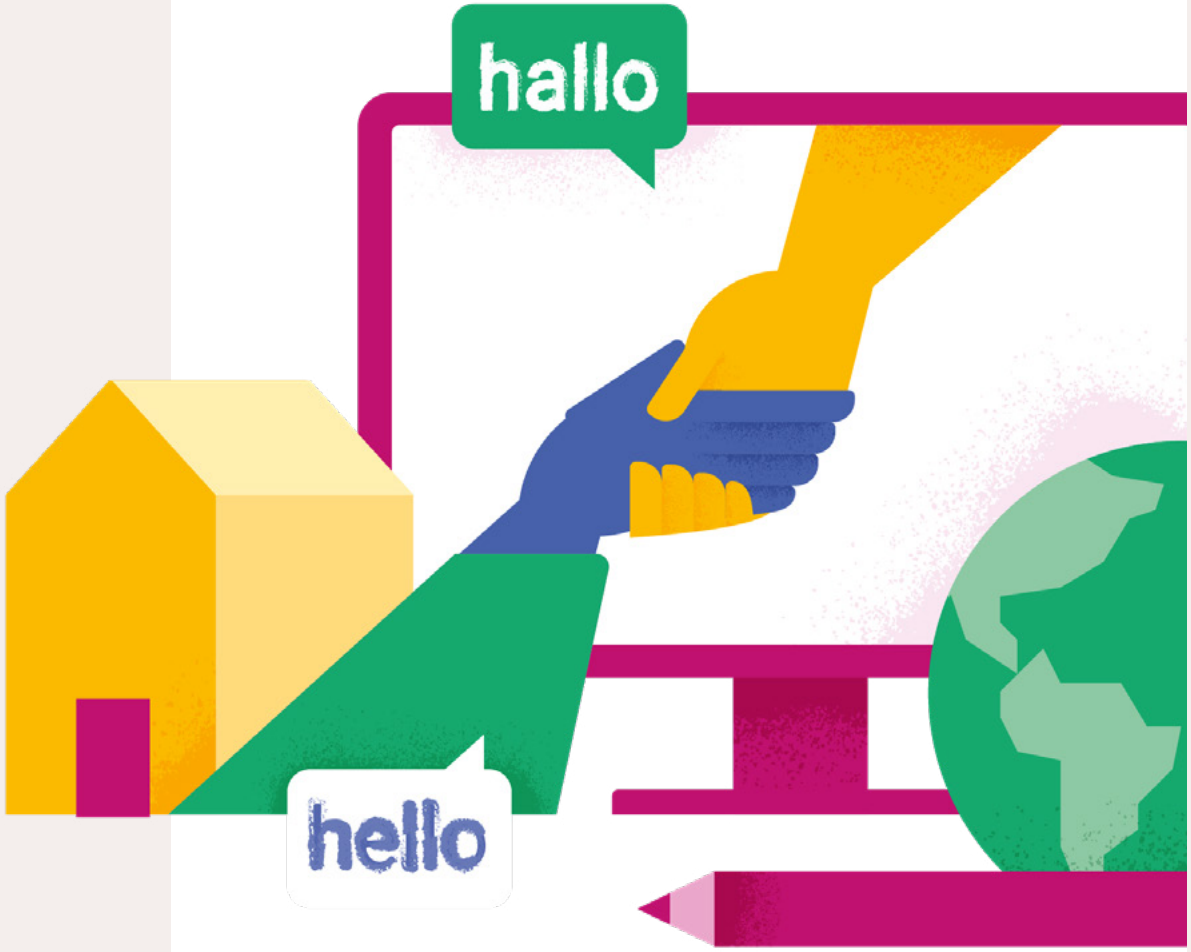
Digitalisation of credential evaluation workflows

Practical guidelines for the ENIC-NARIC Networks.

Erasmus+ Key Action 3,
DigiNet Consortium



Nuffic
meet the world

Co-funded by the
Erasmus+ Programme
of the European Union

Contents

1 Introduction

1.1 Rationale

The digitalisation[1] of credential evaluation processes is a topic of growing interest and importance in the context of global education and mobility. The Covid-19 pandemic has accelerated the need and demand for digital solutions that can facilitate the recognition and verification of foreign qualifications from any location, as well as enhance the quality of recognition decisions and reduce administrative burdens and costs associated with paper-based workflows. It has also boosted developments around digital credentials, such as electronic transcripts, diplomas and certificates that contain new technologies for improved security, authenticity checks, portability and transparency. More recently, astounding advances in generative artificial intelligence and machine learning have opened up new possibilities for building digital services.

In this rapidly evolving environment, ENIC-NARIC centres face the challenge to build IT structures that are flexible and resilient to keep up with the changing demands and opportunities of the field. Currently, members of the Networks find themselves at different levels of digital maturity[2]: Part of the ENIC-NARIC offices use mainly paper-based processes. Others operate in a hybrid form, combining digital and analogue elements (e.g. submission and assessment of paper documents, with outcomes registered in a digital case-processing database). Finally, there are ENIC-NARICs which have digitised every stage of the recognition lifecycle, but with varying use of structured data, standardisation and automation. Many centres are investing in the (further) digitalisation of their processes, aimed at advancing the digital maturity level of their operations.

Such IT transformation projects are complex and demanding endeavours, that require careful planning and execution. They involve changing the way a centre uses technology to achieve its goals and/or deliver its credential evaluation services to its stakeholders. This includes many practical questions, such as:

1 This paper refers to Gartner's definition of digitisation as taking an analogue process and changing it to a digital form, without any different-in-kind changes to the process itself. Examples include transforming paper-based recognition statements into electronic ones, or processing digital documents instead of paper copies. Digitalisation, on the other hand, is understood as the process of using digitised information and digital technologies to improve a centre's processes and operations; such as automating or standardising (part of) a workflow with help of a software application or enhancing the applicant's experience with a digital platform (see the Gartner Information Technology Glossary at https://www.gartner.com/en/information-technology/glossary).

2 A detailed definition and comparison chart of different digital maturity levels for ENIC-NARICs was elaborated by the Nordic ad hoc group on digitalisation: "Digitalisation in Recognition, Policy Paper initiated by the Nordic Council of Ministers", https://norric.org/wp-content/uploads/NCM-Report-on-Digitalization-in-Recognition.pdf

- How do you develop digital systems that are compliant with international agreed practice and treaties, notably the Lisbon Recognition Convention and the Global Convention on the Recognition of Qualifications concerning Higher Education?
- How do you design digital solutions for credential evaluation processes that are secure, efficient and user-friendly?

The project Digital Innovations in Credential Evaluation and the Networks (DigiNet) aimed to address these questions, to support the implementation of efficient and transparent digitalisation strategies for credential evaluation. It builds further on good practice developed in Erasmus+ projects, in the EHEA and in the broader digital learner data ecosystem.

1.2 Goal

This paper reports on the outcomes of the DigiNet project. It provides the ENIC-NARIC Networks with a set of good practices, reflection questions, guidelines and recommendations for implementing digital solutions in the domain of credential evaluation This paper does not advocate for a uniform or standardised approach to digitising recognition processes. Different contexts and goals require different solutions: digitalisation and technology are not ends in themselves, but means to achieve them. Various strategies can be employed to attain objectives such as enhancing efficiency or improving the applicant's experience. Moreover, ENIC-NARIC centres are embedded in different national recognition frameworks and vary in terms of mandate, size and organisational structure (e.g. with IT in-house, externally supplied or a mix of both). They are likely to have different visions for their processes and IT landscapes.

The paper therefore rather aims to offer guidance and suggestions on how to plan digital innovations in collaboration with an IT team, how to align the IT system with the centre's objectives and its stakeholder needs and what aspects to consider in the process. The main emphasis of the paper is on the (functional) design of digital solutions, rather than the various ways to technically implement digital credential evaluation workflows.

1.3 Methodology

In the framework of the DigiNet project, 8 ENIC-NARIC centres worked on individual implementation plans to optimise the digitalisation of their respective credential evaluation processes. As a first step, the partners analysed their processes against the recommendations of the DigiRec White paper[3] and drafted blueprints identifying areas of improvement. The design of the blueprints included peer-counselling, where the project partners reviewed each other's results and provided feedback for further refinement.

Based on the results of this exercise and the areas in which the partners wished to innovate, a series of peer-learning events were organised. These study webinars and meetings focused on topics such as:

- Principles of enterprise architecture for building IT structures;
- Data models and interoperability;
- Alignment with European standardisation efforts such as EMREX and European Digital Credentials for Learning;
- Issuing recognition statements as verifiable credentials, and
- Good practice from the centres participating in the project.

Expert input was provided both by representatives of the DigiNet Steering Group and members from the project team, as well as external partners such as EQAR and the European Commission's European Digital Credentials for Learning (EDC) team.

The study webinar on the European Learning Model and the newly launched EDC platform was followed up by a small pilot, which saw the DigiNet partners test the EDC infrastructure, create (sample) digitally verifiable recognition statements and evaluate the potential of the technology for the further development of the output of their own systems (i.e., issuing recognition statements).

The peer-learning events helped further shape the implementation plans of the project partners. First findings and recommendations from this series of activities were presented and discussed with participants from ENIC-NARICs at the 2022 ENIC-NARIC annual meeting, with the results feeding into this paper. As a final step, this report was drafted and published to enable ENIC-NARICs not part of the consortium to benefit from the outcomes.

3 The DigiRec project produced a White Paper for the ENIC-NARICs that helps the ENIC-NARIC networks to understand the effects of digitalisation on their day-to-day work and serves as basis to further digitise the office processes.

1.4 Structure

This first chapter introduces the project and the approach, while the following two chapters focus on its outcomes:

- The first part outlines general principles of IT architecture and design, and provides an overview of typical steps that can be taken to develop an implementation plan for digital innovations in an organisation. While these principles are general and not limited to recognition-related IT innovations, they are helpful to plan and manage change processes in ENIC-NARICs and to evaluate and compare different solutions and alternatives.
- Building on this, the second part outlines specific recommendations for IT-development in ENIC-NARIC centres that the partners derived from the activities in the project. They are clustered and formulated as guiding principles that can help design and build IT systems for credential evaluation processes.

1.5 About the DigiNet project

This report is produced as part of the European Commission Erasmus+ Key Action 3 Digital Innovations in Credential Evaluation and the Networks (DigiNet) project.

The DigiNet consortium is composed of the following representatives from the ENIC-NARIC Networks: The Netherlands (Nuffic, coordinator), Estonia, France, Italy, Norway, Sweden, Poland and Canada, as well as EMREX (represented by SIKT, the Norwegian Agency for Shared Services in Education and Research) and the Groningen Declaration Network.

DigiNet started in April 2020 and is co-funded by the Erasmus+ Programme, Key Action 3, NARIC call, of the European Union.

2 Digital innovations in credential evaluation: methods and processes

This chapter introduces the basic concepts and principles of enterprise architecture and IT design, and how they can help ENIC-NARIC centres to align their digital strategies with their organisation's goals and processes. It also presents an overview of the typical steps involved in developing and executing an implementation plan for digital innovations, covering the main steps from identifying the needs and opportunities, to analysing the requirements and designing and deploying the solutions. It draws on learnings from the project's study webinars with expert input from EMREX (member of the DigiNet Steering Group).

2.1 The importance of vision in IT transformation

Designing IT components without having an overarching vision in place is a bit like having to solve a jigsaw puzzle without the possibility to look at the bigger picture on the lid of the box: You may be able to match a few pieces and find solutions that work for the job at hand. But the process risks being inefficient, costly, and difficult to maintain and scale. In reality, the digitalisation of recognition and credential evaluation encompasses more than just technology. It touches upon the whole "architecture" of an organisation and how it operates (including, for example, its processes, culture, governance and its interactions with stakeholders). The discipline of enterprise architecture helps to align these elements with the vision of the organisation, and to ensure that digital solutions are "fit for purpose":

Enterprise architecture (EA) is the holistic view of how an organisation's business processes, information systems, and technology infrastructure work together to achieve its goals and vision. Methods of enterprise architecture can help organisations to analyse, design, plan and implement IT infrastructures that align with its strategies and avoid "IT silos" that do not communicate well with each other. Enterprise architecture aims to create a coherent and consistent IT landscape that enables agility and innovation.

IT design, on the other hand, is the detailed specification of how a particular IT component will function and interact with other components or systems in this landscape. The process of elaborating an enterprise architecture typically precedes the IT or software design process, as it provides the foundation and direction for the latter.

Both are linked by a feedback loop that ensures consistency between them. The enterprise architecture process provides input to the IT or software design by defining the business needs and expectations that the IT system or platform should meet. The IT design process provides feedback to the EA by validating whether the IT system meets the expectations and identifying any adjustments that need to be made.

2.2 Methods of enterprise architecture

An enterprise architecture typically consists of three main components:

1. business architecture
2. information architecture
3. technology architecture

Each component describes a different aspect of the organisation and how it relates to the others:

Business architecture defines the purpose, competencies, processes and governance of the organisation. In the case of ENIC-NARICs, the business architecture would describe the purpose of doing recognition, the services offered, the policies and stakeholders involved, and the work processes that tie these elements together.
Business architecture helps align the centre's activities with its mission and ensures that the organisation delivers value to its target groups or stakeholders. A practical example of this layer of architecture is the following:

- A competency is a part of the business architecture that represents what the organisation can do or offer to its stakeholders. For example, an ENIC-NARIC may have competencies such as issuing comparability statements, providing expert information on education systems, managing knowledge sharing platforms, etc.

Information architecture defines the data and information that the organisation needs, produces and consumes. It describes how data and information are structured, stored, accessed, shared and used across the organisation. For ENIC-NARICs, this includes the data needed for doing recognition, the sources of these data, and the information that is produced in the evaluation process (e.g. diplomas, transcripts, personal identification data, quality assurance information, comparability assessments, etc.). And what system and standards are used to organise these data. Information architecture helps ensure that the organisation has reliable, consistent and secure data and information to support its decision-making and operations.

- For example, a data model is an element of the information architecture that represents how data is organised and related in a logical way. An ENIC-NARIC case-handling system may have a data model that includes entities such as the personal data of applicants, data on the higher education institutions and qualifications assessed and the purpose of the assessments (among others).

Technology architecture defines the hardware, software, network and infrastructure that the organisation uses to support its business and information architectures. It describes how technology components are configured, integrated, deployed and managed across the organisation. For ENIC-NARICs, this would include the technologies used to support the recognition process, to facilitate the secure input, output and storage of data. It also includes technologies used to process recognition data (e.g. machine learning tools or technology used to automate (part of) the credential evaluation workflow). Technology architecture helps ensure that the organisation has efficient, effective and adaptable technology solutions to enable its business processes and information flows.

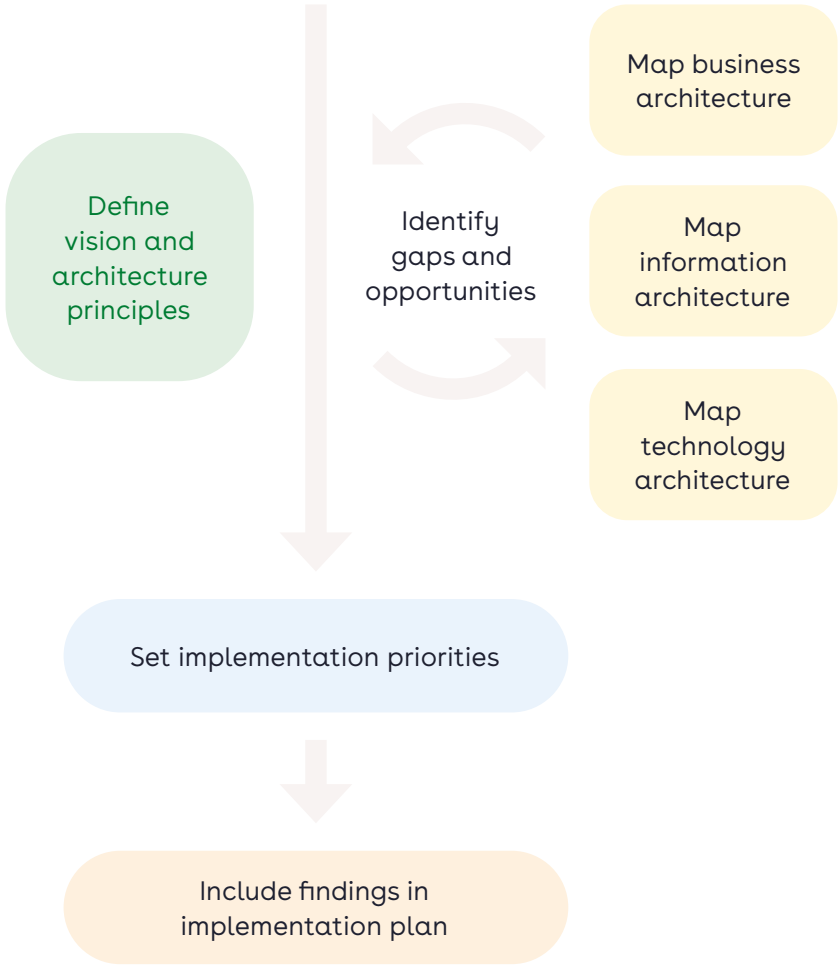
- A cloud service is an example of a part of the technology architecture that represents a resource or functionality provided over the internet. An ENIC-NARIC centre may use a software as a service (SaaS) provider that offers cloud services such as email, file storage or analytics for a web portal.

Each component of an enterprise architecture can be mapped or visualised using different EA frameworks[4], methods and tools, depending on the purpose of the representation. Some common methods include diagrams, matrices or catalogues.

The enterprise architecture planning process also depends on the framework used. But it usually involves the following steps (visualised in a simplified overview in Figure 1):

1. defining the vision of the ENIC-NARIC centre: this is a statement on the future state of the organisation and its services (defining goals, objectives and guiding principles to achieve them);
2. analysing the current state of the centre's processes, resources and IT system(s) or platform;
3. identifying the gaps and issues that need to be addressed;
4. developing a future state that describes how the services will operate and perform in the future, and
5. planning the roadmap and transition steps to achieve the future state.

Figure 1 Simplified overview of the enterprise architecture planning process



4 Some common frameworks and methods in enterprise architecture are for example the Open Group Architecture Framework (TOGAF), the Zachman Framework or ArchiMate Modeling Language.

Mapping an enterprise architecture can provide a clear vision and direction for a successful IT transformation that supports the organisation's objectives and meets its expectations. The benefits of applying EA methods are that they help reduce complexity, inconsistency and risk in the IT system, as well as improve integration among its different components (increasing their efficiency and adaptability). The methods also facilitate communication, collaboration and coordination among different stakeholders involved in the service: In the case of ENIC-NARIC systems these could be database users, service managers, IT suppliers, governance and compliance staff, etc.
However, not all ENIC-NARIC centres have in-house enterprise architects who can design and maintain an EA. In such cases, a centre could do one or more of the following:

- Hire external consultants who have expertise in EA and can provide guidance and support for developing and implementing an EA;
- train existing staff members who have relevant skills and knowledge in EA;
- use existing open-source EA frameworks, methods and tools that are widely available and can help structure and document an EA;
- seek feedback and input from various stakeholders within and outside the organisation who may be able to contribute to the EA vision and requirements; or
- cooperate with similar organisations on developing and implementing an EA.

2.3 Methods of IT design

After defining the enterprise architecture, the next step is to design the specific IT components or software that will implement its high-level principles, standards and guidelines and support the future state of the organisation's services. The design process of an IT or software solution entails determining its elements, structure, requirements, specifications, interfaces and functionalities, as well as testing, deploying, operating and maintaining it.

Different software development models can be used to organise this process and to collaborate with developers (either in-house or subcontracted). Two of the most commonly used software development models[5] are:

- **Agile**: This model is based on the idea of delivering an IT solution in small and frequent increments, rather than in one big release at the end. Developers work in teams that collaborate with each other and with

5 For the purpose of this paper, this subchapter provides a concise and simplified overview of commonly used IT design methodologies. It does not intend to cover all the nuances and complexities of the topic, which can be found in more comprehensive and specialized sources, such as the 2020 edition of the "Software Development Life Cycle (SDLC) – Complete Guide" by Gerardus Blokdyk.

the users to get feedback and improve the software continuously. Agile is flexible and adaptable to changing requirements and situations.

- **Waterfall**: This model is based on the idea of following a linear process, where each phase of the development has to be completed before moving on to the next one. Waterfall is simple and structured, but it can be rigid and inflexible to changes.

Within these models, developers work in stages. These typically include planning, analysis, design, development, testing, and maintenance:

1. Planning and analysis
This stage involves gathering and analysing the requirements of the IT project from all stakeholders in the project. It evaluates the feasibility, user needs, expected costs and benefits of the project.

2. Design
This step involves creating the basic structure and functional design of the software, including the system architecture, programming language, platform, security measures, and user interface. A prototype is usually developed to visualise and test the product before coding.

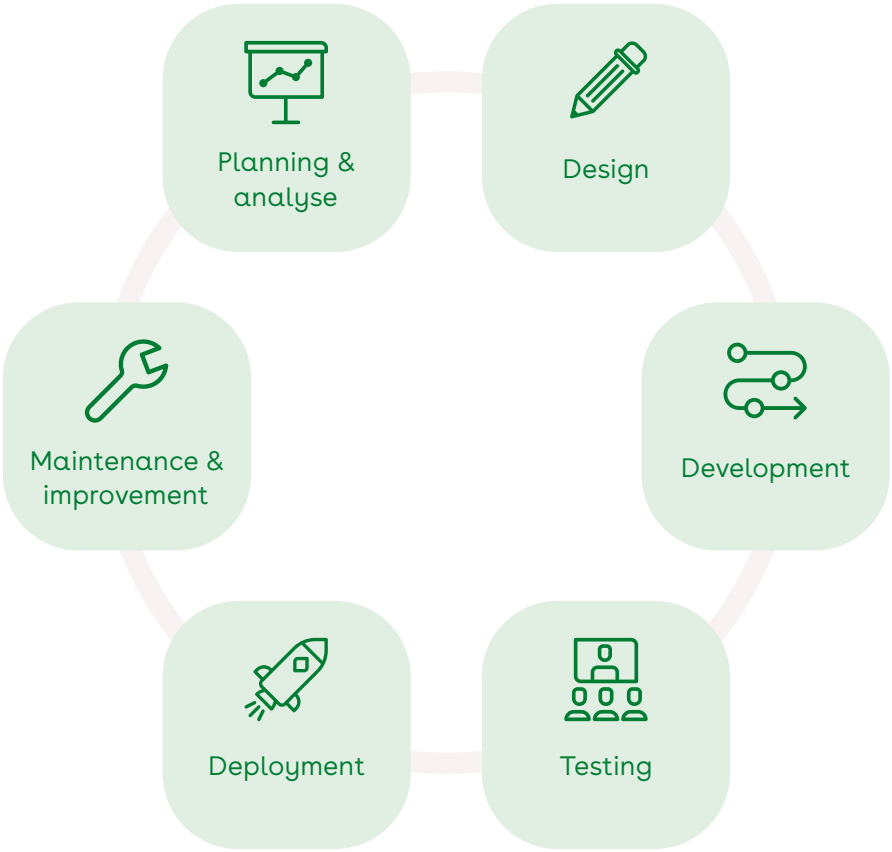
3. Development
This stage involves writing the code that implements the product specifications and requirements. Depending on the methodology used, testing (stage 4) can be done concurrently or separately to identify and fix any bugs or errors.

4. Testing
The IT product is tested to ensure its functionality, user experience, and security.

5. Deployment
The IT product is delivered and released to the user in this stage. Its deployment process can be automated and scheduled, depending on the type of software or update.

6. Maintenance
This stage involves fixing bugs and errors that users may encounter. The maintenance stage can also be a source of improvement and new features for future releases/updates.

Figure 2 Typical stages of software development



The waterfall and agile development models differ in their sequencing. In the waterfall approach each stage is completed before moving on to the next one. The agile model follows an iterative approach, where the IT project is divided into smaller cycles. With every cycle or “sprint”, a small product increment is released. So instead of doing each stage once for the whole project, the agile team moves through them repeatedly for each sprint.

3 Digital innovations in credential evaluation: practical guidelines

Throughout the DigiNet project's duration, the team members engaged in various peer-learning activities, where they updated each other on the status, challenges and achievements of their IT projects. They also exchanged feedback, advice and lessons learned from their experiences. The IT projects of the project partners differed significantly, from enhancing the functionality and performance of existing systems to designing and implementing new case-handling systems to transforming paper-based workflows into digitised ones.

Despite these different contexts, the team members discussed and identified underlying principles that informed their IT innovations. These practical guidelines are presented in more detail in the subsequent chapter. They address aspects such as user-centricity, accessibility and inclusivity, data privacy and security, sustainable interoperability, sharing and reusing data and LRC-compliance.

3.1 User-centricity

ENIC-NARICs offer information and services to various stakeholders, which may include students, higher education institutions, employers, public authorities, and others. When designing digital services for credential evaluation, it is crucial to adopt a user-centric approach. This means that the services should meet the **needs, preferences, and expectations of the service users** (e.g. admission officers, students, ENIC-NARIC-staff, etc.), rather than the assumptions of the designers or developers. This can bring benefits to both the user and the ENIC-NARIC that provides the services in different ways. For example, it can enhance the usability and accessibility of the services for diverse users (see also 3.2 on accessibility), increase their satisfaction and trust, decrease errors and misunderstandings, thus saving time and resources.

To achieve user-centric design, it is vital to engage users early in the design process and test potential solutions or improvements in regular as well as exceptional situations. This can help to identify the challenges that users encounter, generate and test potential solutions or improvements, and assess their usability and effectiveness. It is important to consider all possible scenarios, even the challenging ones, to diminish the risk of costly re-adjustments in the next phases of a digitalisation plan.

Common **methods of service design** include:

- **User research:** This involves understanding the needs, preferences, motivations and challenges of the user groups that will use the digital system to seek or provide credential evaluation, such as students, educational institutions and/or credential evaluators. User research can be done through interviews, surveys, observations and other techniques.

- **Journey mapping:** This involves visualising all the steps that users or applicants go through when they interact with the service, and their needs and perceptions at every touchpoint - from the initial contact to the final outcome. Journey mapping can help identify "points of frustration", opportunities and areas for improvement in the service.

User feedback is a vital component of the digital service lifecycle: not only during the design phase but also after the launch of digital credential evaluation platforms or portals. The "end product" itself should also incorporate feedback options. It is important to plan ahead how to measure and enhance the usability and satisfaction levels of the service, and to **embed feedback mechanisms** accordingly. User feedback can be collected in various ways, such as surveys, comments, suggestions or complaints. These mechanisms should be user-friendly, visible and responsive. Regular and systematic collection and analysis of user feedback data can help evaluate the performance of the digital service and inform future design decisions.

> **Example 1.1: "Digitalisation Labs" to foster collaborative innovation**
> The Central Office for Foreign Education (ZAB), which is the German ENIC-NARIC, has experienced an increased demand for its credential assessment services. To meet this demand, the ZAB is collaborating with the Federal Ministry of the Interior and Community and the Federal Ministry of Education and Research to digitalise its entire credential evaluation application and case-handling system. The goal is to develop a seamless and user-friendly online solution that benefits both applicants and the ENIC-NARIC staff.
>
> The project team launched this initiative with its first "digitalisation lab" in Berlin in October 2022. Digitalisation labs are an innovative method to create online solutions for administrative services as part of the German federal digitalisation program. They use interdisciplinary and agile teams that involve users from the start. Methods such as design thinking are applied to solve problems creatively and collaboratively.

The digitalisation lab gathered participants from different backgrounds and perspectives to create a shared vision for the future of ZAB's credential evaluation service. They agreed that end-to-end digitalisation is the best way to improve efficiency, quality and transparency. Taking the needs and expectations of both applicants and the ENIC-NARIC centre into account, the participants analysed the current processes, identified challenges and opportunities, and developed a vision for the target process. "Lightning demos" (brief presentations) were conducted to learn from good practices around the world, gather inspiration and discuss first prototypes.

Example 1.2: Applying Journey Mapping to gain user insights
Nuffic, the Dutch ENIC-NARIC, is in the process of redeveloping its digital platforms. The objective is to integrate its various credential evaluation applications for different target groups into one single, user-friendly platform and online interface.

To achieve this, Nuffic engaged an external party to conduct user research and user journey mapping. The research involved data analysis, workshops and interviews to understand the goals, motivations and challenges of key user groups (e.g. individual applicants, admissions officers and ENIC-NARIC staff with different roles). The journey mapping produced visual representations of the steps that different user groups take to use the credential evaluation service, as well as their emotions, thoughts and actions along the way. The research findings helped to identify areas for improvement and to define the functional requirements for system development based on the users' needs and expectations.

3.2 Accessibility and inclusivity

Facilitating access to recognition and to information on higher education systems is a central tenet of the Lisbon Recognition Convention. ENIC-NARIC centres are important partners in supporting and promoting these objectives. Therefore, it is vital that the information platforms and services that ENIC-NARIC centres provide for recognition are designed and delivered in a way that is accessible and inclusive[6] for everyone, regardless of age and ability. This means that all users and/or applicants can receive the same quality of service.

Some of the diverse groups of people that should be taken into account in this context are:

6 According to the Web Accessibility Initiative (WAI), accessibility means that people with disabilities can perceive, understand, navigate, and interact with websites and applications. Inclusivity can be defined as the practice of designing products and services that understand and enable people of all backgrounds and abilities. Therefore, accessibility is a subset of inclusivity, but not the only one (https://www.w3.org/WAI/fundamentals/accessibility-usability-inclusion/).

- People with **disabilities**: These include people with visual, hearing, cognitive, motor or other impairments that may affect their ability to use online services. For example, some users or applicants may require screen readers, captions, magnifiers, keyboard navigation, voice control or other assistive technologies to access online content and functions.
- People of **varying digital literacy**: People have different levels of experience and confidence in using online services. For example, some users or applicants may need clear and simple instructions, additional explanations or guidance to use online application tools.
- People of different **linguistic backgrounds**: Providing digital services in multiple languages can increase their accessibility by allowing users or applicants to access information and interact with the service in their preferred language.

There are many **national and international regulations** that set standards and guidelines for the accessibility of digital products and services, such as the EU Web Accessibility Directive (focused on public sector websites and mobile apps) and the broader European Accessibility Act (EAA). Most of the laws and standards are based on the Web Content Accessibility Guidelines (WCAG), which provide criteria and best practices for ensuring equal access and inclusion in the digital domain.

In addition to the national context and mandate of the centre, there may be specific regulations regarding the multilingualism of public services, or the need to accept and/or provide both digital and paper-based documents when performing administrative acts such as recognition procedures. It is essential to be aware of these regulations and requirements on the outset of an IT project, to avoid any legal or technical issues later on. It is also important to remain up-to-date with applicable norms governing accessibility, as they might evolve. Therefore, collaborate with experts and service providers who are able to design a platform that can adapt to new accessibility requirements.

To enhance the **inclusivity** of the design process, it is advisable to involve users from diverse groups and backgrounds throughout the different stages of design. This can include conducting user research in the initial phase, as well as testing and collecting feedback from users who represent the target audience and the **variety of needs and preferences** in later phases. The results can help prioritise the most important functions that benefit most users, as well as alternatives for those who have additional needs (e.g. related to multilingualism or multichannel delivery of services), and to balance them with the resources and limitations of the IT project. The feedback sessions will also help to identify and solve any usability problems at an early stage. If involving

users from diverse backgrounds proves to be challenging, some conformity tools exist for publicly accessible web pages and other resources[7].

Example 2.1: Accepting and processing applications in different formats

The Polish ENIC-NARIC (NAWA – Polish National Agency for Academic Exchange) strives to ensure equal and convenient access to its credential evaluation services for all applicants. In accordance with Polish legislation, it accepts both paper and electronic documents from various sources and formats. Currently, NAWA offers three options for submitting applications:

1. Electronically, through ePUAP, a national communication platform that requires an electronic signature or a trusted profile. Applicants and institutions can send scanned or electronic documents in any format.
2. By post, with paper application forms and certified copies of diplomas and transcripts. If the documents were originally issued as electronic documents, they can be sent by email instead.
3. By email, with scanned or electronic documents attached.

NAWA is digitalising the entire recognition process. From the submission of applications, the handling of cases and appeals, to issuing recognition statements. The new system, SYRENA, is connected via APIs to database of the European Quality Assurance Register for Higher Education (DEQAR) and NAWA's database of international qualifications (Kwalifikator). SYRENA is to be launched in September 2023. This will decrease the use of paper and increase security, the speed of data transmission and efficiency.

7 The World Wide Web Consortium (W3C) maintains a list of tools to help measure conformity in this area: https://www.w3.org/WAI/ER/tools/.

3.3 Data privacy and security

ENIC-NARICs often deal with a large amount of personal data, such as names, dates of birth, educational records, transcripts, diplomas, etc. These data must be protected from unauthorised and/or inappropriate access, use, disclosure or loss. Therefore, privacy and data security must be assured throughout all phases of the design, development and entire lifetime of IT solutions that support the work of ENIC-NARIC centres. This includes not only the IT systems themselves, but also the work processes that involve the use of personal data, such as credential evaluation, quality assurance, internal and external communication, etc. For example, credential evaluators working remotely must ensure that they access and store personal data securely and do not share them with anyone else. Data privacy and security should be embedded in the business and system architectures, the software development, the data management and the user interface.

Good practices for ensuring data privacy and security include:

- Comply with relevant (inter)national **laws, regulations, standards and agreements** on data privacy and security. These may cover some of the elements listed below or provide additional guidance or requirements for data protection;

- Apply **principles of data protection by design:** This means that data protection should be a priority from the initial stage of the IT system development. Throughout the process, identify the personal data that will be collected, used and shared in the system (and the legal basis for doing so). Consult stakeholders from your centre who can provide guidance on the legal obligations related to data protection and ensure the system's design complies with those regulations (e.g. a data protection officer or a member from a legal team);

- Define and implement **data minimisation and data retention policies** to collect, store and process only the essential data for the intended purpose of the user or applicant - and only for the necessary duration (see also 3.5 on reusing data);

- Integrate secure protocols and features such as encryption and authentication techniques to safeguard personal **data in transit** (e.g. credential evaluation requests submitted to a centre or a recognition statement sent to an applicant) and **data at rest** (e.g. applicants' data stored in a centre's case-handling database);

- Implement suitable technical and organisational measures to ensure the **security, integrity and availability** of personal data of applicants. This can include using firewalls, antivirus software, backup systems, access control policies (defining how access to personal data is regulated and who, under what conditions, may access what information), staff training and incident response plans. It is recommended to document all measures and changes made to them, to ensure continuity and facilitate assessments by third-party certifying bodies or administrative authorities (if applicable);

- Set out clear roles and responsibilities for **data ownership and management**. This includes specifying who owns the data, who can change it, and who can delete it. Ideally, appoint a data controller and a data processor, and clarify their respective duties. Where possible, explore options for self-sovereignty, which would give applicants agency and control over their own data (e.g. by issuing recognition statements as verifiable credentials that can be stored and managed in personal wallets; see example 3.1 below).

- Provide **clear and transparent information** to users and applicants about how their data will be used, shared and protected. Privacy regulations such as the European Union's General Data Protection Regulation may also grant applicants the right to access, rectify, erase, restrict, object or port their personal data. Consider if and how options should be implemented for applicants to give, change or withdraw their consent for the data processing;

- Conduct **regular assessments** after deploying your IT system to monitor and evaluate the effectiveness of your data privacy and security measures and make any necessary adjustments. Consider seeking certification from a third-party certifying body as a way to reinforce trust and demonstrate compliance with data protection regulations.

These practices can help design IT systems that are not only efficient and effective for credential evaluation workflows and applications, but also respectful and responsible for data privacy, security and ownership.

Example 3.1: Data ownership and data security in CIMEA's Diplome service

CIMEA's Credential Information Service (CIS) issues comparability statements for Italian and foreign qualifications through its "Diplome" platform, using blockchain technology.

This service allows users to create a wallet where they can manage their qualifications and assessments in a secure, transparent and certified way. Only certified authorities (higher education institutions, ENIC-NARIC centres, national administrations, etc.) can issue qualifications or certificates using blockchain. Through the "Diplome platform", qualifications uploaded by applicants are evaluated by CIMEA experts and certificates are issued by CIMEA (certified authority) in the wallet using blockchain technology.

In this decentralised qualification management system, the holder of the qualifications and certificates has full ownership of both the data in the wallet and the cryptographic key that allows access to them on the blockchain (in full alignment with the principles expressed by the EU's General Data Protection Regulation - GDPR). The holder decides with whom to share the information.

The comparability statement can be shared by the wallet holder in two different ways:

1. sending the certificate via email to a destination entity in a secure and standardised way, together with full verification elements, or

2. as a verifiable credential, i.e. issuing a signed credential fully compliant with the World Wide Web Consortium's W3C standards.

3.4 Sustainable interoperability

Digital learner data and qualifications are increasingly available in various data formats with different levels of data maturity. A growing number of credentials go beyond a PDF image of their paper equivalent and offer structured, machine-readable data and embedded verification technologies for enhanced functionality.

In the future, this ecosystem is likely to grow and enable more learner data to be transferred electronically and securely from higher education institutions to the data owners, to (inter) national registries or other recipients. Moreover, other trusted sources provide digital databases with information relevant to the credential evaluation process, such as quality assurance registries or verification portals.

As ENIC-NARICs advance their digitalisation level, these developments offer different opportunities regarding the digitalisation of credential evaluation processes, the secure exchange of data and the automation of steps in the workflow. Interoperability is key to unlocking this potential. This means the extent to which ENIC-NARIC IT systems can communicate and exchange structured data with trusted sources, without requiring manual intervention or conversion by the credential evaluator or system administrator.

Interoperability affects every stage of the credential evaluation process:

1. Input phase: this can include the ability to accept and import digital learner data into your case-handling system, or to integrate electronic identification or payment solutions (see example 4.1 below);
2. Throughput or processing phase: the ability to connect your system to other trusted sources or stakeholders and exchange relevant information (e.g. regarding quality assurance or verification checks);
3. Output phase: the ability to deliver recognition statements with structured data that can serve as input for other digital platforms or systems (e.g. credential wallets or repositories, see example 4.2 below);

Interoperability is a complex challenge, because there are many different standards, formats, and languages for representing and storing learner data. Practical steps to work towards sustainable interoperability include the following:

- A first and essential step is to design a **robust information architecture**, to thoroughly understand and organise your own data. Develop clear and consistent data models and schemas that specify the essential attributes and relationships of credential evaluation data, such as applicant

information, educational history, assessment results, etc. Document the data structure, format, and meaning of the data elements.

- Assess if and how you can (partially) align your data model with common **data models and semantic vocabularies**, such as the European Learning Model v3 (used in Europass and European Digital Credentials for Learning), ELMO (used in Erasmus Without Paper and EMREX), or data standards from the Postsecondary Electronic Standards Council (PESC) and 1EdTech.

- One way to improve the quality and reliability of your data model is to use **standard identifiers** for the entities that you are working with, whenever they are available and relevant. Standard identifiers are unique codes or "labels" that allow you to refer to entities in a consistent and unambiguous way across different languages and applications. For instance, a widely adopted standard code is the ISO 3166 code for the names of countries and their principal subdivisions. You can also use different standard identifiers for higher education institutions in your database, such as the European Tertiary Education Register (ETER) ID or the World Higher Education Database (WHED) ID, maintained by the International Association of Universities (IAU). Using standard identifiers can help you prevent errors and duplication and enable data linking across different platforms.

- When preparing the system for data exchange (at any stage of the credential evaluation process), ensure that the database can handle **various standards for data formats** – both current and future ones. Some of the most common standards today are XML, JSON, and PDF. However, data and documents are dynamic, and new formats may emerge over time. Therefore, it is essential to design your platform for **sustainable interoperability**; i.e. for it to be able to evolve and adapt to possible future standards for data formats, with or without the intervention of a third-party. Application programming interfaces (API) can help you connect your database or case-handling system to trusted sources and exchange data or information in a secure way; e.g. credential repositories, higher education institutions, the database of the European Quality Assurance Register for Higher Education (DEQAR), etc.

- Collaborate continuously with internal and external stakeholders to **establish common trust measures** for data exchange. For instance, through the Groningen Declaration Network (GDN), a global initiative that enables digital student data portability across borders. It offers a set of principles and guidelines for ensuring trustworthiness and security of digital student data among different stakeholders.

Example 4.1: Streamlining applications with electronic identification solutions

The Swedish ENIC-NARIC (Swedish Council for Higher Education, UHR) has integrated its digital application system with national electronic identification solutions. Applicants can access the service called "Mina sidor" (My Pages) to request an evaluation of their foreign qualification using their Swedish national eID. This covers about 90% of the applicants. The national eID allows applicants to authenticate their identity and retrieve their personal data from the national ID registry. This ensures that their name and Swedish national identity number are accurately entered into the processing system and prevents identity fraud. Furthermore, the service has been enhanced to provide tailored information to applicants based on their country of study. "My Pages" also allows them to monitor the status of their application online.

The application system supports various mobile electronic identity solutions that are approved by the Swedish government, such as BankID, Mobile BankID and Freja ID Plus (the last one is not issued by banks). Applicants can log in to My Pages, prepare their application, save it for later, upload the required documents and submit their application when ready. Applicants that do not have an eID and/or a Swedish national identity number can still apply for credential evaluation online, through a different digital pathway.

Example 4.2: Recognition statements as verifiable credentials – a pilot with European Digital Credentials for Learning

European Digital Credentials for Learning (EDC) is a recently launched EU standard for issuing tamper-proof, verifiable education credentials. Learners can store their credentials in an e-wallet and have full control over what credentials they want to share, with whom and for how long. The EDC initiative was started by the EU in 2018, and the launch of the technical infrastructure took place in 2021. EDC uses the European Learning Model and open standards that are fully aligned with familiar EU frameworks and instruments such as the European Qualifications Framework for Lifelong Learning (EQF) and the European Classification of Skills, Competences, Qualifications and Occupations (ESCO).

The DigiNet project partners conducted a pilot with the European Digital Credentials for Learning team, to test the use of the EDC infrastructure and explore how digitally verifiable statements could be useful for recognition.

First, the project team attended a training webinar by the EDC Support Team, to learn how to use the EDC-infrastructure in practice to build digitally-signed recognition statements. They subsequently used the EDC Online Credential Builder ("developer playground") to create digitally signed recognition statement and discussed the experiences and outcomes in an evaluation meeting.

While not all aspects of semantical and technical interoperability could be assessed in depth within the scope of the pilot, the partners did see clear benefits in expressing recognition statements in standard comparable terms and in the technical format of a verifiable credential. This would increase the portability and verifiability of the statements and give the holder more agency and control over the document. At the same time, the centre that issued the statement can revoke the certificate, if necessary. Apart from its features, the benefits of using the EDC-platform would depend on its adoption and acceptance by important stakeholders, such as higher education institutions and employers. A follow-up project will be conducted to examine the possibilities and requirements of connecting ENIC-NARIC systems and workflows to the EDC platform.

3.5 Sharing and reusing data

Sharing and reusing existing data from previous research or collection can save a significant amount of time and resources. It can also enhance the quality and reliability of recognition decisions. This is especially important for ENIC-NARICs when they create or improve digital systems for managing information or handling cases, which contain a lot of data on foreign qualifications and education systems.

When developing digital solutions for providing information or evaluating credentials, these are some aspects to consider in this regard:

- Consider creating a knowledge database of qualifications that is **searchable by categories**, such as the name of the institution, name of qualification, awarding country, awarding year, assessment, etc. It can be useful to apply query processing and optimisation methods to support quick and effective data retrieval and analysis. Depending on the centre's mandate, the database can be used by credential evaluators or made accessible to stakeholders to assist them in their recognition decisions.

- Set clear **standards and formats** for each category in your digital database or platform to ensure the data quality and consistency. Standards and formats are rules that specify how data should be represented, organised, and validated (see also 3.4 on interoperability). Data quality and curation are also essential if you intend to apply machine learning methods on your dataset; for example predictive algorithms to match new credential evaluation requests to older recognition decisions in your database.

- If you manage a case-handling system containing individual recognition assessments, identify **what information you can retain** and what data need to be deleted over time.
  ENIC-NARIC centres often handle applicants' personal data that need to be privacy protected and can only be stored for a specific purpose and/or a limited amount of time.
  It is therefore important to determine:
  - what personal data should be deleted after a certain period of time, such as applicants' names, contact details, copies of qualifications or identification documents (see also 3.3 on data minimisation and data retention policies) and to implement methods to delete or anonymise the personal data in the related files, and
  - what information on the qualifications and the evaluation process can be preserved (e.g. the name, year and level of the qualification, the country and institution of origin, the outcome of the evaluation etc.) to build or expand your knowledge database.

- One of the challenges of information provision is to answer the frequent and repetitive questions that stakeholders may have on topics concerning recognition. To improve efficiency and **reuse answers to common questions**, there are several techniques that can be applied, for example:
  - Building a centralised repository of short articles or standardised answers that can be easily accessed and updated;
  - Developing FAQs that can be displayed on your website or application portal, or
  - Installing a chatbot that can interact with users using natural language and answer the most common questions people ask (see example 5.1 below). This can be a particularly effective way to answer repetitive questions, as chatbots can be trained to understand a wide variety of queries. They do require content curation in the backend to ensure that they are up-to-date and accurate. This can be done by analysing the reports that the chatbot produces to identify new or unusual queries.

- In addition to these techniques, centres can use a variety of other channels to provide information to stakeholders, such as a phone system with an auto-attendant menu, structured contact forms, or self-serve tools. Technology can also be used to automate tasks, such as routing calls to the appropriate department or to standardised answers to common questions.

- ENIC-NARIC centres often monitor and **share data and developments** related to credential evaluation in the national context and within the Networks. When designing or developing a database, define the purpose, scope, audience, and frequency of your centre's reporting. It may prove helpful to include tools in the IT design that facilitate **data management, analysis and visualisation**. These can include:
  - filters and queries to sort, select and cross-reference data,
  - charts and graphs to visualise data, and
  - (automated) reports and dashboards to summarise and present data.

Example 5.1: Using a chatbot to help applicants and improve efficiency

Cybèle is a chatbot that was launched in 2021 by the French ENIC-NARIC (France Education International - FEI). It is a service that provides quick and accurate answers to common questions from applicants about the recognition of foreign qualifications, the application procedure and file processing. The chatbot was created to address the increasing number of emails from applicants and the difficulty of managing them efficiently with limited staff resources.

The chatbot is available on FEI's website and interacts with users through text messages. It uses artificial intelligence to learn from a growing database of previous questions and answers, as well as user feedback and updates from the French ENIC-NARIC's team. The chatbot handles more than 200.000 user queries per year, with a highly positive performance rate.

Cybèle also produces automated internal reports on answers that users rated as "non satisfactory", so that the knowledge base can be constantly improved. In these cases, the chatbot offers applicants to forward their questions to FEI's mailbox, to be answered by a staff member. Alternatively, it guides users to other relevant sources of information. By doing so, Cybèle helps to improve the quality of service, save staff resources and enhance the applicants' experience.

3.6 Compliance with the Lisbon Recognition Convention

The ENIC-NARIC centres have different mandates, but they all share the common responsibility of facilitating the implementation of the Lisbon Recognition Convention Treaty at the national and European level. The Lisbon Recognition Convention and the EAR Manual provide the guidelines and good practices for the recognition of qualifications in the Networks. The ENIC-NARICs should ensure that their databases and systems are aligned with these standards. To achieve this, the following aspects should be considered when designing databases or digitalising credential evaluation workflows:

- Comply with (inter)national regulations and choose a design for your database or application that allows you to act in line with the Lisbon Recognition Convention. Use the **European Area of Recognition (EAR) manual** as a reference and check if your digital workflow matches its good practices. Pay specific attention to the following points:
  - Design IT solutions that support **transparent, consistent** and **efficient** recognition procedures;
  - Make sure that your digital workflows can handle **appeals, revisions and revocations** of recognition decisions (if applicable for your centre), and
  - Document the process and principles of your digital applications and databases for quality assurance purposes (especially if parts of the workflow are to be automated). Make sure that your quality assurance framework is aligned with and up to date with all digital developments (see example 6.1).
- One of the basic principles of the Lisbon Recognition Convention is to grant applicants access to a fair assessment of their qualifications. Therefore, be prepared to receive, process and store qualifications in **different data formats** and of **different data maturity levels**, and implement methods for **secure delivery** (see also 3.2 on accessibility and 3.4 on interoperability). Since not all higher education institutions issue digital qualifications yet, keep your recognition system open for "born-analogue" documents (e.g. scanned paper qualifications, with verification options) as well as "born-digital" ones (e.g. verifiable credentials). Also ensure that applicants are granted access to information on the status of their application during the process, if needed.

- When issuing digital recognition statements, choose data formats that contain minimum security features and that are used and **accepted by learners and stakeholders**. Implement **verification options** that are freely and easily accessible at any time for admission officers, employers, immigration officials and other relevant stakeholders. Depending on the format and technology used, include the possibility to **offer a replacement** or facilitate (renewed) access to a recognition statement already issued - ideally through "**self-service options**", that follow user-centric design. These are features that enable applicants to perform tasks or access information (e.g., downloading a recognition statement) without the need for human assistance.

Example 6.1: Update of the Pan-Canadian Quality Assurance Framework to reflect the trends in digitisation of learner data

The Pan-Canadian Quality Assurance Framework for the Assessment of International Academic Credentials (QAF) is a framework that provides guidance and best practices for evaluating foreign academic credentials in Canada. It is maintained by the Canadian Information Centre for International Credentials (CICIC), the Canadian ENIC, under the direction of the Council of Ministers of Education Canada (CMEC) and a QAF Steering Committee composed of members from various organisations that adhere to the framework. The QAF aims to ensure fair, reliable, and consistent assessment methods for international academic credentials across different organisations and jurisdictions. It draws on the General Guiding Principles for Good Practice in the Assessment of Foreign Credentials developed by the provincial credential assessment services supported by CICIC, which are aligned with the 2010 Revised Recommendation on Criteria and Procedures for the Assessment of Foreign Qualifications adopted by the Lisbon Recognition Convention Committee.

The QAF is regularly revised and updated to respond to new developments. It is currently undergoing an update to incorporate trends in the field of digitalisation of learner data and to add principles that facilitate the acceptance, processing and issuance of these data. CICIC prepares the new principles with the assistance of an expert consultant. The new principles will be presented to members of the Alliance of Credential Evaluation Services of Canada (ACESC) and to the QAF Steering Committee for review and approval.

Summary of recommendations

The final section of this report presents a concise and accessible summary of the practical guidelines and recommendations discussed in the preceding chapter. These guidelines serve as a set of principles for designing and implementing digital solutions for recognition processes. Each principle is accompanied by a rationale that explains how it can enhance the quality and effectiveness of electronic recognition systems.

Adhere to a user-centric approach

Rationale

User needs and requirements should guide the design and development of the IT architecture around the recognition process. Users (be it learners/applicants, admission officers, credential evaluators, etc.) expect user-friendly, intuitive and coherent IT services. By adhering to a user-centred approach, users will find it simpler to interact with the IT structure and reach their goals. This can help lower support costs, increase efficiency and reduce processing time.

Recommendations

- Conduct user research to understand the needs and challenges of different stakeholders who seek and/or provide credential evaluation services or information;
- Involve users early on in the design process of your digital service, using methods like service design to identify and address points of frustration and opportunities that users encounter when they interact with your system;
- Ensure that your digital service is usable and accessible for different users, and that it increases their satisfaction and trust;
- Plan and integrate feedback mechanisms in your digital service, such as surveys, comments, suggestions or complaints;
- Collect and analyse user feedback data regularly and systematically to measure and improve the usability and satisfaction levels of your digital credential evaluation services.

Design for accessibility and inclusion

Rationale

IT services and platforms around recognition should be usable by everyone, regardless of age and ability. This ensures that all users, including (but not limited to) people with disabilities, people of higher age and non-native speakers are able to enjoy a similar level of service. Facilitating access to recognition and to information on higher education systems and qualifications of the other parties is also a central tenet of the LRC.

Recommendations

- Ensure that platforms and services related to recognition are accessible and inclusive for everyone; consider applicants with disabilities, varying digital literacy levels, and different linguistic backgrounds;
- Comply with national and international regulations that set standards and guidelines for the accessibility of digital products and services;
- Involve users from different groups and perspectives throughout the design stages to secure inclusivity in the design process and identify potential usability problems;
- Prioritise the most essential functions that benefit the majority of users, as well as alternatives for those with additional needs (e.g. regarding multilingualism or multichannel delivery of services) and balance these with the IT project's resources and constraints.

Ensure data security and privacy

Rationale

ENIC-NARIC centres have to provide their services and deal with personal data in a secure manner. This entails that they have to comply with regulations and fulfill requirements for information security and privacy. Protection of legal rights, privacy, information security and transparency are important in building trust in the centre's services.

Recommendations

- Adhere to the relevant (inter)national laws, regulations, standards and agreements on data privacy and security that apply to your context and scope of work;
- Incorporate data protection by design principles into the IT system development process and consult with legal experts on the data protection obligations and compliance;
- Implement data minimisation and data retention policies;
- Employ secure protocols and features such as encryption and authentication techniques to safeguard personal data in transit (when sending or receiving data) and data at rest (when storing data);
- Establish suitable technical and organisational measures to ensure the security, integrity and availability of personal data of applicants;

- Establish clear roles and responsibilities for data ownership and data management, such as who can create, modify or delete the data;
- Provide clear and transparent information to users and applicants about the purpose, scope and duration of their data processing, as well as the parties involved and the safeguards in place;
- Conduct regular assessments after deploying the IT system to monitor and evaluate the effectiveness of the data privacy and security measures and make any necessary adjustments.

Design for sustainable interoperability and data portability

Rationale

When establishing IT services for recognition, digital solutions should be developed in a way to minimise technological dependencies, to facilitate interfaces with other (national and international) digital solutions and to be able to adapt to a rapidly evolving technological environment. Data should be easily transferable among different systems and applications to avoid lock-in, to realise integrated services and support flexible and cost-effective processes.

Recommendations

- Build a solid information architecture to organise your data: elaborate clear and consistent data models and schemas that define the essential attributes and relationships of credential evaluation data;
- Evaluate if and how you can (partially) align your data model with common data models and semantic vocabularies to facilitate data portability and connectivity with other trusted stakeholders (e.g. HEI, diploma or ID registers, accreditation agencies);
- Use standard identifiers to describe entities in your data model where useful and possible to avoid errors and duplication and to facilitate data linking across different platforms;

- Ensure that your database can receive, process and/or produce various standards for data formats – now and in the future. Design for sustainable interoperability: i.e. for the platform to be evolutive and adaptive to possible future standards for data formats, with or without the intervention of a third-party;
- Engage in ongoing collaboration with internal and external stakeholders to adopt common trust measures for data exchange.

Share and reuse data

Rationale

Reusing data already available helps to increase the knowledge, consistency and efficiency of the credential evaluation process. It can also facilitate automation of (parts of) the service provision.

By sharing relevant data, the public domain benefits from information managed by ENIC-NARIC centres for increased knowledge and transparency in regard to international higher education systems and qualifications.

Recommendations

- Consider creating and maintaining a knowledge database of qualifications that is searchable by categories;
- Define clear standards and formats for each of the categories in the digital database or platform to ensure the quality and consistency of the data stored in it;
- Determine what personal data should be deleted after a certain period of time and implement methods to delete or anonymise the personal data in the related file (while preserving information on the qualifications and the evaluation process to build or expand the knowledge database);

- To improve efficiency and reuse answers to common questions, consider developing a centralised repository of short articles or standardised answers that can be easily accessed and updated;
- Define the purpose, scope, audience, and frequency of your centre's reporting when designing or developing a database;
- Include tools in the IT design that facilitate data management, analysis and visualisation such as filters and queries to sort, select and cross-reference data, charts and graphs to visualise data.

Ensure compliance with the LRC

Rationale

The databases and systems of the ENIC-NARIC Networks have to operate in line with the Lisbon Recognition Convention and the good practices as formulated in the EAR manual to support fair and smooth recognition.

Recommendations

- Ensure that IT solutions facilitate fast, transparent and consistent recognition procedures, in line with the good practices laid out in the EAR manual;
- Accept and process qualifications in various data formats and maturity levels;
- Accommodate appeals, revisions or revocations of recognition decisions in your digital workflows;
- Provide options for applicants to request and receive information on the status of their application during the process, if needed;
- Document and elucidate the process and principles of your recognition workflows for quality assurance purposes and align your quality assurance framework with developments in digitalisation;
- Include the possibility to offer a replacement or facilitate (renewed) access to a recognition statement already issued;

- Choose data formats for recognition statements that have minimum security features and that are widely accepted by learners and stakeholders;
- Provide verification options for recognition statements that are free of charge and easy to access at any time for various stakeholders.

Colophon

Acknowledgements:

Nuffic (Coordinator) - The Dutch organisation for internationalisation in education

Centro Informazioni Mobilita Equivalenze Accademiche (CIMEA)

Canadian Information Centre for International Credentials (CICIC)

Estonian Education and Youth Board

France Education International

German Central Office for Foreign Education (ZAB)

Groningen Declaration Network (GDN)

Norwegian Agency for Shared Services in Education and Research (SIKT)

Polish Agency for Academic Exchange (NAWA)

Swedish Council for Higher Education (UHR)

Design

Osage

Nuffic Kortenaerkade 11
2518 AX The Hague
PO Box 29777 2502 LT The Hague
T +31 (0)70 4260 260 www.nuffic.nl