The future is in your wallet – how EMREX plans interaction with the EUDI wallet

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Abstract

EMREX is a solution for transferring student data internationally in a machine-readable way and in a structured format. The EMREX service network has been in production since 2017. ELMO is the data standard used in the EMREX network to describe student achievements and supporting data.

One of the strategic goals established for EMREX in 2022 by the Executive Committee of the EMREX User Group was to support one or more wallet solutions. For the EMREX-used data standard ELMO a strategic goal was set to keep ELMO compatible, as far as possible, with other European educational standards: European Learning Model (ELM) and Single Digital Gateway (SDG).

The new digital European landscape was shaped by two EU-legislations, bringing into live the European Digital Identity Wallet (EUDI) and Single Digital Gateway, a platform which facilitates online access to information, administrative procedures, and assistance services that EU citizens and businesses may need in another EU country. To fulfil the established strategic goals, some partners from the EMREX community joined the Digital Credentials for Europe (DC4EU) project, consisting of 80 partners from 23 countries. The aim is to create a working pilot installation of a digital wallet that conforms to the EUDI wallet framework. The participation is expected to add value both to the EMREX-community and other organisations handling or in need of educational data.

This paper brings all these initiatives into common perspective.

1 Introduction

EMREX is a solution for transferring student data internationally in a machine-processable way. It originated as an EU-funded project 2015-2017, aiming to simplify and increase the quality of the credit transfer process after a student exchange. The EMREX service network went into production before the successful project ended and has been in production ever since. EMREX is not limited to the EU i.e. it can be used worldwide. At present, EMREX is operational in a number of countries in Europe. It is a technical solution used to securely exchange educational data between students and third parties, for example higher education institutions (HEIs) or potential employers.

The technical solution is extremely flexible, the only requirement is that participating clients (EMREX Client – **EMC**) and EMREX data access point (**EMP**) follow the ELMO standard. ELMO is the data standard used in the EMREX network to describe student achievements and supporting data. It is used also by other projects and organisations (such as Erasmus Without Paper[*]). Any actor can be behind an EMP, for instance a single HEI, an organisation or a national data provider. The requirements for participation for data providers and consumers are low – anyone can build an EMREX client and any local system that delivers data upon request can be connected to an EMP. Security is maintained in an adaptive manner, from initially a basic solution to coming technologies. More information on this can be found on the EMREX website[†]. All specifications and software are open source and can be found in Github[‡]. It is an easy and cost-efficient solution for implementing transfer of student records between institutions.

In the beginning the scope of EMREX was only to include Transcript of Records relating to student exchanges within Europe but it was soon discovered that the tool can be useful in many more ways. For instance admission, recruitment systems, university partnerships, and qualifications are examples of applications that would benefit from EMREX.

2 EMREX strategic decisions

EMREX consists of two parts: the technical solution and the international network of partners (EMREX User Group – EUG). During 2022 the Executive Committee of the EUG conducted work on strategies for the next several years and among other items the following goals were established:

- EMREX will become a leading international transport system for any education data (not only tertiary education) of any data structure (not only ELMO).
- EMREX will focus on business or use cases that guarantee a large regional spread on the one hand and a high degree of utilisation on the other (e.g. enrolment/admission to universities in Germany, recognition of educational achievements by ENIC/NARIC organisations, data exchange between the Baltic and Scandinavian states).
- EMREX will be recognized by the European Commission as a leading transport system for educational data through participation in EU projects.

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[*] Erasmus Without Paper website – www.erasmuswithoutpaper.eu
[†] EMREX website – www.emrex.eu
[‡] EMREX in GitHub, repository for specifications and software – https://github.com/emrex-eu/

- EMREX is accepted and implemented by the Single Digital Gateway – SDG (see Section 3.2) as the sectoral solution for the education space.
- EMREX will support one or more wallet solutions.

For the EMREX-used data standard ELMO one additional strategic goal was set to keep ELMO compatible, as far as possible, with other educational data standards: European Learning Model (ELM)[§] and SDG.

In this paper we describe more of our ambitions in this area.

3 The new digital European landscape

In the latter years many initiatives with increased focus on digital processes has come to the surface and some of them have led to major changes in EU-legislation. Two of the most significant for us are described here.

3.1 European Digital Identity Wallet

The European Digital Identity Wallet or EUDI-wallet is an extension of the original eIDAS-regulation (910/2014). Evaluation carried out in 2021 showed that there are several problems hindering the wider use of EUDI[**]. Excerpts from the evaluation are that it was difficult for private entities, had limitations for the public sector, lacked flexibility and there was an unclear situation with data protection. In reality the rollout of systems using eIDAS had also been very poor with an estimated number of only 50% of EU-citizens being able to access at least one service.

In 2021 an Amendment was suggested, entitled Procedure 2021/0136/COD[††] (also called eIDAS 2.0). The arguments put forward were the following:

> "A more harmonised approach to digital identification should reduce the risks and costs of the current fragmentation due to the use of divergent national solutions and will strengthen the Single Market by allowing citizens, other residents as defined by national law and businesses to identify online in a convenient and uniform way across the Union. Everyone should be able to securely access public and private services relying on an improved ecosystem for trust services and on verified proofs of identity and attestations of attributes, such as a university degree legally recognised and accepted everywhere in the Union."

The proposal includes:

- A framework for a digital wallet that must be issued by member states.
- It should follow standards.
- It should have a high degree of security of user identification.
- It should include electronic signing, seal and ledger.
- It should be free to use by citizens.

[§] European Learning Model – https://europa.eu/europass/en/european-learning-model
[**] See https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0281&from=EN
[††] See https://eur-lex.europa.eu/procedure/EN/2021_136

3.2   Single Digital Gateway

The regulation for a single digital gateway (SDG, REGULATION (EU) 2018/1724)[‡‡] calls for a harmonised way for citizens to interact with authorities in different states within the EU. According to the regulation a citizen should not be forced to show proof of their identity and attributes connected to them more than once.

The attributes should seamlessly travel between countries by connected systems.

Three procedures regarding the life event "Studying" concerns the higher education area:

- Applying for a tertiary education study financing, such as study grants and loans from a public body or institution.

- Submitting an initial application for admission to a public tertiary education institution.

- Requesting academic recognition of diplomas, certificates or other proof of studies or courses.

The regulation specifies a technical solution, a One Only Technical System (**OOTS**) that links in with national or sectoral systems to provide the proof or manifestation needed transnationally.

4   Digital Credentials for Europe

With the above information in mind the EMREX User Group (EUG) Executive Committee set as one of the strategic goals to aim for a wallet solution, preferably in cooperation with others in a large EU-funded project. The EUG is not an entity that can be a legal partner in a project so partners from the EUG were encouraged to apply separately.

At the time of writing this paper one such project, Digital Credentials for Europe (**DC4EU**), has been approved for funding. The aim of the project is to create a working pilot installation of a digital wallet that conforms to the EUDI wallet framework. The project consists of over 80 partners from 23 countries and with a wide coverage of use cases. The main characteristics of this project are:

- Combining the best of identity and signature provided by the eID, with the potential and flexibility of verifiable credentials and the increased privacy provided by the EBSI ledger.

- A set of use cases with cross-border scenarios, reusing a broad base of previous work done by Member States.

- The EUDI Wallet is an element of hybridization for cross-use cases (Identity, Signature, Educational Credentials and Social Security).

- Hybrid bridges, to connect existing solutions based on other protocols (e.g. those used by the European Digital Credentials Initiative, EMREX, ELM, ELMO or eduGAIN in the educational field) with this new paradigm based on citizen empowerment and verifiable credentials.

- The use cases for the eIDAS call are eID, Educational Credentials and professional qualifications and Social Security.

Some of the members from the EMREX community, SIKT in Norway, the Ladok Consortium in Sweden and some single consultants, are part of the work package 5 in this project. They participate in two tasks, one is to create an EMREX gateway to the wallet and the other is to create conversion

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[‡‡] See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R1724

possibilities between the two formats, ELMO and ELM. This way the wallet can transport educational data between any parties, not limited to higher education institutions. The project is planned to start May 1, 2023 and will run for two years. The information on the project web page[§§] will be updated continuously as the project advances.

This project is embedded in an interoperable ecosystem created in recent months by EMREX and the European Commission's EMPL Directorate. Based on the strategic goal of keeping ELMO ELM compatible, interoperability between the ELMO version 1.7 and ELM version 3 data standards could be created. This means that in the future service systems such as EMREX, EWP, and Europass could freely exchange data with each other, with the help of the converter between ELMO and ELM data developed under the DC4EU project.

In addition, working groups have now been formed with staff from the EMREX Executive Committee and SDG/OOTS with the aim of linking EMREX as a sectoral solution under the SDG Implementation Act with SDG/OOTS via a bridge structure. In this way, this ecosystem is also ensured in this area.

5   Conclusions

With the take-off in strategic decisions by the Executive Committee of the EUG and bearing in mind the different EU-regulations and funding opportunities that describe the future digital landscape, it is clear to us that the EMREX-community needs to reach out to the parties working in this area. The first reason for this is of course to increase the usage of EMREX, and delivering education data to a wallet solution could substantially increase both usage and the number of use cases. The opposite is equally valid, to receive data from a wallet. Secondly the EMREX solution is really from the start all about making systems communicate with each other, so a not less important reason is that we in this way contribute to a more interoperable mesh of systems within the education area. Educational data from higher education is probably the type of information that has the biggest need to flow between countries.

Why a wallet solution then? EMREX is dependent on a unique identification of the user in two countries. eIDAS could have been a solution but the original eIDAS-regulation apparently never became a full success and was deemed unfit in an evaluation. Instead, a more modern approach evolved, the European Digital Identity Wallet which is a more user-centric way and a solution that links in with EMREX rather easily. A wallet solution is also ideal since many different types of applications can connect to the wallet and use the data in their own ways.

Thus, some partners from the EMREX community joined the Digital Credentials for Europe project, gathering 80 partners from 23 countries. The aim is to create a working pilot installation of a digital wallet that conforms to the EUDI wallet framework so that the wallet can transport educational data in the ELMO-format on the user's demand. It is not limited to transport between higher education institutions, it can be done between any parties, for instance that the student fetches diploma information and sends it to a prospective employer or that the student fetches transcript of records and put data into an admission system.


[§§] DC4EU website https://www.dc4eu.eu

6 Author biographies

Tor Fridell, M. Sc. in Computer Science and Engineering. Currently Head of Student Information System at Linkoping University and   coordinator for international affairs for the national Swedish Ladok Consortium. Previous jobs include Operations manager for the Ladok Consortium, IS manager for Linkoping Institute of Technology, and programmer. Tor has been employed by the university since 1996. Tor has long been involved in international cooperation regarding exchange of student data and is also active in standards work and development of student information systems. Tor has been President of the European Campus Card Association and Chairman of the National Swedish Standards Committee SIS TK450, the national body for CEN TC 353, working with Learning Technologies. Tor has been involved in the EMREX project since the start and is also active in development of student information systems. Tor is currently Chair of the EMREX User Group Executive Committee.

Geir Vangen has more than 20 years' experience in developing nationwide systems within higher education. He is head of development at Sikt – the Norwegian Agency for Shared Services in Education and Research. He participates in national and international standardisation work. He has been member of national committees appointed by the Ministry of Education and Research, and has led projects on behalf of the Ministry. Geir Vangen graduated from University of Oslo, Institute of Informatics in 1989.
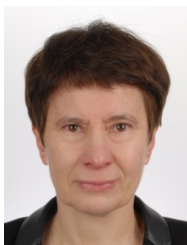
 Janina Mincer-Daszkiewicz graduated in computer science from the University of Warsaw, Poland, and obtained a Ph.D. degree in maths from the same university. She is an associate professor in Computer Science at the Faculty of Mathematics, Informatics and Mechanics at the University of Warsaw. Since 1999, she leads a project for the development of a student management information system USOS, which is used in almost 90 Polish Higher Education Institutions. Janina takes an active part in many nation-wide projects in Poland. She has been involved in EMREX, Erasmus Without Paper, European Digital Student Service Infrastructure and European Student Card Initiative projects.

Jan Joost Norder works at the Dienst Uitvoering Onderwijs, part of the Dutch Ministry of Education, Culture and Science. In his role as Product Owner he is responsible for the Dutch Diplomaregister and he also has been Chair of the Executive Committee of EMREX. He has many years of experience in improving the digital enrolment process and exchange of student data in higher education. Since 2016 he has been involved in international projects.

Kimmo Rautio is responsible for EMREX in Finland, and he works with national achievements registry VIRTA as well as with identity access management issues at CSC – IT Center for Science, a non-profit company owned by the Finnish state and Finnish higher education institutes. Before his contract at CSC, Kimmo worked for multiple years in Finnish tertiary and secondary level educational institutions.

Guido Bacharach, Former Head of Strategy and Digitization Unit at the Stiftung für Hochschulzulassung in Dortmund. After his study he had management positions especially in the sales area and in public services. The focus of his work is on strategic digitization, process improvement and project management. He is a member of the Deutsche Gesellschaft für Projektmanagement (GPM e.V.).

Igor Drvodelić is the Assistant Director of the Agency for Science and Higher Education. He is the head of the Central Admissions Office since its foundation in 2009. He actively promotes the introduction of new services into Croatian higher education, such as graduate tracking, recognition of foreign qualifications, student's guidance, electronic data exchange and verifiable credentials.