

# Developments in Exchange and Authentication of Higher Education Achievement Data

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## Keywords

Bologna Process, Electronic European Diploma Supplement, authentication, Erasmus, grades, ECTS.

## 1. EXECUTIVE SUMMARY

Momentum is growing at European level in the creation and promotion of standards for the exchange of student achievement data in Higher Education. In addition, there is emerging common practice in issuing and authentication online of electronic graduation documents. Combined, these two areas will offer very significant benefit by supporting student mobility in and beyond the European Higher Education Area and supporting processes to aid graduate employability and recruitment. This paper will outline current developments and predict how the two areas will combine to the significant benefit of stakeholders.

### 1.1. Common Practice

Institutions currently cope with the work involved in manual processes, such as for the return of student achievement data. These processes often involve students carrying paper with them back to their home institutions. This makes the process laborious and prone to error as data needs to be manually input to Student Information Systems at home institutions. It also renders the process insecure, given that institutions may not authenticate the results returned.

### 1.2. Alternative

Digitary is a demonstrator of the use of Advanced Electronic Signatures (xAdES) for the authentication of student achievement data. The system is used by institutions for the online issuing and authentication of electronic graduation documents.

Allied to this there is very significant acceleration in the development of standards for student and curriculum data. The Rome Student Systems and Standards Group is made up of organisations that develop and implement student systems and other experts from 13 countries. The group is coordinated by Digitary, Kion and unisolution and is part of the growing movement for the development of standards in data, process and policy in higher education.

Combined, electronic authentication and the emergence of data standards offer the potential for the automation of secure exchange of student achievement data.

### 1.3. Conclusions

Secure exchange of student achievement data and secure delivery of electronic graduation documents offer significant benefit to higher education institutions and other stakeholders. This paper will offer insight into emerging common practice and the current status of work in standards development.

## 2. INTRODUCTION

Traditionally, higher education achievement data has been exchanged on paper. Students traveling to host institutions for Erasmus exchanges, returning to their home institutions after Erasmus exchanges, or transferring to other institutions to continue their studies, have typically carried records of their achievement with them on paper. Anecdotally, these records are often not authenticated, meaning that they may be prone to being misrepresented by some students. In addition, grades and other data are input into the target student information system through keyboard entry, so requiring laborious work to be done and creating potential for error.

This paper will show how electronic signatures can be used to authenticate higher education achievement data and how this, combined with collaborative efforts occurring at a national and European level to standardise data structures, processes and policies for the exchange of curriculum and achievement related data, will facilitate the secure and efficient transfer of curriculum and student achievement data.

## 3. AUTHENTICATION

The accepted emerging European common practice for authentication of Electronic Graduation Documents is XML documents signed using Advanced Electronic Signatures (xAdES) that comply with EU Digital Signatures Directive (1999/93/EC) and national enacting legislation. The key characteristics of these documents are that they are (1) legally-valid and (2) tamper-evident.

The Digitary system is the first demonstrator of such use of Advanced Electronic Signatures for the issuing and authentication online of official electronic graduation documents.

Signed XML documents are made available online to students and graduates who can send user-defined Document Shares to Relying Parties such as employers or other Higher Education Institutions, who, in turn, use Document Shares to visit the institution's web site and authenticate and access documents.

## 4. STANDARDS

### 4.1. Authentication: Standard Technologies and Institutional Adoption

The Digitary approach uses accepted standard next generation technologies (web services, XML and xAdES) to future proof investment for institutions and make the adoption of the approach as low risk as is possible, given the state of current knowledge.

Authentication currently occurs by Relying Parties revisiting a URL that is part of the issuing institution's website and viewing the results of live authentication checks and the data from the signed document in a browser. This enables institutions to gain benefits from the investment in this approach in advance of standards being developed in data structures for curriculum and achievement related data exchange.

The approach was developed with and for Higher Education and no Intellectual Property with respect to the approach has been protected in order to make it possible for the sector to adopt the approach as common practice.

Digitary was first implemented at University of Limerick in September 2005 and is in use by approximately 20 Higher Education institutions in Ireland and the United Kingdom for the issuing of documents including diplomas, European Diploma Supplements and Official Transcripts of Results. In Ireland, Digitary customer institutions now account for approximately 65% of full-time and 72% of part-time publicly funded students<sup>1</sup>. Many more institutions in Ireland and the United Kingdom and elsewhere are considering implementation of Digitary.

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<sup>1</sup> Higher Education Authority, 2004

## 4.2. Standards Development

The Rome Student Systems and Standards Group (RS3G) is a group that consists of student system implementers and domain experts from 13 countries and aims to collaborate for the development and promotion of standards for data, processes and policies in the area of student mobility. The group is promoted by Digitary along with Kion (the leading student information system provider in Italy) and unisolution (the German based company that provides systems that support international mobility related processes for hundreds of European universities).

The group aims to participate in and influence the development of standards based on implementation needs and, in turn, offer a ready route for the adoption of resulting specifications.

The group held its first workshop in Rome in November 2007 and followed this quickly by a second workshop in Dublin in April 2008, arising from which current activity is focused on prioritising areas for the group to progress. Already agreed is the development of a common glossary, so that there is a common underpinning of development work. In addition to this, at time of writing, a call is being issued for voting by the group to identify the key areas of activity for the group to address at the next workshop that will likely take place in Germany in October. Four areas will be chosen from the following candidates:

- Exchange mobility
- Security / authentication
- Description of course units / unit catalogue
- Curriculum versioning (snapshot)
- Curriculum rules
- Academic history of individual
- Graduation documents
- Course equivalency/matching
- Assessment criteria

The group works with a wide range of stakeholders in Higher Education standards definition in and beyond Europe - both workshops have been attended representatives of the Postsecondary Education Standards Council in the US.

It aims to build on national level initiatives, such as XCRI in the UK, CDM in Norway and CDM-Fr in France to help to harmonise and leverage these efforts to promote interoperability and mobility.

It works to support European standardization initiatives such as the CEN's Metadata for Learning Opportunities and the project "Guidelines for a European Learner Mobility Model" that proposes to produce a specification suitable for the production of a standard European Diploma Supplement.

Finally, it aims to liaise with HR XML and IMS to ensure that the benefits of standardisation efforts can be gained beyond Higher Education.

## 5. THE FUTURE

Emerging standards will enable a "web of trust", where web services will be widely used, authentication will be automated and data standards will be leveraged to realise efficiencies from data and business process interoperability. This will lead to new ways for institutions, students, graduates, recruiters and employers to interact online. Exchange Agreements will be facilitated online and will act as the basis for the return of structured achievement related data that will be tamper-evident through the use of electronic signatures. This data will be machine authenticated and uploaded into Student Information Systems at the home institution and will, in turn, form part of the student's European Diploma supplement, which will also be tamper evident and machine readable for automatic consumption by recruitment systems.

## 6. REFERENCES

EU Digital Signatures Directive 1999/93/EC, Located [30.1.2008] on World Wide Web:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:013:0012:0020:EN:PDF>

Institutions using Digitary, Located [30.1.2008] on World Wide Web: <http://trust.digitary.eu>