



# **Study to support the revision of the Diploma Supplement and analyse the feasibility of its digitalisation at European level**

Annex

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## Digitalisation case study reports

The case study reports present identified examples of the Diploma Supplement and other student data digitalisation initiatives across the world. These reports are annexes to the digitalisation practices presented in the main report, presenting more in-depth technical information:

A short introduction outlining the purpose and main features of the initiative.

### The basis for the solution

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative

### Status of the solution

- ☐ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued, e.g. the solution was discontinued when the pilot project ended
- ☐ Discontinued without implementation, e.g. the solution/concept was created, but never implemented
- ☐ Concept/future plan, e.g. the solution is at the conceptual phase, with no clear plan to develop it in the near future

### Outputs of the solution

Brief description of available outputs:

- ☐ Student data transfer
- ☐ Standalone electronic document
- ☐ Online interface
- ☐ Services (e.g. Skills matching/job search)

### Specific elements/pieces of information that the solution provides

- ☐ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges

### Availability of the output

- ☐ Only upon graduation
- ☐ During the whole study period

### Who can access the final output

- ☐ Students/graduates themselves
- ☐ Other HEIs
- ☐ Potential employers

- ☐ Third party applications

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data  
☐ Spreadsheets (e.g. excel) or similar tabular format  
☐ Xml or similar structured format  
☐ JSON-LD or similar linked data  
☐ Relational database (SQL, Oracle)

**Ownership of student data**

- ☐ Student/graduate  
☐ Higher Education Institution  
☐ Other third party, please specify  
☐ No information

**Data storage**

Brief description of student data storage arrangements provided by the identified solution.

**Authentication infrastructure**

Brief description of authentication measures applied to identify and authenticate potential users and owners of student data.

**Security measures**

Brief description of security measures against fraud, unauthorised altering of the data, or forgery.



## EMREX

EMREX is the solution for electronic transfer of student records between higher education institutions in Europe. The electronic transfer of the student achievement is initiated by a student's approval through the Student Mobility Plug-in (SMP), installed in the student web/ the student portal at the home university. The student records are then obtained from the National Contact Point (NCP) of the host university in question. EMREX is neither an IT project as such, nor the project aiming at developing a new system. The solution utilises existing infrastructure (e.g. user authentication, authorisation, data warehouses etc.). The tangible outcome of EMREX is a federated solution that supports the exchange of student data on achievements.

### What is the basis for the solution?

- ☒ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative

ERASMUS+ program, Key Action 3: European policy experimentation

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

Field trial at the time of writing

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	<p>Each country has two roles in the EMREX network:</p> <ol style="list-style-type: none"> <li>1. Provide the student with application(s) that allow them to fetch their results from another HEI, either in the same country or from abroad (EMREX client)</li> <li>2. Provide national client(s) with functionality to fetch assessments (results from courses, qualification) from the databases containing this information (National Contact Point - NCP). The EMREX-system is dependent on connecting to an existing solution that can fetch results for a given student at a given HEI.</li> </ol>
Online interface	<p>An EMREX client is a (part of a) web application at a HEI, where the student can collect results from other institutions. The EMREX project will be implementing an example EMREX client that will include the following:</p> <ol style="list-style-type: none"> <li>1. A graphical user interface for selecting and connecting to the NCP;</li> <li>2. A graphical user interface for displaying the result data that has been returned from the NCP;</li> <li>3. Written in Java and with an English user interface.</li> </ol>

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)

- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges
- ☒ Not applicable

#### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period

#### Who can access the final output?

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☐ Potential employers
- ☐ Third party applications

#### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

Emrex uses the ELMO XML format as the basis for the exchange of result information. ELMO is based on the CEN standard EN 15981-2011 EuroLMAI. EuroLMAI is a data model describing assessments, primarily Diplomas, Diploma Supplements and Transcripts of Records for higher educations.

#### Who owns the student data?

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

#### Authentication infrastructure

Logging in is divided into two parts. An anonymous statistical log that can be shared with the whole EMREX network. And a national log that fulfils the national requirements for logging. This part is not shared between the countries and is different between different implementations.

Each country and HEI uses their own authentication methods, but the common ground is: a federation of trust based on unique username+password can be used also in the EMREX network; there need to be one point of strong identification; the matching of names is proposed to be done with a Levenshtein method.

#### Security measures

The information exchanged in the EMREX network is personal. Confidentiality is ensured by enforcing https during transfer of results. Data integrity is ensured by adding a digital signature to the transferred results, which can be verified by the EMREX client.



## Erasmus Without Paper (EWP)

The Erasmus Without Paper project aims to create a network supporting the electronic exchange of student data by interlinking the existing Erasmus student databases of Higher Education Institutions (HEIs), with the goal to permanently migrate from the paper world to the electronic world of student data. The EWP Network attempts to standardise student data transfer on a European-wide scale. The transfer does not involve documents themselves (e.g. scanned copies) but rather the data that is contained in these documents, so that they can be used for the generation of various documents, processed automatically, and stored in institutional databases. No data is held centrally.

### What is the basis for the solution?

- ☒ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative

Erasmus+ Key Action 3

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	EWP project provides a student mobility data exchange network composed of the EWP Hosts and the Registry.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges
- ☒ Not applicable

### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period



### Who can access the final output?

- ☐ Students/graduates themselves
- ☒ Other HEIs
- ☐ Potential employers
- ☐ Third party applications

The project aims to set up an Electronic Network that will allow any Erasmus+ HEI that organizes student exchanges to exchange its student data with any EU HEI system using the network and vice versa in a secure and efficient way.

### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

### Who owns the student data?

- ☐ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☒ No information

### Where/how the data is stored?

The data is stored in institutional databases. In particular, no data is held centrally.

### Authentication infrastructure

Application Programming Interfaces (APIs) serve to identify the partners.

### Security measures

The Echo API allows EWP developers to test the security of their EWP Network connections. It doesn't "do" anything, but it requires the developer to implement the core security framework (which will be needed by all the other APIs later on). The EWP Network specification posted on GitHub establishes common security measures.



## Stork 2.0. eAcademia Pilot

Secure idenTity acROss boRders linKed (STORK) makes it easier for citizens to access online public services across borders by implementing Europe-wide interoperable cross border platforms for the mutual recognition of national electronic identity (eID) between participating countries. The eAcademia pilot has built a cross-border interoperability platform, in which services offered by higher education institutions and other government institutions can be accessed using electronic credentials (i.e. username and password) issued by foreign countries. The private sector was also involved in the pilot; they were allowed to tailor the academic information found in the Electronic Diploma Supplement (e-DS) to their own purposes. For example, in order to assess job candidates' qualifications, the private sector participants in the pilot were able to find proof of candidates' qualifications online. The e-DS was adopted as an academic data model during the development of the eAcademia Pilot project.

### What is the basis for the solution?

- ☒ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative

Project co-funded by the European Community under the ICT Policy Support Programme.

### What is the status of the solution?

- ☐ Ongoing implementation
- ☐ Implemented and active/functional
- ☒ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

At the time of writing there was uncertainty about the continuity and sustainability of infrastructure.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges
- ☒ Not applicable

### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period

### Who can access the final output?

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☐ Third party applications

### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

eAcademia pilot adopted an XML format to exchange electronic DS between MS, as it is being promoted as a standard in Spain and has the potential to achieve standardisation at a higher level.

### Who owns the student data?

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

The explicit consent of the owner of the data, the user, is always required before his data can be sent to the service provider.

### Where/how the data is stored?

The cross-border platforms do not store any personal data, they just pass messages and are fully compliant with data protection regulations ant national and European level.

### Authentication infrastructure

Secure cross-border authentication through national eID system.

### Security measures

There is no storage of identity credentials by the service providers. Identity credentials are only used by the national authorities.

Throughout the project, steps have been taken to ensure that only the minimal amount of data transfer and processing is completed, and that rights to access, correct and ultimately delete personal data are maintained in line with Data Protection regulations.



## Diploma Registry in Norway

The Diploma Registry works as an intermediary between the applicant, the recruiter, and the education institution, to ensure that degrees and results are transferred directly from the source (the education institution) to the recruitment system. This ensures that results cannot be tampered with when transferred to the recruiter. The applicant can publish the study results as a PDF or Web page through the Diploma Registry, or make a raw data transfer between the source and the destination.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☒ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative

The Ministry of Education and Research has commissioned the University Centre for Information Technology (USIT) at the University of Oslo to prepare a requirements specification for a national diploma registry.

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	The student can make a raw data transfer between source (issuing HEI) and destination.
Standalone electronic document	The student can generate an electronically signed Diploma Supplement through the Diploma Registry system.

### What specific elements/pieces of information does the solution provide?

- ☒ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges

### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period



### Who can access the final output?

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications (Third party recruitment systems that are connected to the diploma registry)

### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☐ Other

The ELMO XML format, the same format is used in EMREX.

### Who owns the student data?

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

After logging in, the results owner will be able to retrieve information about which educational institutions hold information about his/her results. All the results for each educational institution must be displayed, and the results owner must be able to view a description of each result.

### Where/how the data is stored?

The Diploma Registry itself does not store much data; it will still be the source (the education institution) that contains the data and it will be retrieved from there every time. This is to ensure that the data is always fresh and that the Diploma Registry itself is not another source of potential security breaches. In that way, Diploma Registry service is closer to a Diploma Portal.

### Authentication infrastructure

The user logs in to the Diploma Registry, using a national identity provider (ID-porten).

### Security measures

The communication with the web application is encrypted (SSL encryption);

The results are collected directly from the educational institutions databases;

For institutions that are to supply data, both a WebService and an interface for clients using a WebService must be created in a diploma registry;

The user logs in using a certified secure national ID solution.



## e-HEAR (Higher Education Achievement Report)

The HEAR is specific to the UK and is a concise (no longer than 6 pages in printed form) electronic document produced by HEIs. It provides a record of a student's achievement during their time in higher education. The HEAR incorporates the European Diploma Supplement and may be accessed at any time during a student's career with the institution and afterwards. The document is verified by the Academic Registrar or an equivalent officer. The document, in addition to the information provided in the usual DS format, includes voluntary and extracurricular activities, participation in clubs, societies, awards received, etc. The Higher Education Academy (HEA) provides national support for the implementation and maintenance of the HEAR.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative
- ☐ Other

An initiative brought forward by the representative bodies for Higher Education in the UK.

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Standalone electronic document	The HEAR is an electronic document produced by a higher education institution that provides a record of student achievement during their period of study. It adheres to a template incorporating the European Diploma Supplement, and is verified by the Academic Registrar or equivalent officer.
Online interface	The HEAR reference pack recommends HEIs to provide a view of the HEAR as it develops, accessible through a student portal.

### What specific elements/pieces of information does the solution provide?

- ☒ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☒ Information on student mobility
- ☒ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☒ Integration to social/professional media
- ☒ Badges
- ☐ Other
- ☐ Not applicable

**When the output is available?**

- ☐ Only upon graduation
- ☒ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications, e.g. social/professional media.
- ☐ Other

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☐ Other

**Who owns the student data?**

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

**Where/how the data is stored?**

The data is stored in HEI's servers.



## Spanish Electronic Diploma Supplement (e-DS)

The e-DS is a proposed content model for the DS from an XML specification. This application targets HEIs, employers, students and service companies related to the proposed model. The XML data model of the e-DS has been designed following the information contained in the outline structure for the DS and ECTS/DS labels. The main features include the usage of rich text to provide an attractive impression using customized style sheets, the ability to add attached documents referenced from optional elements, the introduction of external web links with extra information, and the integration of electronic signature elements. An electronic DS may include attachments, extension content and several digital XML signatures. This solution supports various electronic signature formats, including XAdES-A, PAdEs (PDF Advanced e-sign), and mobile electronic signature is also supported. Timestamping and batch processing functionalities are also offered.<sup>1</sup>

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☒ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative
- ☐ Other

the Royal Decree 22/2015, January 23rd, which regulates the issuance of DS in Spain, and its subsequent development in the grade and master study guides compiled the mandatory use of e-DS for generating and electronic issuance. In addition, some universities have started to generate this format in the frame of the different interoperability projects promoted by the Conference of Spanish University Chancellors (CRUE), which represents more than 70 universities.

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Standalone electronic document	<p>Different universities, following several pilot projects, have started to adapt their information systems in order to generate an e-DS.</p> <p>For example, currently, the University of Santiago de Compostela (USC) issues DS both in paper and electronic format. Documents issued jointly are available to the student once the diploma is requested and the fees are paid.</p>

<sup>1</sup> Centro de Transferencia de Tecnologia, Case study documenting the Electronic Diploma Supplement standard,  
<https://administracionelectronica.gob.es/ctt/sete/descargas?idioma=en#.WSvTfmiGPcs>



**When the output is available?**

- ☒ Only upon graduation
- ☐ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☐ Other HEIs
- ☐ Potential employers
- ☐ Third party applications
- ☐ Other

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☐ Other

**Who owns the student data?**

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

**Authentication infrastructure**

STORK 2.0

**Security measures**

1. Electronic signature system based on a recognized certificate for any document to be authenticated: Recognized electronic signature of the Secretary General of the University or certificate of electronic seal, (body seal) in case of automated shipments.
2. The document must be signed on the electronic structure. For this, the XML format of advanced electronic signature (XAdES) described in the Signature Policy of the General State Administration, version 1.9 or higher, will be used.
3. Time stamping and secure verification code.



## Dutch diploma register (DUO)

In 2012, DUO (the executive agency of the Dutch MoE) established a diploma register. It is an online register that contains details of diplomas, certificates and testimonials of Dutch programmes of study that are funded by the Ministry of Education, Culture and Science. These details are linked to the personal details of the owner of the diploma. The register is made available by the Ministry of Education, Culture and Science to combat fraud. The register can also be used cross-border in projects to support international student mobility. As part of an international cooperation and improving processes, DUO has been piloting the exchange of student data together with Flanders, a region of Belgium.<sup>2</sup>

### What is the basis for the solution?

- ☒ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative
- ☒ Other, DUO

DUO uses 2 solutions: 1) sending pdf files by SFTP; 2) participating in EMREX (EU funded).

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

The SFTP solution is active (3 HEI's involved in 2016; 15 in 2017); the EMREX solution will be active from May 2017 onward.

### What is the output of the solution?

A detailed description of the specific output	
Student data transfer	Dutch students will be able to select their diploma data at the DUO website and give DUO their consent to send the data to the foreign HEI. This will be done by means of both solutions: SFTP and EMREX

<sup>2</sup> Sources: Jan Otten, DUO Registers & Pilots, <http://emrex.eu/wp-content/uploads/2017/01/EMREX-januari-2017-DUO.pdf>  
 DUO, <https://translate.google.it/translate?hl=en&sl=nl&u=https://duo.nl/particulier/diplomas/over-mijn-diploma/uittreksel-diplomagegevens-downloaden.jsp&prev=search>  
 DUO (Dienst Uitvoering onderwijs), Groningen Declaration Network, <http://www.groningendeclaration.org/signatories/duo-dienst-uitvoering-onderwijs>

**What specific elements/pieces of information does the solution provide?**

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges
- ☒ Other

For HE DUO provides only diploma data at the moment, but the organisation is now working on adding the diploma supplement.

**When the output is available?**

- ☒ Only upon graduation
- ☐ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications
- ☐ Other

Other HEI's and governmental organisations in the NL on a legal basis; foreign HEI's and employers only with the explicit consent of the student involved.

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☒ Other, PDF

In the SFTP solution it's pdf; in EMREX it's xml (and pdf). The student can also download for free a PDF from the diploma register.

**Who owns the student data?**

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

**Where/how the data is stored?**

In the first place the data are stored at the educational institutions. They send (a copy of) the data to DUO on a legal basis. DUO stores the data in registers.



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### **Authentication infrastructure**

Students must identify themselves by means of the Dutch digital ID-service DigiD. This requires a username, password and sms-code sent to the students cell phone. Next year DUO hopes to be able to make use of the new eID services.

### **Security measures**

DUO complies to all the regulations the Dutch government holds for registration and digital services.



## CINECA ESSE3 Diploma Supplement

ESSE3 is the Higher Education Student Information System (HE-SIS), produced by CINECA an Italian inter-University Consortium, and used by 70 Italian public and private Universities. ESSE3 manages all the Course Catalogue and Student Data required by the full Diploma Supplement report, and can produce it automatically at the end of the graduation process. Students can download their Diploma Supplement from the ESSE3 web-portal using their personal username and password. The DS can also be digitally signed by a University Administrator in PDF-A format before students download it.<sup>3</sup>

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☐ Private business initiative
- ☒ Other, Consortium Solution (by CINECA, Italy)

The solution is provided by Consortium CINECA (<https://www.cineca.it/en>) to all its Universities members.

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Standalone electronic document	PDF or signed PDF-A document.
Online interface	Students can download his/her DS document through the Web-User-Interface of ESSE3 System.

### What specific elements/pieces of information does the solution provide?

- ☒ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☒ Badges

<sup>3</sup> Diploma Supplement - ESSE3 - CINECA Technical Portal, <https://wiki.u-gov.it/confluence/display/ESSE3/Diploma+Supplement>; ESSE3 Diploma Supplement, <https://eventi.cineca.it/it/formazione/esse3-diploma-supplement>



Ongoing implementation realised with the integration of ESSE3 system and BESTR system (CINECA's Open Badge platform)

**When the output is available?**

- ☒ Only upon graduation
- ☐ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☐ Other HEIs
- ☐ Potential employers
- ☐ Third party applications
- ☐ Other

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☐ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☒ Relational database (SQL, Oracle)
- ☐ Other

**Who owns the student data?**

- ☐ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☒ No information

**Where/how the data is stored?**

Data is stored in the ESSE3 Database: one distinct DB for each University.

**Authentication infrastructure**

The solution support the same authentication measures used by the University systems. Each University has its own policy. The system support LDAP, Active Directory, SSO (Shibboleth), SPID (Italian Digital Identity Public System: <https://www.spid.gov.it/> ) and many others.

**Security measures**

Standard Data protection of SIS Database, managed by the single University or "as a service" in CINECA's DataCenter.

## Digitary

Digitary is a private provider of solutions for issuing, distributing, and verifying digital Diploma Supplements and other student documents. It enables HEIs to issue digitally signed Diploma Supplement as PDF documents (and XML data) to their students and graduates online. These documents contain legally binding digital signatures in accord with EU legislation and ETSI standards. Digitary supports "privacy by design": graduates control the sharing of their documents with third parties in a secure, audited way. Employers can integrate Digitary with their HR systems and verify student documents online. Digitary also facilitates the digital exchange of DS and other academic documents with institutions in Australia, China, India, New Zealand, and the United States.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☒ Private business initiative
- ☐ Other

Digitary is an Irish company who produced the first fully digital DS solution in 2005.

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	Student data transfer is on the roadmap for 2018. Digitary has two elements to providing this functionality: 1) A network. Digitary connects participating Universities through it's own "hub and spoke" network. This facilitates exchange of PDF documents and other data. 2) Digitary PDF documents can (optionally) embed underlying XML data, including HEAR data in the UK based on the EuroLMAI project. This future-proofs the solution to allow for the transfer of data in addition to PDFs. This layered approach provides easy exchange of PDF in the short term, but the foundation for data exchange in the long term.
Standalone electronic document	Digitary enables the production of digitally signed PDF documents from University systems. Existing PDFs can be easily uploaded by HEIs via a user interface - making it easier for adoption by Universities who do not have the resources to general XML or other structured data.
Online interface	Digitary provides an online portal for students/graduates to access their qualifications from multiple HEIs and obtain a consolidated view of their achievements. They can share them in a variety of secure ways with third parties. Online interface allows third parties to verify documents in real time.
Other	International Admissions: Digitary enables HEIs in Europe to receive





verified qualifications from 100% of international applicants - even if they do not have qualifications that were issued digitally.

API Integration: Digitary's APIs can be used to seamlessly attach DS and other documents to online applications for jobs / further study. These APIs are being used at Stanford University and are being rolled out to other HEIs in the US.

### **What specific elements/pieces of information does the solution provide?**

- ☒ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☒ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☒ Integration to social/professional media
- ☐ Badges

### **When the output is available?**

- ☐ Only upon graduation
- ☒ During the whole study period

### **Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications; API integration allows third party applications to access digital credentials as part of an online application workflow
- ☐ Other

Students/graduates access documents initially. They can then share their documents with third parties, this is the cornerstone of Digitary's "privacy by design" data protection model.

### **Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☒ Other

Digitary system can accept XML data or existing PDF documents. XML data requires HEIs to be able to produce XML - this is sometimes a barrier to adoption. Therefore, the system allows them to upload existing PDFs from any source, and Digitary can certify them. This encourages faster adoption and facilitates the transition to digital more quickly.

### **Who owns the student data?**

- ☒ Student/graduate
- ☒ Higher Education Institution
- ☐ Other third party, please specify



The "custodian" of the data is the HEI. Digitary provides them with a dedicated repository of their records. They can store this wherever they need to for compliance reasons (I.e. Within the EU or within a specific country). Their repository is linked to Digitary's central hub which facilitates the secure online student access, verification, and data exchange elements.

**Where/how the data is stored?**

Each HEI gets its own Digitary repository. This can be hosted anywhere. Digitary provides fully managed and secure EU hosting platform by default, in compliance with all relevant data protection laws and security best practices.

**Authentication infrastructure**

HEIs are authenticated using multi-factor authentication for issuing documents.

Students can authenticate using University-supplied credentials (federated authentication - EduRoam/Shibboleth, etc.). Students can link to social login/ personal email for long-term access where Universities do not provide access to accounts indefinitely.

**Security measures**

Digitary is hosted on a fully managed, redundant, multi-tiered enterprise infrastructure within the EU with multiple layers of security. All components are suitably partitioned into separate networks. Authentication and authorisation policies in place to restrict access to components on an "as-needed" basis. All data is encrypted in transit and at rest. Cryptographic material is stored on FIPS 140-2 level 3 Hardware Security Modules (HSMs). All components are fully redundant. Strict change control procedures are in place. All systems are monitored 24/7 for security vulnerabilities and network intrusion detection service is in place. Strict operational and change controls are in place to ensure that system and code changes do not introduce new security vulnerabilities.

## SPEEDE Server

SPEEDE Server transfers electronic transcripts between HEIs. SPEEDE Server was put into service in 1995 by the University of Texas at Austin. In 2012, the university made an offer to the National Student Clearinghouse to assume responsibility and operations for SPEEDE Server, and since October 2013, the National Student Clearinghouse has been responsible for its operation. Participating institutions have to register at the National Student Clearinghouse to use the server, which allows them to send single files containing multiple ISA-IEA envelopes to the server: one file per intended recipient. Each envelope can contain multiple transcripts, requests, acknowledgements, or other EDI transactions. The server sends the specified recipient a file containing one or more ISA envelopes from different schools.<sup>4</sup>

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	The solution offers the delivery of educational documents. The National Student Clearinghouse in 2013 also introduced the G.R.E.E.N. Statement of Principles to promote a free, open, principles-driven data exchange ecosystem through which electronic student academic records can be securely exchanged worldwide. It was endorsed by the Groningen Declaration Network as one of best practices that hopefully can inform the further development of the Digital Student Data Ecosystem.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges
- ☐ Other
- ☐ Not applicable

<sup>4</sup> Source: Speede Server, <https://speedeserver.org>

**When the output is available?**

- ☒ Only upon graduation
- ☐ During the whole study period

**Who can access the final output?**

- ☐ Students/graduates themselves
- ☒ Other HEIs
- ☐ Potential employers
- ☐ Third party applications

The Clearinghouse does not allow any unauthorized third parties to access files stored within the SPEEDE system.

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

The SPEEDE Server is designed to support EDI delivery of ANSI ASC X12 standard envelopes using FTPS or SFPT files. With EDI technology and its formats being fairly stable, the SPEEDE Committee turned most of its attention to the newer XML (Extensible Markup Language) schema, which provides a quicker, easier, and ultimately less expensive way for some schools to join the exchange process. SPEEDE and AACRAO chose to use the Postsecondary Electronic Standards Council (PESC) to approve these XML data standards. An XML schema/format for the postsecondary transcript was approved by PESC in May 2004. XML can be converted to EDI and vice-versa using converters. This means that the exchange between EDI-using and XML-using institutions is not restricted. List of supported formats on the electronic transcript exchange: - Postsecondary Electronic Standards Council (PESC) XML High School and Postsecondary Transcript - ANSI X12 TS130 Student Educational Record (EDI) - All system or statewide standard data record formats - All graphical formats (including PDF), which look like paper-based transcripts.

**Who owns the student data?**

- ☐ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☒ No information

**Where/how the data is stored?**

The software that runs SPEEDE resides entirely on a server located within the Clearinghouse's data centre that is used only for the delivery of packets.

**Authentication infrastructure**

The National Student Clearinghouse recommends using the signature option. It allows the server to 1) verify that the file has not been altered and 2) authenticate that the file was sent by the institution and not someone else. HEIs can log into the secure FTP account of other institution to view the status of any transcript file it has uploaded.





At the beginning NSC administrators need to connect the server of the institution to complete an initial approval (including uploading NSC public key to the server of the institution). Institutions are required to have an SSH server with the SFTP subsystem configured. Once this process is done, SPEEDE is ready to send electronic documents via SCP. Using a password is an interactive step (waiting for a prompt on the screen), whereas the SPEEDE Server sends via SFTP in batch format.

### **Security measures**

NSC digitally signs transcript PDFs on behalf of schools as well as accept and deliver digitally signed transcript PDFs from schools.

From the time files reach the SPEEDE Server until they are moved to the receiving organization's mailbox, they are encrypted both in transit and at rest. In addition to its encryption capabilities, SPEEDE's additional security features include: Logon limits, known entity exchanges (users must have trading relationships with the server), e-mail notices when files are received and sent, system activity logs and notifications.

In addition to encrypting files when they are at rest and in transport, the Clearinghouse maintains industry standards regarding the public/private key exchange. For example, a future planned enhancement is upgrading private key encryption to the current 2048-bit industry standard.



## Ellucian eTranscript

The National Student Clearinghouse and Ellucian have formed a strategic alliance to enable real-time electronic authentication, production, and transfer of transcripts between the Clearinghouse and Ellucian's administrative systems (Banner, Colleague, and PowerCampus). The Clearinghouse has the largest number of Ellucian customers compared with other transcript-order providers.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☒ Private business initiative
- ☐ Other

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Standalone electronic document	Certified PDF transcript. All configurations are defaulted to Clearinghouse Transcript Ordering. These configurations include those in your administrative system, cloud-based input and output traffic, and security settings. Students can submit a transcript request outside of normal office hours and receive an official transcript PDF within 20 to 30 minutes.
Online interface	The electronic interface and authentication is supported by Postsecondary Electronic Standards Council (PESC) XML standards, minimizing development time and maintenance investment. Ellucian eTranscripts support the Banner by Ellucian and Colleague by Ellucian administrative systems.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges

### When the output is available?

- ☒ Only upon graduation
- ☐ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☐ Other HEIs
- ☐ Potential employers
- ☐ Third party applications
- ☐ Other

**Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☐ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)
- ☐ Other

**Who owns the student data?**

- ☐ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

**Where/how the data is stored?**

Ellucian's work with AWS supports the company's cloud strategy, offering colleges and universities a secure move to the cloud, at their pace. Currently, a number of Ellucian solutions are cloud-ready, including Ellucian Recruiter™, Ellucian Mobile, Ellucian Pilot, Ellucian Elevate™, and Ellucian eTranscripts.

**Authentication infrastructure**

Ellucian eTranscripts automates processes to support the full lifecycle of transcript requests—from student identification and validation to order collection and fulfilment. The transcript ordering vendor validates the data entered by students against information in the Ellucian enterprise resource planning (ERP) system to ensure that the transcript can be produced and that there are no institutional holds on the student.

**Security measures**

Secure electronic transcript delivery and automatic checks to verify authentication and eligibility. The solution developed in partnership with the National Student Clearinghouse creates a secure interface between institutions participating in the Clearinghouse's Transcript OrderingSM service and the institution's Ellucian administrative system.

## Parchment

Parchment is a major competitor of the NSC/Ellucian system. The company got its start with high school transcripts. It launched in 2004, and by 2010 it was processing 1 million credentials per year, and as of 2017 that number has grown to 1 million credentials every month. Currently Parchment provide a network of digital credentials services, which works with transcripts, diplomas, verifications and other electronic documents. For instance, their service 'Parchment Send' offers ordering and fulfilling of these documents from the registrar's office and includes an online ordering platform, secure electronic delivery with Blue Ribbon technology, and end-to-end security with data encrypted at rest.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☒ Private business initiative

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan
- ☐ Other

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	eTranscript can be sent to all HEIs the students are applying by logging in their online profile.
Standalone electronic document	Parchment eTranscripts are provided in PDF form and are HEIs branded. Parchment also offers Competency Based Transcripts as well as Experiential Transcripts.
Online interface	Parchment Credential Profile allows students/graduates to gather and manage all credentials they have earned from all institutions. Official records can be re-ordered and sent to institutions worldwide.
Other	The system has a possibility to interact with LinkedIn and generate a verified link to employers.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☒ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☒ Integration to social/professional media
- ☐ Badges



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**When the output is available?**

- ☐ Only upon graduation
- ☒ During the whole study period

**Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications

**Who owns the student data?**

- ☐ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☒ No information

**Security measures**

Every sending and receiving institution is authenticated by Parchment Exchange, and all transmissions between them are carried over secure channels. Parchment Exchange employs the same data security technology used in online banking solutions.



## My eQuals - Digital Student Data

The Digital Student Data Project, referred to as My eQuals, was established to ensure that students and employers could verify the legitimacy of academic qualifications provided by Australian and New Zealand students.

Its first phase focused on delivering data-enabled secure PDF replicas of each university's key academic records (testamur or parchment, transcript, AHEGS (Australian Higher Education Graduation Statement)). The initiative was piloted at four sites, starting with Monash and the University of Melbourne. At Australian National University, Digitary also introduced eTranscript exchange functionality that allows ANU students and graduates to send electronic transcripts from their Digitary accounts to up to 3000 US institutions.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative

Backed by the Ministry of Education of Australia, however, no mandate or funding from the government. The initiative is starting locally with a potential of spreading globally, not only via the Groningen Declaration network, but also through existing and emerging individual partnerships.

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	Universities will also be able to use the system to check the academic credentials of students applying to study higher degrees or who want to transfer from one university to another.
Standalone electronic document	PDFs of academic transcripts, AHEGS and testamurs. Students can also give permission to HEI representatives to access their data upon graduation, in case of conditional offer etc.
Online interface	A simple online interface enables users to share documents with as many or as few people as desired for as long as desired.
Services (e.g. Skills matching/job search)	With a job applicant's permission, employers will be able to access the database to check on the applicant's qualifications or academic record.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)



- ☒ Evidence of learning (papers, presentations, media artefacts)
- ☒ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges

A network of credential repositories - one for each university linked to a central node for regional and international connection.

#### **When the output is available?**

- ☐ Only upon graduation
- ☒ During the whole study period

#### **Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☐ Third party applications

#### **Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

#### **Who owns the student data?**

- ☒ Student/graduate
- ☒ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

Institutions own the data but students/graduates control who can access the data.

#### **Authentication infrastructure**

The Digitary (private provider) system gives institutions complete control over electronic documents. Documents can only be accessed by authorised individuals. Parties with provided link can access the student data. Student can manage whom to give the authentication to access the documents.

#### **Security measures**

Documents are issued using advanced electronic signatures which are compliant with EU Digital Signatures Directive 1999/93/EC and national enacting legislation. The documents are both legally-valid and tamper-evident.

## Credential Solutions Electronic Transcripts

Credential Solutions Electronic Transcripts is a system that manages and transfers digital transcripts. It works as part of larger network that integrates online ordering (Transcript Plus) and automation software (RoboRegistrar). This solution enables digital trading of EDI, XML and PDF transcripts through secure a Credential Solutions network, as well as other hubs such as Speede Server. The solution extracts student records using existing integration with a student integration system, and includes formatting, transmission, and receipt acknowledgement. To ensure that only certified institutions participate, sending HEIs must be accredited. Differently from some of the other market solutions, email is not used to deliver electronic transcripts.<sup>5</sup>

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☒ Private business initiative

### What is the status of the solution?

- ☐ Ongoing implementation
- ☒ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	The system enables client institutions to electronically trade EDI, XML and PDF transcripts with one another directly through Credentials' secure network as well as industry-accepted transcript hubs, including: Ohio Board of Regents F.A.S.T.E.R. SPEEDE Server eTranscriptCA
Standalone electronic document	The system extracts student records utilizing Credentials' integration with HEI's information system and produces an electronic transcript of records.
Online interface	<p>Credential Solutions link their server with HEI student information system to automate the manual production processes involved with transcript orders (locating online student records; confirming record using data elements supplied by students; authenticating name, student ID, SSN, DOB; managing orders with issues; extracting data for electronic orders)</p> <p>The system provides a self-service environment for students &amp; alumni; elimination of data input by HEI staff; and the ability to manage both electronic and archived records.</p>

<sup>5</sup> Credential Solutions, <http://www.credentialssolutions.net/>



### **What specific elements/pieces of information does the solution provide?**

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☐ Badges

### **When the output is available?**

- ☒ Only upon graduation
- ☐ During the whole study period

### **Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☐ Potential employers
- ☐ Third party applications

### **Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

### **Who owns the student data?**

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

### **Authentication infrastructure**

Pin authorization; Automatic authorization (based on successful completion of critical data elements; Written signatures.



### Bestr open badge platform

Bestr adopts the Open Badges standard to represent skills and competences acquired in formal, non-formal and informal environments. Through Bestr the companies themselves can define the competencies they need, the universities and the training institutions can offer the resources to acquire them, and whoever thinks to possess a specific competence, can prove it and certify it undergoing a verification process which is defined and agreed upon by companies and educational institutions. Whomever claims to possess a specific competence can be asked to prove and certify it by undergoing a verification process, which is defined and agreed upon by companies and educational institutions.<sup>6</sup>

#### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative

Bestr is a project by CINECA, who is the main Italian interuniversity Consortium.

#### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

#### What is the output of the solution?

	A detailed description of the specific output
Other	The Bestr platform provides tools for badge Issuing and sharing, a login and a possibility to integrate open badges with the student information systems in Italian HEIs. In this specific case, Bestr provides Automatic Badging solution valorizing competencies fostered by extra-curricular activities and MOOCs using APIs.

#### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☐ Transcript of grades (as a separate document)
- ☐ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☒ Badges

#### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period

<sup>6</sup> Bestr, <https://bestr.it/>

### Who can access the final output?

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications

### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☐ Xml or similar structured format
- ☒ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

### Who owns the student data?

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

The mechanism for using the badges is fully user-centered. The learner has to accept the badge that was issued to him/her, i.e. the badge has to be "claimed".

### Where/how the data is stored?

The badge itself includes the following fields of metadata:

(1) Recipient, (2) Issue Date, (3) Badge Title or Name, (4) Image URL, (5) Description, (6) Criteria, and (7) Issuer. The optional metadata fields include (8) Expiration Date and (9) Evidence URL.

Individual badge collections can be stored in a badge Backpack. There are multiple applications that support collecting, managing and displaying Open Badges.

### Authentication infrastructure

The HEI creates and endorses a badge in Bestr system;

A learner earns the badge ( based on an xAPI; an e-learning software specification that allows learning content and learning systems to speak to each other in a manner that records and tracks all types of learning experiences), and since the badge is already endorsed by the HEI, then it can approve the badge and add credits.

### Security measures

The badges are protected by Assertion. The assertion describes three key aspects of an Open Badge: (1) Who a badge was awarded to; (2) What that badge represents, (3) Who issued the badge.

Viewers of badges (e.g. peers, employers) can verify the badge based on the data contained in the assertion and displayed from an earner's public collections of Open Badges. Each assertion has a unique ID.

Additionally, badge assertions can be hosted at the location where the badge is produced, or secured with digital signatures or authentication codes.

## Stanford Blockchain ledger

Stanford University's public credentials verification service uses private blockchain implementation, which offers drag&drop functionality for Stanford's academic credentials that are produced as digitally signed, xml-based pdfs.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☒ HEI initiative
- ☐ Private business initiative

Stanford has developed a "private chain" in house, with internal staff.

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	
Standalone electronic document	Stanford produces a digitally-signed pdf which is store in the University cloud. This document contains links to competences profile, rich visualization tool ( <a href="https://edusalsa.com">https://edusalsa.com</a> ) and student's e-portfolios to augment the record with evidence or artifacts of learning.
Online interface	he BlockChain implementation is done through a public online interface found at <a href="http://certify.stanford.edu/">http://certify.stanford.edu/</a> managed by the office of the Registrar.
Services (e.g. Skills matching/job search)	Stanford's private blockchain is used to run a credentials verification service on the authenticity of Stanford's own certificates. It is implemented through a user-friendly drag&drop functionality. The certificate has a hash value in a Stanford block-chain ledger. When the holder drags it into the site: <a href="http://certify.stanford.edu/">certify.stanford.edu</a> , it will validate the hash.

### What specific elements/pieces of information does the solution provide?

- ☐ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☒ Evidence of learning (papers, presentations, media artefacts)
- ☐ Information on student mobility
- ☐ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☐ Integration to social/professional media
- ☒ Badges





Evidence of learning is implemented by linking the "augmented" transcript of records to e-portfolio platform (when available), mainly Digication. The concept of "badges" is implemented not through the Open Badges specifications, but rather through an alternative visual representation called "SkillsStamp". Stanford follows PESC's Academic College Transcript standard.

#### **When the output is available?**

- ☐ Only upon graduation
- ☒ During the whole study period

#### **Who can access the final output?**

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications

#### **Primary data format used/needed for the solution**

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☒ Xml or similar structured format
- ☐ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

#### **Who owns the student data?**

- ☒ Student/graduate
- ☒ Higher Education Institution
- ☐ Other third party, please specify
- ☐ No information

The students own the data, while Stanford is the "custodian", providing storage and verification services to third parties.

#### **Where/how the data is stored?**

The signed PDFs is stored on Stanford's server in campus.

#### **Security measures**

The "verification" service is open to the public so anyone who would want to validate a Stanford credential (pdf) may simply drag and drop the file into the service at <http://certify.stanford.edu/>.

## Learning Machine Blockcerts

Learning Machine is a commercial company that uses the Blockcerts standard as part of its software ecosystem for governments, universities, professional member organizations, corporations, recipients, and independent verifiers. Blockcerts is a free, open standard that allows organizations and individuals to build applications that issue and verify official records on the blockchain. Blockcerts records are owned by recipients and instantly verifiable by independent parties such as potential employers or admissions committees. They are designed to last a lifetime and be maximally portable across systems and geographical jurisdictions. Any type of document may be issued as a Blockcert, including diploma supplements. Supplements may be issued as standalone documents or adjoined to other documents, such as diplomas.

### What is the basis for the solution?

- ☐ An EU funded pilot project
- ☐ Solution based on national legislation
- ☐ HEI initiative
- ☒ Private business initiative
- ☒ An open source project

The MIT Media Lab and Learning Machine co-developed the Blockcerts open standard for blockchain credentialing in 2016. Any institution can use the standard to build their own software for issuing and verifying credentials on the blockchain without payment or credit to Learning Machine or MIT. A full open source reference implementation is available for free to schools and vendors to use and build upon.

### What is the status of the solution?

- ☒ Ongoing implementation
- ☐ Implemented and active/functional
- ☐ Implemented and discontinued
- ☐ Discontinued without implementation
- ☐ Concept/future plan

Blockcerts is an open project with a highly active global community of developers and users. The Learning Machine product implements the open standard as an enterprise platform (with federation, governance, support) that is being used by governments, educational institutions, professional membership organizations, and companies.

### What is the output of the solution?

	A detailed description of the specific output
Student data transfer	Blockcerts metadata is fully machine readable. As Blockcerts are shared, their data can be ingested by any database or applicant tracking system.
Standalone electronic document	A Blockcert is a standalone electronic record that is issued to an individual recipient, be that a learner's record of achievement, a citizen's identification document, a professional's license to practice, or an institution's accreditation.
Online interface	Learning Machine provides a friendly user interface for institutions to design records, compile recipient lists, issue records, track analytics, and manage administrative access. It also fully sponsors the free, open

	source Blockcerts mobile app for recipients to receive, store, and easily share their Blockcerts as they see fit. Finally, verifying institutions (employers, governments, universities, etc.) have a simple online interface for verifying any blockchain certificate (this can also be done through a manual blockchain lookup and through the Blockcerts mobile app).
Services (e.g. Skills matching/job search)	As Blockcerts are publicly shared by recipients, for example, to networking and job search websites. Their metadata can be read to match potential applicants with jobs and educational programs that match their skills. This is always opt-in.

### What specific elements/pieces of information does the solution provide?

- ☒ Standard Diploma Supplement data specified in the template
- ☒ Transcript of grades (as a separate document)
- ☒ Evidence of learning (papers, presentations, media artefacts)
- ☒ Information on student mobility
- ☒ Extracurricular activities performed (e.g. sports, science competitions or artistic achievements, memberships of societies and clubs)
- ☒ Integration to social/professional media
- ☒ Badges

Any type of document can be issued as a Blockcert: Standard Diploma Supplements, Transcripts, Evidence of Learning, Comprehensive Student Records, Badges, Diplomas, Professional Certifications, Student IDs, and others. Blockcerts can be shared directly (most secure), via social media or displayed independently via web links. Blockcerts are compliant with the OBI standard. Because they are issued on the blockchain, Blockcerts add a high standard of authenticity verification and proof of ownership to traditional Open Badges.

### When the output is available?

- ☐ Only upon graduation
- ☒ During the whole study period

Blockcerts can be issued by an institution at any time. They are immediately available to the recipient upon issuance. Blockcerts are emailed to recipients as file attachments, are delivered automatically to a learner's Blockcerts mobile application, and can be shared via web link. Availability to recipients is determined by when the issuing organization decides to send the certificates.

### Who can access the final output?

- ☒ Students/graduates themselves
- ☒ Other HEIs
- ☒ Potential employers
- ☒ Third party applications

Blockcerts are issued directly to recipients as private files. It is up to recipients to self-curate their achievements by displaying and sharing them whenever and however they see fit. If they choose to share them, Blockcerts can be verified and "read" by intake systems, websites, and databases. They can also be viewed and verified by anyone with the weblink (for example, a potential employer reading a CV that includes the weblink). No institution or vendor is required for official records to be shared or verified once they have been issued as Blockcerts.



### Primary data format used/needed for the solution

- ☐ Flat/unstructured data
- ☐ Spreadsheets (e.g. excel) or similar tabular format
- ☐ Xml or similar structured format
- ☒ JSON-LD or similar linked data
- ☐ Relational database (SQL, Oracle)

### Who owns the student data?

- ☒ Student/graduate
- ☐ Higher Education Institution
- ☐ Other third party, please specify
- ☒ No information

Once a Blockcert is issued to a learner, they own it forever, even if their issuing institution closes or loses their records.

### Where/how the data is stored?

Blockcerts data is stored in a student owned record that is cryptographically sealed and verifiably official. Once issued, a Blockcert is itself a system of record alongside an issuing institution's systems. Every blockchain certificate is one file that contains three layers: presentation, content, and receipt. The Blockcert file is issued by an institution, held by the recipient, and verified by any third party with whom it is shared. The receipt layer in the Blockcert allows for this verification. One can manually compare or use simple apps and verification portals to validate that the local blockchain receipt matches the public blockchain entry. The only data ever written to a public blockchain is the transaction data: public keys of issuer and recipient, a one-way hash of the certificate content, and the date and time of the issuing event. No presentation or content layer data contained in the Blockcert is ever written to the blockchain nor can it be derived from the transaction data.

### Authentication infrastructure

The Learning Machine platform uses an open standard for the authentication of institution-issued and learner-controlled official student records: the Blockcerts standard. A blockchain certificate is a standards-based, tamper-evident, learner-owned student record. These records are digital files that have been cryptographically signed by an issuer and registered on one or more blockchains. Once issued, a recipient can demonstrate ownership of a record without any dependence upon a centralized authority.

When a certificate is issued, its data is compressed into a hash and logged on the blockchain. This generates a receipt that can always be checked at a later date. A verification service validates the signature of the issuer and the certificate data; it also ensures that the certificate status has not expired or been revoked.

### Security measures

Learning Machine uses the latest recommended secure cipher suites and protocols to encrypt all traffic in transit using 256-bit SSL. All platform data is also encrypted at rest with 256-bit AES. Learning Machine services and the Blockchain mobile applications use Hierarchic Deterministic (HD) wallets for issuer key generation. The initial seed is created by a BIP39 mnemonic phrase that is fully encrypted and connected to a customer-provided issuing password. This results in a keypair hive from which keychains can be derived. The customer-provided issuing password must be entered by the customer before each issuance.



## Survey questionnaires

### Diploma Supplement HEIs survey

#### 1. Which country do you work in?

#### 2. What is the name of the higher education institution you work for?

Please write down the name of the HE institution you work for in the box below

#### 3. How is your work related to student data management?

Please tick all that apply

- ☐ I work with the database of student records / data
- ☐ I work with Diplomas and/or accompanying documents recording student data
- ☐ I deal with student data exchange related to student mobility, double/joint degrees or job matching
- ☐ I work with recognition of diplomas and/or other student records
- ☐ Other, please specify \_\_\_\_\_
- ☐ My work is not related to student data management or achievement records

#### 4. What student data does your university collect and store?

Please tick all that apply

- ☐ Courses taken by the student
- ☐ Grades / other assessment data
- ☐ Credits acquired
- ☐ Learning outcomes acquired
- ☐ Evidence of learning (papers, presentations, media artefacts, etc.)
- ☐ Data of student mobility
- ☐ Extracurricular activities performed (e.g. sports or artistic achievements, memberships of societies and clubs)
- ☐ Information on earlier student degrees/qualifications/learning outcomes, etc.
- ☐ Student contact data (e.g. email, telephone, address)
- ☐ Graduate tracking data (e.g. further career, further education)
- ☐ Other, please specify \_\_\_\_\_
- ☐ Do not know/cannot answer

#### 5. Where does your higher education institution store the student record data?

Please tick all that apply

- ☐ The data is stored in analogue format (paper or similar type or archive)
- ☐ The data is stored in digital format on our institution's servers (e.g. Student Information System, Learning Management System, ePortfolio system or similar)
- ☐ The data is stored in digital format on external servers or SAS applications (e.g. cloud)

- ☐ The data is stored in digital format in a national /regional student data repository
- ☐ Do not know/cannot answer

**6. How does your institution manage and store the digital student's records (only for those who store data in any digital format)?**

Please tick all that apply

- ☐ We store data as flat (unstructured) files/in a flat file database
- ☐ We store pdf files
- ☐ We store data in spreadsheets (e.g. excel) or similar tabular format
- ☐ We store data in xml or similar structured format
- ☐ We store data in JSON-LD or similar linked data format
- ☐ We store data in an relational database (SQL, Oracle)
- ☐ Other, please specify \_\_\_\_\_
- ☐ Do not know/cannot answer

**7. Please indicate how often your institution uses the student record data for the following purposes:**

	Very often	Often	Sometimes	Rarely	Never	Do not know/cannot answer
Providing students with data on their performance during the course of their studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issuing a document presenting student's educational performance upon graduation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exchanging data with other educational institutions in cases of mobility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exchanging data with other educational institutions in cases of educational transition (e.g. joint degrees, higher level education)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing data for job-matching systems or other employment services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Providing data to national authorities / agencies for statistical or labour market forecasting purposes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adjusting curricula	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improving student services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marketing and promotion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





Alumni services ☐ ☐ ☐ ☐ ☐ ☐

Other (please specify in the box below) ☐ ☐ ☐ ☐ ☐ ☐

Other:

**8. Does your institution issue a document providing a description of the acquired competences, completed studies, their nature, level, context and content along with a higher education diploma?**

- ☐ Yes
- ☐ No
- ☐ Do not know/cannot answer

**9. (if no to q8) What are the reasons for not issuing such a document?**

Tick all that apply

- ☐ It is administratively too burdensome
- ☐ It is financially too expensive
- ☐ It requires too much of human resources
- ☐ We do not have enough technical capacities
- ☐ We do not see the purpose of such a document
- ☐ Other, please specify \_\_\_\_\_

**10. (if yes to q8) Does this document follow a European/Europass Diploma Supplement template?**

- ☐ Yes, it follows the European/Europass Diploma Supplement template
- ☐ No, but it is similar/equivalent to the European/Europass Diploma Supplement (please specify) \_\_\_\_\_
- ☐ No, we use a totally different tool/follow a different template (please specify) \_\_\_\_\_
- ☐ Do not know/cannot answer

**11. Is the Diploma supplement (or equivalent document) in your institution issued:**

**Automatically**

- ☐ Yes
- ☐ No

(if no) What are the main reasons for this?

**Free of charge**

- ☐ Yes  
☐ No

(if no) What are the main reasons for this?

**To all students**

- ☐ Yes  
☐ No

(if no) What are the main reasons for this?

**In a widely spoken European language** (e.g. there is a version in English, French, German, Spanish, Russian etc.)

- ☐ Yes  
☐ No

(if no) What are the main reasons for this?

**12. In what format does your HE institution issue the Diploma Supplement (or equivalent document) to graduates?**

Please tick all that apply

- ☐ Printed on paper  
☐ Simple pdf or scanned document  
☐ Secure pdf verified by the HE institution  
☐ Online access to the official achievement records (through a website or specific interface)  
☐ A set of open badges  
☐ Other, please specify \_\_\_\_\_  
☐ Do not know/cannot answer

**13. (only for those who issue paper version) Is your institution planning to start issuing the Diploma Supplement (or an equivalent document) in a digital format (e.g. secure pdf, online access, open badges, etc.) in the near future?**

- ☐ Yes  
☐ No  
☐ Do not know/cannot answer

**14. Based on your experience, to what extent you agree with the following statements about the Diploma Supplement (or an equivalent document)?**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
Issuing a Diploma Supplement (or an equivalent document) to graduates is <u>administratively burdensome</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issuing a Diploma Supplement (or an equivalent document) is <u>technically complicated</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issuing a Diploma Supplement (or an equivalent document) to graduates <u>requires a lot of human resources</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Issuing a Diploma Supplement (or an equivalent document) to graduates is <u>financially expensive</u> for our institution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The structure of the Diploma Supplement (or an equivalent document) is <u>suitable for presenting the student data</u> we gather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <u>guidelines</u> attached to the Diploma Supplement (or an equivalent document) template are clear	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The structure of the Diploma Supplement (or an equivalent document) is <u>useful for student data exchange</u> with other HE institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**15. Does your institution gather feedback from students about the use and usefulness of the Diploma Supplement (or an equivalent document)?**

- ☐ Yes, please specify
- ☐ No

**16. Does your institution gather feedback from employers about the use and usefulness of the Diploma Supplement (or an equivalent document)?**

- ☐ Yes, please specify
- ☐ No



**17. (only for HEIs that issue the DS or similar documents in any digital format)**

**Based on your experience, to what extent you agree with the following statements about the digitalisation of the Diploma Supplement or an equivalent document your institution issues:**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
Digitalising the Diploma Supplement (or an equivalent document) required <i>significant initial costs</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) <u>reduced the overall costs</u> of issuing this document	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We <u>used an already existing student information system</u> to issue a digital version of the Diploma Supplements (or equivalent document)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) encouraged our institution to <u>review curricula</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) encouraged our institution to <u>review the learning outcomes</u> of our programmes/subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) encouraged our institution to <u>enable matching services</u> for our students/graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) <u>saves time when exchanging student data</u> with other educational institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) is <u>more secure</u> than the analogue one	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) significantly <u>eased the recognition process</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**18. (only for HEIs that issue the DS or similar documents in analogue format)**  
**Based on your experience, to what extent you agree with the following statements about the digitalisation of the Diploma Supplement or an equivalent document your institution issues:**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
Digitalising the Diploma Supplement (or an equivalent document) would require <u>significant initial costs</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) would <u>reduce the overall costs</u> of issuing this document	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We could <u>use an already existing student information system</u> to start issuing a digital version of the Diploma Supplement (or equivalent document)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) would encourage our institution to <u>review curricula</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) would encourage our institution to <u>review the learning outcomes</u> of our programmes/subjects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitalising the Diploma Supplement (or an equivalent document) would encourage our institution to <u>enable job matching services</u> for our students/graduates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) would <u>save time when exchanging student data</u> with other educational institutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) <u>would be more secure</u> than the analogue one	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement (or an equivalent document) would significantly <u>ease the recognition process</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Diploma Supplement graduates survey

### 1. What is your country of residence?

### 2. Do you have a degree/diploma in higher education?

- ☐ Yes, I hold a higher education degree  
☐ No, but I am currently a candidate/studying at a higher education institution  
☐ No, I do not have a degree and I am currently not a candidate

### 3. (if yes to q2) What is the level of your latest degree?

Please tick all that applies if you have multiple degrees

☐ Bachelor or equivalent

Country where issued

Year of graduation

Higher education institution

☐ Master or equivalent

Country where issued

Year of graduation

Higher education institution

☐ Doctoral or equivalent

Country where issued

Year of graduation

Higher education institution





#### 4. Did you receive a diploma supplement or a similar document along with your higher education diploma(s)?

*Definition: diploma supplement is a document issued along with a higher education diploma, describing the knowledge and skills of the holder. It provides a description of the completed studies, their nature, level, context and content.*

- ☐ Yes, I received a diploma supplement or an equivalent document
- ☐ I did not receive a diploma supplement (end of survey)
- ☐ I do not know/do not remember whether I received a diploma supplement (end of survey)

#### 5. (if yes to q4) In what format did you receive your diploma supplement?

Tick all that apply

	I could request for it anytime during my studies	I received it only upon graduation	Do remember/cannot answer
Printed on paper	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simple pdf or scanned document	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Secure pdf verified by the HE institution (i.e. an electronically signed pdf)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online access to the official achievement records (through a website or specific interface)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A set of open badges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, please specify in the box below	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 6. (if no, but I am currently a candidate/studying at a higher education institution to q2) What is the level of your future degree?

Please tick all that applies if you have multiple degrees

<input type="checkbox"/> Bachelor or equivalent	Country where issued <input type="text"/>
	Year of graduation <input type="text"/>
	Higher education institution <input type="text"/>

<input type="checkbox"/> Master or equivalent	Country where issued <input type="text"/>
---	--

Year of graduation

Higher education institution

☐ Doctoral or equivalent

Country where issued

Year of graduation

Higher education institution

**7. Will you receive a diploma supplement or a similar document along with your higher education diploma?**

*Definition: diploma supplement is a document issued along with a higher education diploma, describing the knowledge and skills of the holder. It provides a description of the completed studies, their nature, level, context and content.*

- ☐ Yes, I will receive a diploma supplement or an equivalent document  
☐ No, I will not receive a diploma supplement (end of survey)  
☐ I do not know whether I will receive a diploma supplement (end of survey)

**8. (if yes to q7) In what format will you get access to your diploma supplement?**

Tick all that apply

	I can request for it anytime during my studies	I will receive it only upon graduation	Do not know/cannot answer
Printed on paper	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simple pdf or scanned document	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Secure pdf verified by the HE institution (i.e. an electronically signed pdf)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online access to the official achievement records (through a website or specific interface)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A set of open badges	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, please specify in the box below	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



### 9. Have you used your diploma supplement in any of the following contexts?

Please tick all that apply

*Employment:*

- ☐ I sent a diploma supplement along with a CV/cover letter or other application documents
- ☐ I used the diploma supplement to present/explain my skills and qualifications during a job interview
- ☐ I used the diploma supplement to present/explain my skills and qualifications to my employer
- ☐ I used the diploma supplement to access a job/skills-matching service
- ☐ Other, please specify
- ☐ I never used a diploma supplement in this context

*Application to educational or training programme:*

- ☐ I submitted a paper version of my diploma supplement for the application process (sent it by mail or handed directly)
- ☐ I submitted my diploma supplement or equivalent achievement records to the institution I applied to electronically (over email or an electronic application interface)
- ☐ I requested my higher education institution to transfer my diploma supplement or equivalent achievement records to other institution directly
- ☐ I never used the diploma supplement for applying to educational or training programme

*Other contexts:*

- ☐ I used the information provided in the diploma supplement to fill in a CV/cover letter/professional profile or other similar documents
- ☐ I used the diploma supplement to complement/augment my online profile (e.g. LinkedIn, ePortfolio)
- ☐ I used the diploma supplement for applying for internship/traineeship
- ☐ I used the diploma supplement for applying for volunteering
- ☐ Other contexts, please specify



## Diploma Supplement employee survey

### 1. Please select the size of your company.

- ☐ Small (staff 10-49)
- ☐ Medium-sized (staff 50-249)
- ☐ Large (staff >250).

### 2. Which of the following business sectors does your company represent?

Tick all that apply

- ☐ Agriculture, forestry and fishing
- ☐ Mining and quarrying
- ☐ Manufacturing
- ☐ Electricity, gas, steam and air conditioning supply
- ☐ Water supply; sewerage; waste management and remediation activities
- ☐ Construction
- ☐ Wholesale and retail trade; repair of motor vehicles and motorcycles
- ☐ Transporting and storage
- ☐ Accommodation and food service activities
- ☐ Information and communication
- ☐ Financial and insurance activities
- ☐ Real estate activities
- ☐ Professional, scientific and technical activities
- ☐ Administrative and support service activities
- ☐ Public administration and defence; compulsory social security
- ☐ Education
- ☐ Human health and social work activities
- ☐ Arts, entertainment and recreation
- ☐ Other

### 3. Which country you are based in?

- ☐ Armenia
- ☐ Austria
- ☐ Belgium
- ☐ Czech Republic
- ☐ Finland
- ☐ France
- ☐ Georgia



- ☐ Germany
- ☐ Hungary
- ☐ Italy
- ☐ Latvia
- ☐ Moldova
- ☐ Netherlands
- ☐ Spain
- ☐ Turkey
- ☐ UK
- ☐ Other, please specify

**4. During the recruitment processes, to what extent is it important for you to have a description of candidate's acquired skills/competences, subjects studied, grades received and other supplementary student data?**

	Very important	Important	Moderately important	Of little importance	Not important at all	Do not know/cannot answer
A description of <u>skills / competences</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Courses</u> taken by the student	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Grades/</u> other assessment data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Credits</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Learning outcomes</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Evidence of learning</u> (papers, presentations, media artefacts, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data of student <u>mobility</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Extra-curricular activities</u> , skills certifications, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 5. What are the main reasons why some supplementary student data is less important?

(Only those options which have been attributed of little importance, not important at all in the previous question)

	We are not interested in such data	This data is verified by other methods of candidate's skills testing (interviews, practical tests, etc.)	This data is verified by an external contractor recruiting the employees	Other
A description of <u>skills / competences</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Courses</u> taken by the student	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Grades/</u> other assessment data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Credits</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Learning outcomes</u> acquired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Evidence of learning</u> (papers, presentations, media artefacts, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
Data of student <u>mobility</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Please specify
<u>Extra-curricular activities</u> , skills certifications, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Other, please specify	<input type="text"/>			



**6. How often do you use the following sources of information to acquire information describing the knowledge, skills, and completed studies of the candidates?**

	Very often	Often	Someti mes	Rarely	Never	Do not know/ca nnot answer
<u>A diploma supplement:</u> printed/scanned or simple pdf document outlining student achievement records (knowledge and skills of the holder, a description of the completed studies, their nature, level, context and content)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>A digital diploma supplement:</u> electronic document (e.g. digitally signed secure pdf) or an interface containing data on student achievement records (knowledge and skills of the holder, a description of the completed studies, their nature, level, context and content)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Skills matching services</u> enabling to search for candidates having a specific set of skills, learning outcomes, or subjects studied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Professional/social networks,</u> e.g. LinkedIn, Opportunity or similar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**7. (If rarely or never to Q6 ) What are the reasons for not using such document/service? Tick all that apply.**

- ☐ We are not aware of such document/service
- ☐ Our recruitment processes do not require gathering such data
- ☐ Handling such document/service is administratively too burdensome
- ☐ Handling such document/service is financially too expensive
- ☐ Handling such document/service requires too much of human resources

- ☐ We do not have enough technical capacities to handle such document/service  
☐ We do not see the purpose of such document/service  
☐ We have not come across any of such documents/services in our recruitment process  
☐ Other, please specify

**8. (if "Very often, Often, or sometimes" to Q6 diploma supplement) Based on your experience, to what extent do you agree with the following statements about diploma supplement<sup>7</sup> or equivalent document you have used:**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
The <u>information</u> provided in the Diploma Supplement <u>is relevant for recruitment purposes</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>Terminology</u> used in the Diploma Supplement <u>is clear</u> and easy to understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diploma Supplement provides <u>excessive/redundant information</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Diploma Supplement provides <u>enough information</u> about the <u>specific candidate's skills</u> required for the position	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using Diploma Supplement <u>saves time and administrative costs</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diploma Supplement <u>provides reliable and transparent student data</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<sup>7</sup> A document outlining student achievement records (knowledge and skills of the holder, a description of the completed studies, their nature, level, context and content)

Diploma Supplement has a convenient structure for presenting the information on candidate's achievements

○ ○ ○ ○ ○ ○

**9. (if "very often, often, or sometimes" for digital diploma supplement in Q6)  
Based on your experience, to what extent do you agree with the following statements about the digital Diploma Supplement or an equivalent document you used?**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
The digital version of the Diploma Supplement <u>reduces the costs</u> of recruitment process	○	○	○	○	○	○
The digital version of the Diploma Supplement <u>saves time</u> during the analysis of candidates' applications	○	○	○	○	○	○
The digital version of the Diploma Supplement is <u>easier to verify</u> than the analogue one	○	○	○	○	○	○
The digital version of the Diploma Supplement <u>the overall recruitment process easier</u>	○	○	○	○	○	○



**10. (if “very often/often/sometimes” to diploma supplement, and “rarely/never” to digital diploma supplement in Q6) If you got a chance to use a digital diploma supplement for your recruitment purposes, to what extent would you agree with the following statements?**

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Do not know/cannot answer
The digital version of the Diploma Supplement would <u>reduce the costs</u> of recruitment process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement would <u>save time</u> during the analysis of candidates' applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement would be <u>easier to verify</u> than the analogue one	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The digital version of the Diploma Supplement would make <u>the overall recruitment process easier</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**If you have any other comments / suggestions related to the Diploma Supplement and digital student data, please provide them here:**

## Interview guidelines

### Status quo of the implementation

1. Please describe your professional background and involvement in the implementation of the Europass Diploma Supplement.
2. In your view, what are the main benefits of having a common template in the form of the DS for presenting students' achievements? How useful do you find the explanatory notes attached to the current DS template? Are the current template and explanatory notes too rigid, or would it be useful if they were even more specific?
3. What are the most desirable features (related to the layout, presentation of data, portability, etc.) of the DS that are currently missing?
4. What are the success factors for the DS implementation? What are the hindering factors for uptake/rejection of the DS by the HE institutions?
5. What are the difficulties/challenges in the implementation of the DS? Could you identify the underlying causes for these problems? Are you aware of the examples of successfully solved DS implementation problems? What are the organisational (e.g. university or public authority) level causes of the identified DS implementation problems? What are the individual (e.g. graduate or employer) level causes of the identified DS implementation problems?
6. Are you aware of any feedback mechanisms regarding the use and implementation of the DS?

### Corresponding to current developments

7. To what extent does the version of the DS with which you work the most reflect the development of learning outcomes and qualifications frameworks? How could the concept of learning outcomes be better mainstreamed in order to use it consistently in the DS? How could the compatibility with the qualifications frameworks be better ensured?
8. To what extent do the learning outcomes included in the current template of the DS reflect the knowledge, skills and competences higher education qualifications (should) equip our students with these days (e.g. room for different kinds of (work-based) learning activities such as volunteering, mobility periods, etc. [awarded through ECTS credits])?
9. Is there a need to issue the DS for the programmes outside the Bologna structure (e.g. regulated professions)?

### Digitalisation aspect

10. Have you already worked with digitalised DS or similar documents? What was your experience in general?
11. Are you aware of other examples of digitalisation of the DS or comparable documents at institutional and/or national level? If yes, what are the strong and weak points of the respective practices?
12. Have you already discussed issues related to digitalisation of the DS with its main beneficiaries? What were the outcomes of such discussions? Are there any documented resources available?
13. In your view, to what extent would the digitalisation of the DS help make the DS a more useful tool for its users? Which particular digitalisation features do you see as most important for DS's users?



14. What format of digitalisation (e.g. secure PDFs, Open Badges, Digital Credentials, etc.) would you see as the most useful to the beneficiaries? Why?
15. Do you think there is a need for a specific document format (pdf) or would the data exchange format be enough (xml)?
16. Do you think there should exist a communication network to exchange digital DS? If so, should this be part of the digitalisation of the DS?
17. Do you think that BlockChain technology could be leveraged in supporting the storage and exchange of digital Diploma Supplement? What would be the pros and cons? Are you aware of any initiatives on that front?
18. Should the digital DS be released progressively, that is as competences are acquired and not only after acquiring the degree?
19. What do you think about keeping the DS at hand, e.g. in a smartphone, as a "digital credential" which could be sent anytime autonomously?
20. Are you aware of previous standardisation projects about the DS in digital format? If yes, can you name them? Are you aware of any adoption of it?
21. To what extent should the digitalisation effort take into account best practices such as existing digital standards and exchange networks which already work outside of Europe (USA, China, Australia, etc.)?
22. Should the information in the DS be presented differently in its digital version? What information should be made more readily accessible and what information is not so useful (should be dropped)?
23. Do you agree that platforms like LinkedIn and similar should be able to "read" the information in the digital DS and automatically add the competences to your profile?
24. Would it be useful if the information in the digital DS could be integrated into the Europass CV?
25. To what extent would the digital version of the DS have an effect on automatic and free of charge issuance of the DS?
26. What are the most important functionalities which digital DS should contain?
27. Should the current list of requirements for the implementation of the DS be revised? If yes, which requirements in particular? What other requirements should be included for the digital version of the DS?
28. What would be the success factors for the digitalisation of the DS? What could be the potential obstacles while switching to digital DS?
29. What are the potential concerns which should be considered in terms of security and data protection?
30. Do you think that each DS should have a "digital signature"? Can you suggest alternative existing solutions to ensure security?
31. What is your view on the possibility to allow users to share the DS content in Social Networks?
32. Should the DS data be linked with your national digital ID (where possible), just like official credentials (like medical records)?
33. What is the potential influence of digitalisation on the following results of the Diploma Supplement?
  - a) providing additional information for making a diploma more understandable;





- b) facilitating recognition and application procedures;
- c) saving time and other resources for degree holders, employers, HEI staff, etc.;
- d) improving student record systems.

34. What is the potential influence of digitalisation on the following long-term impacts of the Diploma Supplement intervention?

- a) improved employability and professional / study prospects;
- b) improved level of competences and skills;
- c) increased transparency, clarity and diversity of study curricula;
- d) more reliable recruitment processes;
- e) competitive advantage over other HEIs or companies;
- f) greater transparency and flexibility in higher education systems;
- g) increased mobility levels;
- h) higher quality of higher education;
- i) lifelong learning.

35. What would be the advantages and difficulties of digitalising the DS in all 48 EHEA countries? How could the difficulties in digitalising the DS in all 48 EHEA countries be tackled?

#### **Closing remarks**

36. Do you have any documents (studies, evaluations, discussion, presentation, etc.) which you could share with us for the purposes of this study?

37. Do you have any additional suggestions or comments that should be addressed in this evaluation?

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