondary Education

Name	Description	Example value	Mandatory / Optional
Country	Country of completed secondary education; code list	Belgium	M
Degree	Degree previously obtained	General upper secondary education	M
Name of school	Name of a secondary school that a person finished	International school	M
Name of programme	Name of a secondary school programme that a person successfully finished	General secondary programme	M

Table 6: UC#1 – Common Mandatory and Optional Data for Procedure – Completion of Higher Education

Name	Description	Example value	Mandatory / Optional
Country	Country of completed HE education; code list	Spain	M
HEI name	Name of HEI where a student obtained a degree; text	University Jaume I	M
Study programme	Name of a study programme that a student finished at HEU; text	Computer Science	M
Field of education	Field of finished higher education; code list	Science	M
Degree	Academic title or degree obtained	Master	O
Date of issue	Date of issue of the certificate or diploma; date	2019-06-30	O
Place of issue	Place of issue of the certificate or diploma; text	Castellón, Spain	O
Language certificate	Certificate of language proficiency		M

Table 7: UC#1 – Common Other Mandatory and Optional Data for Procedure - Other

Name	Description	Example value	Mandatory / Optional
E-mail address	Contact e-mail address of a person	anna.smith@mymail.com	M
Contact phone number	Contact phone number of a person	+34 678123456	O

Summary Table 8 shows, which required mandatory and optional data is available for provision in the involved Members States, which formats are supported, e.g. structured such as XML, or unstructured, whether data sources can be accessed directly from the data provider sources using certain (M2M) interfaces/APIs or via national “intermediation” infrastructures (data aggregators), and what are the data sources.

Table 8: UC#1 – Available Mandatory and Optional Data for Procedure

Required Attribute	DP Slovenia				DP Spain			
	Available?	Direct access or derived	Standard format including whether Structured or Unstructured (S/U)	Source	Available? ³	Direct access or derived	Standard format including whether Structured or Unstructured	Source ⁴
Identification								
First name	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Family name	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Gender	Y	Derived	S	Citizens registry	Y*	Direct/ Derived	Simple	eIDAS optional/ University/ Ministry
Date of birth	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Place of birth	Y	Derived	S	Citizens registry	N*	Direct/ Derived	Simple	eIDAS optional/ Ministry
Country of birth	Y	Derived	S	Citizens registry	Y**	Derived	Simple	University/ Ministry
Citizenship	Y	Derived	S	Citizens registry	Y**	Derived	Simple	University/ Ministry
Address	Y	Derived	S	Citizens registry	Y*	Derived	Simple	eIDAS optional/ University/ Ministry
Completed secondary education								
Country	Y	Direct	S	Ministry	N ⁵	Derived	Simple	Region

³ Attributes marked with an asterisk (*) are optional eIDAS attribute, currently not delivered in Spain. Alternatively, could be provided by the Ministry through another service, or as a last resort, by the university, despite not being an authoritative source (and not being able to provide any level of assurance above low) for it, and if legally allowed, which needs to be checked (or if not, just in a pre-production environment). And this only in certain types of enrolment where the student already has data in another university. For first-time enrolment, only the Ministry could be a valid data provider. Attributes marked with two asterisks (**) are the same as the others but not provided by eIDAS in any case.

⁴ All data not served through eIDAS in Spain, will be served through the Ministry. Even if some data is taken from the university as a source, the only DP will be the ministry.

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	DP Slovenia				DP Spain			
Degree	Y	Direct	S	Ministry	N	Derived	Simple	Region
Name of school	Y	Direct	S	Ministry	N	Derived	Simple	Region
Name of programme	Y	Direct	S	Ministry	N	Derived	Simple	Region
Completed higher education								
Country	Y	Direct/ Derived	S	Ministry/ HEI	Y*** ⁶	Direct	Simple	University/ Ministry
HEI name	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/ Ministry
Study programme	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/Ministry
Field of education	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/Ministry
Degree	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/ Ministry
Date of issue	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/ Ministry
Place of issue	Y	Direct/ Derived	S	Ministry/ HEI	Y***	Direct	Simple	University/ Ministry
Language certificate	N	-	-	HEI/Student	N ⁷	-	-	University/Student
Other								
E-mail address	N	Direct	S	Student	N ⁸	Direct	Simple	Student

⁵ All attributes in this section marked as N are not available because the provider is one of the Spanish regional governments, and for the involved partners at least it does not have a live query service that can be used to obtain them, and the institution in charge is not involved in the project.

⁶ Attributes marked with a triple asterisk, mean that they can be retrieved from the university, but might need to be retrieved from the ministry, for legal or political reasons. HEI diplomas are requested (and proofed) by the university on competition of a programme, but the legal issuer is the government, so both are direct sources in some sort of way.

⁷ University could have some language certificates imported and validated, but it is not a general practice, and, in most cases, they are not the original source for it

⁸ These attributes could be delivered by the university, but usually are provided on the spot by the same user, there is no risk in that, and it's not clear whether the university should be allowed to (or is an adequate source to) deliver them.

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	DP Slovenia				DP Spain			
Contact phone number	N	Direct	S	Student	N	Direct	Simple	Student

4.2.3 Structured Procedure Description (User Journey Map)

User journey

Anna is a Belgian⁹ citizen who wants to enrol to the Master (2nd Bologna cycle) studies programme in computer science at University of Maribor (UM) in Slovenia. In the past she finished her secondary education in Belgium and Bachelor or undergraduate (1st Bologna cycle) studies at UJI in Spain. In Belgium she has also obtained a certificate of English language proficiency.

In order to be able to enrol at UM she needs to submit an application form to a central service at Slovenian Ministry of Education, Science and Sport. The service defines mandatory and optional data that shall be provided with the form. This includes both identification and academic related data.

Anna accesses the service and authenticates herself by appropriate identification means, e.g. the one that has been issued under the Belgium notified eIDAS identification scheme or another type of electronic identity such as self-sovereign identity from ESSIF. After successful authentication, she is presented with a list of available study programmes at Slovenian higher educational institutions.

Following the selection of the study programme of her choice she is requested to provide evidence of the criteria that proves the requirements for enrolment in that programme. Anna first identifies the countries where she finished her studies and where the competent authorities have issued required evidence, i.e. Spain for completion of undergraduate education and Belgium for the evidence of language proficiency.

Depending on the supported communication pattern (e.g. intermediation, supported user-managed access, user-transferred data or self-sovereign identity) evidence is retrieved from the appropriate data providers in Spain and Belgium, aggregated, and presented to her. Before the exchange occurs, she is given a chance to preview the evidence, e.g. at the infrastructure of the DP country¹⁰. After Anna decides that the evidence should be transferred to the competent authority, the data is transferred to the Slovenian central application service at Ministry of Education, Science and Sport.

Anna fills the form with additional mandatory and optional information that cannot be gathered from the data sources, e.g. her e-mail address, contact phone number, and address for notice.

The service checks data completeness and validity of the evidence, asks Anna to enter missing mandatory data if necessary, and returns the acknowledgement of receipt of application when the application form is complete. With this step the application to higher education in Slovenia successfully concludes.

After a few months, the Ministry informs Anna that she was accepted to UM. Anna can now officially enrol at UM without the need of sending her academic data again.

Functional and non-functional requirements

A list of functional and non-functional requirements for UC#1 is provided in the following two tables. The requirements will be subsequently refined and extended in the next steps of the pilots' lifecycle in collaboration with the DE4A technical work packages of architecture, semantics, common components design and development and legal and ethical compliance.

⁹ Although Belgium is not part of UC#1, a Belgian student is chosen for the user journey description to show that more than two countries (e.g. Slovenia and Spain) can be involved in the procedure.

¹⁰ This is related to current preliminary analysis in the context of DE4A work package focused on legal and ethical compliance, however a more complete analysis, also considering the implementation options, is under way.

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Table 9: UC#1 – Functional requirements

Requirement ID	Requirement description	MoSCoW
STA01-PREV-01	Environment requirements Student uses a client PC or a mobile device with internet connection and a web browser.	S
STA01-PREV-02	Student eID Student has a legally recognized electronic identity.	M
STA01-PREV-03	Student enrolment eligibility Student fulfils the conditions for enrolling in a higher education programme.	M
STA01-PREV-04	Mandatory and optional data definition Data consumer has defined which data needs to be provided when applying to the higher education and it is verified that the evidence can be requested using the DE4A platform.	M
STA01-PREV-05	Evidence availability Required data is available at data providers or competent authorities have issued evidence that can be subject to automated exchange and re-used (it allows to be processed by the DC, c.f. Art. 14.3 (d) of SDGR) to prove the fulfilment of the requirements.	S
STA01-MFLE-01	Student authentication request Student is requested to authenticate with legally recognized electronic identity, e.g. through eIDAS or possibly ESSIF in the future.	M
STA01-MFLE-02	Student authentication Student authenticates herself with a legally recognized electronic identity.	M
STA01-MFLE-03	Data request Data consumer asks the student and/or DP to provide a set of evidence to prove student's eligibility for enrolment in higher education.	M
STA01-MFLE-04	Selection of data providers Student indicates all countries where the required evidence can be retrieved.	S
STA01-MFLE-05	Data collection and aggregation The approach will enable the processing of requests for evidence to be accessed or exchanged and ensure an adequate level of interoperability with other relevant systems (c.f. Art.14. 3 (b) and (g) of SDGR). Depending on the selected communication pattern It is possible to retrieve and aggregate evidence from data providers. Further requirements related to quality of evidence will be explored together with other pilots and DE4A technical work packages.	M
STA01-MFLE-06	Evidence preview Student is given a chance to preview evidence before it is transferred to data consumer, supporting the GDPR principles (related to the accuracy and relevance of the data exchanged and strengthening control by the user over data exchanged) and rights (of access and to restrict/object to the processing).	S
STA01-MFLE-07	Student consent for evidence Student previously identified gives valid consent ¹¹ for the evidence to be transferred to the data consumer (or rejects the transfer).	S

¹¹ Note: work is ongoing with DE4A legal work package to clarify scope of "consent" (e.g. as one of legal grounds in GDPR for legitimacy of processing of personal data) which is a different concept than "explicit

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STA01-MFLE-08	Data validation Data consumer checks validity of the obtained evidence (in particular to minimize risks of impersonation).	M
STA01-POST-01	Acknowledgment The data consumer informs the students whether the application has been accepted or denied, and provides receipt of the application in the first case. If denied, the student will be informed of the causes and can try to repeat the procedure after solving the reported issues. The student must now wait for the applications to be evaluated and sorted to see if an opening has been assigned. And if assigned, then the student can proceed to enrol at HEI.	M

Table 10: UC#1 – Non-functional requirements

Requirement ID	Requirement description	MoSCoW
STA01-PRI-01	Data minimization The data exchanged between the student, data consumer, and data providers should be limited to the data required by the procedure with the aim to not process evidence beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose.	M
STA01-PRI-02	Data purpose The data exchanged between the student, data consumer, and data providers should only be used for the explicitly agreed purpose.	M
STA01-PRI-03	Evidence processing Evidence should not be processed beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose (SDGR Art 14.3 (i)).	S
STA01-PRI-04	Preview Student should be able to preview the evidence to be used by the requesting competent authority and to choose whether or not to proceed with the exchange of evidence.	S
STA01-INT-01	Data semantics Semantic interoperability between evidence (e.g. diploma, completion of secondary school) from Data Consumer and Data Providers countries needs to be ensured on the basis of agreed principles, formats and standards.	M
STA01-AVA-01	Data Evidence can be exchanged across borders automatically in an electronic format.	M
STA01-SEC-01	Data security Required evidence according to common/standardized data models is provided from trustworthy sources with guaranteed availability, integrity, and confidentiality of data so as to ensure a high level of security for the transmission and processing of evidence (SDGR Art 14.3 (e) and (h)).	M

request” in the SDGR and also in relation to SDGR Art. 14. 3 (f) when user can choose whether or not to proceed with the exchange of evidence after the possibility of Evidence Preview.

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STA01-SEC-02	Identity matching Data provider can uniquely match presented electronic identity of a student with the person to whom evidence belongs.	M
STA01-SEC-03	Data request validity verification Data provider should verify validity of the data request before evidence is sent.	S
STA01-SCA-01	Scalability The addition of new data consumers, data providers and students should be easily dealt with by the infrastructure.	S
STA01-SCA-02	Degradation The addition of new data providers and consumers must not degrade the whole system.	M
STA01-SCA-03	Member states The procedure can involve data providers or evidence issued from several (more than two) Member States.	S
STA01-USA-01	Multilinguality Students are able to access and receive instructions for completing the procedure in at least one official language of the European Union other than the national language or, where applicable, the national languages. Further usability requirements (i.e. for the user consent, user preview of evidence) will be explored together with other pilots and legal and technical work packages of DE4A.	M

Generic cross-border procedure

Preconditions:

- Student wants to apply to a public tertiary education institution in a Data Consumer country.
- Student has a legally recognized eID, e.g. issued within an eIDAS notified identification scheme.
- Data consumer has defined the mandatory and optional data needed for the application and it is verified that the evidence can be requested using the DE4A platform. Adequate trust mechanisms have been put in place to ensure the security of the exchange (i.e. guarantees exist on provenance/integrity/quality of evidence data).
- Student fulfils the requirements for enrolment in the Data Consumer country.
 - o Some will be common criteria, established by the Data Provider country and understandable by the Data Consumer country (which means equivalences can be established with the local requirements)¹², like having finished secondary education, for undergraduate enrolment, or having a diploma in a certain knowledge area, for graduate enrolment. Especially for the doctoral (3rd Bologna cycle) and Master (2nd Bologna cycle) it can happen that evidence will have to be provided from multiple Member States.
 - o Some will be very specific local criteria, or criteria that can change over time. These will be established or collected by the Data Consumer country directly from

¹² Ideally, as simple as possible machine-readable assertions should be exchanged, but it must not be underestimated the liability consequences that providing unlawful data could have, and thus the potential need for keeping rich evidence of the transaction for audits (as it was designed in STORK, where the IdP assertions were signed by the DP and transferred as-is, without altering the signature. It was not even validated, as it was a proxied system and the DC didn't need to know nor trust the DP, but the signature was there if a latter investigation required to validate it to check the integrity of the data transfer).

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the user (like, for example, additional language certifications, specific competency exams, final marks for higher education, passing specific exams and the obtained marks).

- Competent authorities in the Data Provider countries (there can be more than one Data Provider country) have issued evidence that proves the criteria for enrolment are matched.
- Competent authorities in the Data Consumer country have issued evidence of the specific local criteria that proves the requirements for enrolment (like additional exams, passing of interviews, physical or health tests, or the convalidation of any other evidence that cannot be obtained through trusted electronic means). This evidence is not transferred across border, but should be provided locally in the Data Consumer country.

Main flow:

- Student accesses the page with an application form in the Data Consumer country.
- Student is requested to authenticate at DC with legally recognized electronic identity, e.g. through eIDAS or possibly ESSIF in the future. The student may also need to authenticate as well at the DP depending on technical conditions difficult to determine at this moment.
- Upon successful authentication the student is presented with a list of study programmes.
- Student selects the programme of choice.
- Student is requested to provide the evidence for academic and additional identification information that is mandatory for application.¹³
- Student selects/indicates all countries where she/he finished her/his studies and where the competent authorities have issued required evidence (e.g. completion of secondary education or completion of undergraduate education, evidence of language proficiency) or where data providers can provide the requested data.
- The evidence is retrieved at data providers and aggregated (the way of retrieval and aggregation depends on the selected communication pattern, e.g. intermediation, supported user-managed access, user-transferred data, or self-sovereign identity).
- Student is given a chance to preview the evidence before transfer¹⁴.
- Student gives consent¹⁵ for the evidence to be sent to the data consumer.
- Evidence is transferred to the data consumer.
- Student provides additional mandatory and optional information that cannot be gathered from the sources of evidence, e.g. e-mail address, contact phone number, address for notice. If users could benefit from providing false information, this information should be validated later (the way to determine this depends on the DC and their trust criteria). If it is on his/her own interest, it can be accepted as is.
- Data consumer checks data completeness and validity of the evidence.

¹³ The evidence can be machine-readable or non-machine readable, but it must be relevant for the online procedure and available in an electronic format that allows automated exchange.

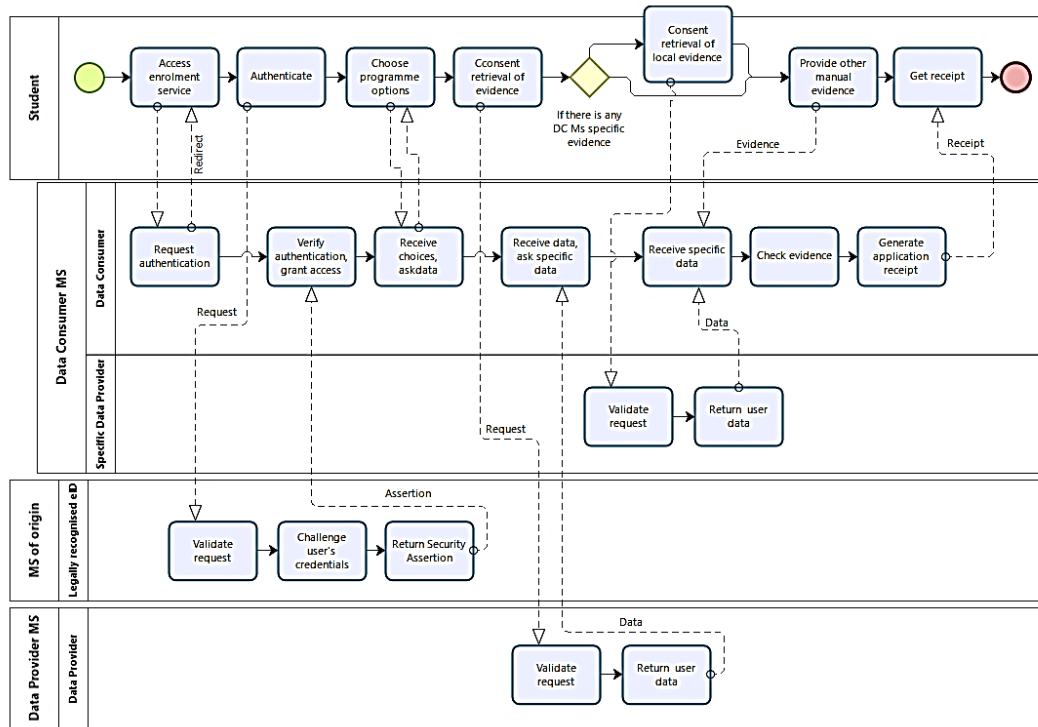
¹⁴ This is related to current preliminary analysis in the context of DE4A work package focused on legal and ethical compliance, however a more complete analysis, also considering the implementation options, is under way.

¹⁵ Work is on-going with DE4A legal work package to clarify scope of “consent” (e.g. as one of legal grounds in GDPR for legitimacy of processing of personal data) which is a different concept than “explicit request” in the SDGR and also in relation to SDGR Art. 14. 3 (f) when user can choose whether or not to proceed with the exchange of evidence after the possibility of Evidence Preview.

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Postconditions:

- Student application is submitted successfully or might have errors. If errors are found, the user can solve them and retry the procedure to submit an application.
- In case the application is submitted successfully, the data consumer provides acknowledgment of receipt of the application, so it can be used to check the status of the application until all of them are evaluated and assigned to the openings.



Powered by bizagi Modeler

Figure 1: Process flow diagram for UC#1

Communication patterns

The process flow as currently presented in a diagram can be implemented using a DE4A intermediation, supported user-managed access, or user-transferred data pattern. The obvious advantage of the intermediation pattern is that the intermediating elements can hide the complexity of accessing the data sources, as well as apply transformations or matching to the retrieved data to follow the process requirements, and be transparent to the DC and the user. The disadvantage would be relying on a central element in the infrastructure. An alternative flow using self-sovereign identity and blockchain-based infrastructure would be almost the same as the diploma validation sub-use case of UC#3. Anna would obtain verifiable credentials from all data providers (not just the diploma, but also credentials for other required evidence) and store them in her wallet. When applying to higher education, she would present through her wallet verifiable presentations that include the credentials to the data consumer. UC#1 can therefore be seen as a subsequent step of UC#3. The presented flow is not suitable for the subscription and notification or lookup patterns, while the fully user-managed pattern is not considered as OOP in the sense defined by Article 14 SDGR.

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Country specifics

The following provides description of the existing procedures of the involved Slovenian and Spanish data consumers. None of the procedures can be currently performed fully online and with evidence in electronic form only.

Slovenia

In Slovenia, a unified application for enrolment into HE study programmes has already led to the optimisation of processes and simplification of administrative procedures. For the opening of the enrolment application deadline in the central evidence system eVŠ HEIs must send to the Ministry of Education, Science and Sport a call for enrolment, which includes a set of mandatory data on the enrolment requirements and selection procedures. All calls for enrolment are published publicly together on the same web page; this means that candidates no longer have to search for information on web pages of individual HEIs. The electronic application form for enrolment also includes the elements for recognition of foreign education degree.

Every candidate who wishes to enrol into Slovene higher education system must therefore first submit an application through the central evidence system eVŠ at the Ministry of Education, Science and Sport. Each year, there are a couple of application periods, the first one usually from mid February till mid March, and the second one at the end of August. The second period is meant for the candidates who did not apply in the first-round application period or have not been admitted into any of the study programmes specified in the first-round application or have not enrolled in the study programme to which they have been admitted in the first-round application period or have deregistered from that study programme by certain date.

Foreign citizens can authenticate by means of a notified eIDAS identification scheme and fill in an online application form. All candidates with foreign degree qualifications must then undergo a procedure for the recognition of foreign education qualifications upon applying for studies. The procedure depends on the level of the enrolled programme.

Citizens applying to study with a foreign secondary school diploma for the application and recognition process shall supplement the application with the documents as listed:

- Original of the final (upper secondary school) certificate(s) legalized according to the system of legalization in the country of issue;
- Verified photocopy of the original certificate(s) and verified translation into Slovene language;
- Verified copies of annual report cards, transcripts, a diploma supplement or some other evidence on the contents and duration of education (last four years of education) and verified translation into Slovene language;
- Short chronological description of the entire education;
- Evidence of Slovene language examination on level B2 or equivalent – if required for enrolment to individual programme.

For Masters (2nd Bologna cycle) or Doctoral (3rd Bologna cycle) programme, the application should be supplemented with the following compulsory evidence (none of the evidence can be currently sent in an electronic form): original or the duplicate of the final certificate(s), representing general requirement for access to higher education programme cycle in the country of issue; photocopy of these original certificate(s); certified Slovene translation of the certificate(s). An authorised person at the University member (academy or faculty) runs the procedure in this case.

Candidates who will submit an incomplete application or application for recognition of foreign education for the purpose of continuing education in Slovenia will be additionally informed about the request and the deadline for supplementing the application by regular and electronic mail. The recognition procedure normally takes up to two months.

The admitted candidates are informed in summer. The enrolment itself takes place at HEIs.

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Preconditions:

- Student wants to apply to a public tertiary education institution in Slovenia to study an undergraduate, graduate or doctoral programme.
- Student has recognized identification means, e.g. from a notified identification scheme that can provide his/her identification attributes required for authentication through eIDAS (eID assurance level substantial or high).
- eVŠ has defined the mandatory and optional data needed for the application.
- Student fulfils the requirements for enrolment in the Slovenian higher education system.
- Competent authorities in Data Provider countries (there can be more than one Data Provider country) have issued evidence that proves the requirements for enrolment.

Main flow:**Part I: Application to HE at eVŠ**

- Student accesses the web page with an application form at eVŠ.
- Student is requested to authenticate through eIDAS with an eID that matches the required assurance level (e.g. high or substantial).
- Upon successful eIDAS-based authentication the student is presented with a list of study programmes.
- Student selects the programme of choice.
- Student is requested to provide the evidence for academic and additional identification information that is mandatory for the application.
- Student provides the required information.
- The eVŠ system checks data completeness.

Part II: Procedure for the recognition of foreign education qualifications

- HEI runs procedure for the recognition of foreign education qualifications.

Part III: Enrolment to HEI

- The Ministry informs the students whether they were accepted to the selected study programme or not.
- The Ministry sends the list of accepted students to HEI.
- Accepted student enrolls at HEI (no evidence is transferred at the final stage).

Postconditions:**Part I: Application to HE at eVŠ**

- Student application is submitted successfully or might have errors. If errors are found, the user can solve them and supplement the application. In case the application is submitted successfully, the data consumer provides acknowledgment of receipt of the application, so it can be used to check the status of the application until all of them are evaluated and assigned to the openings.

Part II: Procedure for the recognition of foreign education qualifications

- Candidates who submit an incomplete application are informed about the request and the deadline for supplementing the application by regular and electronic mail.

Part III: Enrolment to HEI

- Student is accepted to HEI.

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Spain

While in Slovenia the procedure is the same for all three Bologna cycles, the differences in Spain exist between the 1st and 2nd Bologna cycle studies application procedures. Both existing procedures are explained below.

Spain (1st Bologna cycle studies):

Viktorija is a Slovenian student who has finished her secondary studies in her country and wants to start a degree (1st Bologna cycle studies) at UJI in Spain.

She applies to National Distance Education University¹⁶ in Spain to get a certificate certifying that she is able to enter university studies and the equivalence in Spain of the university entrance marks obtained in Slovenia. She uses an online form to send all the documents proving that she has finished secondary studies and her marks in the university entrance exam (if done). National Distance Education University will provide her with a European studies equivalence certification¹⁷. (Not an automatic procedure)

Then she will auto-register in the UJI's Regional Government Application to pre-enrol in any university in that region. She will choose and sort as many tuples (degree/university) as she wants. At the end of the period on pre-enrolment, regional government declares final results and vacancies. Viktorija has been assigned her second chosen option: Studying a computer science degree in UJI. (Not an automatic procedure)

UJI receives from the regional government the results and sends to Viktorija an email with an appointment to fill in the final registration. Viktorija will have to provide personal data, as well as her studies background, European students equivalence certification from National Distance Education University, and other mandatory documentation. The enrolment is done via a web application but the documentation must be later be validated manually by university staff. (Not a fully automatic procedure)

Preconditions:

- Student wants to apply to a public tertiary education institution in a Data Consumer country to study an undergraduate program.
- Student fulfils the conditions for access (finished secondary education, passed the university access exams) in Data Provider country.
- Student has a self-enrolment user (can be self-generated from user's national id card, or passport) for the regional government pre-enrolment application of Data Consumer country.
- Student has requested a certificate (to the National Distance Education University) in the Data Consumer country that will assess if they fulfil the conditions for access to the Data Consumer university.

Main flow:

Part I: Application

- Access the regional data consumer government pre-enrolment application.
- Select and prioritise the programmes on data consumer universities of choice.

¹⁶ Note that National Distance Education University has integration with eIDAS, but strangely it is only useful for login after an account has been created, not for account creation. This is an where efforts will be made to try to get corrected.

¹⁷ It can be verified online, but not in any automated way. Distance University offers a registered portal for universities to manually check a certificate, but cannot be integrated as a DP as it is right now.

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- Add special preconditions (large family, disabilities, terrorism victim, regional inclusion income etc.)¹⁸.
- Add additional required documentation (certificates to assert the preconditions).
- The regional data consumer government assigns the vacancies to the applicants based on the order of their choice and their marks. That information is sent to the data consumer universities electronically after the process is finished (but not in an automated method, as data is sent after a few days).
- The data consumer universities notify (normally by email to) the admitted students and provide them with a temporary user to do the enrolment.

Part II: Enrolment

- Students access the enrolment app.
- Students meeting some special conditions (to be beneficiary of a regional inclusion income, degree of disability, large family) must add optional official certificates to confirm them as only Spanish students may be automatically verified.
- Depending on the application type, some pre-conditions may be validated during the enrolment, as documentation may have been generated later.
- Student is asked for some data that did not come from the pre-enrolment app or was not reliable (place and date of birth, gender, nationality, permanent residence address, and current residence address).
- Student chooses the courses.
- Student marks if she is going to request a grant (in this case, payments are postponed).

Post conditions:

Part I: Application

- User can access enrolment application at the university
- User is left in waiting list in case vacancies appear

Part II: Enrolment

- User is enrolled and payments are issued normally.
- User is conditionally enrolled, payments postponed until grants are requested and resolved

Challenges, barriers and special discussion points

- It should be noted the number of not interconnected electronic steps in the above-described process.
- Currently, about half of the students don't get their identity validated, from the administrative point of view, until the moment they go to collect their diploma. They are expected to be identified on each exam they take, but the point is they can enrol without a physical and trusted validation of their identity (this pilot will improve this situation e.g. as students authenticate with an eIDAS eID, such eID will in most cases have been issued with physical identity check). eIDAS high-level credentials will help improve this situation.
- In this use case, the university can act as data provider for the access exams results.

¹⁸ These attributes are optional and of national or even regional scope only (not part of the agreed common attributes to interchange) and can be added by the user later providing extra documentation (if user meets the criteria).

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- Access conditions vary from place to place, and in time (special conditions, like terrorism victim, special ponderation with up to 6 optative exams that can raise the grades above 10, and also these exams can allow you to request access to other programmes that require passing these topics to be able to access). Any interoperability platform must have this into account and design the procedures accordingly (it is useless to exchange the raw data, there should be a common and stable concept to exchange).

Spain (2nd Bologna cycle studies):

Peter is a Belgian student who has finished a Bachelor's degree (1st Bologna cycle studies) at University of Ghent and now wants to start a Master's degree at UJI.

Peter asks National Distance Education University (Data Consumer) to issue a certification of homologation of the degree achieved in his country (Data Provider) and an equivalence of the final mark obtained. (Not an automatic procedure)

When the pre-enrolment period is open, he accesses UJI's electronic assistant in order to pre-enrol. He creates a new user or uses his electronic credentials through the Belgian eIDAS node and fills in his personal data (additional to those in the electronic credentials), academic data, desired program and attaches other documents to prove that he fulfils all the requirements to access a Master's degree program.

The UJI staff then validates the documentation and if everything is correct, their request goes to an evaluation committee for each specific Master program. (Not an automatic procedure)

This committee sorts a list of candidates to enrol (most of the times everybody who meet the requirements is admitted, but there are a few cases where students must be ordered by merits, previous studies final mark, incomings, previous working experience, etc.) (Not an automatic procedure)

The master committee approves the request from Peter and assigns him a time slot to do the real enrolment. Peter is asked to confirm the data provided in the pre-enrolment application and provide any extra documentation that is required and that UJI was no table to validate or that Peter was not able to provide in that moment.

Preconditions:

- Student wants to apply to a public tertiary education institution in a Data Consumer country to study a graduated program.
- Student fulfils the conditions for access (finished 1st Bologna cycle studies, optionally language certification) in Data Provider country.
- Student has requested a certificate (to the National Distance Education University) in the Data Consumer Country that will assess equivalence between the final mark in the Data Provider country and the Data Consumer country.

Main flow:

- Student access pre-enrolment platform at UJI. Fills personal data, academic data and some optional information.
- UJI Staff validates claimed information.
- Master's committee receives request and decides if student meets the requirements and checks there is a vacancy for her/him. If accepted, student receives confirmation.
- Student enrolls in the master's degree program.

Postconditions:

- Student is enrolled in the Master's degree program that was chosen.
- Student is left in a waiting list, hoping for a future vacancy in the study program.

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4.3 Use Case “Applying for Study Grant” (UC#2)

The second use case focuses on the procedure of applying for a study grant abroad. The procedure is similar to Use case 1, although it also involves sources of non-academic data, for example related to the student’s income or household situation. It should be noted again, that while the whole use case is analysed the refined analysis and design decisions considering organisational and legal constraints may result in scope adjustments for actual piloting.

4.3.1 Actors Identification (DPs, DCs, end users) and Partners Involved

Student: main subject of the action and owner of the data.

Data consumer (DC): an institution where students apply for study grants. Data consumers can be regional government departments (for example in Belgium), Ministries, or higher education institutions.

Data provider (DP): an institution that provides evidence required by DC, for example academic achievements or household and financial information. Again, data providers can be regional governments, ministries, or higher education institutions.

Table 11: UC#2 – Data providers and consumers

UC#2		
	Data provider	Data consumer (Service Provider)
BE	<p>BOSA will be the intermediary partner connecting with the data providers in all three communities as it is the federal service integrator and will function as a SPOC.</p> <p>For Flemish community: AHOVOKS [41] (for higher education)</p> <p>For French speaking community: FWB (Fédération Wallonie-Bruxelles)</p>	<p>For Flemish community: AHOVOKS (for higher education)</p> <p>For French speaking community: FWB (Fédération Wallonie-Bruxelles)</p> <p>For German speaking community: no grants are given to foreign students</p>
ES	UJI, Ministry	/
SI	UM	Public Scholarship Fund [42], UM

In Belgium, education is a matter that is managed by the communities, so the data and processes are addressed from three different points of view, i.e. for Flemish, French speaking, and German speaking communities.

4.3.2 Required and Available Data for Evidence Exchange

Grants may be universal, merit-based, or income based. Accordingly, the evidence requested will vary. The Deloittee’s study has identified the following examples of evidence, relevant to UC#2, that can be located abroad in Member States and which is lawfully issued by a competent authority [40]:

- Certificate of perception of subsistence minimum allowance or care allowance for individual or their household
- Certificate of perception of orphan allowance or military orphan allowance
- Copy of court decision ordering institutional care/educational measure/other urgent measure

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- Court decision granting custody of the applicant to someone other than the applicant's parent(s)
- Certificate of perception of scholarship in previous or current academic year
- Document proving that the applicant has three or more underage and unprovided-for siblings or two or more underage and unprovided-for siblings who study full-time at university
- Record of results of previous academic year

Again, the evidence can be:

- Digitalisation of paper-based evidences not machine-readable
- Evidence as electronic document with prefixed structured contents allowing some machine-readable capabilities
- Evidence as electronic document with machine-readable metadata
- Evidence as datasets with prefixed data schemas fully machine-readable

The following table has been prepared on the basis of the information on required data from the involved service providers. As there is very little overlapping between the attributes of the involved Member States and their regions, lack of the data in electronic form in the existing procedures, and pending clarification on the data semantic for certain Member States (Belgium), the list will be refined for the actual piloting in collaboration with the DE4A technical work packages of architecture, semantics and common components design and development.

Table 12: UC#2 – Common Mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Current given names of the natural person.	Sarah	M
Family name	Current family name of the natural person.	Chalk	M
Gender	Gender of the natural person (Male, Female, Unspecified).	Female	O
Unique Identifier	Unique identifier for the natural person, e.g. as defined by the eIDAS Regulation.	BE/SI/02635542Y	M
Date of birth	Date of Birth for the Natural Person (Based on xsd:date i.e. YYYY-MM-DD format).	1970-05-28	M
Country of citizenship	Country of citizenship	BE	O
HEI name	Name of the HEI where the student is enrolled	University of Maribor	M
Former Studies Name	Name of the previously completed programme	Computer Science	O
Obtained credits	Last study year obtained credits	60	O
Average grade	Average grade of the studies	8.6	M
Information on work and income	TBC	TBC	M
Household situation	TBC	TBC	M

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Table 13: UC#2 – Available Mandatory and Optional Data for Procedure

Required Attribute	DP Belgium				DP Slovenia				DP Spain			
	Available?	Direct access or derived	Standard format including whether Structured or Unstructured (S/U)	Source	Available?	Direct access or derived	Standard format including whether Structured or Unstructured	Source	Available? ¹⁹	Direct access or derived	Standard format including whether Structured ²⁰ or Unstructured ²¹	Source ²¹
First name	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Family name	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Gender	Y	Direct	S	eIDAS optional	Y	Derived	S	Citizens registry	Y*	Direct/ Derived	Simple	eIDAS optional/ University/ Ministry ²²
Date of birth	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	Simple	eIDAS
Country of citizenship	Y	Derived	S	Authoritative source	Y	Derived	S	Citizens registry	Y**	Derived	Simple	University/ Ministry

¹⁹ Attributes marked with an asterisk (*) are optional eIDAS attribute, currently not delivered in Spain. Alternatively, could be provided by the Ministry through another service, or as a last resort, by the university, despite not being an authoritative source (and not being able to provide any level of assurance above low) for it, and if legally allowed, which needs to be checked (or if not, just in a pre-production environment). And this only in certain types of enrolment where the student already has data at another university. For first-time enrolment, only the ministry could be a valid data provider. Attributes marked with two asterisks (**) are the same as the others but not provided by eIDAS in any case

²⁰ Simple attributes are structured data

²¹ All data not served through eIDAS in Spain, will be served through the Ministry. Even if some data is taken from the university as a source, the only DP will be the ministry.

²² It remains unclear if it is lawful for the ministry or the university to provide this personal data as a DP, because the student provided it for a given specific purpose, which can potentially differ from the activities of the entity as a DP.

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	DP Belgium				DP Slovenia				DP Spain			
				(National Registry)								
HEI name	Y	Derived	S	Authoritative source Flemish community	Y	Direct	S	Ministry	Y	Dir	Simple	University
Former Studies Name	Y	Derived	S	Authoritative source Flemish community	Y	Direct	S	Ministry	Y	Dir	Simple	University
Obtained credits	Y	Direct	S	Authoritative source Flemish community	Y	Direct	S	Ministry	Y	Dir	Simple	University
Average grade	N	N/A	/	/	Y	Direct	S	Ministry/HEI	Y	Dir	Simple	University
Information on work and income	Y	Derived	/	Authoritative source Flemish community	Y	Derived	U	Ministry	N	/	/	/
Household situation	Y	Derived	/	Authoritative source Flemish community	Y	Derived	U	Ministry	N	/	/	/

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4.3.3 Structured Procedure Description (User Journey Map)

User journey

Anna is a Belgian citizen who has just enrolled in the Doctoral programme in computer science at University of Maribor (UM) in Slovenia. She finished her Master studies at UJI in Spain. Before starting her studies in autumn, she wants to apply for a Slovenian national study grant for foreign EU students to finance her tuition fees and living costs in Slovenia.

She visits a Slovenian national eGovernment portal where the call for grants has been opened. The available grants are both merit and income-based, meaning that the criteria for selection of the applicants who will receive grants include past academic performance (average degree during the Master's studies) and financial and social situation of the applicants.

Anna accesses the Slovenian eGovernment portal and authenticates herself by appropriate identification means, e.g. the one that has been issued under the Belgium notified eIDAS identification scheme or another type of electronic identity such as self-sovereign identity from ESSIF. After successful authentication, she is requested to provide evidence on the current student status (enrolment into Slovenian higher education institution), past academic performance, and financial and social status.

Anna identifies the country where she finished her Master studies, i.e. Spain, and where the competent authorities have issued required evidence, for completion of education and the average degree during the studies.

Depending on the supported communication pattern (e.g. intermediation, supported user-managed access, or user-transferred data, self-sovereign identity) past academic performance evidence is retrieved from the appropriate academic data provider in Spain, the evidence on the enrolment into Slovenian higher education systems from the Slovenian national evidence system eVŠ, and data on her financial and social status from the Belgium national sources, aggregated, and presented to her.

Before the exchange occurs, she is given a chance to preview the evidence, e.g. at the infrastructure of the DP countries²³. After Anna decides that the evidence should be transferred to the competent authority, the data are transferred to the Slovenian eGovernment portal.

The data consumer checks data completeness and validity of the evidence. If the application form is valid, it returns the acknowledgement of receipt of such application. If not, Anna is asked to supplement the application.

After a month, Anna is informed that her grant application was approved.

Functional and non-functional requirements

A list of functional and non-functional requirements for UC#2 is provided in the following two tables. The requirements will be subsequently refined and extended in the next steps of the pilots' lifecycle in collaboration with the DE4A technical work packages of architecture, semantics and common components design and development.

²³ This is related to current preliminary analysis in the context of DE4A work package focused on legal and ethical compliance, however a more complete analysis, also considering the implementation options, is under way.

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Table 14: UC#2 – Functional requirements

Requirement ID	Requirement description	MoSCoW
STA02-PREV-01	Environment requirements Student uses a client PC or a mobile device with internet connection and a web browser.	S
STA02-PREV-02	Student eID Student has a legally recognized electronic identity.	M
STA02-PREV-03	Student grant eligibility Student fulfils the conditions for applying for a grant.	M
STA02-PREV-04	Mandatory and optional data definition Data consumer has defined which data needs to be provided when applying for study grant and it is verified that the evidence can be requested using the DE4A platform	M
STA02-PREV-05	Evidence availability Required data is available at data providers or competent authorities have issued evidence that can be subject to automated exchange and re-used (it allows to be processed by the DC, c.f. Art. 14.3 (d) of SDGR) to prove the fulfilment of the requirements.	S
STA02-MFLE-01	Student authentication request Student is requested to authenticate with legally recognized electronic identity, e.g. through eIDAS or possibly ESSIF in the future.	M
STA02-MFLE-02	Student authentication Student authenticates herself with a legally recognized electronic identity.	M
STA02-MFLE-03	Data request Data consumer asks the student and/or DP to provide a set of evidence to prove student's eligibility for applying for study grant.	M
STA02-MFLE-04	Selection of data providers Student indicates all countries where the required evidence can be retrieved.	S
STA02-MFLE-05	Data collection and aggregation The approach will enable the processing of requests for evidence to be accessed or exchanged and ensure an adequate level of interoperability with other relevant systems (c.f. Art.14. 3 (b) and (g) of SDGR). Depending on the selected communication pattern It is possible to retrieve and aggregate evidence from data providers. Further requirements related to quality of evidence will be explored together with other pilots and DE4A technical work packages.	M
STA01-MFLE-06	Evidence preview Student is given a chance to preview evidence before it is transferred to data consumer, supporting the GDPR principles (related to the accuracy and relevance of the data exchanged and strengthening control by the user over data exchanged) and rights (of access and to restrict/object to the processing).	S
STA02-MFLE-07	Student consent for evidence Student previously identified gives valid consent ²⁴ for the evidence to be transferred to the data consumer (or rejects the transfer).	S

²⁴ Work is on-going with DE4A legal work package to clarify scope of “consent” (e.g. as one of legal grounds in GDPR for legitimacy of processing of personal data) which is a different concept than “explicit request” in the SDGR and also in relation to SDGR Art. 14. 3 (f) when user can choose whether or not to proceed with the exchange of evidence after the possibility of Evidence Preview.

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Requirement ID	Requirement description	MoSCoW
STA02-MFLE-08	Data validation Data consumer checks validity of the obtained evidence (in particular to minimize risks of impersonation).	M
STA02-POST-01	Acknowledgment The data consumer informs the students whether the application is valid or needs amendments, and provides receipt of the application submission in the first case. Student must now wait for the application to be evaluated.	M

Table 15: UC#2 – Non-functional requirements

Requirement ID	Requirement description	MoSCoW
STA02-PRI-01	Data minimization The data exchanged between the student, data consumer, and data providers should be limited to the data required by the procedure with the aim to not process evidence beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose.	M
STA02-PRI-02	Data purpose The data exchanged between the student, data consumer, and data providers should only be used for the explicitly agreed purpose.	M
STA02-PRI-03	Evidence processing Evidence should not be processed beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose (SDGR Art 14.3 (i)).	S
STA02-PRI-04	Preview Student should be able to preview the evidence to be used by the requesting competent authority and to choose whether or not to proceed with the exchange of evidence.	S
STA02-INT-01	Data semantics Semantic interoperability between evidence (e.g. diploma, completion of secondary school, student status, income, family situation) from Data Consumer and Data Providers countries needs to be ensured on the basis of agreed principles, formats and standards.	M
STA02-AVA-01	Data Evidence can be exchanged across borders automatically in an electronic format.	M
STA02-SEC-01	Data security Required evidence according to common/standardized data models is provided from trustworthy sources with guaranteed availability, integrity, and confidentiality of data so as to ensure a high level of security for the transmission and processing of evidence (SDGR Art 14.3 (e) and (h)).	M
STA01-SEC-02	Identity matching	M

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	Data provider can uniquely match presented electronic identity of a student with the person to whom evidence belongs.	
STA01-SEC-03	Data request validity verification Data provider should verify validity of the data request before evidence is sent.	S
STA02-SCA-01	Scalability The addition of new data consumers, data providers and students should be easily dealt with by the infrastructure.	S
STA02-SCA-02	Degradation The addition of new data providers and consumers must not degrade the whole system.	M
STA02-SCA-03	Member states The procedure can involve data providers or evidence issued from several (more than two) Member States.	S
STA02-USA-01	Multilinguality Students are able to access and receive instructions for completing the procedure in at least one official language of the European Union other than the national language or, where applicable, the national languages.	M

Generic cross-border procedure

Preconditions:

- Student wants to apply for a study grant in a Data Consumer country.
- Student has a legally recognized eID issued, e.g. within an eIDAS notified identification scheme.
- Data consumer has defined the mandatory and optional data needed for the application and it is verified that the evidence can be requested using the DE4A platform. Adequate trust mechanisms have been put in place to ensure the security of the exchange (i.e. guarantees exist on provenance/integrity/quality of evidence data).
- Student fulfils the requirements for requesting a study grant in the Data Consumer country.
 - o Some will be common criteria, established by the Data Provider country and understandable by the Data Consumer country, like student income details.
 - o Some will be very specific local criteria, or criteria that can change over time. These will be established or collected by the Data Consumer country directly from the user (like, for example, amount of credit points the student will take on in the academic year for which the grant is being requested).
- Competent authorities in the Data Provider countries (there can be more than one Data Provider country) have issued evidence that proves the criteria for applying for a grant are matched.

Main flow:

- Student accesses the page with an application form in the Data Consumer country.
- Student is requested to authenticate at DC with legally recognized electronic identity, e.g. through eIDAS or possibly ESSIF in the future. The student may also need to authenticate as well at the DP depending on technical conditions difficult to determine at this moment.
- Upon successful authentication the student sees the study grant application.

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- Student is requested to provide the evidence for academic and additional identification information that is mandatory for application.
- Student selects/indicates all countries where she/he finished her/his studies and where the competent authorities have issued required evidence or where data providers can provide the requested data (e.g. income data).
- The evidence is retrieved at data providers and aggregated (the way of retrieval and aggregation depends on the selected communication pattern).
- Student is given a chance to preview the evidence before transfer²⁵.
- Student gives consent²⁶ for the evidence to be sent to the data consumer.
- Evidence is transferred to the data consumer.
- Data consumer checks data completeness and validity of the evidence.

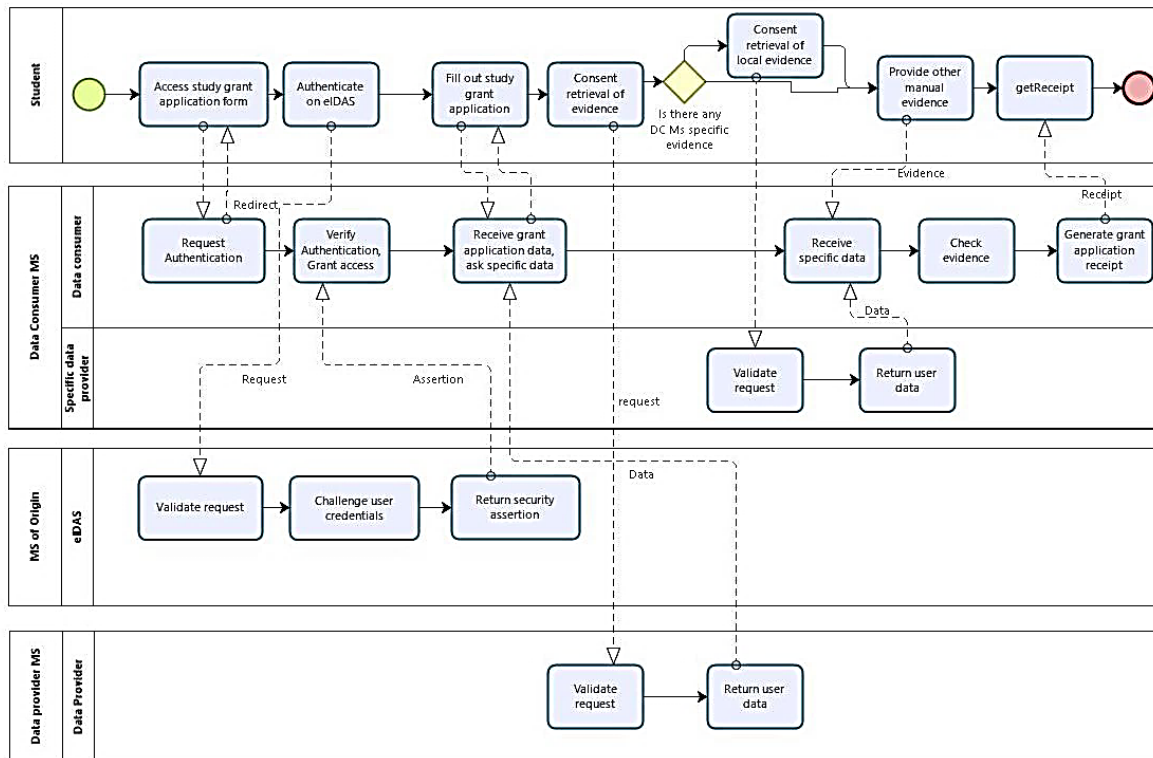
Postconditions:

- Student grant request is submitted successfully or might have errors. If errors are found, the user can solve them and retry the procedure to submit an application.
- In case the grant request is submitted successfully, the data consumer provides acknowledgment of receipt of the grant request, so it can be used to check the status of the request until all grant applications are evaluated.
- The students are informed about the results after certain period of time (it could be weeks or months).

²⁵ This is related to current preliminary analysis in the context of DE4A work package focused on legal and ethical compliance, however a more complete analysis, also considering the implementation options, is under way.

²⁶ Work is on-going with DE4A legal work package to clarify scope of “consent” (e.g. as one of legal grounds in GDPR for legitimacy of processing of personal data) which is a different concept than “explicit request” in the SDGR and also in relation to SDGR Art. 14. 3 (f) when user can choose whether or not to proceed with the exchange of evidence after the possibility of Evidence Preview.

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Figure 2: Process flow diagram for UC#2

Communication patterns

The process flow is similar to the one in UC#1 and can be implemented using an intermediation, supported user-managed access, user-transferred data, or self-sovereign identity pattern. All remarks from the UC#1 discussion are also relevant to this use case.

Country specifics

The following provides description of the existing procedures of the involved Belgian and Slovenian data consumers. As different regions in Belgium have different procedures and requirements the specifics of the Flemish, French, and German-speaking communities are also provided.

Belgium – Flemish Community

Preconditions for applying to a BE-FL study grant

- **Nationality:** The student must be a Belgian national. If she is not a Belgian national, she or her parents must have lived in Belgium for some time and must be working, or have already worked in Belgium.
- **Income:** The decision to award her a study grant depends on, amongst other things, her family situation and her income. This includes her salary as well as, for example, any benefits and alimony payments she may be receiving.
- **Household situation**
- **Academic preconditions:**

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- She must follow a recognised study programme at an institution that is recognised, financed or funded by the Flemish Community. Some study programmes are not eligible for a study grant.
- Her study programme must lead to a diploma.
- She must still have sufficient study grant credit.

Main flow

- The student is authenticated via the BE eID authentication mechanism and can fill in a form for applying for a study grant.
- During the whole procedure, the student or his intermediary can follow up on the status of his application via the same application "e-Loket".
- Upon receipt of the study grant application, data is automatically collected from various authoritative sources.
- The applications are handled in chronological order.
- The student or his intermediary is informed about the decision in the online procedure and by mail.

Postconditions

- Grant is assigned.
- Grant is rejected.

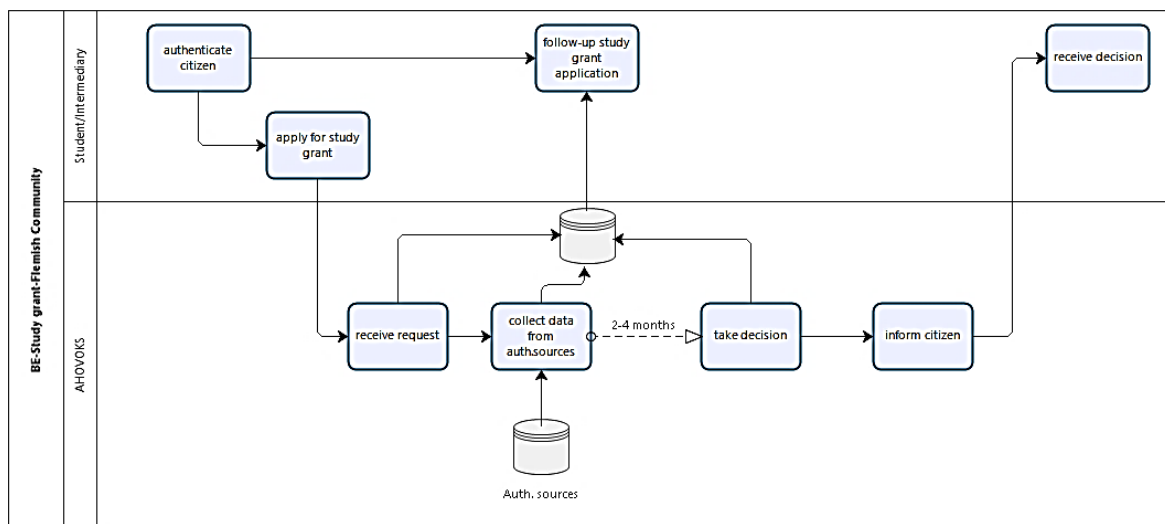


Figure 3: Process flow diagram for UC#2 – BE - Flemish community

Belgium – French Community

Preconditions for applying to a BE-FR study grant

- **Income/revenue:** from jobs, real estate, allowances, etc.
- **Conditions linked to the academic course** of the applicant (being a regular student etc.)
- **Nationality**
 - One of the student’s parents has to work or has worked in the EU, or
 - She must have a Belgian residence.

Main flow

- The student is authenticated and can fill in a form for applying for a study grant (this new procedure will be available as from July 2020; the old procedure consisted of filling out an on-line form after which a request ID is confirmed by mail).
- During the whole procedure, the student can follow up on the status of his application.

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- During the procedure, the student can be contacted by a relationship manager for sending additional evidence; this contact can be by e-mail or by phone.
- The applications are handled in chronological order.
- The student is informed about the decision by letter.

Postconditions

- Grant is assigned.
- Grant is rejected.

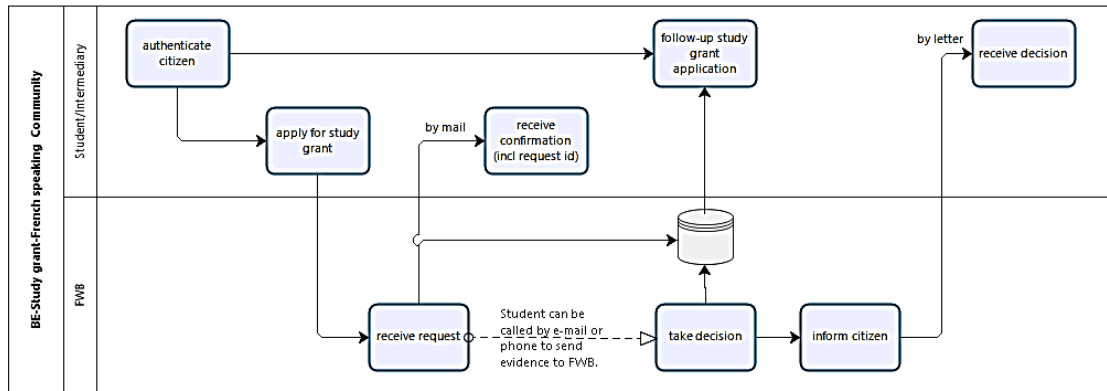


Figure 4: Process flow diagram for UC#2 – BE - French community

4.4 Use Case “Diploma/Certs/Studies/Professional Recognition” (UC#3)

4.4.1 Actors Identification (DPs, DCs, end users) and Partners Involved

Student (Holder): the entity who possesses one or more VC (verifiable credentials), i.e., diplomas/certificates, and shares/submits them as needed to verifiers.

Data consumer (Service Provider / Verifier): entity to whom holders (in this case students) submit their requests for diplomas/certificates recognition, which requires and consumes data about students’ and academic data included in a VC to verify the student and validate academic data. Service providers can be, for example, universities, Ministries, or regional governments.

Data provider (Issuer): an entity that issues VC, i.e., diplomas/certificates upon completion of studies, and registers the student’s title. Data providers can be universities or Ministries (e.g. Ministry of Education, Science and Sport in Slovenia).

Table 16: UC#3 – Data providers and consumers

UC#3		
	Data provider	Data consumer (Service Provider)
BE	The three Belgian communities: Flemish community, French-Speaking community and German-speaking community with BOSA as the federal service integrator (SPOC)	The three Belgian communities: Flemish community, French-Speaking community and German-speaking community with BOSA as the federal service integrator (SPOC)

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ES	UJI, Ministry of Education ²⁷	/
SI	UM, Ministry of Education, Science and Sport,	UM, Ministry of Education, Science and Sport, JSI

4.4.2 Required and Available Data for Evidence Exchange

The following tables provide common mandatory and optional evidence data required for both the Issuing and Verifying student's VC procedures. The tables include identification information of actors (student and institution) and the information about past education that foreign students need to provide when applying for their diploma recognition process in another Member State (e.g. information on completion of secondary or undergraduate studies). The tables have been prepared based on the analysis of the Belgian and Slovenian procedure requirements. The details of those requirements can be found in Annex IV. This data is also the basis of the VC data model. The VC data model is defined and based on the data collected from MS, however it can be arranged in the manner that the Data Model for the EDCI is used.

Table 17: UC#3 – Common Mandatory and Optional Identification Data for Student

Name	Description	Example value	Mandatory / Optional
First name	Current given names of the natural person	Ana	M
Family name	Current family name of the natural person	Petelin	M
Gender	Gender of the student	F	M
Date of birth	Date of birth, written in the form yyyy-mm-dd	1998-12-08	M
Place of birth	Birth city	Maribor	M
Defined identifier for the student* ²⁸	Student's ID given by the issuer	E95043456	O
Holder's identifier*	Identifier related to student digital identity (e.g., DID, eID, identifier of SES, public key of AES or QES)	N/A	M
Citizenship	Citizenship of the student	Slovenia	M
Address	Student's address	Koroška cesta 20, 2000 Maribor	M

Table 18: UC#3 – Common Mandatory and Optional Identification Data for Issuer

Name	Description	Example value	Mandatory / Optional
Issuer's identifier*	Identifier related to issuer's digital identity (e.g., DID, eID, identifier of	N/A	M

²⁷ A Royal Decree in Spain currently limits implementation of Self-Sovereign Identity schemes, so it will need to be checked in more detail how this can affect towards the piloting (it is expected more legislation will be passed clarifying this point and aligned with EU upcoming regulatory framework evolution in this domain).

²⁸ The attributes with an asterisk in all three tables are related to the infrastructure and not provided by involved data providers.

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	SES, public key of AES or QES)		
Issuer type	Type of the institution issuing the certificate (University, College, Company, Institute)	University	M
Issuer full name	Full Name of the issuer	University of Maribor	M
Issuer address	Address of the issuer	Slomškov trg 12	M
Issuer city	City of the issuer	Maribor	M
Issuer zip	Zip code of the issuer	2000	M
Issuer country	Country of the issuer	Slovenia	M
Department of the official Issuer	Department of the issuer	Faculty of Electrical Engineering and Computer Science	O
Address of the department of the official Issuer	Address of the department of the official Issuer	Koroška cesta 46, 2000 Maribor, Slovenia	O

Table 19: UC#3 – Common Mandatory and Optional Academic Data for Procedure Issuing and Verifying of Verifiable Credentials

Name	Description	Example value	Mandatory / Optional
Context*	The URI where the verifiable credential data schema is defined	https://feri.um.si/vc/v1	M
Type	Type of verifiable credential	Diploma	M
Verifiable credential ID*	Identifier of verifiable credential	01255922	M
Verifiable credential issuance date	Issuance date of the verifiable credential	2010-01-01T19:73:24Z	M
Diploma title	The title of the printed diploma issued to the student	Certificate of passed undergraduate studies	M
Value	Represents the amount or value of the certificate, which can be of various types	360	O
Value type	Represents the type of the value, which can be ECTS or DIPLOMA UNIT or any other value	ECTS	O
Length of the study	Official length of the study in years	6	O
EOVK	European Framework for Higher Education Qualifications (http://www.ecahe.eu/w/index.php/Framework_for_Qualifications_of_the_European_Higher_Education_Area)	1	O

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Name	Description	Example value	Mandatory / Optional
Diploma language	The language in which diploma is issued to the student	Slovene	M
Study programme name	In case the diploma is rewarded for a study program	Information and Communication Technology	M
Awarded title	An academic title awarded after receiving this diploma	Bachelor of Science ICT	O
Diploma identification number	Unique ID of the issued diploma	000000000260	O
Date of awarded diploma	The date of graduation or the date the student formally received the diploma (in the format yyyy-mm-dd)	2014-07-22	M
Date of issued diploma	The date the diploma was issued to the student	2014-03-12	M
Issuer identifier*	Identifier related to institution digital identity (e.g., DID, eID, identifier of SES, public key of AES or QES)	N/A	M
Proof (signature)*	Cryptographic proof – data related to the digital signature of the verifiable credential, digitally signed by issuer digital identity. Required data is a type of signature, creation date, proof purpose, verification method and signature value	Type: RsaSignature2018 Created: jws Proof purpose: diploma issuance Verification Method: Issuer public key Signature Value: N/A	M
Revocation*	Location e.g. URI, where the list of revoked verified credentials is published	https://feri.um.si/diploma/revocation/list/2018	O

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Table 20: UC#3 – Available Mandatory and Optional Data for Procedure

Required Attribute	DP Belgium				DP Slovenia				DP Spain			
	Available?	Direct access or derived	Standard format including whether Structured or Unstructured (S/U)	Source	Available?	Direct access or derived	Standard format including whether Structured or Unstructured	Source	Available? ²⁹	Direct access or derived	Standard format including whether Structured or Unstructured	Source ³⁰
Identification-Student												
First name	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	S	eIDAS
Family name	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	S	eIDAS
Gender	Y	Derived	S	eIDAS optional	Y	Derived	S	Citizens registry	Y*	Direct/ Derived	S	eIDAS optional/ Ministry
Date of birth	Y	Direct	S	eIDAS	Y	Direct	S	Citizens registry	Y	Direct	S	eIDAS
Place of birth	Y	Derived	S	eIDAS optional	Y	Derived	S	Citizens registry	Y*	Direct/ Derived	Simple	eIDAS optional/ Ministry
Citizenship	Y	Derived	S	HEI / Ministry	Y	Derived	S	Citizens registry	Y**	Derived	Simple	University/ Ministry
Address	Y	Derived	S	HEI / Ministry	Y	Derived	S	Citizens registry	Y*	Derived	Simple	University/ Ministry
Identification-Institution												
Issuer type	Y	Derived	S	Belgian community	Y	Direct/ derived	S	HEI/Ministry	N	Direct	S	HEI/ Ministry

²⁹ Attributes marked with an asterisk (*) are optional eIDAS attribute, currently not delivered in Spain. Alternatively, could be provided by the Ministry through another service, or as a last resort, by the university, despite not being an authoritative source (and not being able to provide any level of assurance above low) for it, and if legally allowed, which needs to be checked (or if not, just in a pre-production environment). And this only in certain types of enrolment where the student already has data in another university. For first-time enrolment, only the ministry could be a valid data provider. Attributes marked with two asterisks (**) are the same as the others but not provided by eIDAS in any case.

³⁰ All data not served through eIDAS in Spain, will be served through the Ministry. Even if some data is taken from the university as a source, the only DP will be the ministry.

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	DP Belgium				DP Slovenia				DP Spain			
				register								
Issuer full name	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Issuer address	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Issuer city	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Issuer zip code	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Issuer country	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Department of the official Issuer	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Address of the department of the official issuer	Y	Derived	S	Belgian community register	Y	Direct/derived	S	HEI/ Ministry	Y*	Direct	S	HEI/ Ministry
Academic data												
Type	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/Ministry	Y	Direct/derived	S	HEI/ Ministry
Verifiable credential issuance date	N	Derived	S	HEI	N	Direct	S	HEI	N	Direct	S	HEI/ Ministry
Diploma title	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct/derived	S	HEI/ Ministry ³¹
Value	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	N	Direct/derived	S	HEI/ Ministry

³¹ Again, attributes in this section to be determined whether this should be provided by the university or by the ministry, as it depends on legal and political decisions.

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	DP Belgium				DP Slovenia				DP Spain			
Value type	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	N	Direct/derived	S	HEI/ Ministry
Length of the study	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct/derived	S	HEI/ Ministry
EOVK	N	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	N	Direct/derived	S	HEI/ Ministry
Diploma language	N	Derived	S	HEI	N	Direct/derived	S	HEI/ Ministry	Y	Direct/derived	S	HEI/ Ministry
Study programme name	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct/derived	S	HEI/ Ministry
Awarded title	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct	S	HEI/ Ministry
Diploma identification number	N/Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct/derived	S	HEI/ Ministry
Date of awarded diploma	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct	S	HEI/ Ministry
Date of issued diploma	Y	Derived	S	HEI	Y	Direct/derived	S	HEI/ Ministry	Y	Direct	S	HEI/ Ministry

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4.4.3 Structured Procedure Description (User Journey Map)

User journey

Student Ana (holder) is a Slovenian citizen who finished her undergraduate studies at a university in a Data Provider (issuer) country (i.e. Slovenia). She successfully passed all her exams and paid all fees for receiving the diploma. The issuer (university) in the Data Provider country possesses a digital identity (e.g., eID), with the associated identifier (e.g., DID, public-key). Moreover, a holder must also possess a digital identity and its associated identifier. The issuer issues a VC, i.e., diploma/certificate to the holder only after the holder explicitly gives consent³² to the previewed contents of the VC. The physically issued certificate (diploma) is prepared in a digital form of VC (e.g., JSON possibly following the EDCI VC data model [36]), which is cryptographically signed by the issuer. VC, including academic data and a cryptographic proof (i.e., credential digital signature) is stored in holder's repository – a digital identity wallet that stores and protects holders VCs (e.g., wallet).

Ana wants to continue her graduate studies at a different university (i.e. HEI) in a Data Consumer (verifier) country (e.g. Belgium). She checks that she meets the required enrolment criteria (see for example Section 4.2.3) and initiates the process of VC (diploma) recognition at the university (verifier) in Data Consumer country by possibly applying for the study over a dedicated ICT solution, which enables the OOP. In order to apply for the study (covered in Section 4.2), for a grant (covered in Section 4.3) or another application where diplomas are required as evidence, she must authenticate herself (method depends on the Holder identifier type e.g., DID, eID identifier) and must have her VC recognized, i.e., verified. She selects the VC from her repository that she wishes to share with the university in the Data Consumer country. In order to enable the Data Consumer country's HEI institution to verify her VC, she once again authenticates over a dedicated ICT solution. After that, she transmits the selected VC to the Data Consumer country by either uploading the VC to the Data consumer's dedicated ICT solution or by sending it as an attachment to an email indicated by the Data Consumer country or by sending it through dedicated SSI-based agents. The HEI of the Data Consumer country, after receiving the VC, verifies the proofs and academic data included in received VC. If successfully verified, her academic data from VC is stored in the university's local database. From this point on, the Data Consumer country continues with their own diploma recognition process.

The procedure consists of competent authority in the Data Provider country issuing a statement of comparability certifying that a citizen's diploma, certificate or other proof of studies, issued in the Data Provider country, is comparable to a corresponding diploma, certificate or proof of studies issued in the Data Consumer country (as defined in European Recognition Area Manual [43] and the EAR Project [44]). This formal statement is again expressed in the form of a VC, which is addressed towards the Holder (student Ana), while issued and digitally signed by the competent authority.

Both processes of issuing and verifying of verifiable credential i.e., diploma within UC#3 depend on the Fully user-managed access or Self-sovereign identity pattern, as both cases are initiated by the student.

Functional and non-functional requirements

There are several functional and non-functional requirements, which have been identified in order to successfully carry out the issuing and verifying VCs, presented in the following tables. These will be subsequently refined and extended in next steps of the pilots' lifecycle in collaboration with the

³² Work is on-going with DE4A legal work package to clarify scope of "consent" (e.g. as one of legal grounds in GDPR for legitimacy of processing of personal data) which is a different concept than "explicit request" in the SDGR and also in relation to SDGR Art. 14. 3 (f) when user can choose whether or not to proceed with the exchange of evidence after the possibility of Evidence Preview.

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DE4A technical work packages of architecture, semantics and common components design and development. It should be noted that the core of the process is a VC. Based on the available infrastructure at the time of the piloting, the VC can be decentralized and SSI-based VC, represented by a DID, which is based on the ESSIF and subsequently EBSI infrastructure. For this to be functional, the MS and their formal institutions, should be able to formally accept, comply and implement the required EBSI infrastructure and ESSIF. Furthermore, to be fully functional in such a manner, foreseen interoperable SSI wallets (edge or cloud) are required, which are based on the EBSI and left for the market to be implemented and spread. However, the VCs can be based on centralized and eIDAS backed eIDs and in this case digital identity wallets, which are not SSI based.

Table 21: Functional requirements for the process of issuing VCs

Requirement ID	Requirement description	MoSCoW
STA03-PREV-01	Environment requirements Holder/Issuer uses a client PC/mobile device with internet connection and a web browser. Based on the infrastructure available, either software for managing eID or an SSI-wallet is needed.	M
STA03-PREV-02	Holder/Issuer digital identity Holder/Issuer has a digital identity with its associated identifier. Based on the infrastructure available, this can either be an eIDAS-based eID or an ESSIF-based DID.	M
STA03-PREV-03	Holder digital identity – issuer verification Student digital identity is verified by issuer administration. Based on the infrastructure available, it can be through eIDAS eIDs or through ESSIF DIDs.	M
STA03-PREV-04	Holder course/study completion Holder (Student) passes a course or finishes his/her study for which he/she must receive a VC.	M
STA03-PREV-05	Mandatory and optional data definition Data provider has defined which data needs to be provided within a VC.	M
STA03-PREV-06	Evidence availability Required data is available in machine-readable format (VC) where data providers or competent authorities have issued evidence that can be used as claims subject to automated exchange and re-used (allowing to be processed by the Verifier, c.f. Art. 14.3 (d) of SDGR) to prove the fulfilment of the requirements.	S
STA03-MFLE-01	Issuer previews evidence Issuer previews evidence that was obtained from the internal data providers through STA03-PREV-06, supporting the GDPR principles (related to the accuracy and relevance of the data exchanged and strengthening control by the user over data exchanged) and rights (of access and to restrict/object to the processing).	M
STA03-MFLE-02	Data validation Issuer checks validity of the obtained evidence.	M
STA03-MFLE-03	Digital signing Issuer digitally signs a VC.	M
STA03-POST-01	VC attachment VC is assigned to student identifier associated with their digital identity.	M
STA03-POST-02	VC accessibility VC is within holder repository, and only holder has the ability to	S

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	select to whom this VC is shared. The approach will enable the processing of requests for evidence to be accessed or exchanged and ensure an adequate level of interoperability with other relevant systems (c.f. SDGR Art. 14.3 (b) and (g)).	
STA03-POST-03	VC verification VC can be easily verified by anyone (verifier) to whom it is shared by holder (student).	M

Table 22: Functional requirements for the process of verifying holder's/student's VCs

Requirement ID	Requirement description	MoSCoW
STA03-PREV-07	Environment requirements Holder/Data Consumer uses a client PC/mobile device with internet connection and a web browser. Based on the infrastructure available, either software for managing eID or a SSI-wallet is needed.	M
STA03-PREV-08	Authentication availability Holder belongs to a country with a notified identification scheme that can provide her identification attributes required for authentication through eIDAS. It can also be based on the SSI principle, which however would rely on DIDs provided within an operational ESSIF.	S
STA03-PREV-09	Holder/digital identity Holder/Issuer has a digital identity with its associated identifier. Based on the infrastructure available, this can either eID based on the eIDAS or a DID based on ESSIF.	S
STA03-PREV-10	Mandatory and optional data definition Data consumer has defined which data needs to be provided as evidence for VC i.e., diploma recognition process.	M
STA03-MFLE-04	VC access Holder has access to the repository where to his identifier verifiable credentials are stored.	M
STA03-MFLE-05	Holder authentication Student is requested authenticate herself. Based on the infrastructure available, this can be done using a DID based on ESSIF.	M
STA03-MFLE-06	Holder VC selection Holder selects his/her digital verifiable credential, which he/she wants to share. Based on the infrastructure available, this can be an SSI edge or could be based on wallet or other dedicated software for managing VCs.	M
STA03-MFLE-07	Holder VC sharing Holder sends VC to Data Consumer (HEI) / verifier.	M
STA03-MFLE-08	Data consumer/verifier VC verification Data consumer has ability to perform verification of VC proofs (claims) provided by the Holder. Evidence should not be processed beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose (SDGR Art 14.3 (i)).	S
STA03-POST-04	Holder VC sharing VC can be reshared with anyone, anytime again.	M
STA03-POST-05	VC information VC provides all the required information about the issuer, student,	S

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	and certificate itself in a machine- readable form, possibly including cryptographic material allowing verification of provenance and integrity	
STA03-POST-06	VC deviations VC can be changed, but any deviation from the original data is automatically detected within verification using blockchain infrastructure (possibly EBSI).	W

Table 23: Non-functional requirements for UC#3 procedures

Requirement ID	Requirement description	MoSCoW
STA03-PRI-01	Data minimization The data exchanged between the holder (student), verifier (DC), and issuer (DP) should be limited to the data required by the procedure with the aim to not process evidence beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose.	M
STA03-PRI-02	Data purpose The data exchanged between the holder (student), verifier (DC), and issuer (DP) should only be used for the explicitly agreed purpose.	M
STA01-PRI-03	Evidence processing Evidence should not be processed beyond what is technically necessary for the exchange of evidence, and then only for the duration necessary for that purpose (SDGR Art 14.3 (i)).	S
STA03-PRI-04	Preview Holder should be able to preview the evidence to be used by the requesting competent authority and to choose whether or not to proceed with the exchange of evidence.	S
STA03-INT-01	Data semantics Semantic interoperability between evidence (e.g. diploma, completion of secondary school) from the DC and DP countries needs to be ensured on the basis of agreed principles, formats and standards.	M
STA03-AVA-01	Data Evidence can be exchanged across borders in an electronic structured format, i.e. in the form of claims stored in VCs.	S
STA03-SEC-01	Data security Required evidence according to common/standardized data models is provided from trustworthy sources with guaranteed availability, integrity, and confidentiality of data so as to ensure a high level of security for the transmission and processing of evidence (SDGR Art 14.3 (e) and (h)).	M
STA03-SEC-02	Identity matching DP can uniquely match presented digital identity of a Holder (student) to whom evidence belongs. Based on the infrastructure available, this can either be an eID based on eIDAS or a DID based on ESSIF.	M
STA03-SCA-01	Scalability The addition of new Verifiers (DCs), Issuers (DPs) and Holders (students) should be easily dealt with by the infrastructure.	S
STA03-SCA-02	Degradation	M

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	The addition of new data Verifiers (DCs), Issuers (DPs) must not degrade the whole system.	
STA03-SCA-03	Member states The procedure can involve Issuers (DPs) or evidence issued from several MS.	S
STA03-USA-01	Multilinguality Holders (Students) are able to access and receive instructions for completing the procedure in at least one official language of the EU other than the national language or, where applicable, the national languages. Further usability requirements (i.e. for the user consent, user preview of evidence) will be explored together with other pilots and legal and technical work packages of DE4A.	M

Generic cross-border process of issuing student's VC:

Preconditions³³:

- Holder (student) has a digital identity and its associated identifier based on the infrastructure available (ESSIF or eIDAS).
- Holder owns a repository where the verifiable credential after issuance is stored.
- Holder's digital identity is verified by the issuer's administration, which back checks its identity.
- Issuer (e.g., University) of verifiable credentials has all student's data, including academic data stored in its own dedicated ICT solution.
- Issuer of the verifiable credential has its digital identity and its associated identifier.

Steps:

- Holder (student) passes a course or finishes the study for which he/she/it must receive a VC i.e., diploma/certificate.
- The issuer issues a verifiable certificate via the appropriate ICT-backed solution.
 - o Issuer first acquires holder identifier and verifies its related digital identity.
 - o Issuer defines all the VC certificate mandatory and optional data.
 - o Issuer verifies academic data and digitally signs the new VC for the holder.
- The digital VC is cryptographically signed with issuer digital identity and transmitted to the holder (i.e., student) VCs repository.

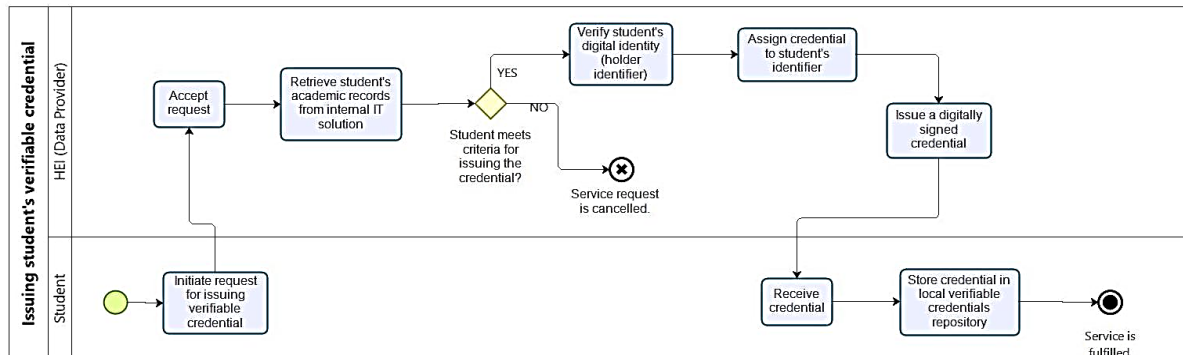
Postconditions:

- VC is digitally attached/assigned to student's digital identity identifier.
- VC data is cryptographically signed by the Issuer.

³³ There can be a number of legal, governance and organizational aspects that would need to be solved before envisaged SSI approach i.e., DID is used as holder identifier, can be fully made operational in production environments (e.g. adapting legislation on electronic identity at EU and national levels, evolution of EBSI-ESSIF to a production-ready status, availability of components, having common governance agreements and policies for EU-wide registration of SSIs for citizens and organisations, and bring standardised credential formats and semantic definitions into EU's data interoperability plan...). The pilot will work closely with different work packages in DE4A focused on legal, governance and technical components as well as with EBSI and ESSIF teams to assess these challenges and propose pragmatic approaches.

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- The certificate is accessible by the holder (student) at anytime/anywhere through his VCs' repository.
- The VC can be easily shared and verified by anyone.



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Modeler

Figure 5: Cross-border process flow of issuing student's verified credential

Generic cross-border process of verifying holder's VC³⁴:

Preconditions:

- Holder (student) has already an assigned VC.
- Holder is in possession of digital identity to prove that the VC belongs to her.

Main flow:

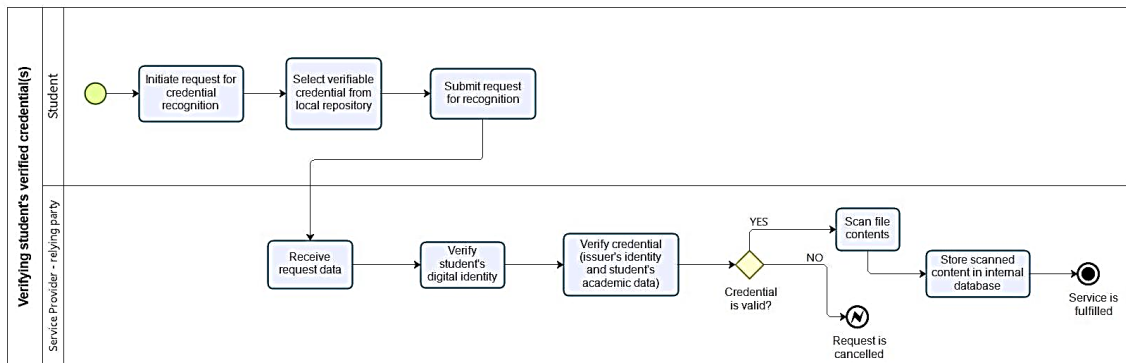
- Holder accesses his local VCs repository.
- Holder selects issued VC he wants to share.
- Holder uses his digital identity that is related to the holder identifier in the VC to authenticate him/herself towards the ICT backed solution.
- Holder sends or uploads the files to a HEI or its ICT solution, he/she wants to prove he/she has specific VC.
- The verifier (HEI) receiving the VCs, i.e. diplomas/certificates in the form of shareable files, uploads these into its system if the student herself has not done it already.
- The verifier's information systems received VCs that the student presented to the HEI institution.
- The VC is verified positively or not, this includes the verification of academic data and the digital identity of the issuer.
- When the verifiable credential is verified positively, the HEI institution receiving the credential, automatically scans the content and imports the data into its own database.

³⁴ The process only enables the signing, storing, sharing and verifying credentials but not the compatibility of the content within various institutions – there it enables only a technical solution and not the content based. In order to enable this, the EDCI standard would need to be accepted throughout EU and the VC would need to be fully adapted to the EDCI VC data model. We aim to at least do this among participating HEIs in this use case.

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Postconditions:

- The VCs are kept within a dedicated repository (e.g. wallet), which can be in the edge or cloud form but fully controlled and managed with his digital identity.
- The VCs can be reshared with anyone, anytime again.
- The VC can provide all the required information about the issuer, holder (student) including cryptographical proofs and the certificate itself in a computer-readable form.
- The shared VC can be changed but any deviations from the original data/content defined by the digital certificate issuer can be automatically and easily detected when verifying proofs inside VC.



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Figure 6: Cross-border process flow of verifying student’s verified credential

Communication patterns

The process flow as currently presented in a diagram is planned to be implemented using the Self-sovereign identity pattern.

Country specifics

The following text provides description of the **existing** procedures of the involved Member States. None of the procedures can be currently performed fully online and in an electronic form only.

Slovenia

Preconditions:

- Student has completed all the credits for the programme.

Steps:

- Student does the title deposit request through an ICT-backed solution.
- Student pays the taxes (electronic payment procedure with credit card).
- University sends the records to the ministry through an API and receives the registration number.
- After a period of time, the diploma will be received in paper at the university.
- The student must go there in person (possibly a trusted delegation procedure exists) and her ID card is physically checked to allow him to collect the diploma.

Postconditions:

- Diploma is delivered to the student.

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- Diploma data (including registry number) is stored for internal use (to use as evidence of requirement compliance for a Master's degree enrolment, for example).
- Diploma can be validated electronically (by the owner or by a human third party who has received an access token generated by the owner) through a web service offered by the Ministry of Education (university does not offer access to it).

Belgium

User journey: Student from EU enters a demand for diploma recognition from the Flemish Community.

Option 1: Student visits an intermediary within BE (for ex. VDAB) and needs a diploma recognition.

- ➔ Online procedure for diploma recognition from Flemish government initiated by the intermediary party

Option 2: Student sends a demand for diploma recognition directly to the Flemish government (without an intermediary party)

- ➔ Offline procedure (send evidence by email/mail)

The Flemish government is currently developing a fully digital and online application for diploma recognition. There are 2 types of diploma recognitions possible:

1. Recognition of the degree (Master, Bachelor, Secondary education,...)
2. Specific diploma recognition: full recognition (for ex. Master of Science in Medicine)

For the recognition procedure, several types of evidence are required:

- Base documents (necessary for every procedure)
- Evidence pieces necessary depending on the degree (for ex. recognition of a Master's degree requires a thesis)
- Some evidence pieces necessary depending on the country of origin of the diploma

The procedure is not free. The person that asks for diploma recognition has to pay the procedure.

Main steps in the diploma recognition procedure by the administration:

- Check for authenticity
- Check for country and school/education
- In some cases: ask for advice from external advisors

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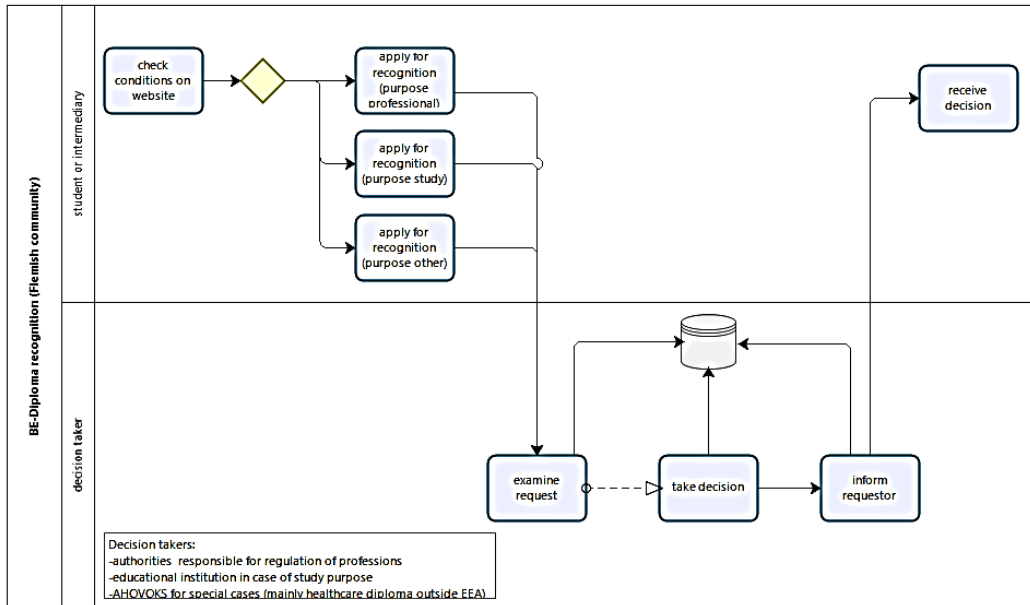


Figure 7: Process flow diagram for UC#3 – BE - Flemish community

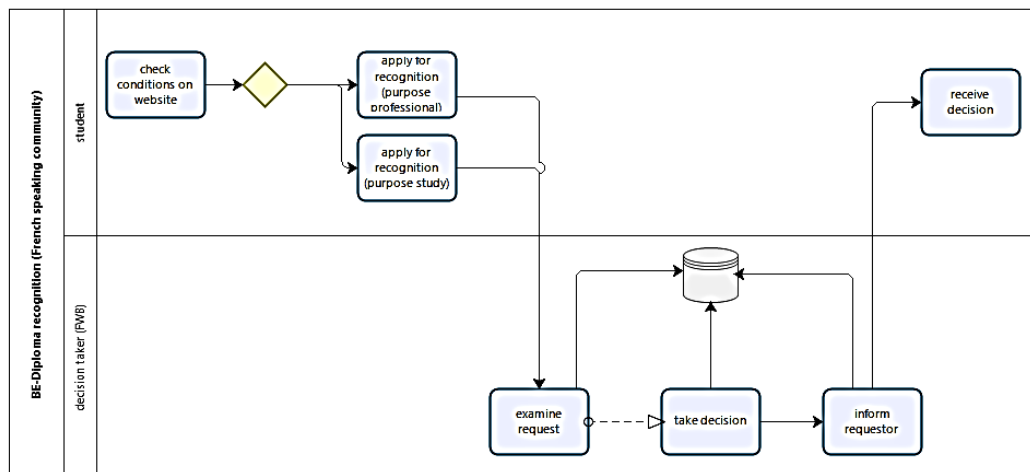


Figure 8: Process flow diagram for UC#3 – BE – French speaking community

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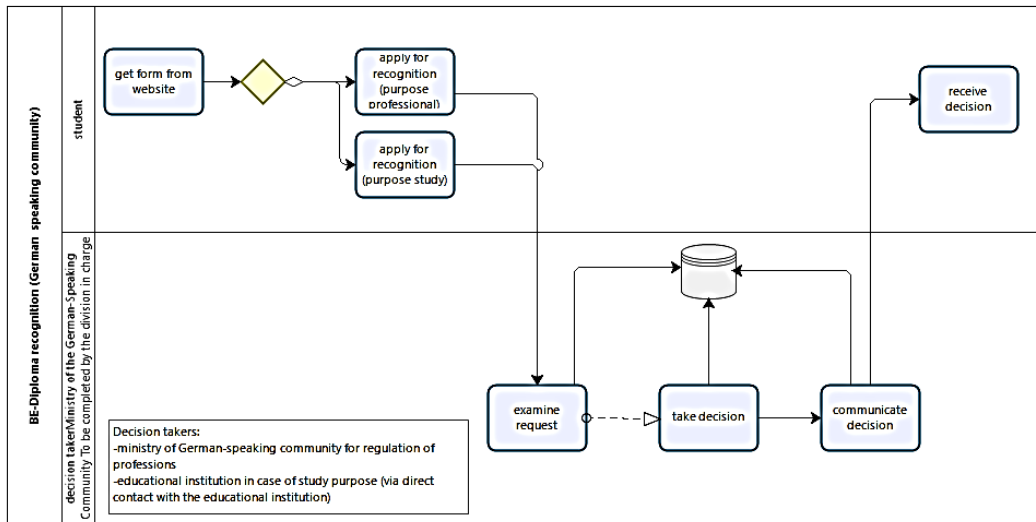


Figure 9: Process flow diagram for UC#3 – BE – German-speaking community

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5 Barriers and Challenges Relevant to the Pilot

Table 24: Barriers and challenges relevant to the pilot

Nr. (ID)	Barrier type (Political / Organisational / Legal/ Semantic/ Technical)	Name of gap	Brief description of the gap
1	Legal	Blockchain ID in Spain	By RDL 14/2019 it is forbidden in Spain to use a blockchain infrastructure to offer any identification or signature process (until a European or national law regulates the use of these technologies)
2	Legal	Recognition of diplomas/secondary studies	In Spain, recognition of studies previously obtained in other countries must be done (by national and regional law) by National Distance Education University (UNED). It is not foreseen to be able to directly use a credential provided by another foreign university without a previous peer-to-peer agreement. Also in Slovenia, the candidates with foreign qualifications must undergo a procedure for the recognition of those qualifications, which at the moment requires also originals and certified copies of the evidence.
3	Organisational	Regional education competences transferred to regional government	As education competences are transferred in Spain to Regional Governments it is difficult to define a unique point for applications to higher education to other MS citizens.
4	Technical/legal/organisational	Personal data in blockchain and evolution of EBSI, ESSIF and eIDAS	If blockchain is to be used in any use case there must be very clear grounds that the solution fully complies with GDPR and all its precepts and legal, governance and organisational arrangements for evolution of EBSI, ESSIF and eIDAS would be also of direct relevance (at least in UC#3).
5	Semantic	Equivalence for studies/subjects	It is already complicated to offer equivalence between degrees. Trying to offer equivalence between subjects in different degrees in different universities and different countries may be a titanic effort and not worthy. Relevant on-going efforts (e.g. EAR project, ENIC-NARIC Network) will be considered. For example: a set of five subjects in a degree offer access to a specific mention in a Master's degree, but is there an equivalence with those subjects in other degrees from different universities?
6	Semantic	Data formats and high variability of attributes	Wide range of formats for electronic evidence and low overlapping/high variability of the

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Nr. (ID)	Barrier type (Political / Organisational / Legal/ Semantic/ Technical)	Name of gap	Brief description of the gap
			attributes that form evidence in different Member States. Finding a way for abstracting from very specific local specific requirements that may also change over time could be necessary.
7	Political/legal	Notified eIDs in Slovenia	Slovenia has not notified yet its identification scheme. It is also not clear when the notification will be done, as a national law on the eID still needs to be adopted.
8	Political/legal	Study grants' restrictions	Several MS or their regions have restrictions on which foreign students can apply for a study grant. This can affect the number of students available for piloting in the production phase. For example, in Flanders, the student must be domiciled in Belgium for an uninterrupted period of 5 years OR the parents of the student should have worked in Belgium for a certain period. In Wallonia, it is required for a student to have residence in Belgium and at least one parent works or has worked in the EU. In Spain a foreign student must be a Spanish resident for at least 2 years.
9	Political	Limited interest in study grants	Limited interest in the Applying for grant procedure for foreign EU students among public administrations in the participating MS. The interlocutors in the Belgian communities explained that the number of foreign students applying for a study grant in Belgium is very low.
10	Political	IT budgets	The interlocutors in the Belgian communities indicated that for 2020 there are no IT budgets foreseen for SDG or DE4A.
11	Political/technical/organisational	Maturity of EBSI/ESSIF	There is a risk that EBSI, ESSIF and Diplomas UC will not be mature enough for the Studying Abroad pilot in production phase. The same applies for connection of eIDAS with ESSIF.
12	Political/technical	Time restrictions for procedures	Some of the piloted procedures in production will be available only for a limited period of time each year, for example a call for applications to higher education in Slovenia is usually open in February and March.
14	Political	Limited number of piloting partners	There is a limited number of partners participating in the Studying Abroad pilot, e.g. only two MS in UC#1.
15	Technical	Identity matching, preview, interaction patterns	Identity matching remains a challenge in the eIDAS infrastructure. Preview design and implementation still under discussion, innovative

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Nr. (ID)	Barrier type (Political / Organisational / Legal/ Semantic/ Technical)	Name of gap	Brief description of the gap
			interaction patterns for data exchange are still to be designed and technically supported for integration and piloting.
16	Technical	Double authentication	It could be possible that a student may need to authenticate more than once when evidence also comes from third countries and DP requires the student to authenticate again at DP.

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6 Examples of Existing Services

In this section, examples are given of existing services for each of the three use cases. All depicted services are Data Consumer services.

6.1 Use case 1

6.1.1 Slovenia

Since 2012 Ministry of Education, Science, and Sport of Republic of Slovenia has been operating the eVŠ system (The records and analytical information system of higher education in the Republic of Slovenia). The system was established for the purpose of determining candidates' eligibility to study in Slovenia and other rights chargeable to public funds, higher education policy planning and the monitoring of the higher education system, the monitoring of the network of higher education institutions and study programmes, public information, and for research, analytical and statistical purposes. All candidates who wish to enrol at one of the Slovenian higher education institution must submit an application through this system (<https://portal.evs.gov.si/prijava/?lang=en>), available in Slovene and English.



Enrolment application for study **eVŠ**
Visoko šolstvo v Sloveniji

CALLS FOR ENROLMENT | INSTRUCTIONS FOR COMPLETING THE APPLICATION | FAQ SLO | ENG

First application deadline for Slovene citizens and citizens of the Member States of the European Union under the Call for enrolment into undergraduate and long-cycle master study programmes in 2020/2021 is extended until 9 April 2020.

How do I apply? »

Digital certificates »

What will happen to my application? »

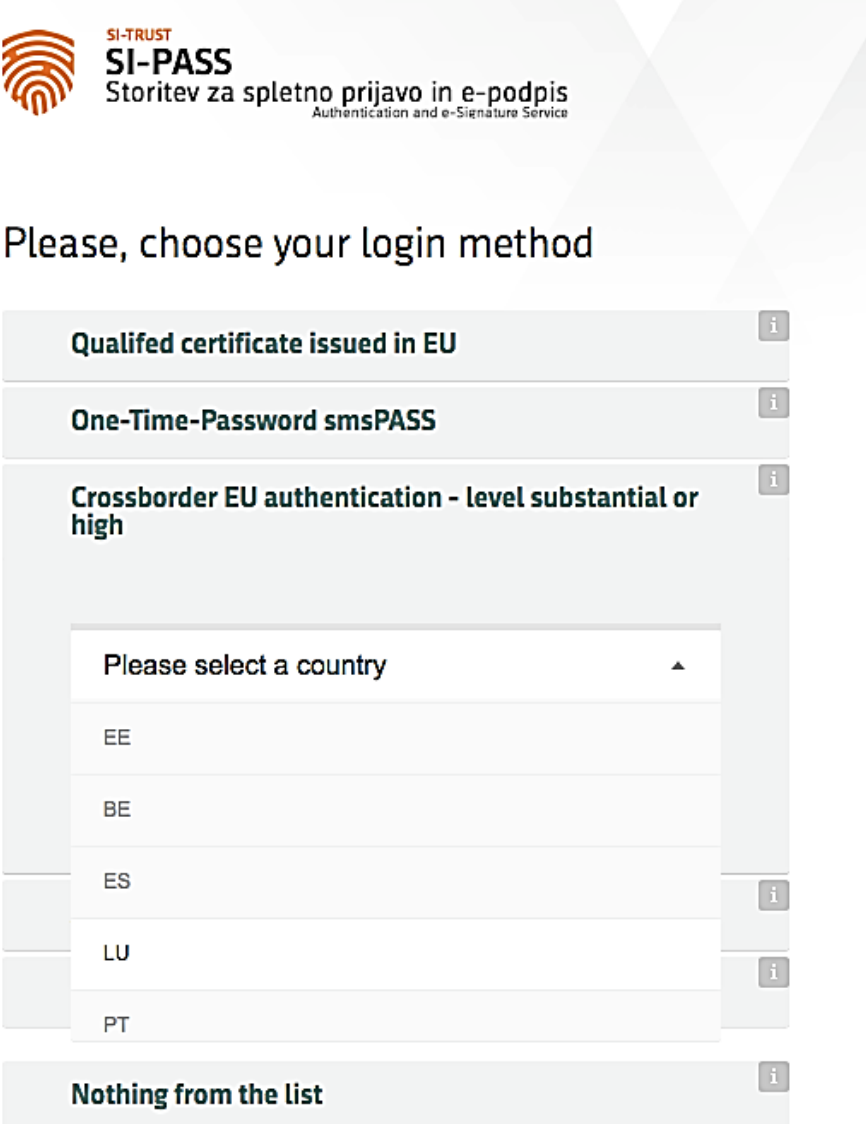
Continue to login with SI-PASS


Enter the enrolment application by clicking the "Continue to login with SI-PASS" button above, which will redirect you to the authentication service.

SI-PASS enables different types of authentication.

Figure 10: Central enrolment service eVŠ – front page

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SI-TRUST
SI-PASS
 Storitev za spletno prijavo in e-podpis
 Authentication and e-Signature Service

Please, choose your login method

- Qualified certificate issued in EU i
- One-Time-Password smsPASS i
- Crossborder EU authentication - level substantial or high i
 - Please select a country ▲
 - EE
 - BE
 - ES i
 - LU i
 - PT
 - Nothing from the list i

Figure 11: Central enrolment service eVŠ – selection of a country for eIDAS-based authentication

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Enrolment application for study



Visoko šolstvo v Sloveniji

[CALLS FOR ENROLMENT](#) | [INSTRUCTIONS FOR COMPLETING THE APPLICATION](#) | [FAQ](#)

Name and surname:

Tomaž Klobučar

[Log out](#)

Status of the application is **NOT COMPLETED**. There are still the following steps to the completion of the application:

[Personal information](#) → [Details of achieved qualifications](#) → [Data on desired study](#) → [Supplemental documents](#) → [Review and submission of application](#) → [Print form](#)

Selection of call for enrolment and type of application

Select Country of citizenship:

I am Slovenian without Slovenian citizenship: Yes No

Study programme level:
 - Select One -
 First cycle (Bachelor Professional and Academic study programmes and integrated Master's study programmes)
 Second cycle (Master's study programmes)
 Third cycle (Doctoral study programmes)

Public higher education institutions and concessions Private higher education institutions

Call for enrolment:

Application deadline:

Type of application:

[← Back](#)

[Continue →](#)

Figure 12: Central enrolment service eVŠ – study programme selection page

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Enter details of achieved higher education qualifications

Enter details of achieved higher education qualifications. Date of graduation is left blank, if you have not yet completed your study.

Details of achieved higher education qualifications

Country: Cancel

Along with the enrolment application I apply for recognition for access to education at higher education institutions in the Republic of Slovenia.
Write all data in original language or in Latin script (do not translate).
Information on education recognition procedures can be found on the following website: <https://www.uni.lj.si/study/information/recognition-of-foreign-education-for-enrolment-in-second-and-third-cycle-studies-and-for-transfer>

Higher education institution:

Higher education institution website address:

Field of education:

Study programme:

Academic title or degree obtained:

Level and type of study programme:

Field of study/module:

Method of study:

Date of graduation:

Place of actual carrying out of education:

Official duration of education in years:

Scope of study programme in credit points:

Name of the certificate or diploma – proving completed education:

Date of issue (of the certificate or diploma):

Place of issue (of the certificate or diploma):

Back
Add qualification
Continue

Figure 13: Central enrolment service eVŠ – achieved HE qualifications page

6.1.2 Spain

Pre-enrolment in a second stage of Bologna studies (Master's Studies) is fully managed in Spain by each university. UJI offers this assistant to pre-enrol students obtaining their personal data, previous studies, desired Master's Studies to be enrolled, as well as other optional and mandatory documents, such as diploma degree or a copy of an ID card/passport.

This system is already connected to eIDAS authentication to obtain European students' personal data (name and surname, date of birth and national ID) through a previous developed CEF project (ESMO).

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Figure 14: Pre-enrolment assistant at UJI – First step: creating a new user or using existing credentials

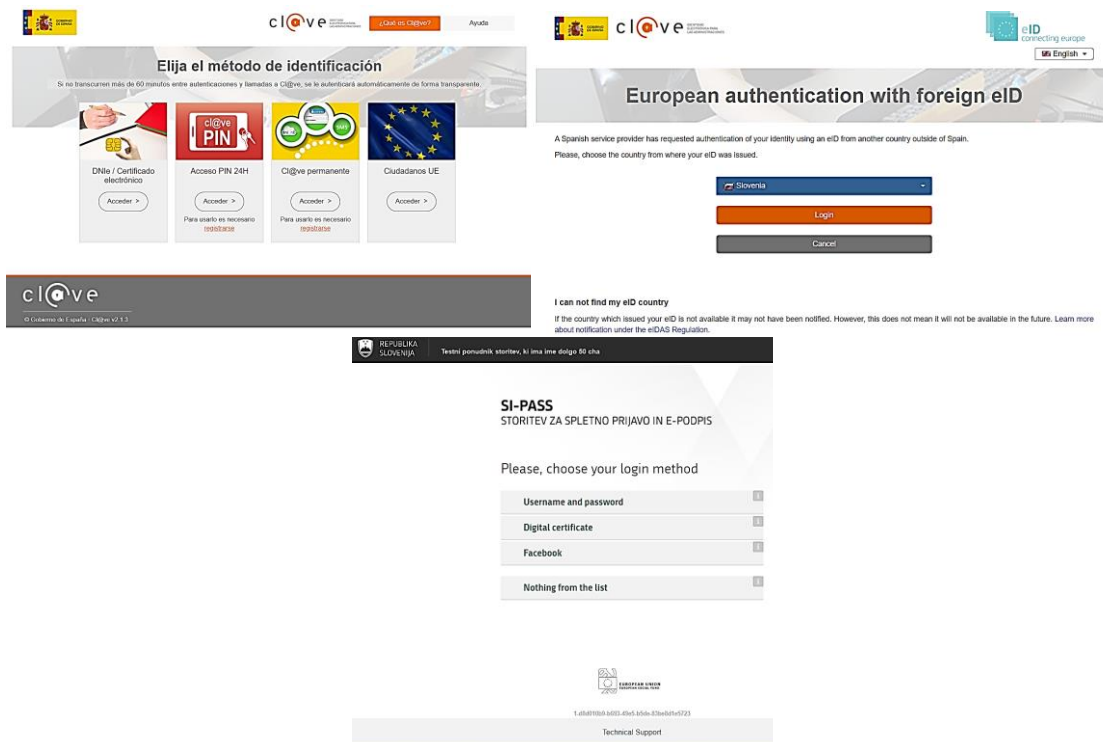


Figure 15: Pre-enrolment assistant at UJI – Using existing credentials with eIDAS authentication

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Pre-registration wizard 2020 / 2021

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Select the course you would like to pre-register for:

Master's Degree Pre-Registration

Doctoral Program Pre-Registration

Pre-registration for the Senior Citizens' University (over 55s)

Registration for training courses

Preinscripció de Màsters Universitaris con atribución profesional

- University Master's Degree for Secondary Education, Vocational Training and Language Teaching
- University Master's Degree in General Health Psychology
- University Master's Degree in Industrial Engineering
- University Master's Degree in Professional Legal Practice

Preinscripció de Màsters Universitaris

- Master's Degree in Brain and Behaviour Research
- University Master's Degree in Applied and Pharmacological Chemistry
- University Master's Degree in Applied Chromatographic Techniques (2013 Programme of Study)
- University Master's Degree in Applied Research in Feminist, Gender and Citizenship Studies (2019 Programme of Study)
- University Master's Degree in Business Management
- University Master's Degree in Computational Mathematics (2013 Programme of Study - Classroom-Based)

Figure 16: Pre-enrolment assistant at UJI – Selecting type and name of studies to be enrolled

Assistent de preinscripció 2020 / 2021

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Traducció

University Master's Degree in Marketing and Market Research

Pre-Registration Wizard

Activities

Information

Personal data

Choose your working language

Birthday data

Student's address

Disability

Academic information

Printing documentation

Student's address

Street type (*):

Street name (*):

Number: Staircase: Floor: Door:

Country (*):

Province/Region/State (*):

Town/City (*):

Postcode (*):

Telephone:

Email (*):

(*) Camp obligatori.

[Continue](#)

Telephone: +34 964 38 77 77 / Hours of operation: 9 a.m. to 8 p.m. e-mail: info@uji.es

Figure 17: Pre-enrolment assistant at UJI – Providing Personal and academic data

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University Master's Degree in Marketing and Market Research

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[Traducció](#)

- Pre-Registration Wizard ✓
- Activities ✓
- Information ✓
- Personal data ▲
- Choose your working language ✓
- Birthday data ✓
- Student's address ✓
- Disability ▶
- Academic information ▼
- Printing documentation

Disability

Do you have any kind of disability? (*): No Yes

Authorisation for verification of disability status.

This authorisation enables the Universitat Jaume I to use the query service of the Spanish Ministry of Finance and the Civil Service to verify the details regarding disability required for registration. If the details are correct, it will not be necessary to submit any documents.

I authorise the Universitat Jaume I to obtain the data needed to verify my disability status.

Select the autonomous community you come from:

If you do not wish to authorise the disclosure of these details, check the box below and provide an attested photocopy of your disability certificate.

I do not authorise the Universitat Jaume I to obtain the data needed to verify my disability status.

Verification of the data is not immediate. After verification, they will be considered for your registration.

(*) Camp obligatori.

Continue

Telephone: +34 964 38 77 77 / Hours of operation: 9 a.m. to 8 p.m.

e-mail: info@uji.es

Figure 18: Pre-enrolment assistant at UJI – Intermediation service to obtain national disability data

Assistent de preinscripció 2020 / 2021

University Master's Degree in Marketing and Market Research

Valencià Castellano

[Log out](#)

[Traducció](#)

- Pre-Registration Wizard ✓
- Activities ✓
- Information ✓
- Personal data ▼
- Academic information ▲
- Access Pathway ✓
- Academic data ✓
- Payment (through the virtual PoS terminal) ✓
- Specialisations ✓
- Documents ▶
- Printing documentation

Documents

Document type:

Seleccionar document del teu ordinador

Document type	Document name	Actions (**)
Statement of equivalence average grade issued by the MECD	F-1589572344/enrolment-uji-06.png	↓ 🗑️
Certificate of disability	F-1701310603/enrolment-uji-05.png	↓ 🗑️
Degree certificate or diploma	F1717586342/enrolment-uji-02.png	↓ 🗑️
CV (European format)	F214747864/enrolment-uji-04.png	↓ 🗑️
National identity document / foreigner identity card / passport	F-452960639/enrolment-uji-01.png	↓ 🗑️
Academic transcript	F-866912233/enrolment-uji-03.png	↓ 🗑️

(**) 📄 - Download document 🗑️ - Delete document

Continue

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e-mail: info@uji.es

Figure 19: Pre-enrolment assistant at UJI – Documents to be attached and manually validated later

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6.2 Use case 2

6.2.1 Belgium (Flanders)

The Flemish community in Belgium offers a study grant service via an online procedure (there is also a paper procedure).

The online procedure makes use of the Belgian identification system CSAM (<https://www.csam.be/en/index.html>).

A higher education student or his intermediary (public centre for Social Welfare, municipality, school, student facility, ...) can make a request as from the 1st of August preceding the start of the academic year; the student needs to have a bank account number.

The following documents in Dutch, French, German or English can be attached to his request (Depending on the situation of the student, certain documents might be required):

- Probable income in 2018 for academic year 2019-2020, pdf form
- Probable income form in 2019 for academic year 2019-2020, pdf form
- pdf file Form other dependents 2019-2020.pdf
- pdf file Form registration higher education foreign studies 2019-2020.pdf
- pdf file Form higher education study history outside Flanders 2019-2020.pdf
- Form studies abroad in English and French (other languages need to be officially translated)

The student or his intermediary can do an on-line follow-up of the procedure.

The student can expect the duration for handling his request to take between 2 to 4 months.

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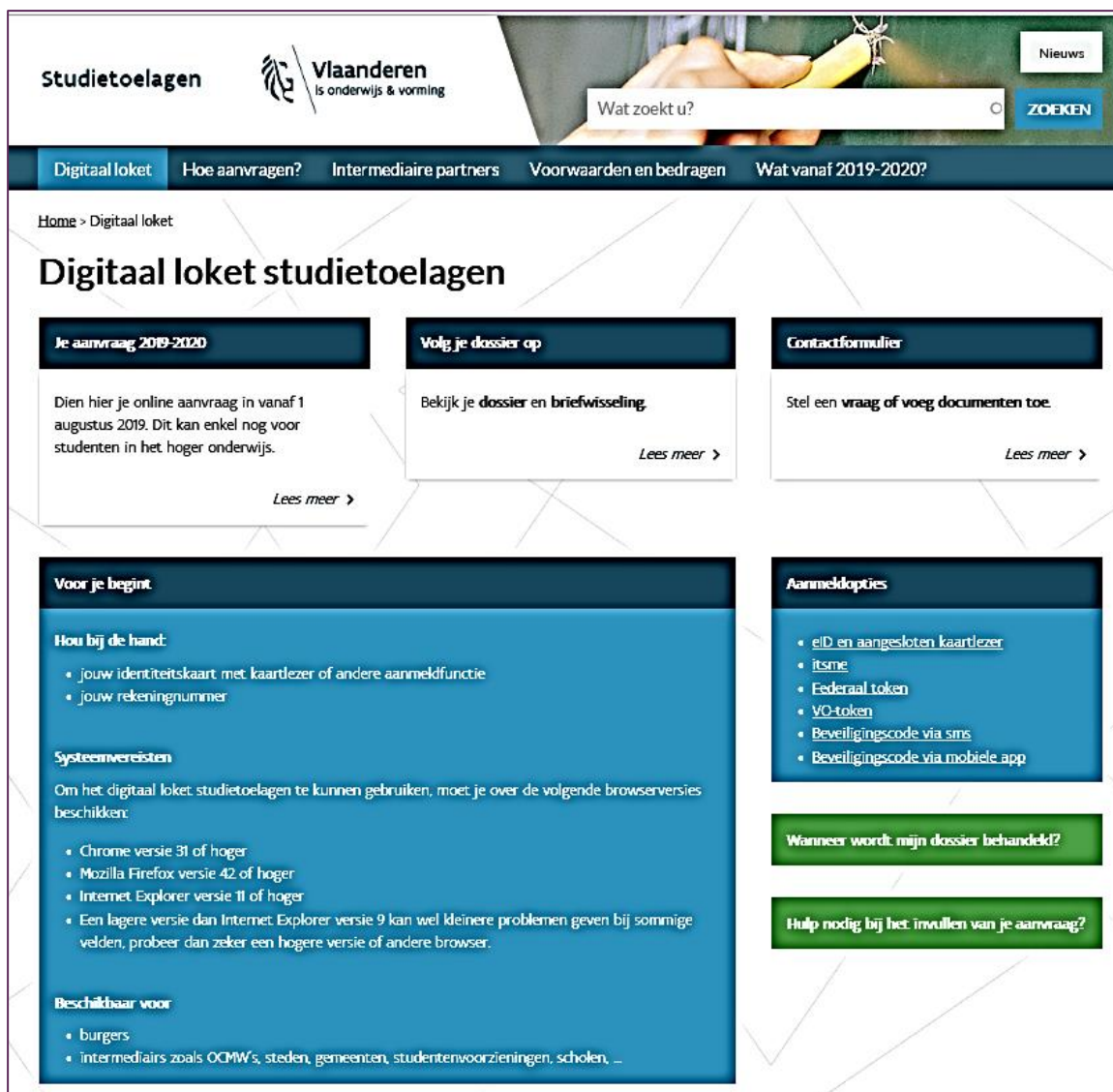


Figure 20: Grant service – BE – FL – front page

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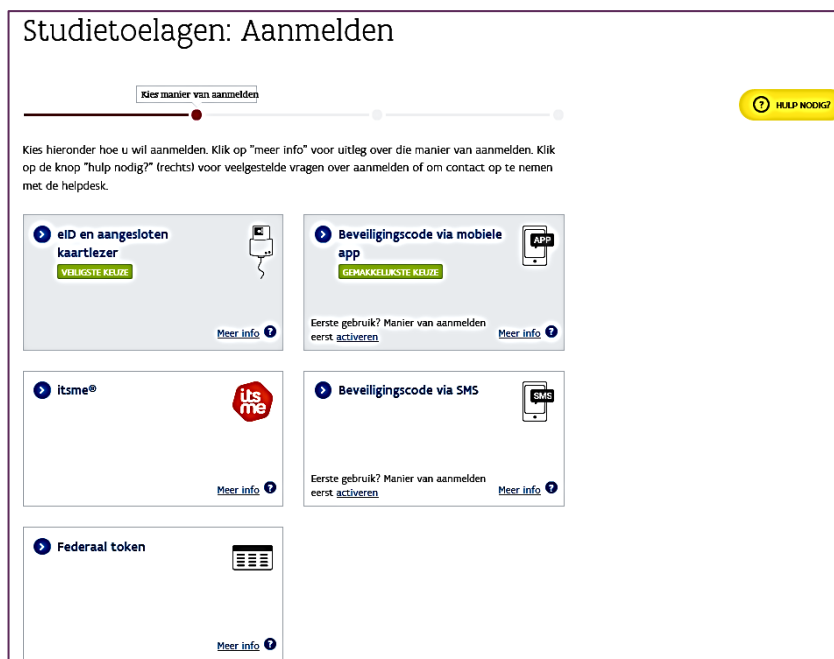


Figure 21: Grant service – BE – FL - authentication

6.3 Use case 3

6.3.1 Slovenia

As already described in Chapter 4.1.3, EduCTX is a blockchain-based solution for managing micro-certificates, including diplomas. Below, the scenarios of issuing a diploma from a HEI to a student, as well as verifying the diploma from the student by a HEI are depicted. Figure 22 depicts the existing interfaces of the EduCTX solution (<https://platform.eductx.org>). In the case of UC#3, such interfaces are not planned to be used, as the EduCTX will be used as a blockchain-based backend-service and not as a standalone solution. The EduCTX is planned to manage SSI-based VC but through the existing consortium-based blockchain network, which however will depend on formal eIDs. It is planned that EduCTX platform will be aligned with the EBSI and ESSIF when available.

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Figure 22: HEI (official person) dashboard – Issuing Diploma certificate to a student

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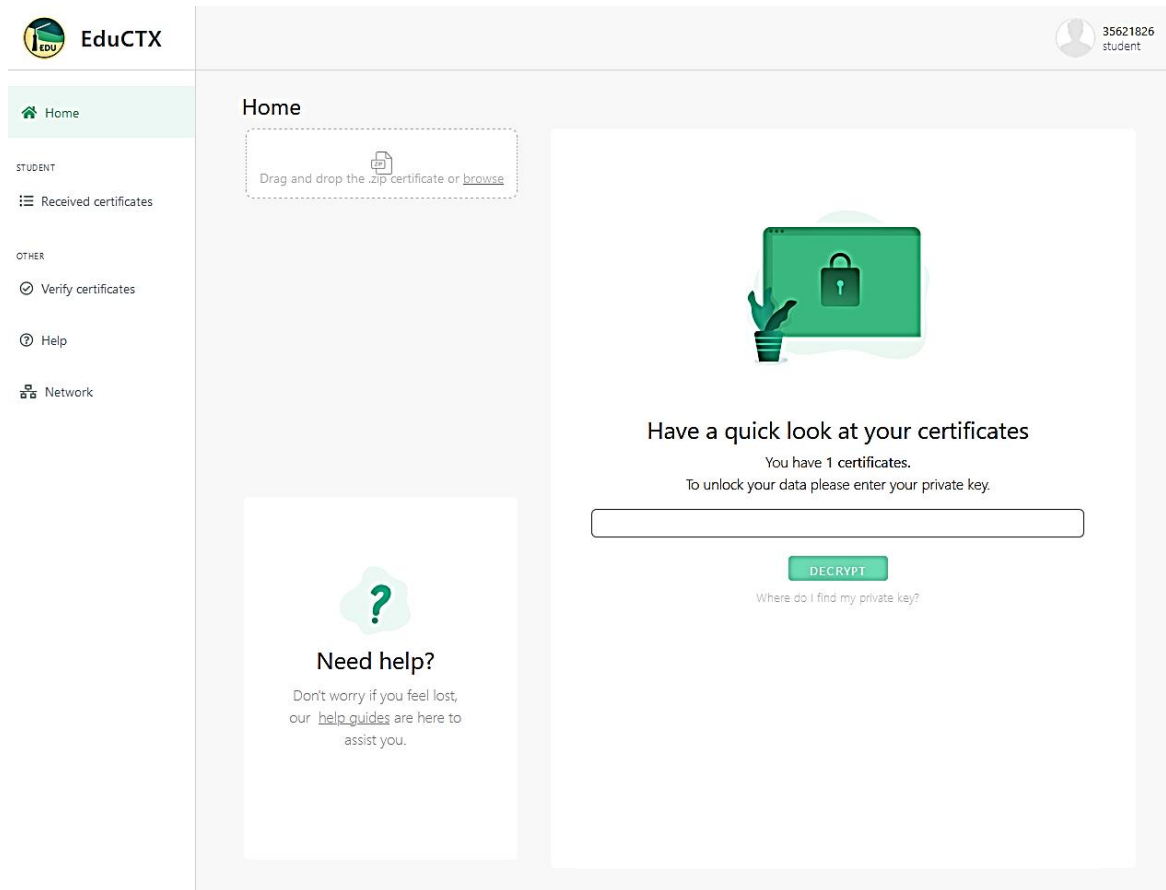


Figure 23: Student dashboard after login with digital certificate – all received Diploma certificates are encrypted

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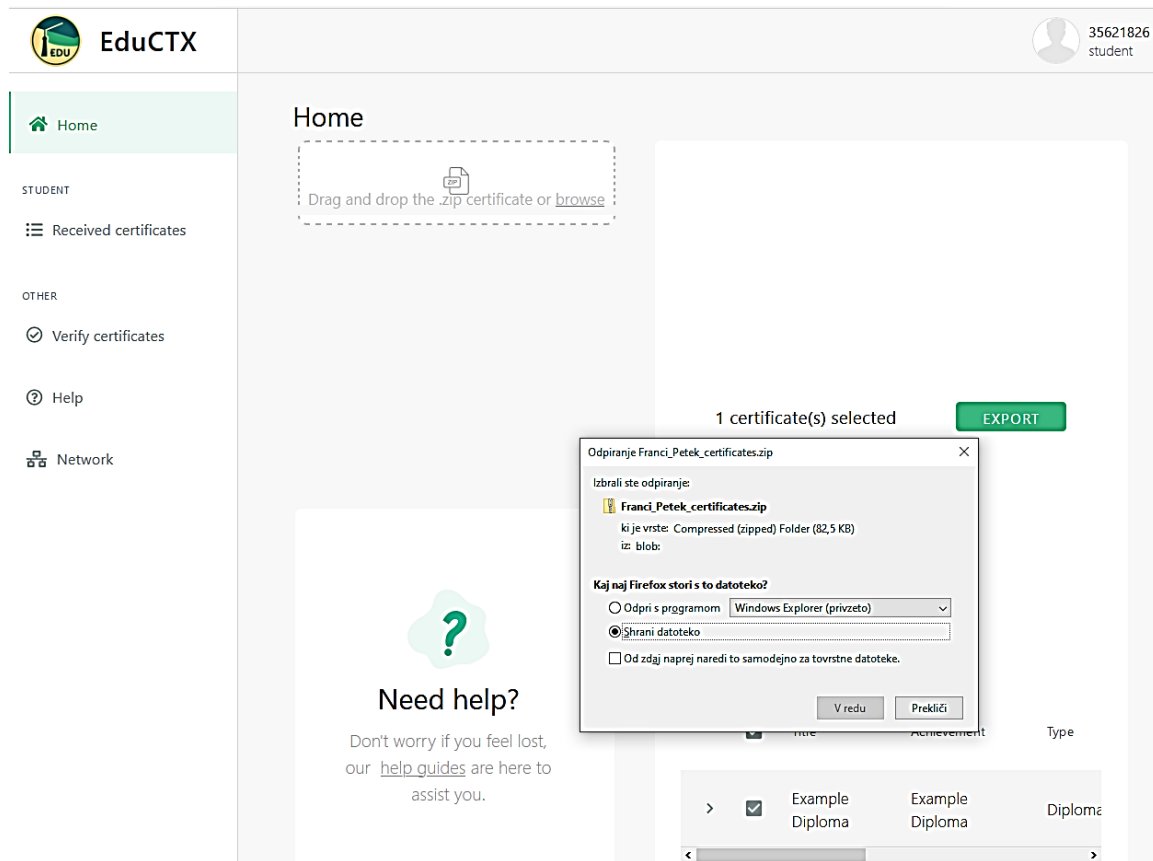


Figure 24: Student dashboard after decrypting the Diploma certificates with his private key, and exporting the selected diploma to his device

6.3.2 Spain

Ministry of Education and Vocational Training offers in Spanish only a centralized national service to register all university diplomas. Each student may fetch this information for his/her degrees/masters/PhD achieved and it can also be disclosed to selected targets with a verifiable document, link or QR code.

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Está usted en: [Sede electrónica](#) Títulos Oficiales

Títulos Oficiales

Datos personales

Nombre completo [Redacted]

Núm. documento [Redacted]

[Títulos universitarios](#) [Autorizaciones](#) [Crear incidencia](#) [Lista de incidencias](#)

Títulos universitarios

Si tiene alguna incidencia con los títulos mostrados, con el certificado de correspondencia MECES o no aparece el título que deseaba consultar deberá crear una incidencia mediante la opción: [Crear incidencia](#).

Núm. título	Denominación	Fecha fin	Fecha exp.	Universidad
[Redacted]	Ingeniero Informático	30/06/2009	[Redacted]	Universidad Jaume I
[Redacted]	[Redacted]	29/feb/2012	[Redacted]	Universidad Jaume I

Figure 25: Electronic procedure to obtain your own registered diplomas

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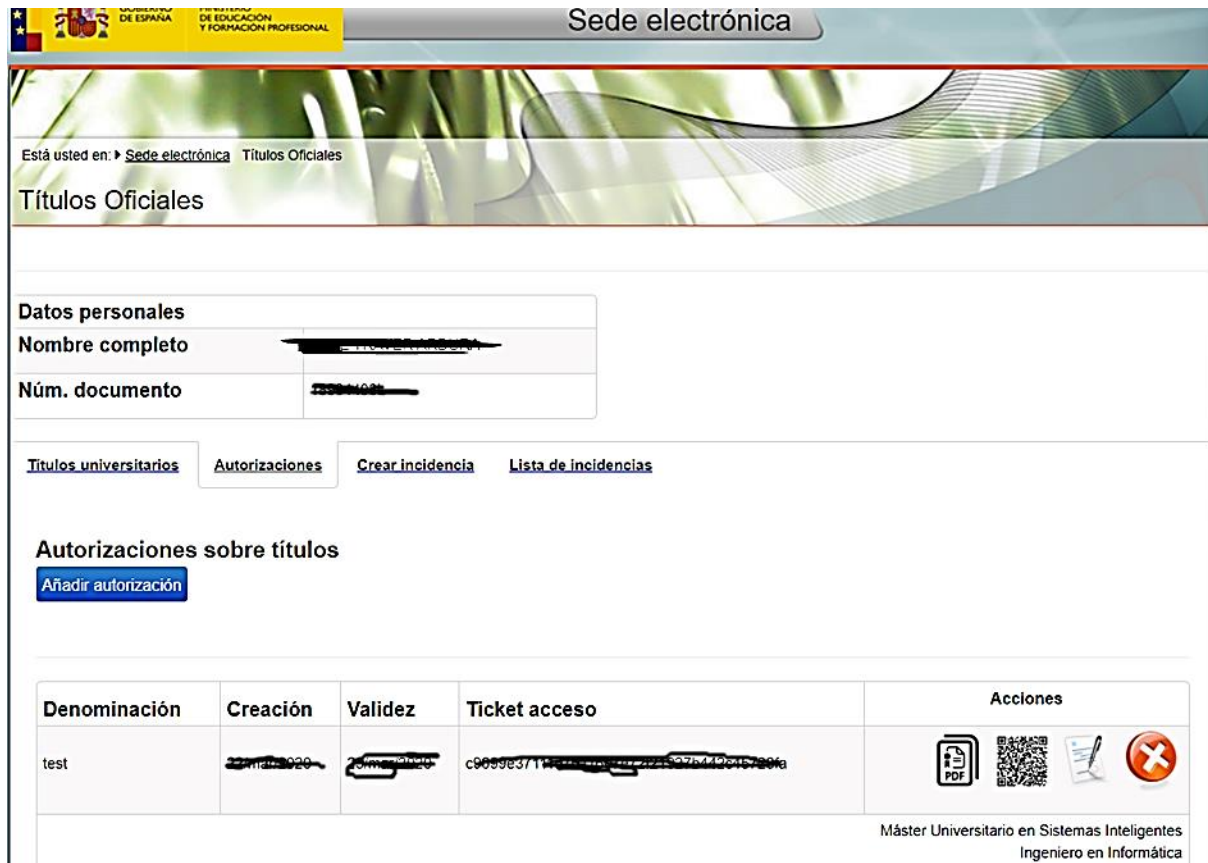


Figure 26: User allows to disclose information to owners of the validating ticket

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7 Conclusions

This document specifies the three use cases of the Studying Abroad pilot: Application to public higher education, Applying for study grant, and Diploma recognition. It defines actors, describes the process flows, and lists the functional and non-functional requirements that data consumers, data providers, and the common infrastructure of DE4A must fulfil. Preliminary identification of available electronic data and their sources is provided as well.

The results constitute the basis for the next phase of pilot planning. They will also serve as major input to other DE4A activities, in particular WP2 – Architecture vision and framework (requirements are a starting point for joint development of Project Start Architecture, underlying blockchain support framework and later towards technical architectures and interoperability solutions toolbox), WP3 – Semantic interoperability solutions (requirements feeding semantic interoperability framework and corresponding semantic solutions -components/tools- needed to support the pilot), and WP5 – Common component design & development (requirements relevant for identification of features for products and components and later for their technical design and common specifications). The document as well identifies legal and organisational barriers relevant to WP7 - Legal and ethical compliance and consensus building and WP6 - Sustainable impact and new governance models.

The main conclusions and identified challenges include:

- The three use cases have different levels of complexity, require different data sources, and should also involve the institutions that are not members of the DE4A project for the procedures to be run fully in an electronic way. As full involvement of external institutions cannot be guaranteed, a pragmatic approach (e.g. piloting different procedure phases or at different Bologna levels in different Member States) will be taken to demonstrate in practice the benefits of realizing across border the principles of Once Only and Digital-by-Default.
- There is little overlapping between the mandatory and optional data required by the existing procedures and services in Member States and even in the different regions of the same Member State. There is also low overlapping between the attributes that compose academic evidence in different Member States and evidence are often still required in paper. To address these challenges a pragmatic and feasible approach will be followed to maximize interoperability aiming to semantically match evidences and also re-using semantic standards and common data models that exist in the Higher Education domain.
- Authentication of a natural person is crucial for the Studying Abroad pilot. Student authentication will be mainly handled by eIDAS. Not having a notified eID, as this is currently the case in Slovenia, may limit the production piloting. The same applies to the connection of the eIDAS notified eIDs with the self-sovereign identities that will be part of the European Self-sovereign Identity Infrastructure.
- Legislation and regulation issues need to be resolved in order to fully support the procedures, e.g. the legal use of self-sovereign identities (RDL 14/2019 in Spain), or recognition of foreign qualifications. The Member States have already made a political commitment to introduce automatic recognition of higher education and upper secondary education diplomas without having to go through a separate recognition procedure, but this will most probably not happen before 2025.
- For sustainability purposes and the production phase of the pilot it should be noted that there is limited interest in the Applying for grant procedure for foreign EU students among public administrations in the participating MS. Even in the cases where such procedures exist, different constraints limit the number of students who are eligible for applying for a grant and can be involved in the piloting phase.

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- The Studying Abroad pilot will implement at least two patterns for cross-border data requests and transfer:
 1. UC#1 and UC#2 can be implemented with a number of communications patterns, such as intermediation, supported user-managed access, user-transferred data pattern, or self-sovereign identity. Except for UC#3 which is more clearly oriented towards Self-sovereign identity, these two UCs give no indication of which patterns are better suited. Selection of the pattern to use in each use case will be made at later stage in collaboration with WP2 and for the project start architecture.
 2. UC#3 plans to use the self-sovereign identity pattern, preferably based on the EBSI and related to the EBSI Diplomas use case. As recognized diplomas and other credentials for qualification recognition are required evidence for the procedures in UC#1 and UC#2, UC#3 could also be linked with one of the other two use cases. Maturity of EBSI, ESSIF, and the EBSI Diploma use case remains a challenge for the production phase of UC#3 of the Studying Abroad pilot.

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Annexes

Annex I – Requirements classification table

Pilot		Non-functional (NFR)		Functional (FR)	
Prefix	Definition	Prefix	Definition	Prefix	Definition
STA	Studying abroad	ACC	Accessibility	PREV	Previous phase
DBA	Doing Business abroad	ADA	Adaptability	MFLE	Main Flow event
MVA	Moving abroad	AUD	Auditability and control	POST	Post phase
		AVA	Availability		
		COM	Compliance		
		CFG	Configuration management		
		INT	Data integrity		
		DEP	Deployment		
		EFF	Efficiency		
		EXP	Exploitability		
		IMP	Implementation		
		INT	Interoperability		
		LEG	Legal		
		OPE	Operability		
		PER	Performance		
		PRI	Privacy		
		POR	Portability		
		QUA	Quality (e.g. faults discovered, faults delivered)		
		REL	Reliability		
		RES	Response time		
		REU	Reusability		
		ROB	Robustness		
		SCA	Scalability (horizontal, vertical)		
		SEC	Security		
		STB	Stability		
		STA	Standards		
		TES	Testability		
		TRA	Transparency		
		USA	Usability		

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Annex II – MS required data for Use case 1

This annex provides additional information on the data required by the UC#1 data consumers in each of the participating Member States (Spain, Slovenia).

Spain

Table 25: UC#1 – ES - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name			M
Family name			M
Gender	Gender (options: male, female)		M
National ID number (DNI)		12345678Z	M
National foreigner number	NIE: Number assigned to foreigners in Spain equivalent to National ID number. Either DNI or NIE must be provided.	Z1234567P	M
Date of birth	Date of birth, written in the form dd.mm.yyyy	23.04.2001	M
Place of birth		Paris	O
Country of birth		France	M
Country of citizenship		Italy	M
Student address during academic course		20 oak street, Castellón, Spain	M

Table 26: UC#1 – ES - Mandatory and Optional Academic Data for Procedure – completed secondary education

Name	Description	Example value	Mandatory / Optional
Final marks from higher education entrance exam	<p>Access to higher education may be achieved in three different ways:</p> <ul style="list-style-type: none"> • Examination at the end of high school (PAU) • Studying a second (or later) degree • University examination for people who skipped first option at three different levels (people over 25, 40 or 45 years old) <p>One accessing way out of these three options is Mandatory</p>	11.89 rank [0-14]	M

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Initial marks from higher education entrance exam	Students are allowed to do additional exams to increase their marks and to be able to widen their degree list of choice	8.42 rank [0-10]	M
Additional Marks taken to increase marks for higher education entrance exam	Students are allowed to do additional exams to increase their marks and to be able to widen their degree list of choice	0.75 [rank 0-1]	O
Additional subjects taken to increase marks for higher education entrance exam	Students are allowed to do extra exams to increase their marks and to be able to widen their degree list of choice	Mathematics	O
European students equivalence certification	University Nacional a Distancia (UNED) will check requirements for each country and studies achieved by students and will certify the level of equivalence and a final mark to be compared with national studies.	Certificate using standard equivalences: Slovenian Matura certificate (Maturitetno spricevalo). Zadostno = 5,5. Dobro = 7. Prav dobro = 8. Odlicno = 9.	M
Place where initial higher education entrance exam was taken	Allows to confront marks indicated by students (optional if examination taken in UJI, mandatory other way)	University of Vigo	O
Degree	Degree previously obtained	Computer science bachelor degree	M
Degree final Qualification	Aggregated marks from a previously achieved degree	7.12	M
Degree University	Higher education institution where degree was obtained	University of Bologna	M
Certificate of degrees obtained	Certificate to verify that the degree(s) is recognized in National Higher education system in Spain		M
Marks for adults' late access to higher education	Special access for students over 25, 40 and 45 year	6.34	M
Degree to be enrolled	Official title (as registered in national universities, centres and degrees database - RUCT)	Mechanical engineering degree	M

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Table 27: UC#1 – ES - Other mandatory and Optional Data for Procedure – completed higher education

Name	Description	Example value	Mandatory / Optional
Master to enrol	Name of the Master to enrol	Master in nursing	M
Speciality	Itinerary within the master chosen if available	Elder people care	O
Access to Master	Access from UJI degree (1), Spanish university degree (2), degree from university inside EEES (3), degree from university outside EEES (4)	3	M
Country	Country where degree to access master was issued	France	M
University	University where degree was obtained	Université de la Sorbone	M
Studies type		Bachelor in science	M
Access	Degree that allows to enrol in master	Degree in nursering	M
Diploma date	Date when degree was issued	28.12.2020	M
Final degree mark	Range [0-10]	7.23	M
Curriculum vitae		Document	M
Degree homologation certification	When degree is not homologated in Spain, a proof must be provided or pay a tax to start a validation process	Document	M (if not homologated)
Degree final mark equivalence	Certification of Ministry (by UNED) to indicate equivalence between degree final mark and the final mark that should be used to enrol in Spain	Document	M (if outside Spain)
Qualification Marks certificate		Document	M
Language certification	Some masters require a language exam or a minimum level certification	Document	M (if required by specific master)
Disability certificate		Document	O

Table 28: UC#1 – ES - Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
E-mail address		John.smith@mymail.com	O
Contact phone number		+34 678123456	O
Numerous family			O

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Disability degree			O
Regional incoming grant (Renta valenciana de inclusión)			O
Language	Preferred languages when receiving communications (Spanish/Catalan/English)	Spanish	O
Family address			O

Slovenia

Table 29: UC#1 – SI - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Primary name or given name of a person; text	Anna	M
Family name	Full family or surname of a person; text	Smith	M
Gender	Gender (options: male, female)	Female	M
Maiden name	Maiden name of a person; text	Johnson	O
Date of birth	Date of birth, written in the form dd.mm.yyyy	10.04.2001	M
Place of birth	Place of birth of a person; text	Brussels	M
Country of birth	Name of a country where a person was born; code list	Belgium	M
Citizenship	Country name of the person's nationality; code list	Belgium	M
Permanent residence	Permanent address of a person; text		M
Address for notices	Person's address for notices; text		M

Table 30: UC#1 – SI - Mandatory and Optional Academic Data for Procedure - Undergraduate

Name	Description	Example value	Mandatory / Optional
Highest level of prior education completed	Highest level of prior education completed; code list	15002 – General upper secondary education	M
Country of secondary school	Country of secondary school; code list	Belgium	M
Method of secondary	Method of secondary school completion; code list		M

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school completion			
Date	Date of issue of the secondary school certificate, written in the form dd.mm.yyyy	24.06.2018	O
Name of secondary school	Name of a secondary school that a person finished; text	Atheneum Brussels	M
Name of educational programme	Name of educational programme; text	General secondary programme	M
Diploma name	Name of the certificate or diploma - proving completed education; text		O
Place of issue	Place of issue of the certificate or diploma; text		O
Place of education	Place of actual carrying out of education; text		O
Duration of education	Official duration of education; text		O

Table 31: UC#1 – SI - Mandatory and Optional Academic Data for Procedure - Postgraduate

Name	Description	Example value	Mandatory / Optional
Highest level of prior education completed	Code list	17003 – Master’s education (second Bologna cycle)	M
Country	Country of completed HE education; code list	Spain	M
HEI	Text	UJI	M
Field of education	Code list	Science	M
Study programme	Text	Computer science	M
Degree	Academic title or degree obtained; text	Master	O
Level and type of study programme	Code list	7 Master’s or equivalent level	M
Field of study/module	Text		O
Method of study	Code list	Full time	M
Graduation date	Date		O

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Place of education	Place of actual carrying out of education; text		O
Duration of education	Official duration of education in years; code list	3 years	M
Scope	Scope of study programme in credit points; text	240	M
Diploma name	Name of the certificate or diploma proving completed education; text		O
Date of issue	Date of issue of the certificate or diploma; date		O
Place of issue	Place of issue of the certificate or diploma; text		O

Table 32: UC#1 – SI - Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
E-mail address	Contact e-mail address of a person	anna.smith@mymail.com	M
Contact phone number	Contact phone number of a person	+34 678123456	O

Annex III – MS required data for Use case 2

This annex provides additional information on the mandatory and optional data required by the UC#2 data consumers in each of the participating Member States (Belgium, Slovenia) and specific requirements of the Member States that will not be involved in the use case. As the data consumers' requirements in Belgium differ between regions, the required data have been identified for Flanders, Wallonia, and the German-speaking community.

Belgium

Table 33: UC#2 – BE - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Current given names of the natural person.	Sarah	M
Family name	Current family name of the natural person.	Chalk	M
Gender	Gender of the natural person (Male, Female, Unspecified).	Female	O
Unique Identifier	Unique identifier for the natural person as defined by the eIDAS Regulation.	BE/SI/02635542Y	M
Date of birth	Date of Birth for the Natural Person (Based on xsd:date i.e. YYYY-MM-DD format).	1970-05-28	M
Country of citizenship	Country of citizenship	BE	O

Belgium – Flemish community

Table 34: UC#2 – BE-FL -Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
Not applicable	The Flemish community retrieves all educational data for students studying in Flanders directly from the authoritative sources that can reside at federal or regional government institutions	Students don't need to provide academic data for the procedure	N/A

Table 35: UC#2 – BE-FL -Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name of person who is providing for the student	First name of a person who is providing for the student, this might be a parent or legal guardian	John	M
Family name of person who is	Family name of person	Doe	M

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Name	Description	Example value	Mandatory / Optional
providing for the student	who is providing for the student, this might be a parent or legal guardian		
National number of person who is providing for the student	NN of person who is providing for the student, this might be a parent or legal guardian Should be structured as a BE National Number	12345678901	M
Birth date of person who is providing for the student	DDMMYY	2344561	M
Phone number of person who is providing for the student		123456789012	M
Email address of person who is providing for the student		John.doe@email.com	O
Child allowance Year-2	Amount in € received in the year of application -2 (for 2020 this would be the amount of € in 2018)	1234	M
Do you expect to earn less in this year than in Year-2	Y/N (if yes, provide evidence) (for 2020 this would mean 2018)		M
National number of student		12345678901	M
Cell phone number of student		123456789012	M
Bank account number	Bank account to which the study grant will be sent	BE00 0000 0000 0000	M
Do the parents provide for the student	Y/N		M
Email address of the student	Students in higher education receive all information, messages, ... regarding to the grant in their email as well	Jane.doe@email.com	O

Extra extracts to be provided by the person applying for the grant (either the student itself or the person providing for them) if:

- The student resides in a student dorm (add the rental contract)
- The student is married, autonomous or civil state single (“alleenstaand”)
- The student is studying outside of Flanders
- The student has previously studied outside of Flanders
- The student has a residential address outside of Belgium: add an extract of the household composition and the address abroad
- The student is severely ill and can't take on 27 ECTS credit points which is a minimum for applying for a grant

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- The person that provides in the maintenance of the student or the partner have other adult persons they provide for (“ten laste”) but for whom they don’t apply for study grants. (ex. grandparents, brothers, sisters, ...)
- This person or the partner of this person received an income from another country in Year-2. Add evidence to prove income

Belgium – French community

It should be noted that the following data fields are based upon the existing paper procedure and might differ in the future digital procedure.

Table 36: UC#2 – BE-FR -Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
Education category	To select from predefined list		M
Type	To select from predefined list		M
Type of institution	To select from predefined list		M
Institution	Name of the university	Université Libre de Bruxelles (ULB)	M
Section	Name of the study	Biology	M
Year	Year the student is currently in		M
Total number of years	Total duration of the curriculum		M
Last year of the education	T/F		
Mobility	To select from predefined list		M
Number of kilometres from home to school (one-way)	Number value	35	M
Train pass	Y/N		M
Comments	Free text		M

Table 37: UC#2 – BE-FR -Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
Title	From predefined list	Mr, Mrs, ...	M
First name of student		Jane	M
Family name of student		Doe	M
National number of student		12345678901	M
Birth date of student		DDMMYYYY	M
Nationality		Belgium	M

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Name	Description	Example value	Mandatory / Optional
Address			M
Postal code			M
City			M
Cell phone number of student		123456789012	M
Fixed phone number			
Bank account number (IBAN)	Bank account to which the study grant will be sent	BE00 0000 0000 0000	M
Bank Identifier Code			M
Are you more than 66% disabled	Y/N	N	M
Civil state	From predefined list	Célibataire	M
Has your civil state changed	Y/N	N	M
Information on work and income	Exact data to be confirmed by the administration	TBC	M
Household situation	Exact data to be confirmed by the administration	TBC	M
Email address of the student	Students in higher education receive all information, messages, ... regarding to the grant in their email as well	Jane.doe@email.com	M

Slovenia

Table 38: UC#2 – SI - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Primary name or given name of a person	Mary	M
Family name	Full family or surname of a person	Jane	M
Gender	Gender (options: male, female)	F	O
Date of birth	The date on which a person was born or officially has been deemed to be born, written in the form yyyy-mm-dd	1994-03-10	M
Citizenship	Country name of the person's nationality	Slovenia	M
Home address	Student's address in home country		M
Slovene address	Student's address in Slovenia		M
Copy of		N/A	O

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Name	Description	Example value	Mandatory / Optional
passport			
Certificate of residence	Certificate issued by the relevant authority to verify residence and citizenship	N/A	O

Table 39: UC#2 – SI – Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
University Full Name	Name of HEI	University of Maribor	M
University Address	Address of HEI	Slomškov trg 15	M
University Zip Code	Zip code of HEI	2000	M
University City	City where HEI is formally located	Maribor	M
University Country	Country where HEI is formally located	Slovenia	M
Study level	Undergraduate (1), graduate (2), postgraduate (3).	2	M
Study programme name	Name of the study programme the student is enrolled in.	Information and communication technologies	M
Duration of the study	Duration of the study programme in years.	3	M
Academic year		2020/2021	M
Study type	Either full-time or part-time	Full-time	M
Amount of tuition fee per year		4.000 EUR	O
Letter of nomination	Letter issued by the student's home university		M

Table 40: UC#2 - SI - Other Mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
Trustee first name	The Slovene person that formally represents the foreign student during the procedure.	Jan	M
Trustee last name		Medvešek	M

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Spain

Table 41: UC#2 – ES - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
First name	Given name of the citizen	John	O
Family name	Surname of the citizen	Doe	O
Gender	Gender (options: male, female)	M	O
National ID number (DNI)	Unique national identifier	12345678Z	M
National foreigner number	NIE: Number assigned to foreigners in Spain equivalent to National ID number. Either DNI or NIE must be provided.	Z1234567P	M
Date of birth	Date of birth, written in the form dd.mm.yyyy	23.04.2001	O
Country of citizenship	Nationality of the citizen	Spain	M

Table 42: UC#2 – ES -Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
Number of application	Number identifying application in Ministry of Education and Vocational Training form.	1234	M
Academic year	Year of the current course	2013/2014	M
Stage	Describes the stage where grant application is	Ordinary/Allegation/Increase/Appeal	M
Studies enrolled	Identification of studies associated to grant application (could be more than one)	Nursing Bachelor degree	M
Studies enrolled code	Code of the programme he is enrolled	II (for computer science)	M
Double degree	Student is enrolled in two degrees (some programmes are compatible to be coursed in parallel)	T/F	O
Years	How many years does the programme span	4	M
Credits	How many credits does the program include	240	M
Full Grant credits	Minimum amount of enrolled credits to be eligible for a full grant	60	M
Partial Grant credits	Minimum amount of enrolled credits to be eligible for a partial grant	30	M
Is technical programme	If the programme is on the Technological knowledge field	T/F	M
Is face to face	If the programme is imparted	T/F	M

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Name	Description	Example value	Mandatory / Optional
	physically or remotely		
No teaching	If the programme implies no teaching (usually for old programmes being extinguished where the old student just wants to take the tests)	T/F	M
Knowledge area	The knowledge area of the programme	Engineering	M
Is in scholarship	If the student is already under a scholarship programme in any of the departments	T/F	M
Former studies code - university	Internal code for the studies he had previously taken	UPV	O
Former studies code - ministry	Ministry code for the studies he had previously taken	II	O
Former Studies Name	Name of the previously completed programme	Computer Science	O
Former Studies Years	Years that it spanned	2007-2011	O
Former Studies Credits	Credits of the former programme	240	O
Former Studies institution name	Name of the institution where the he last enrolled in a finished programme	Universitat Politècnica de València	O
Former Studies institution code	Code of the institution where the he last enrolled in a finished programme	UPV	O
Former study year Already had a degree	Whether the academic year previous to this one he had a completed degree or not	T/F	O
Year of last academic year enrolled	Student may have resumed studies after gap year(s)	T/F	O
Cause of academic gap	Description of the cause for the gap in the studies	Medical recovery from an accident	O
Has a partial grant	Marks if the applicant already has a partial grant	T/F	M
Former study year average grade	Average, including all the courses. If first year, access exams grade	7.8	O
Former study year average grade without not passed	Average, excluding not passed courses	8.6	O

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Name	Description	Example value	Mandatory / Optional
courses			
Specific grade	When accessing the university from the exams, there is a base grade and the student can do up to 4 optional exams to raise this base grade beyond 10. This is the base grade	8.4	M
Source of grade	1: access exams, 2: grades of passed tertiary vocational programme, 3: others (including foreign, +25 years, +45 years...)	1	M
Former study year grant credits	How many credits were covered by last year's grant	60	O
Former study year Passed credits	The year where the student was last enrolled and successfully completed a study year	2019	O
Former study year percentage of failed credits	How many credits in percentage were failed in this last year he has been enrolled	0	O
Former study year number of validated credits	Some programmes accept considering some courses as passed if proof of compatible passed studies is given.	0	O
Number of given grants	How many grants the student has been awarded in the past	3	M
Had a grant the former year	If he was given a grant on the former year he was enrolled	T/F	M
Former study year is partial grant	If the former year the grant was partial	T/F	O
Current year enrolled credits	How many credits he has enrolled this year on	60	M
Current year validated credits	If the student has validated credits this year (so automatically passed)	0	M
Current year credits pending validation	As above, but proof not yet provided	0	M
Current year credits outside grant	Number of enrolled credits not covered by the grant	0	M
Current year credits in grant	Number of enrolled credits covered by the grant	60	M

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Name	Description	Example value	Mandatory / Optional
Current year programme year	Year inside the programme span, the student is enrolled in	4	M
Current year enrolled semesters	How many semesters the student has enrolled into this year	2	M
Current year credits of first enrolment	How many credits have been taken for the first time (never enrolled before)	60	M
Current year partial grant	Is he asking for a partial grant	T/F	M
Current year already has a degree	Does he have a finished degree as for the moment he is asking for a grant	T/F	M
Current year Credit limit	If the programme has a limit of enrollable credits below the minimum for a full grant, so a full grant can still be requested	T/F	M
Current year end of studies	If the requestor has less than a full year of credits remaining to finish the programme	T/F	M
Current year partial enrolment	Enrolled less than full year, so only partial grant can be requested	T/F	M
Current year remaining credits	Credits left to finish the programme	60	M
Second enrolment grant	If the credits enrolled for a second time can opt for the grant or not	T/F	M

Table 43: UC#2 – ES -Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
UJI person ID	Identifier for student used only in UJI. Only for internal use.	34223	M
Internal UJI grant ID	Auxiliary number to work with grant applications. Only for internal use	23	O
Internal UJI grant Person ID	Auxiliary number to work with grant applications. Only for internal use	45123	O
Ministry temporal ID	Auxiliary number to work with grant applications. Only for Ministry use	2344561	O
Ministry Registry ID	Auxiliary number to work with grant applications. Only for Ministry use	2344561	O
Number of members in	Describes how many people live together in order to calculate some of	6	O

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Name	Description	Example value	Mandatory / Optional
Family	the amounts in the grant		
Number of siblings	Describes how many siblings live together in order to calculate some of the amounts in the grant	6	O
Number of siblings	Describes how many siblings are not living together in order to calculate some of the amounts in the grant	1	O
Numerous family	Does the family unit have 3 or more kids below 26 years under their charge?	T/F	O
Numerous family ID card number	Unique id if the buig family identity card	123445678	O
Region	Region in the country where the student comes from	Madrid	O
Orphan	Is the student an orphan	T/F	O
Disability degree	Which disability percentage has been awarded	70	O
Public transport	Using public transport to access university?	T/F	O
Genre or violence victim			O
Direct genre or violence victim			O
Job for main Family income			O
Public administratio n data transfers			O
Family independence			O
Net income			O
Permanent Residence given			O
Working Visa			O
Home type			O
Rent amount			O
Residence address and other data including public estate registry registration			M

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Name	Description	Example value	Mandatory / Optional
number			
Data from the family unit: members names, ages, relationships, conditions, professional situation, disabilities, custody status, income from work and societies, percentage of the overall income,			M
Economic and income data of the requester if independent from his family			M
Overall income and estate information	Owings in estate and income from all the family unit members. The one used to check if it is below the grant threshold	23546.04€	M
Grant proposal amounts	Based on the analysed data, the proposal includes the amount of money proposed to be awarded on each category by the ministry	1235.60€	O

Spain

Preconditions:

- User wants to request a study grant from the Ministry of Education (the request will be denied if some conditions don't apply, but they are not strictly preconditions to access the procedure).

Steps:

- Access the Ministry app using a self-enrolled user.
- Add personal data, family members and earnings data, residence, past studies, current studies the grant applies at.
- Issue grant request.
- Once the process is done, the Ministry opens the query service for the universities.

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- Universities can download a list of applicants, and then they can download each application addressed at programmes in said university, queried once at a time.
- The university fills in the academic results from the previous year (for the first year, the university access exams grades are filled in).
- If any data is missing or wrong, university officials contact the student to provide them (and proof of their legitimacy).
- The grant request is uploaded again as a grant acceptance/rejection proposal (though the universities have decreasing capacity to reject a grant, they still can propose some reasons to reject it).
- If the student failed to indicate the correct university where they are enrolled, the grant request is rejected so the student will be asked to change this data and present it again.
- After the proposal, a first resolution is issued.
- The student is notified and he can do allegations (to the university, not to the ministry) (as a whole or partial, as the grant has different parts: credits, transport, housing...). A new proposal is uploaded, and a resolution is expected.
- The process above is repeated several times until the final resolution is issued. A student may have different allegations accepted or rejected.
- At the end of the course, if the student hasn't reached a minimum on some success criteria, the university has to notify the Ministry (manual procedure), which can have their grant revoked and the money claimed back.

Postconditions:

- Grant is assigned.
- Grant is rejected.
- Grant is revoked.

Discussion points

- Enrolment outcomes depend on the desire to order a grant. Sometimes students mark that they want to request a grant despite knowing they won't be awarded. They do this to postpone the payments as much as possible. Some grants are resolved near the end of the course. If the student refuses to pay, he has studied for free nearly all the course.
- As most data are provided by the applicant, it is not reliable and might be false or wrong. Requires much validation effort from the university officials.
- Even if officials are used as agents to validate information, this should be stored and reused by the Ministry.
- Grant application is quite lax when the user inserts the data (validating formats or correctness and consistency of the data), but when it is uploaded back from the university, it is stricter (so if data are downloaded and then re-uploaded as is, it might be rejected).
- Exchange format is huge, and it is transferred in its entirety on each proposal/resolution step.
- Most of the data being transferred are useless for the university, as the reasons for the decision are being moved to the Ministry.
- A proper procedure would only notify the university the resolution of a grant (and the university should only notify if a grant has reached a state where it must be revoked and the import claimed). All the data would be centralised on an app at the Ministry and the officials should be users of that app.

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Given this system (the student interacts with the Ministry app but the universities have to download the data locally), sometimes the student knows the result before the university, and allegations are done before even having access to the data.

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Annex IV – MS required data for Use case 3

This annex provides additional information on the mandatory and optional data required by the UC#3 data consumers in each of the participating Member States (Belgium, Slovenia), as well as data and specific requirements of the Member States that will not be involved in the use case, but are part of the pilot (Spain).

Belgium

Table 44: UC#3 – BE-FL - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
Name	Name of the request (ex Give Evidence)	GeefBewijs	M
Version	Number of the version "02.00.0000"	02.00.0000	M
Type	For ex. "QUESTION"	"VRAAG"	M
Datum	Date on the moment of requesting the data. Format YYYY-MM-DD	2011-03-08	M
Timestamp (time)	Time on the moment of requesting the data: Format HH:MM:SS:0000	08:38:12.222	M
Sender			
Identification	Will be communicated when requesting access to the database	led.vlaanderen.be/xxx	M
Reference		550e8400-e29b-41d4-a716-446655440000	M
Role	Will be communicated when requesting access to the database	111	M
User	Has to contain a person number (Currently BE national number) Whether or not this field is necessary will be communicated when requesting access to the database.	00000000097	M/O
Identifier	Student legal identifier (see above)	00000000097	M
INSZ	Person number of the person for whom evidence is being requested.	00000000097	M

Belgium: Flemish Community

Agentschap voor Hoger Onderwijs, Volwassenenonderwijs en Studietoelagen (Agency for Higher Education, Adult Education and Study Grants)

NARIC-Vlaanderen

Koning Albert II-laan 15, 1210 BRUSSEL

T 1700 (from abroad +32 2 553 1700) – www.naric.be

Table 45: UC#3 – BE-FL - Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
	Details of the applicant		
First name			M
Last name			M
Date of birth			M
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Country of birth			M
Nationality			M
Telephone or mobile number			M
E-mail			M
	Submitter of application		
Submitter of application		Diploma holder/intermediary	M
	Intermediary organisation		
Crossroads bank number			O
Name			O
Street and number			O
Postal code and town			O
Telephone number			O
E-mail			O
	Contact for NARIC		
Contact for NARIC		Diploma holder/intermediary	M
	Status of applicant		
recognised refugee status or subsidiary protection status		Y/N	M
attachment			O
	Official address		
Street and number			M
Postal code and town			M
Country			M
	Correspondence address		
Street and number			O
Postal code and town			O
Country			O
	Contact medium		
Contact medium		e-mail/letter	M
	Choice of procedure		
Level recognition		Y/N	M
Specific recognition		Y/N	M
	Diploma title for which you apply		
Diploma title			M
	Purpose of the application		
	Purpose work		
work		Y/N	M
Profession			O
Sector healthcare		Y/N	O
Healthcare			O
Healthcare attachment	If you want to work as care provider, healthcare assistant or nurse, also complete		O

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	the sheet “Healthcare”. Download it via www.naric.be and append it to your application.		
	Purpose study		
study		Y/N	M
Course to follow			O
Flemish university		Y/N	O
VDAB or SYNTRA		Y/N	O
Adult education centre		Y/N	O
Another institution		Y/N	O
Name other institution			O
	Purpose other		
other		Y/N	M
Other purpose			O
	Details of attended programmes		
	Chronological overview of your entire school career		
	Primary education		
Number of school years			O
Period (from to)			O
Country			O
Outcome		Passed/failed	O
	Secondary education		
Title of diploma			O
Number of school years			O
Period (from to)			O
School			O
Town			O
Country			O
Outcome		Passed/failed	O
	Higher education		
Title of diploma			O
Official study programme duration			O
Student workload		years	O
Number of credits		ECTS or credits	O
Period (from to)			O
Educational institution			O
Town			O
Country			O
Outcome		Passed/failed	O
	Dissertation		
Dissertation		Y/N	M
Title dissertation			O
	Other diplomas		

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Other diploma		Y/N	M
Title		list	O
Country		list	O
Educational institution		list	O
Year of diploma		list	O
	Work placements		
Work placements		Y/N	M
List (Work placement location, Period, Tasks performed)		list	O
	Work experience		
Work experience		Y/N	M
List (Employer, Period, Tasks performed)		list	O
	Remarks		
Remarks			O
	Supporting documents		
	In original language, for all applications		
copy of your diploma or certificate			M
copy of your identity card			M
copy of a valid supporting document which exempts you from payment			O
copy of your work placement certificate			O
copy of the documents proving your relevant work experience			O
	In original language, for secondary education application		
mark sheet of the final exam or the report of the final year			O
	In original language, for higher education application		
copy of the diploma supplement			O
copy of the official study programme			O
copy of the document describing the learning outcomes			O
document describing the learning outcomes		Y/N	M
copy of your dissertation			O
copy of your curriculum vitae (only for diplomas of medicine)			O
copy of your list of			O

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publications			
copy of your portfolio (if applicable to your programme of study)			O
	In original language, other relevant supporting documents		
Another supporting document		list	O
	Translated annexes in Dutch, English, French or German		
	Supporting document translated into Dutch by a sworn translator or a social translator		
A copy of the translation into Dutch of your diploma or certificate by a translator who is sworn in at a Belgian court or by a social translator		Y/N	M
	Supporting documents translated into Dutch, English, French or German by a sworn translator		
A copy of the sworn translation of the diploma supplement		Y/N	M
copy of the sworn translation of the mark sheet of the final exam or the report of the final year of secondary education		Y/N	M
copy of the sworn translation of the work placement certificates		Y/N	M
copy of the sworn translation of the certificates proving your work experience		Y/N	M
	Supporting documents which you translated yourself into Dutch, English, French or German		
abstract of the official study programme		Y/N	M
abstract of the document with the description of the learning outcomes		Y/N	M
abstract of the dissertation and the bibliography		Y/N	M
	Other relevant supporting documents which you translated yourself into Dutch, English, French or German		
Other translated		list	O

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supporting document, namely:			
	Signature by the diploma holder		
Date of application			O
Signature			O
First and last names			O
	Signature by the intermediary		
Date of application			O
Signature			O
First and last names			O

Table 46 : UC#3 – BE-FL - Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
	Details of the applicant		
First name			M
Last name			M
Date of birth			M
Country of birth			M
Nationality			M
Telephone or mobile number			M
E-mail			M
	Submitter of application		
Submitter of application		Diploma holder/intermediary	M
	Intermediary organisation		
Crossroads bank number			O
Name			O
Street and number			O
Postal code and town			O
Telephone number			O
E-mail			O
	Contact for NARIC		
Contact for NARIC		Diploma holder/intermediary	M
	Status of applicant		
recognised refugee status or subsidiary protection status		Y/N	M
attachment			O
	Official address		
Street and number			M
Postal code and town			M
Country			M
	Correspondence address		

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Street and number			O
Postal code and town			O
Country			O
	Contact medium		
Contact medium		e-mail/letter	M
	Choice of procedure		
Level recognition		Y/N	M
Specific recognition		Y/N	M
	Diploma title for which you apply		
Diploma title			M
	Purpose of the application		
	Purpose work		
work		Y/N	M
Profession			O
Sector healthcare		Y/N	O
Healthcare			O
Healthcare attachment	If you want to work as care provider, healthcare assistant or nurse, also complete the sheet "Healthcare". Download it via www.naric.be and append it to your application.		O
	Purpose study		
study		Y/N	M
Course to follow			O
Flemish university		Y/N	O
VDAB or SYNTRA		Y/N	O
Adult education centre		Y/N	O
Another institution		Y/N	O
Name other institution			O
	Purpose other		
other		Y/N	M
Other purpose			O
	Details of attended programmes		
	Chronological overview of your entire school career		
	Primary education		
Number of school years			O
Period (from to)			O
Country			O
Outcome		Passed/failed	O
	Secondary education		
Title of diploma			O
Number of school years			O
Period (from to)			O
School			O
Town			O
Country			O

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Outcome		Passed/failed	O
	Higher education		
Title of diploma			O
Official study programme duration			O
Student workload		years	O
Number of credits		ECTS or credits	O
Period (from to)			O
Educational institution			O
Town			O
Country			O
Outcome		Passed/failed	O
	Dissertation		
Dissertation		Y/N	M
Title dissertation			O
	Other diplomas		
Other diploma		Y/N	M
Title		list	O
Country		list	O
Educational institution		list	O
Year of diploma		list	O
	Work placements		
Work placements		Y/N	M
List (Work placement location, Period, Tasks performed)		list	O
	Work experience		
Work experience		Y/N	M
List (Employer, Period, Tasks performed)		list	O
	Remarks		
Remarks			O
	Supporting documents		
	In original language, for all applications		
copy of your diploma or certificate			M
copy of your identity card			M
copy of a valid supporting document which exempts you from payment			O
copy of your work placement certificate			O
copy of the documents proving your relevant work experience			O
	In original language, for secondary education application		
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mark sheet of the final exam or the report of the final year			O
	In original language, for higher education application		
copy of the diploma supplement			O
copy of the official study programme			O
copy of the document describing the learning outcomes			O
document describing the learning outcomes		Y/N	M
copy of your dissertation			O
copy of your curriculum vitae (only for diplomas of medicine)			O
copy of your list of publications			O
copy of your portfolio (if applicable to your programme of study)			O
	In original language, other relevant supporting documents		
Another supporting document		list	O
	Translated annexes in Dutch, English, French or German		
	Supporting document translated into Dutch by a sworn translator or a social translator		
A copy of the translation into Dutch of your diploma or certificate by a translator who is sworn in at a Belgian court or by a social translator		Y/N	M
	Supporting documents translated into Dutch, English, French or German by a sworn translator		
A copy of the sworn translation of the diploma supplement		Y/N	M
copy of the sworn translation of the mark sheet of the final exam or the report of the final year of secondary education		Y/N	M
copy of the sworn translation of the work		Y/N	M

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placement certificates			
copy of the sworn translation of the certificates proving your work experience		Y/N	M
	Supporting documents which you translated yourself into Dutch, English, French or German		
abstract of the official study programme		Y/N	M
abstract of the document with the description of the learning outcomes		Y/N	M
abstract of the dissertation and the bibliography		Y/N	M
	Other relevant supporting documents which you translated yourself into Dutch, English, French or German		
Other translated supporting document, namely:		list	O
	Signature by the diploma holder		
Date of application			O
Signature			O
First and last names			O
	Signature by the intermediary		
Date of application			O
Signature			O
First and last names			O

Belgium: French-Speaking Community

Application form to be sent by web form (see http://www.equivalences.cfwb.be/index.php?id=2769&no_cache=1)

Table 47: UC#3 – BE-FR - Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
	Personal data		
Family name			M
First name(s)			M
Nationality			M
Telephone			M
e-mail			M
Street			M
House nr			M
Box nr			M
Postcode			M
Municipality			M

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Country			M
	Purpose of application		
Purpose		Professional / Study	M
Comment			O
	Diploma in scope of request for recognition		
Name			M
Institution			M
Normal duration			M
Country of issuance			M
Date of issuance			M
End of study work		Y/N	M
Copy of end of study work available		Y/N	M
	Attachments		
Copy of diploma			M
Copy study transcript			M
	List of diplomas in higher education		
Name			O
Institution			O
Normal duration			O
Country of issuance			O
Date of issuance			O
End of study work		Y/N	O
Copy of end of study work available		Y/N	O
	Attachments		
Copy of diploma			O
Copy study transcript			O

Belgium: German-Speaking Community

Application for the Recognition of equivalence of a Foreign Higher Education Diploma

Ministry of the German-Speaking Community

Department VET and Organisation of Education Date of receipt:

Gospertstraße 1

4700 Eupen

E-mail: unterricht@dgov.be

Website: www.bildungserver.be

Table 48: UC#3 – BE-GE - Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
	Details of the applicant		
State register number			M
First name			M
Last name			M
Date of birth		DD.MM.YY YY	M
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Name	Description	Example value	Mandatory / Optional
Native country			M
Nationality			M
Sex		Male Female	M
Telephone number			M
E-mail			M
Street and number	official address		M
Postal code and city			M
Country			M
Street and number	postal address (if different from official)		O
Postal code and city			O
Country			O
	Educational details		
	Primary education		
Number of school years			O
Period (from to)		DD.MM.YY YY	O
Country			O
Result		Passed/Final	O
	Secondary education		
Name of the diploma			O
Number of school years			O
Period (from to)		DD.MM.YY YY	O
Name of the school			O
City of the school			O
Country			O
Result		Passed/Final	O
	Higher education		
Name of the diploma (original)			O
Date of issue of the diploma		DD.MM.YY YY	O
Name of the higher educational institution			O
City of the higher educational institution			O
Country			O
Official duration of studies		study years	O
Student workload		ECTS	O
Number of credits		credit points	O
Additional information regarding the school career or the diploma			O
	Work placements in the course of your		

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Name	Description	Example value	Mandatory / Optional
	studies		
Work placements		Y/N	M
List (Work placement, Duration of the work placement)		list	O
Dissertation (e.g. a thesis or a final paper)	If you did not need to hand in a dissertation to complete your studies, please enclose an official confirmation thereof by the certifying higher education institution	Y/N	M
title of dissertation			O
additional diploma		Y/N	M
other diploma		list	O
	Professional experience		
professional experience		Y/N	M
Employer + duration		List	O
	Purpose of the application		
Training programme		Y/N	M
Work		Y/N	M
Work as			O
Other		Y/N	M
Other			O
	Remarks		
relevant information			O
	Supporting documents		
2 copies of the diploma in the original language		Y/N	M
2 copies of the certified translation of the diploma		Y/N	M
2 copies of the identity card in the original language		Y/N	M
2 copies of the certified translation of the identity card		Y/N	M
2 copies of the diploma supplement in the original language		Y/N	M
2 copies of the certified translation of the diploma supplement		Y/N	M
2 copies of the official study programme		Y/N	M
2 copies of the résumé		Y/N	M
2 copies of the dissertation in the original language		Y/N	M
2 copies of the dissertation's résumé		Y/N	M
2 copies of the previously gained bachelor and/or		Y/N	M

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Name	Description	Example value	Mandatory / Optional
master diploma			
2 copies of the curriculum vitae		Y/N	M
2 copies of the proof of the status of recognised refugee		Y/N	M
2 copies of your curriculum vitae		Y/N	O
2 copies of the labour booklet		Y/N	O
2 copies of the translation of the labour booklet		Y/N	O
2 copies of the documents that give proof of your professional experience		Y/N	O
2 copies of your list of publications		Y/N	O
other enclosures		Y/N	O
other enclosures			
	Varia		
Date			M
Signature			M

Slovenia

Table 49: UC#3 – SI - Mandatory and Optional Identification Data for Student

Name	Description	Example value	Mandatory / Optional
First Name		Franci	M
Last Name		Petek	M
Date of birth		8.12.1998	M
Place of birth		Maribor	M
Issuer defined Identifier for the student	Student's ID given by the issuer	E95043456	O
eID	eID of the Student		M
Application SID	Student ID within a dedicated application (e.g. EduCTX) – acquired from the system after “registration”	03355621	M
eID Public key	Student public key – bound to Application SID		M

Table 50: UC#3 – SI - Mandatory and Optional Identification Data for Issuer - Institution

Name	Description	Example value	Mandatory / Optional
eID	eID of the Institution		M

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Name	Description	Example value	Mandatory / Optional
Application IID	Institution ID within a dedicated application (e.g. EduCTX) – acquired from the system after new Institution is added	01255922	M
eID Public key	Institution public key – bound to Application IID		M
Issuer Type	Type of the institution issuing the certificate (University, College, Company, Institute)	University	M
Issuer Full Name	Full Name of the issuer	University of Maribor	M
Issuer address		Slomškov trg 12	M
Issuer city		Maribor	M
Issuer zip		2000	M
Issuer Country		Slovenia	M
Issuer logo	logoURI	https://www.um.si/SiteAssets/UM%20Libraries/images/univerza_v_mariboru_logotip.png	O
Department of the official Issuer	Department of the issuer	Faculty of Electrical Engineering and Computer Science	O
Full address of the department of the official Issuer	Address of the department of the official Issuer	Koroška cesta 46, 2000 Maribor, Slovenia	O

Table 51: UC#3 – SI - Mandatory and Optional Identification Data for Issuer – Official Person

Name	Description	Example value	Mandatory / Optional
First Name		Janez	M
Last Name		Novak	M
eID	eID of the Official Person		M
Application IOPID	Official Person ID within a dedicated application (e.g. EduCTX) – acquired from the system after the permission for issuing is granted to person from Institution		M
eID Public key	Official Person public key – bound to Application IOPID		M
Person Type responsible with Issuer	Person responsible for the certificate content (e.g. Dean, Rector, Professor)	Rector	M
Person title responsible with the Issuer		Full professor	O

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Table 52: UC#3 – SI -Mandatory and Optional Academic Data for Issuing and Verifying Procedure

Name	Description	Example value	Mandatory / Optional
Application		EduCTX	M
Application version		1.1	M
Timestamp	Timestamp of certificate	1571311545967	M
Certification Type	Can be either formal or informal type	Formal	M
Certification Title	Title of the certification	Certificate of passed undergraduate study	M
Unit Title	Presents the name of the unit, which can be either the name of the study program, the name of the course, the name of the diploma or the name of a summer school	Diploma	M
Short Description	A mandatory short description of the unit the certificate is being awarded to		M
FullDescriptionURI	If the unit, the certificate is awarded to has additional information	http://www...	O
Value	Represents the amount or value of the certificate, which can be of various types	360	O
ValueType	Represents the type of the value, which can be ECTS or DIPLOMA UNIT or any other value	ECTS	O
Length of the study	Official length of the study in years	6	O
EOVK	European Framework for Higher Education Qualifications (http://www.ecahe.eu/w/index.php/Framework_for_Qualifications_of_the_European_Higher_Education_Area)	1	O
SOK	Slovene framework qualification (https://www.nok.si/sites/www.nok.si/files/documents/sokbrosura_strokovna_155x295_potrditev2.pdf)	7	O
Unit Language	The language the unit was presented to the student	Slovene	M
Study Programme Name	In case the certificate is rewarded for a study program	Informatika in tehnologije komuniciranja (Information and Communication Technology)	M
Awarded professional or scientific title	An academic title awarded after receiving this certificate, which in case of a Diploma is his professional title	Diplomirani inženir informatike in tehnologije komuniciranja (Bachelor of Science ICT)	O
Identification Number of the certificate	In case a certificate has a identification number	0000000000260	O

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Name	Description	Example value	Mandatory / Optional
Date certificate awarded	The date of graduation or the date the student formally received the certificate	22. 07. 2014	M
Date of issuance	The date the student got issued with the certificate	3. 12. 2014	M
KLASIUS-P	Level of qualification (https://www.stat.si/klasius/)	17002 Academic higher education	O
KLASISUS-P 16	The qualification domain	0610 – Informacijske in komunikacijske tehnologije (IKT), podrobneje neopredeljeno	O
Identification data of Student	Identification data of Student described in Table 17		M
Identification data of Issuer Institution	Identification data of Issuer Institution described in Table 18		M
Digital Signature	Digital signature of data by Issuer (Institution or Official Person)		M

Spain

Table 53: UC#3 – ES - Mandatory and Optional Identification Data for Procedure

Name	Description	Example value	Mandatory / Optional
Application	ID of the sending application	Diplomas	M
University	Government id code of the sending university	040	M
Send Date	Date the request is sent		M
Expedient Number	Internal studies file identifier of the student		M
University Registration Number	Registration number for the title at the university		M
National Registration Number	Official State Registration number for the title (will be returned on the response)		O
Given Name			M
First Surname			M
Second Surname			O
Identifier Type	Either national Identifier Number or foreigner identification number		M
Identifier	Student legal identifier (see above)		M

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Name	Description	Example value	Mandatory / Optional
Date of Birth			M
Date of Birth is estimative	If DoB cannot be established precisely and verified in documentation, this flag is marked	True/false	M
Locality of Birth			M
Code for Locality of Birth	Internal government code to identify the locality		M
Province of Birth			M
Country of Birth			M
Nationality			M

Table 54: UC#3 – ES - Mandatory and Optional Academic Data for Procedure

Name	Description	Example value	Mandatory / Optional
Diploma Type			M
Document Type			M
Joint Programme			M
Programme Name			M
Date Programme was approved at Ministry Council			M
Date Programme was published at Official State Bulletin			M
Date end of studies			M
Date Document issuance			M
Reasons for issuance proposal	Description of the reasons to request the title to be issued		M
Date effective	Date when this title takes effect (to be filled on the response)		O
Centre of Studies Code	Code of the Centre of Studies (a subdivision of the university) where this programme was taken		M

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Table 55: UC#3 – ES - Other mandatory and Optional Data for Procedure

Name	Description	Example value	Mandatory / Optional
Language (+)	Language(s) in which the diploma must be issued		M

Spain

Process of issuing student's diploma

Preconditions:

- Student has credentials for his/her university.
- Student has national ID card or passport.
- Issuer has all student's data stored in its own dedicated ICT solution.

Steps:

- Student passes a course or finishes his study for which he/she must receive a (digital) certificate.
- Student access to university's procedure to claim for her/his studies certificate using university credentials.
- The person responsible for assigning the student with the certificate verifies that all requirements for issuing the certificate are achieved (finished courses, paid taxes, etc.).
 - University requires official identification (by means of national ID card or passport) to associate official identity to diploma certificate, as public servant acknowledging student identity.
 - The person responsible for assigning the student with the certificate
 - o Issues a verifiable digital diploma.
 - o Issue a request to create physical (paper-based) diploma.
 - o Issue a request to insert diploma data in the national wide centralized register for titles (managed by Ministry of Education and Vocational Training).
 - Student receives physical diploma (paper based).

Postconditions:

- Digital diploma certificate is verifiable at university's ICT services.
- Digital diploma certificate is managed by and verifiable at national registry.
- Student holds a paper diploma.

Process of verifying student's diploma:

Preconditions:

- Student has already a diploma registered at national registry (Ministry of Education and Vocational Training).
- Student is in possession of University certified digital diploma.
- Student has an eID to authenticate in any national or EU valid procedure (qualified certificate, national eID Card).

Steps:

- Student accesses the national registry for title management with valid credentials.

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- Student selects digital diploma he/she has been issued with and he/she wants to share.
- National registry offers the chance of publishing one or more certificates through a temporary link (via QR code) or downloadable PDF with a verification code provided by ministry of education and vocational training (similar to verification codes provided for other public administration procedures).
- Student sends the QR code or PDF with verifiable code to targeted destinations.
- Target destinations may validate diplomas through official validation provided by Ministry of Education and Vocational Training.
- Alternatively, student may send to target destinations the certificate created by issuer university.
- Target destinations will access University registry to validate diploma digital certificate created for student (outcome of the stage for issuing student's digital certificates).

Postconditions:

- The digital certificates provided by Ministry can be reshared with anyone, anytime again during valid period defined by student.
- The digital certificates provided by university can be reshared with anyone, anytime again.
- The digital certificate can provide identification information about the issuer, student and the certificate itself.
- The shared digital certificate file can be changed but any deviations from the original data/content defined by the digital certificate issuer will not be validated through the platforms provided (ministry or University) and a forged document will not be declared as a valid one.

Discussion points:

- There is not a fully automated, machine-readable system to issue and validate diploma and studies certificates accessible to users, but there is a data service at the interoperability node.

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