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Building a national education registry in Norway.

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Abstract

The education register is intended to support digitalization, automation and streamlining in the education sector. The registry will promote data sharing in the sector and provide smoother user experiences. The aim of a new national education register is to provide a platform for generating and assigning unique identity to education and tamper-proof storage of educational information and the formal accreditation of the education. It shall contribute to quality assurance that education offered is accredited, and facilitate the use of data for analysis, management, research, and statistical preparation.

Norway has currently no digital solution for verifying accreditation. This is a challenge as most higher education institutions in Norway are self-accredited rather than being accredited by a central authority such as NOKUT (the Norwegian Agency for Quality Assurance in Education). This poses problems for foreign recipients who may not be able to trust that the individual institution issuing the results has the authority to do so. Over time, this will also create problems for domestic data sharing, as the documentation issued digitally today will need to be valid for many decades. A digital accreditation service is essential for fully automating verification of results.

There will be several parties involved in such a system, the educational institution itself, Nokut as the quality organization, Sikt as the manager of the service and data. In addition, there will be several users of the service, such as the Norwegian State Educational Loan Fund, which must control (manually today) whether a loan is approved for an education.

1 The purpose of the registry

The education register is intended to support digitalisation, automation and streamlining in the education sector. The registry will promote data sharing in the sector and provide smoother user experiences. The aim of a new national education register is to provide a platform for generating and assigning unique identity to education and tamper-proof storage of educational information and the formal accreditation of the education. It shall contribute to quality assurance that education offered is accredited, and facilitate the use of data for analysis, management, research and statistical preparation.

The registry will be a basic part of the national platform for life-long learning, an eco system with data sources, providers and consumers of education.The main data are education providers, certifications, markets, wishes and needs. The education register will take care of data regarding education providers, the education they offer and their formal status.

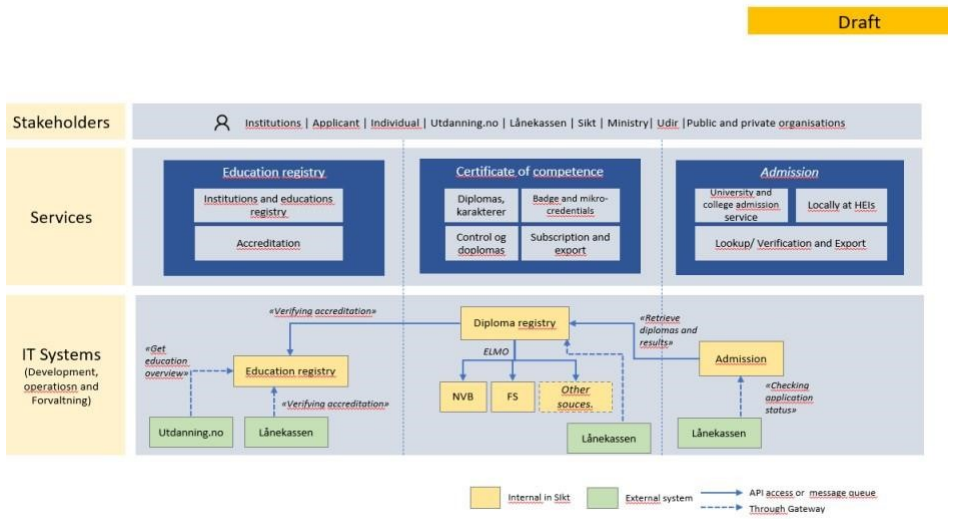

Figure 1 Overview over the infrastructure for lifelong learning

As an education registry, this will generate a unique code for the education that can serve as an authoritative identity for that education linked to a given institution. This requires institutions to register their educations in the registry. Other parties such as the Norwegian State Educational Loan Fund, utdanning.no, The National Admission Service, etc. will use the education registry as their primary source of education listings.

Such a register of institutions and education will be of great benefit in several other systems. The National Diploma Database (NVB) offers a database with diploma and diploma data from upper secondary schools. This database will require information about the schools and different subject offerings. Instead of maintaining this data locally in the NVB, it can come from the education registry.

The NVB will then use the APIs against the education registry for accessing necessary information. It can also listen for event notifications to update its local copy.

The Norwegian University and College Admission Service (SO) is another such system. SO needs a local copy of institutions and educational offerings. SO can use the APIs exposed by the education registry for dynamic lookup and queries. And to synchronize the local copy, it can listen to event notifications.

Data on institutions, education, and accreditation history is also of interest from statistical and data analytical perspectives. Requests for the release of such data for statistics, data analysis, and research will be assessed based on the legal basis for the release of data, suitable exchange formats, and necessary security measures. The education registry will offer APIs and event notifications that are generally available, and depending on the consumer role, the data can be anonymized where necessary.

From a technical perspective, for this to work, it will be very important that the system has a long lifespan and can accommodate organizational changes in institutions and also changes over time in the educational structure.

These are the main functions of the registry:

- Education register - Act as the master source for education data, including the identity of the education.
- Verification service - A service for national-level accreditation verification
- Accreditation process - Include all levels of education and include the processes for applying for accreditations. This must be able to be done at the institutional level, program/education level, and subject/course level. • ID-service – give each education element a unique ID

1.1 Education register

Norway have currently no authoritative overview of the educational offer. The education register shall provide an overall overview of competence offerings in lifelong learning, both formal education and non-formal courses. This includes, among other things, a certificate of apprenticeship and study competence at a broad level, tertiary vocational education, the educational offer of universities and university colleges and courses offered to both private and public actors.

In context of a lifelong learning view the information may be adapted to individuals and/or businesses. Examples of information about the offers are: scope and flexibility, content, type of learning, learning objectives, competence provider, admission and application criteria or information about registration, form of assessment and certificate of competence, as well as funding and facilitation opportunities.

A key principle is that the register and data must be available to both public and private actors, who can offer services and use data on an equal footing. This will ensure that the public sector does not have a monopoly and promote innovation and diversity within field of expertise.

In the first stage of development, the register shall contain data on education at tertiary vocational schools, university colleges and universities, levels 5, 6, 7 and 8 of the Norwegian Qualifications Framework (NQF).

1.2 Verification service

A solution for verifying accreditation is equally relevant for checking whether the education offered is formally approved or accredited. This applies, for example, to services that showcase educational offerings (such as Utdanning.no, official Norwegian national education and career portal) and for Lånekassen, the Norwegian State Educational Loan Fund, when processing applications for study support for education. Verification of education is equally relevant for people who have received results from these institutions and need to have their formal status verified.

A solution for verification of accreditation must be able to support processes throughout the entire lifespan of the education, from when the education arises to when there are no longer any individuals alive who have completed the education.

The diplomas will eventually become fully digital, and recipients at home and abroad will need to be able to verify the authenticity of a diploma, both in terms of education and the institution itself. Verifying the issuer of a diploma is currently a manual task. An important goal of education register is to automate this verification process.

Norway also has obligations to other countries for the delivery of data on Norwegian education and its formal status. These are tasks that are difficult to carry out as the basic registers with educational data are either missing or not adapted for this type of reporting.

1.3 Accreditation of education

To achieve digitalization and automation of several processes within Norwegian education, there is a need for a comprehensive overview of the education offered, and the formal status of this education in the form of accreditation and recognition. This information is needed for both active and inactive education, and the information must be digitally available for many decades to come.

Since Norway currently have no authoritative overview of the educational offer, and thus no secure digital verification of approval status/accreditation. This is a challenge as the vast majority of education programmes in Norway are accredited by the institutions themselves and not by a central authority such as NOKUT.

A central part of the education register is to support the process for accreditation and take care of the results of an accreditation process. This concerns both accreditation that NOKUT carries out in its role

as a quality assurance body for Norwegian higher education and higher vocational education, and universities and colleges that themselves have the authority to self-accredit studies.

1.4 ID service

There is no central identity and authoritative registry for education in Norway. This presents challenges when data is to be exchanged between parties. For example, the same education offered may appear with different identities. Having one authoritative source for all educations is essential for fully automation of processes in the education system, e.g., verification of results, study plan work and statistics. An authoritative source for all educations, regardless of the length of the education, will also be essential for external organizations, both public and private, to digitalize and automate their processes.

A future competence platform for lifelong learning will also be entirely dependent on an authoritative, digital overview of educations and their formal status.

2 Solution architecture

The original design is a typical 3-tier setup with interface (API, message queue and web), application with business logic, and finally data storage.

The API is a REST API that provides both updating of data and retrieval and lookup.

The application publishes event notifications in a message queue. The technology for this is not yet determined, but we will use what is standard in Sikt. All messages are just notifications of changes in data objects and intended for downstream systems to trigger processes with them. The education registry will not receive notifications to update its data as this only occurs through REST APIs.

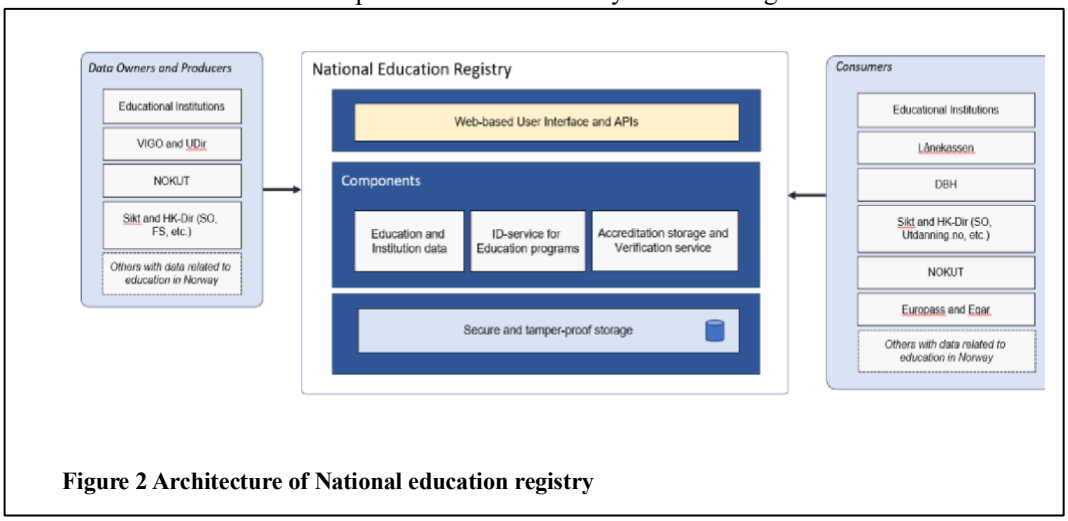

Figure 2 Architecture of National education registry

Not all technical decisions have been made yet, for example, we have not decided how we will store accreditation in a secure manner. Blockchain may be an alternative, but there are other alternatives that may be relevant.

2.1 Information model

Data model is based on the Metadata for Learning Opportunities (MLO) model and has the following overall structure.

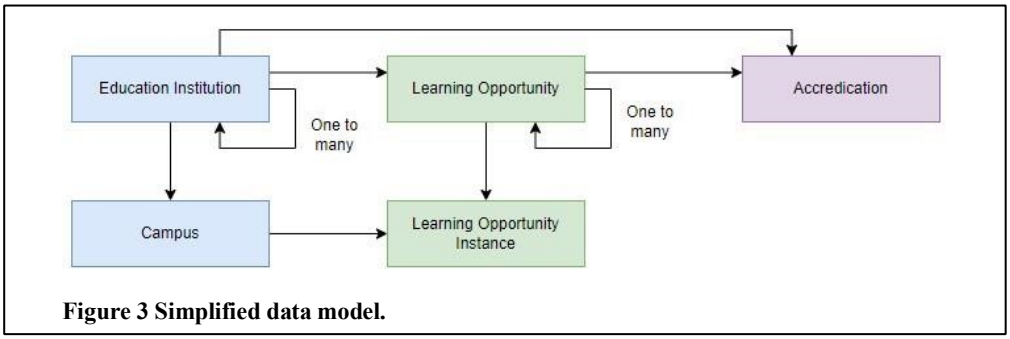

Figure 3 Simplified data model.

Institution represents universities and schools (vocational school, college, etc.) that offer education. An institution is represented at the organizational level but may also include faculties. The institution administers the educational specification, but the actual teaching will be held on campus. The campuses can therefore also be seen as part of the institution, but as a separate computing unit. An institution can have multiple campuses, both physical and virtual. Since the institution is at the organizational level, there may be other special types of organizations that are not a university or vocational school.

Learning opportunity is an abstract description of a learning opportunity, consisting of information that is consistent across multiple instances of education. It provides basic information about education, such as name, level, weighting, etc. This is a general term and can encompass all levels of learning opportunities. It can be, for example, a study program or a course, or even a group of courses. The education specification also shows links between different educations for example between courses or between study programs and courses.

A learning opportunity instance is a single instance of an education (learning opportunity). Unlike an education specification, an educational offer is not abstract and is tied to specific dates and/or locations and can be applied for by applicants. In this data model, there will be a row for each possible combination of educational offerings. For example, a row for each location (campus), date (start date of instruction), and language of instruction.

2.2 Education Registration Process

The education registry involves several different processes, of which the most important are.

- Registration of education
- Accreditation of education
- Verification of formal status of education
- Search for individual educations and institutions

The process for registering a new education is outlined in the figure below. This is a process that starts at the educational institution, which at some point in planning a new education needs to be assigned an identity. This happens ahead of a process for accreditation. The education registry will thus also be able to contain educations that are in the application process for accreditation, and which may never be published and offered.

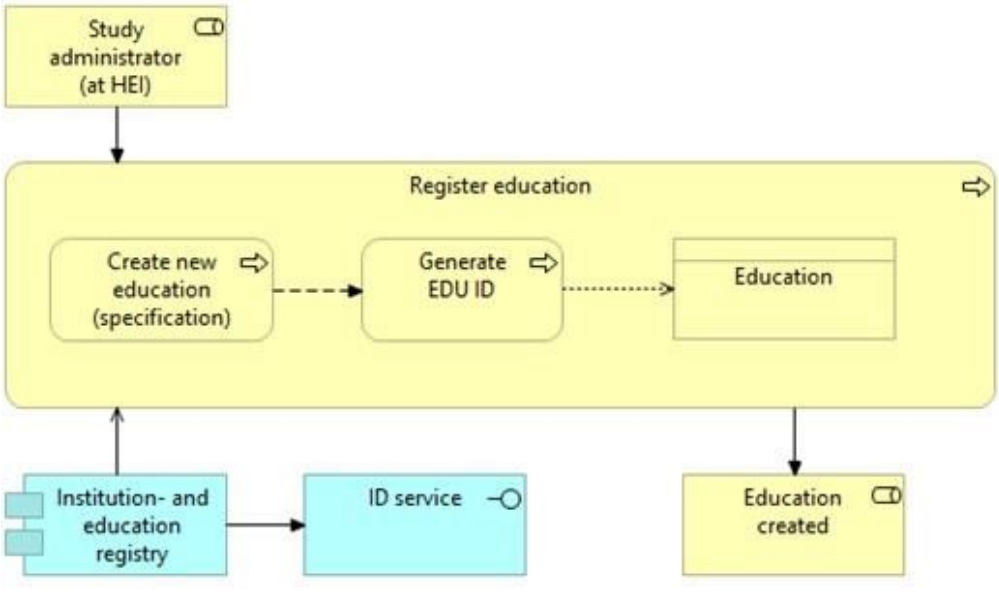

Figure 4 ID Process register new education with national ID.

Registration of an education will either be done via an API or a web interface for educational institutions that do not have local systems that communicate with the API. Such registration will normally be done by an administrative employee at the educational institution.

When registering an education, a minimum of attributes describing the education will be required. A successful registration means that a national ID will be issued for this education, and the education is stored in the education register. When using the API, the ID that is generated will be returned to the system that created this education. This ID will be used in later communication with the education register.

Registration of education in the education register is a small part of the overall process of creating an education. The role the education register plays deals with communication across organizations to streamline the processes for accreditation, data exchange, verification of education, search for information about education at a national level.

3 Summary

The education registry will be an important part of the infrastructure for education and lifelong learning. The goal is to create an accreditation system that offers a national-level accreditation verification service. In addition, the system can also act as an authoritative education registry. It will have a great impact on the possibility to digitize processes.

Sikt was awarded funding to start work on developing and establishing a national education register. The education register is intended to support digitalization, automation and streamlining in the education sector. The registry will promote data sharing within the education sector and provide smoother user experiences. The aim of a new national education register is to provide a platform for generating and assigning unique identity to education and tamper-proof storage of educational programs and the formal accreditation of the program. It shall contribute to quality assurance that education offered is accredited, and facilitate the use of data for analysis, management, research, and statistical preparation.

The education register will be developed to be able to handle data for the entire educational process, from primary and secondary education to higher education. The register shall promote simplification, also regarding the reporting of data. It is also a goal to facilitate simplification of the institutions' reporting of study programs to the Norwegian State Educational Loan Fund, University, college, and vocational college admissions, utdanning.no etc.

4 Author biographies

Berit Norma Bergen has 31 years' experience in IT related architecture from different business domains (Telco, finance, public transport, social security and now education & research). Berit specializes in information architecture and in particular "Data infrastructure", such as MDM (Master Data Management), but she also has experience within Enterprise architecture. Berit has her educations in economy, data engineering and most recently "executive master of management" with a final research paper on Enterprise architecture in projects.

Geir Vangen has more than 20 years' experience in developing nationwide systems within higher education. He is Technical Director at Sikt – the Norwegian Agency for Shared Services in Education and Research. He participates in national and international standardisation work, projects and other international cooperation. 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.

Anne Kathrine Haugen has more than 20 years' experience in working with national student information system and admissions. She has been head of Nucas, the Norwegian university and college admission service. Haugen was project leader for establishing a national coordinated admission to higher vocational training. Now she is working as a senior adviser in Sikt. Haugen has a master's degree in physics (1991) and a program in educational theory and practice (1992).