Impulse

Identity Management in PUbLic SErvices

D6.3 Roadmaps for further development and deployment of the IMPULSE solution

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Executive summary

WP6 aims at representing the project's activities and results to a wider audience, through design and publication of roadmaps. This will help support the implementation of the IMPULSE solution and complementary ones in other countries and regions not covered by the project.

The purpose of deliverable D6.3 is twofold, yet complementary: the design of "6" roadmaps that focus on the pilot experiments and their ideation outputs and "1" roadmap focusing on the European level, integrating those six.

This deliverable was developed in close collaboration with all the project partners thanks to the sharing of results from the other work packages (in particular WP2, WP3, WP4 and WP5), combined with contributions from external experts.

As a result, 6 roadmaps based on the six pilot cases and 1 on European-level integration have been written and are now ready to be published and shared with a wider audience. This deliverable will also be followed by D6.4 which is an analytical report explaining in more detail the roadmaps.

Document information

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Work package	**Number**	WP6	**Title**	Roadmapping for adoption, escalation and sustainability
Task	**Number**	T6.3	**Title**	Design of roadmaps

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Summary (for dissemination)	One of WP6 goals is create roadmaps for the adoption, adaptation and development of the IMPULSE solution, relying on the partners' contact networks, the DIHs participating in the Digital Innovation Board (DIB) and the experts on the Advisory Board (AB). he development of 6 specific roadmaps and one EU roadmap is intended to help partners gather more information, to enable a simple and clear visualisation of the solution being tested in the project and to promote the adoption and/or adaptation of the IMPULSE initiative in European countries, while their integration into a more global European roadmap will facilitate the exploitation of synergies and coordinating efforts. These roadmaps contain information such as the technologies used in the project, a summary demonstration of the application, the process and results of the pilot experiments, as well as useful lessons and recommendations and, finally, avenues for further development of the solution. These roadmaps will be available to anyone (other public administrations, service providers, publics, police, etc.) wishing to learn a little more about the project, and are also an invitation to take an interest in the details published in the reports of the various work packages. In this way, these roadmaps serve as a promotional summary of the 36-month IMPULSE project.
Keywords	Roadmap ; Pilot ; EU ; Exploitation ; Recommandation

Version Log			
Issue Date	**Rev. No.**	**Author**	**Change**
September 2023	1	Bertille Auvray (TES)	First draft
Sept - Nov 2023	2	All WP leaders and pilots	Roadmaps contributions
December 2023	3	Bertille Auvray (TES)	Second draft
January 2024	4	Bertille Auvray (TES)	Final draft for submission
February 2024	4.1	Alicia Jimenez (GRAD), Kristrún Th. Gunnarsdóttir (RVK)	Deliverables and roadmaps review
February 2024	5	Bertille Auvray (TES)	Final draft for submission

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Abbreviations and acronyms

AB: Advisory Board
AEI : Agency for European Integration and Economic Development
AI: Artificial intelligence
ARH: City of Aarhus, Denmark
BDIH: Basque Digital Innovation Hub
CEI: Call for expression of interest
CEL: CyberEthics Lab. Srls
dApps: Decentralized Applications
DEP: Digital Europe Programme
DIB: Digital Innovation Board
DIH: Digital Innovation Hub
DIN: Deutsches Institut für Normung e. V.
DoA: Description of action (IMPULSE project)
Dx.x: Deliverable
EDIH: European Digital Innovation Hub
e-ID: Electronic identification
ERTZ: Basque Government – Security Department – Ertzaintza
Fh ISI: Fraunhofer Institute for Systems and Innovation Research
GIJON: City of Gijón, Spain
GRAD: Fundación Centro Tecnolóxico de Telecomunicacións de Galicia
ICERT: Infocert S.p.A.
ICT: Information and Communication Technologies
LUT: Lappeenrannan-Lahden Teknillinen Yliopisto
MOP: Municipality of Peshtera, Bulgaria
NGO: Non-Governmental Organization
PAs: Public administration-s
RTOs: Research and Technology Organisations
RVK: City of Reykjavik, Iceland
STP: Sofia Tech Park
TES: Association du Pole de Compétitivité Transactions Electroniques Sécurisées – DIH
TREE: Tree Technology SA
Tx.x: Task
UC/IC: Union of Italian Chambers of Commerce / InfoCamere
UNE: Asociación Española de Normalización
WP: Work package (IMPULSE DoA)
WG: Working Group

1 Introduction

1.1 Reminder of the task

IMPULSE is carrying out a user-centric and multidisciplinary impact analysis on the integration of blockchain and AI for eID in public services. The project is evaluating the benefits but also the risks, costs, and limitations of the integration of such technologies in this context. At European level, this means that cross-border access, security, and adaptability will have to be guaranteed to ensure the solution's marketability.

Within the structure of the project, WP6 focuses its work on the wider opening of the project to a more general theme: the use of new eID technologies in public services. Thus, this WP aims both at creating several local communities in different European countries around this topic and to manage them; also, to build on the experience of the IMPULSE project, and more particularly of the 6 case studies, to try and encourage the implementation of these innovative technologies in the widest possible way, through the IMPULSE solution and related ones.

Specifically, Task 6.3 focuses on designing "6 + 1" roadmaps for the further development and deployment of the IMPULSE solution.

1.2 Aim of the deliverable

Task 6.3 consists of designing "6" roadmaps that focus on the pilot experiments and their ideation outputs, and "1" roadmap focusing on the European level, integrating those six. Designing several country-specific roadmaps instead of one generic roadmap helped partners gather a broader base of information to support the adoption of the IMPULSE initiative in other European countries. However, integrating these roadmaps into an overarching European level roadmap facilitates the exploitation of synergies and coordination. These roadmaps will be presented during events organised as part of the project and will be shared within the community to foster innovation in the field of eID security and management after the project end.

1.3 Research questions

The following research questions were covered in activity 6.3:

- How to present IMPULSE in a comprehensive way for any type of reader?
- What did we learn from the pilot experimentations that needs to be shared with others, in order for them to follow the same path or avoid the obstacles?
- What are the next steps to be considered?
- Who are the main contacts for someone who wants to experiment/implement a solution such as IMPULSE?

1.4 Relation to the whole project

D6.3 aligns with the following goals and specific objectives defined in the IMPULSE DoA:

Goal 5: Define clear, tangible and specific roadmaps for the introduction, adoption, escalation and long-term sustainability of the holistic eID framework, supporting public services at different levels.

- S05.2 - Build actionable roadmaps, aligned with DIH plans, defining pathways for a successful adoption of disruptive technologies benefitting eID on public services, considering the variety of stakeholders and particularities of potential fields of applications.

In short, the D6.3 contribution to IMPULSE is:

- Defining a coherent and comprehensible architecture for the roadmaps
- Gathering sufficiently concise but clear information to include in the roadmaps
- Acting as a reader during the writing process to ensure comprehension
- Designing 6+1 clear, usable and attractive roadmaps that respect both the project process and the desired overall goal

1.5 Document architecture

This deliverable is divided into 3 parts:

- Part 1 is dedicated to the definition of the roadmaps
- Part 2 is focusing on the path followed to design the final roadmaps
- Part 3 is about the external experts who took part in knowledge-sharing

2 Roadmaps – a definition

A roadmap is a simplified, usually graphic, representation used to effectively communicate and share a strategic intention in order to mobilise, align and coordinate the efforts of stakeholders to achieve one or more objectives. In IMPULSE, roadmaps are used to define pathways for a successful adoption of disruptive technologies benefitting eIDs in public services. They define pathways for further escalation and long-term sustainability based on realistic business plans and exploitation strategies, considering the variety and particularities of different local ecosystems.

- The goal of the **pilot roadmaps** is to further the development and foster the deployment of the IMPULSE solution. By development and deployment, we mean the takeover of the solution or part of it to carry it further by other organisations (e.g., public administrations, DIHs, services providers from the private sector, etc.). It is a combination of national level and pilot level potential.
- The goal of the **EU roadmap** is to imagine the integration of the IMPULSE solution at European level, i.e., to further the development and foster the deployment of the IMPULSE solution at the EU level. By development and deployment, we mean the takeover of the solution or part of it to carry it further by other organisations (e.g., public administrations, DIHs, services providers from the private sector, etc.).

The roadmaps draw the path that the different pilots have taken, from their state before the solution, the technologies that have been applied during the implementation of the piloting activities and their holding in two iterations, to the analyses and consequences derived from these pilots and the research within the project by means of learnings and recommendations, and the potential to go further.

The roadmaps (even at draft stages) were used as marketing materials during events where IMPULSE participates, to foster innovation projects in the fields of eID security and management (see some examples in section 5).

Overall, the idea is that other organisations can identify with one or more pilot cases (e.g., because the social, political and digital situation is the same, the current needs are similar or the same barriers and limitations are identified), get inspired by it and want to apply, replicate or develop the IMPULSE(-like) solution in their territory.

At stated in the project proposal, a roadmap consists of the following elements: goals, milestones, gaps and barriers, action items, priorities and timelines. The different items interact and are influenced by each other:

- **Goals** "refer to a clear and concise set of targets that, if achieved, will result in the desired outcome". Quantified goals provide specific advantages.
- **Milestones** represent "the interim performance targets for achieving the goals, pegged to specific dates".
- **Gaps and barriers** stand for a list of any potential gaps in knowledge, technology limitations, market structural barriers, regulatory limitations, public acceptance or other barriers to achieving the goals and milestones. In the case of IMPULSE, this is analysed in tight cooperation with the preceding WPs (in particular with WP4).
- **Action items** describe "actions that can be taken to overcome any gaps or barriers that stand in the way of achieving the goals". In the context of IMPULSE, this refers, for example, to further regulatory and standardisation activities, e.g., to establish a standard based on an intended CEN Workshop Agreement.
- **Priorities and timelines** consist of "a list of the most important actions that need to be taken in order to achieve the goals and the time frames."

3 Roadmapping process

3.1 Genesis of the roadmaps

Before arriving at the documents inserted here in appendix, several drafts were made that evolved over the course of the project and as information became available. The first ideas were:

- A roadmap as a visual/graphical document, explaining the path to be taken to implement an eID solution.
- 6 “local” roadmaps: path actually taken.
- 1 “EU” roadmap: ideal path to be taken.
- A roadmap including all the steps and concepts to be considered.
- A visual cover page + about ten illustrated pages with: 1) pathway explanation, 2) relevant contact along the way, 3) opening to other uses based on the pilot cases.
- A document to be distributed to interested parties (public administrations, DIHs, etc.)
- Eye-catching and promotional tools, encouraging the reader to want to read the final and complete analytic report.

3.2 First drafts

The first real draft (below – Figure 1) was produced by TES for the F2F meeting in Madrid in February 2023. It represents a generic architecture of the roadmap that allows the reader to understand the path of the project and bring it to the results and highlights.

During the F2F meeting, the partners were invited to reflect and give their opinion, according to their area of involvement in the project, on how to perfect this architecture. A second version (below – Figure 2) was therefore produced following this workshop, to reflect everyone's requests and modifications.

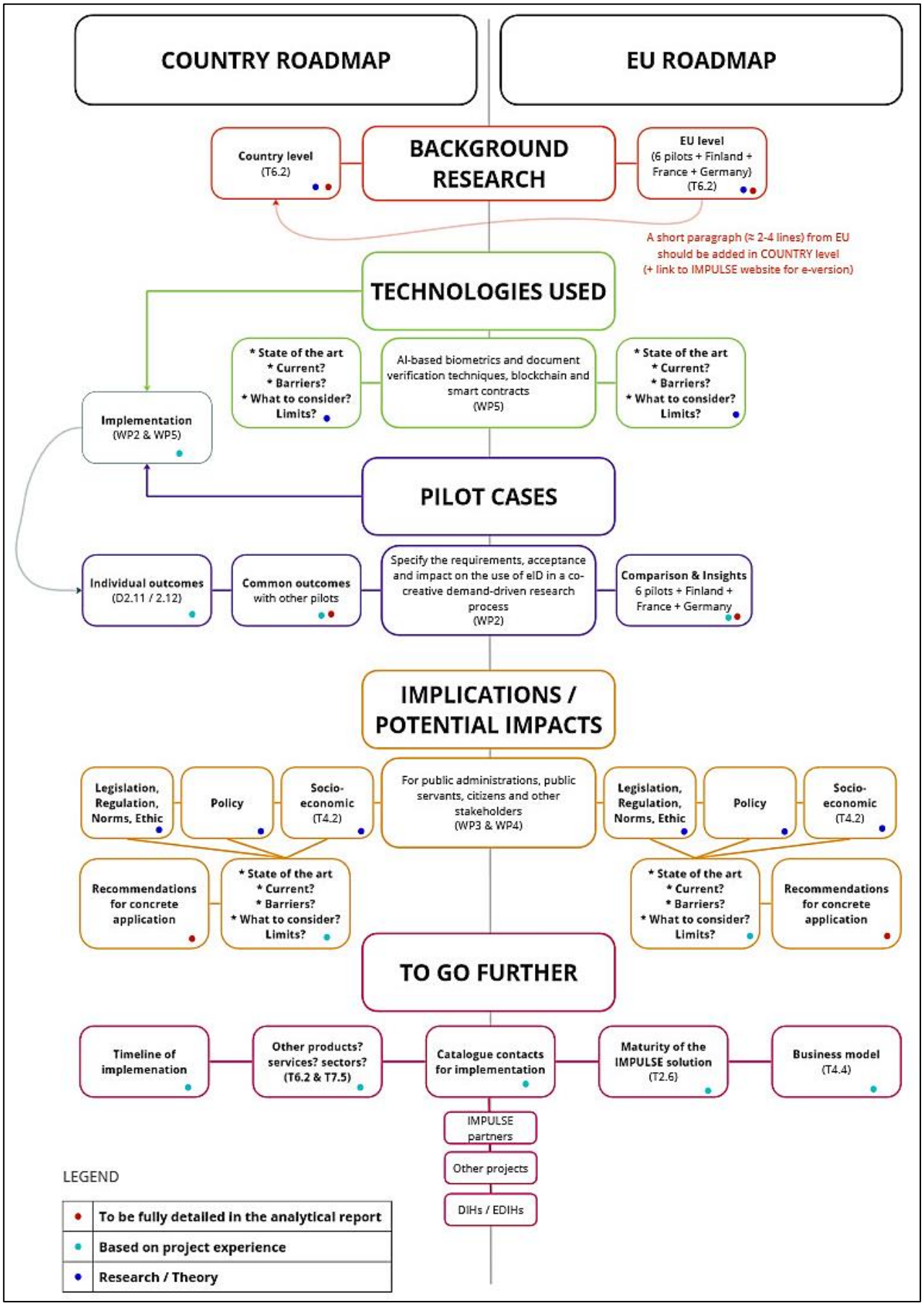

Figure 1: Roadmap architecture - First attempt

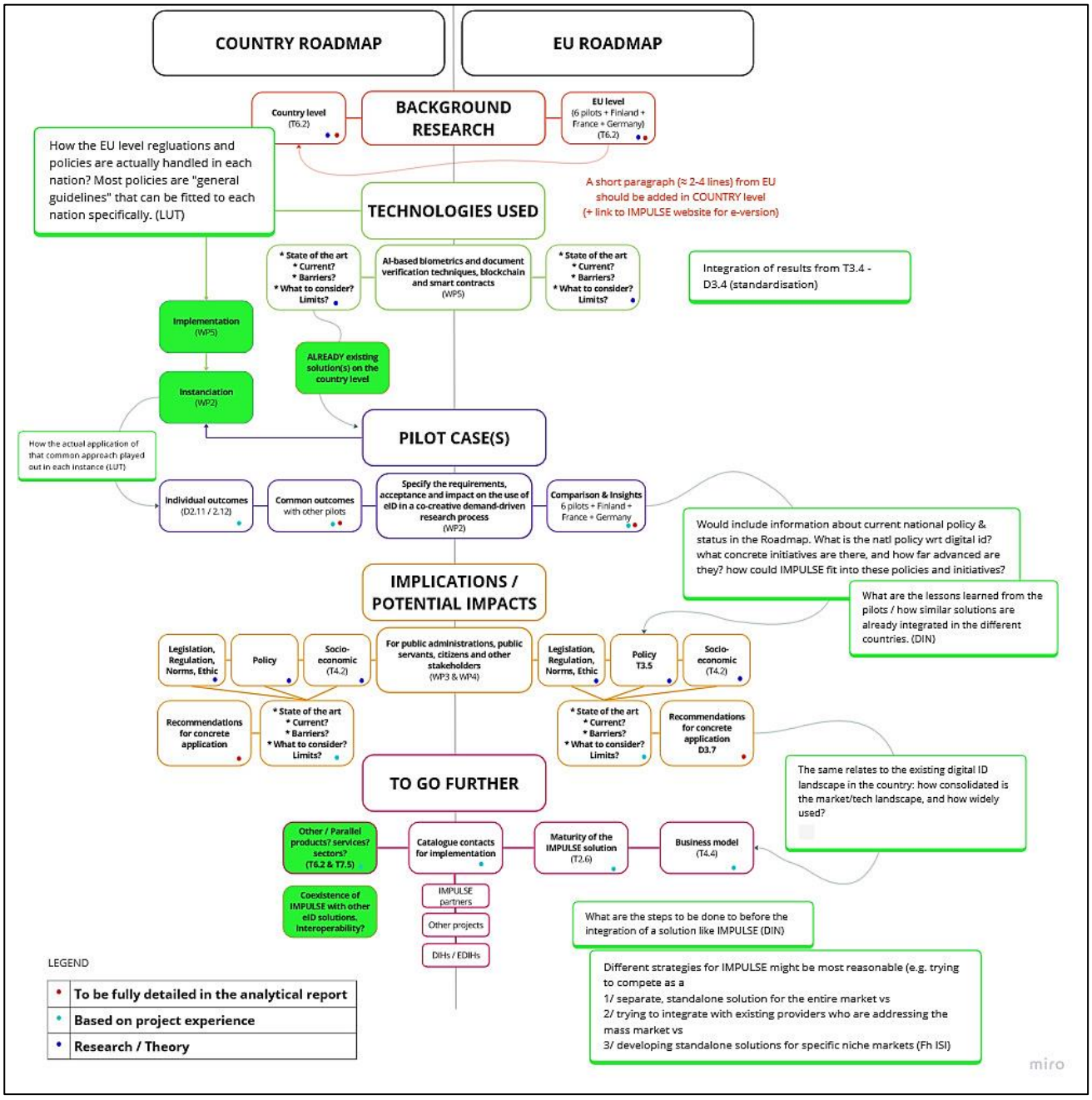

Figure 2: Revised roadmap architecture

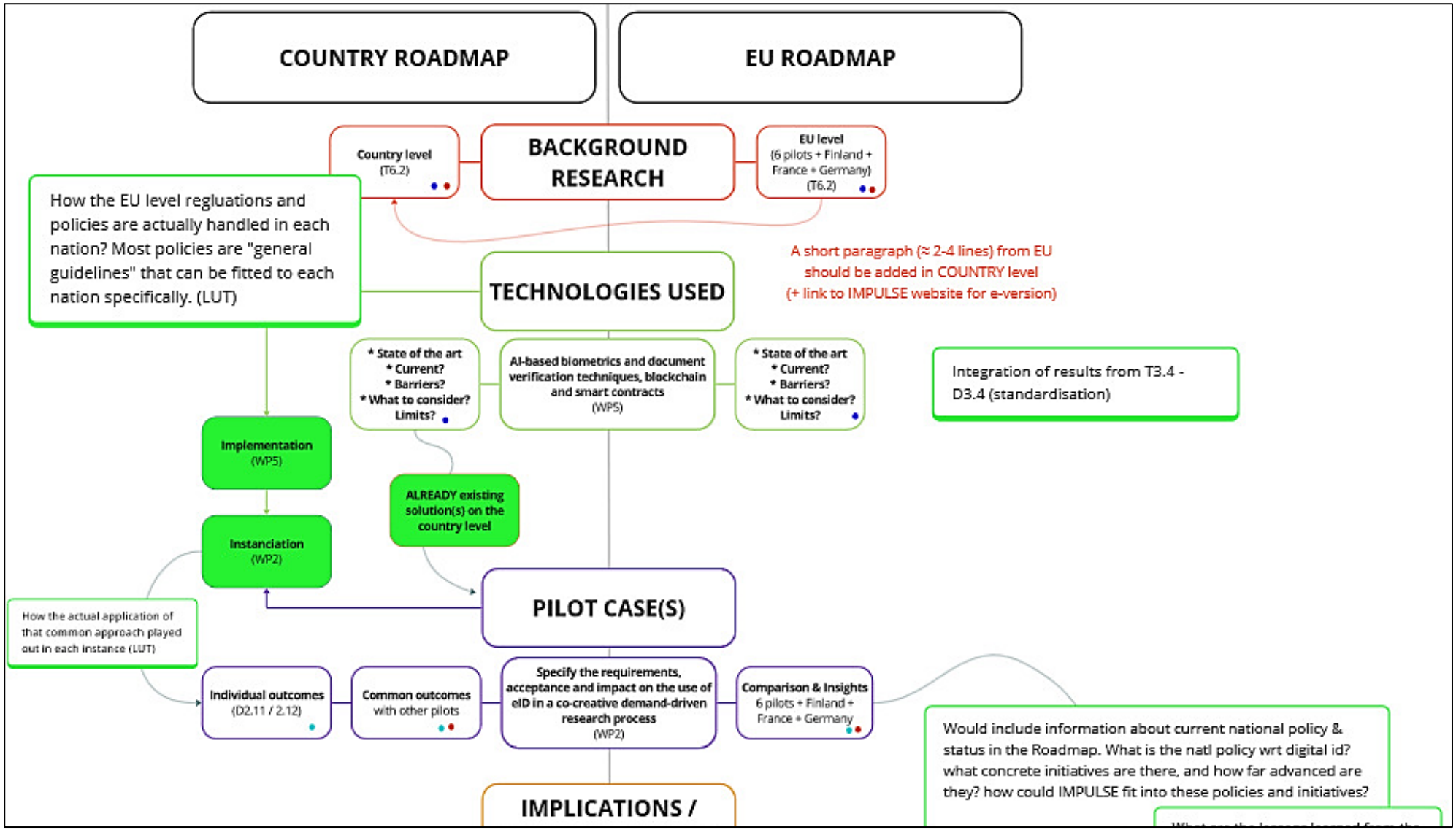

Figure 3 Close up - Top

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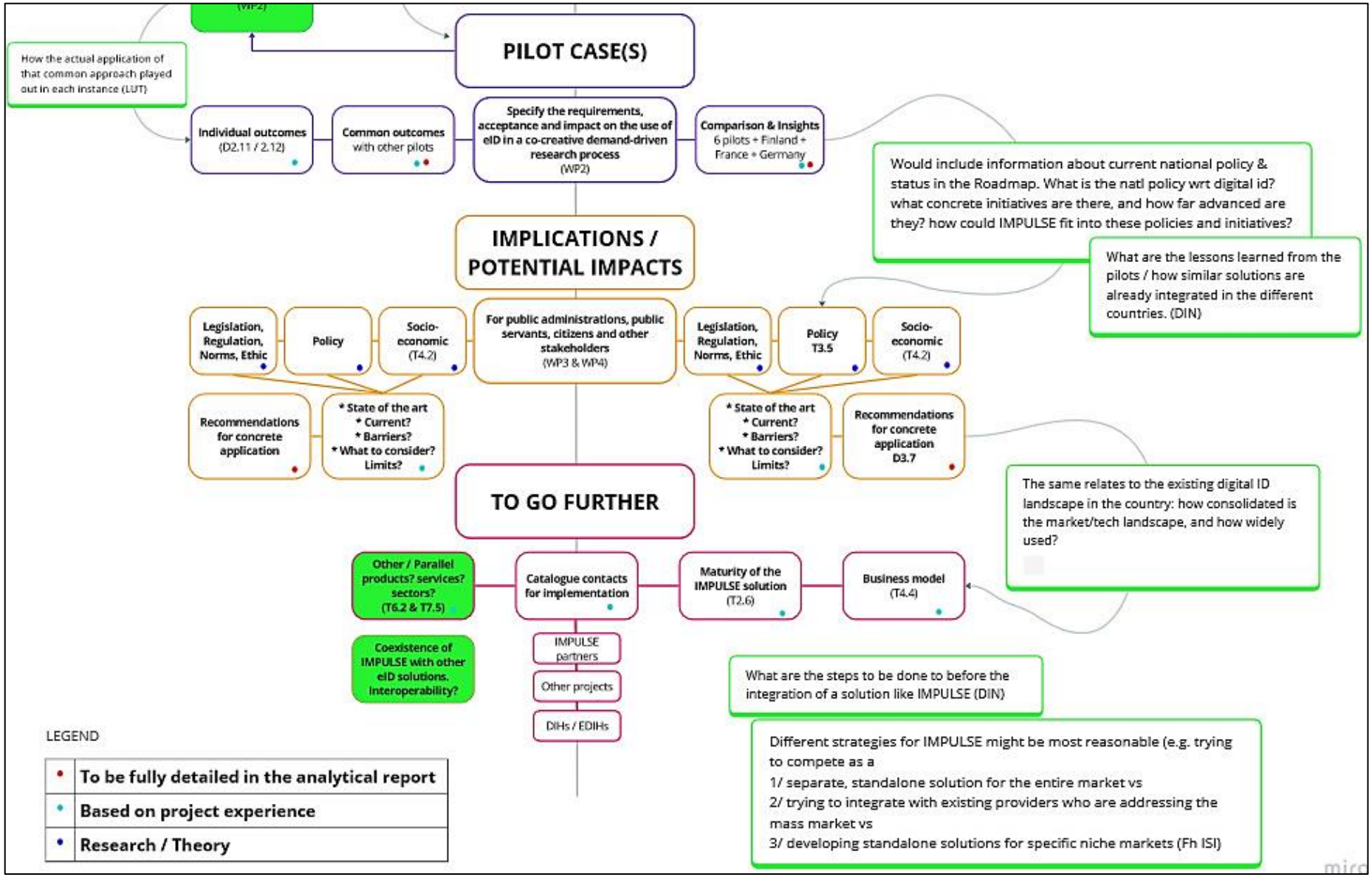

Figure 4 Close-up - Bottom

3.3 Formatting and gathering of initial data

After this revision, the roadmaps initially took the form of a text file containing large amounts of data supplied by all the partners, divided into chapters according to the architecture.

- **Introduction**: Presentations (*to introduce the different topic that will be covered*)
  - Roadmap purpose
  - IMPULSE project
  - The specific pilot case covered by the roadmap
- **Chapter 1**: Background research (*to provide more context to the readers so that they can potentially identify with it and lay the foundations for the reason for the experiment*)
  - Advancement in digital technology
  - Needs of PAs and publics
  - Regulations and policies
- **Chapter** 2: Technologies used (*to highlight IMPULSE's choice of disruptive technologies and their impact*)
  - State-of-the-art
  - Elements of artificial intelligence and self-sovereign identity
- **Chapter 3**: Pilot case (*to introduce the reader to the process followed in the project and the results drawn from experimentation in a real environment*)
  - Explanation of the reason for doing this experiment with IMPULSE
  - Process
  - Results (testers opinions)
- **Chapter 4**: Implications and potential impacts (*to provide generic and specific information for public administrations, public servants, general publics and other stakeholders, as well as concrete recommendations*)
  - Socio-economic
  - Ethics
  - Policy
  - Regulation
- **Chapter 5**: To go further (*to provide information on potential avenues for development, improvement and business to implement a solution such as IMPULSE*)
  - Other products
  - Catalogue of contacts

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3.4 Final version for publication

The final versions of the roadmaps for the pilot cases and for the EU roadmap can be found in the appendix. The 6 pilot case roadmaps contain 8 pages, the EU roadmap 13 pages, and both contain a mix of explanatory text and images to make them easy and pleasant to read. They are divided as follows:

3.4.1 Pilot roadmaps

- **Introduction** (1/2 page)
- **Background research** (1 page)
  - Country specific
  - Pilot specific
  - Done by: Fh ISI, pilot PAs
- **Technologies used** (1 page)
  - AI
  - Self-sovereign identity
  - Done by: GRAD, ICERT, ALiCE, TREE, CEL
- **IMPULSE app** (1 page)
  - Done by: GRAD
- **Pilot case** (1 page)
  - Context and needs
  - Piloting process
  - Done by: LUT, pilot PAs
- **Findings and recommendations** (1 page)
  - Top 3 learnings and recommendations extract from the piloting activities
  - Done by: pilot PAs
- **To go further** (2 pages)
  - Timeline for adoption
  - Other roadmaps available
  - Resource list to contact
  - Done by: Fh ISI, TES

3.4.2 EU roadmap

- **Introduction** (1/2 page)
- **Background research** (1 page)
  - Country specific
  - IMPULSE specific
  - Done by: Fh ISI, pilot PAs
- **IMPULSE context** (1 page)
  - Done by: TREE, TES
- **Technologies used** (1 page)
  - AI
  - Self-sovereign identity
  - Done by: GRAD, ICERT, ALiCE, TREE, CEL
- **IMPULSE app** (1 page)
  - Done by: GRAD
- **Pilot cases** (1 page)
  - Pilots general presentation
  - Piloting process
  - Done by: LUT
- **Findings and recommendations** (4 pages)
  - From pilot experimentation
  - From project research
  - From external experts
  - Done by: pilot PAs, TES, Fh ISI, CEL
- **To go further** (3 pages)
  - SWOT analysis of IMPULSE
  - Timeline for adoption
  - Other roadmaps available
  - Resource list to contact
  - Acknowledgement
  - Done by: LUT, Fh ISI, TES

4 Interviews with external experts

A particular feature of the EU roadmap is the contribution of external experts to the 'Learnings and Recommendations' part. Indeed, in order to be able to cover the subject more widely, it was important to bring in the opinions of players other than those in the consortium, and in particular from different types of organisations. Four interviews were therefore conducted (to be found in the Learning and Recommendations chapter of the EU Roadmap).

4.1 Iratxe Martin – Basque Cybersecurity Agency

This agency is a member of IMPULSE's Digital Innovation Board and has been following the project from the outset, particularly the Ertzaintza case study, which is in its geographical area.

The Basque Cybersecurity Agency is the organization designated by the Basque Government to promote and develop a culture of cybersecurity in the Basque society, to energise activity and to strengthen the professional sector. They have a Computer Emergency Response Team (CERT) for cybersecurity incidents and offer prevention and response services, they do research and development in cybersecurity to create tools that empower companies and professionals, and they collaborate with Basque companies and contribute to the development of their businesses.

4.2 Hervé Jean – Idethic

IDETHIC supports companies and local authorities in their efforts to secure access to information systems and identity management in order to respect user privacy. It is currently developing a new concept in digital identity management: "Idego". This is a secure digital wallet that allows Internet users to log in, authenticate themselves without a password and distribute certified identity data under their control. Logging in no longer requires a password, the presentation of supporting documents or the completion of a form. Thanks to its architecture, this new concept is impervious to ransomware and malware, and its stealth makes hacker attacks drastically more difficult.

4.3 Thomas Möser – DIH Ost

DIH Ost is funded by the Austrian Research Promotion Agency FFG and the provinces of Lower Austria and Burgenland. It offers a comprehensive service programme to promote and increase the transformation capability and speed of small and medium-sized enterprises in Eastern Austria towards digital innovations.

4.4 Dr. R. P. Brand – Dutch Ministry of Economic Affairs and Climate Policy

Rob Brand is a Senior Policy Officer in the Directorate for Digital Economy at the Ministry of Economic Affairs and Climate Policy in The Netherlands. In line with his active involvement in realising the eIDAS regulation from the start in 2014, he holds responsibility for the Dutch policy on the eIDAS Trust Services. Alongside he represents the Dutch Government in the EWC and Potential consortia assigned by the European Commission to run the Large Scale Pilots for the EU Digital Identity Wallet. Furthermore Rob is a member of the eIDAS Expert Group and the ARF Toolbox group.

Built upon his past achievement of implementing the Identity Scheme for e-recognition, which is one of the few current notified schemes for Legal Person Identity in the EU, he is involved in business initiatives for the wallet. Rob has a distinguished career on the intersection of policy making, policy deployment, tech and digitization, most notably in the PKI-field.

5 Initial presentations of the roadmaps

The roadmap concept has already been presented on a number of occasions to obtain feedback and gauge the interest of potential readers.

These include the following events:

- REAL CORP 2022, November 14-16, 2022, 27th International Conference on Urban Development, Regional Planning, and Information Society
- 11th International Conference on Communities and Technologies, May 29, 2023 to June 02, 2023, Lahti, Finland.
- TRUSTECH Paris, November 28-30 2023, The international event dedicated to innovative payments and identification
- IMPULSE final conference in Rome, January 19 2024

The overall feedback from these presentations, at various stages of writing, was that the roadmaps were eagerly awaited and that they would undoubtedly be a good communication tool.

6 Conclusions

To conclude, the ambition of those roadmaps is to show a bit of everything that makes up the project and to help people discover its key components. The roadmaps are not intended to be full explanations of the project, but rather invitations to come and discover more, to arouse the curiosity of all audiences and to serve as a basis for discussions.

Annex A 6+1 roadmaps

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HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Identity Management in PUblic SErvices

Impact assessment of disruptive technologies on electronic identities (eID) for the improvement of digital public services for citizens.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

Roadmap n°1

IMPULSE – Identity Management in PUbLic SErvices – is a H2020-funded project aiming at developing a method for evaluating eID management and more specifically the identification of persons accessing online public services with the support of disruptive technologies, i.e., artificial intelligence and Blockchain.

The project focuses its research on evaluating benefits, but also the risks, costs and limitations of such solutions. It considers the socio-economic, legal, ethical and operational impacts, both for local administrations and publics, through the use of experiments in real conditions. These, together with framework conditions (GDPR and eIDAS2 compliance, existing eID systems and standards), provide a wide variety of contexts. Therefore, six case studies carried out by public administrations in five different countries were set up.

Aarhus Municipality

Aarhus is the second-largest city in Denmark with approximately 300,000 inhabitants. The original city grew up around the mouth of the Aarhus Å river where Vikings decided to settle thanks to the location's excellent potential. The Danish word for "river mouth" was at that time "AROS" from which "Aarhus" originates.

The **Aarhus case study** investigates how – and to which extent – an eID-solution can improve access to public self-services for vulnerable citizens. The Aarhus case explores whether storage of physical devices used for identification in public self-services and other ID documents can ease the often multiple barriers for vulnerable citizens in using public self-services. The case study is conducted by the Citizens Service Department within Aarhus Municipality in collaboration with a local, municipal workshop environment.

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Background research

In Denmark, successive governments have placed particular emphasis on the digitalisation of society.

1968 The basis for the Danish eID is the central personal identification number, the CPR number ("Centrale Personregister"). This number is used by practically all Danish authorities and also in the healthcare system.

2010 The government transferred the CPR number to the Internet. It introduced a digital identity called „NemID", which citizens use to log on to government websites and sign documents digitally. From the outset, Danish banks also used NemID, so the service quickly gained widespread acceptance among the population.

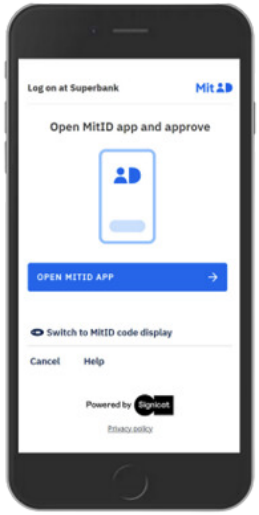
2011 The Danish Agency for Digital Government has maintained all tasks related to digitalisation. These include regulation, policy development, cross-cutting coordination, and implementation of nationwide IT infrastructure projects.

2015 Digital self-service and communication with the public sector was made mandatory for all inhabitants and businesses.

2022 With the new Danish government formed in late 2022, the digital purview has been placed in a new Ministry of Digitalisation and Gender Equality.

2023 MitID replaces NemID as the common public eID solution. The MitID system offers all three levels of assurance (LoA) from eIDAS, Low (single-factor authentication), Substantial (two-factor authenticator combination) and High (more advanced two-factor authenticator combination).

Denmark has consistently been ranked as the world's best digitized public sector in the United Nations' E-Government Survey since 2018 as well as number 1 in the European Commission's Digital Economy and Society Index in 2021. Simultaneously, Danish inhabitants show a high degree of trust in the digital public sector. Still, it is estimated that around 17% of the population can be characterized as challenged in the use of digital public solutions.



At the time of the switch from NemID to MitID in 2023, more than 90 percent of Danish citizens have their own national eID, be it as a PC and TAN or as a mobile version.

What about Aarhus Municipality?

The Citizens Service Department within Aarhus Municipality maintains a wide network in the field of digitalisation and digital inclusion.

On a national level, the department is leading a cross-municipal effort to extend the use of chatbots for citizen inquiries and appointments. The department is also very active in exerting influence on the further digitalisation of the Danish Public Sector services.

On a local level, the department facilitates multiple network groups on, among other things, digital inclusion and vulnerable citizens. In these network groups, the department can share new initiatives for relevant target groups, receive feedback on delivered public services, as well as get a sense of what is happening in communities of interest.

Technologies used

Digital identity is defined as the set of attributes and information that uniquely identifies an entity, whether it be people, organisations, devices and/or information systems in general. It defines and identifies us on the Internet, and therefore, its management must be a fundamental property in the security of information systems, as well as the basis of any service or business model provided over communications networks.

Artificial Intelligence (AI) enables biometric authentication and automated document verification to support eIDs. These technologies are currently reaching the market and can offer reliable and trustworthy solutions to publics in a transparent manner.

Digital Onboarding

The online process of registering new users on an online platform belonging to a company or government service in order to access its products and services. During this process, new users typically provide their ID, and if required, biometric information like a facial scan or fingerprint.

Biometric authentication

Biometric authentication involves the issuing of a unique physical characteristic for identification (fingerprint, facial scan, iris scan, retina scan or some other unique body part). IMPULSE requires facial scan.

MRZ Reading

Machine Readable Zones of ID documents (passports and national ID cards) are read by means of Optical Character Recognition technology.

Document verification

Verification of ID documents (passports and national ID cards), by users taking a photograph with their smartphones through the IMPULSE app. Different techniques based on AI are implemented to detect forgeries, fakes and counterfeits.

Self-Sovereign Identity (SSI) is the core concept of the IMPULSE eID system. It is a disruptive paradigm that has been gaining relevance for some time, promoting advantages over centralised approaches. It solves some of the privacy and sovereignty issues eID solutions present.

Blockchain

Distributed ledger technology that retains the information of all transactions that happen in the network and is immutable over time. In SSI, the blockchain is the means to give autonomy to the user.

Smart Contract

Programs that can be executed in the context of the blockchain. They can be used to read or register information on the Blockchain. The code is available on the blockchain itself so anyone can audit.

Digital Wallets

Software and/or hardware components that store the digital assets of the user. They can be physically placed on an end-user device (as in IMPULSE), or stored in a cloud-based environment to be accessed through an end-user device.

Data Ownership

The user is the only entity that stores their verifiable credentials, and the only entity able to present the credentials for authentication.

Qualified Electronic Seal (QSeal)

A qualified electronic seal (electronic signatures used by legal entities) is an electronic seal that is compliant with EU Regulation No 910/2014 (eIDAS Regulation).

EBSI European Blockchain Services Infrastructure, a peer-to-peer network of interconnected nodes running blockchain-based operations. The EU Digital Identity Wallet scheme suggests that all EU/EEA countries issue compliant eIDs to their residents and businesses by end of 2024, however, eID Apps under the EU DI Wallet scheme are already being trialled and implemented widely without blockchain, See for example the EU DI Wallet Pilot implementation, of which only the DC4EU trial uses EBSI to manage education certificates and access to social security benefits.

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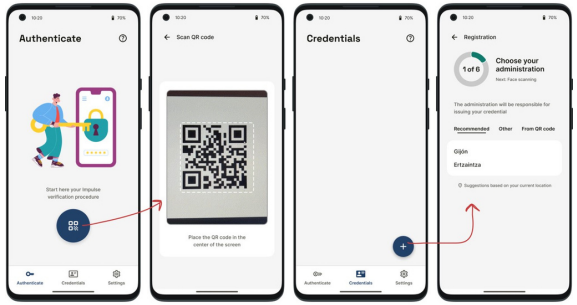
IMPULSE app

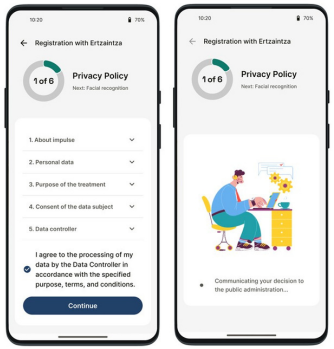
IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an alternative authentication method. It offers a robust and privacy-focused solution, guided by the concept of Self-Sovereign Identity (SSI) which forms the foundation of a user-centred eID approach.

To initiate the registration process, there are three methods available:

1. **Scan a QR Code using your mobile camera**, issued by the public administration you want to sign up for.
2. **Manually add credentials**, choosing administration from a list.

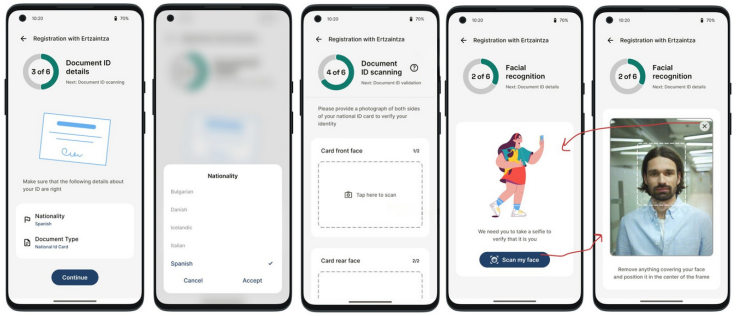


3. **Automatic initiation**: A service app displays a link to initiate onboarding with the IMPULSE App or it sends a notification to the phone, whereby tapping the notification redirects to the IMPULSE App for onboarding.



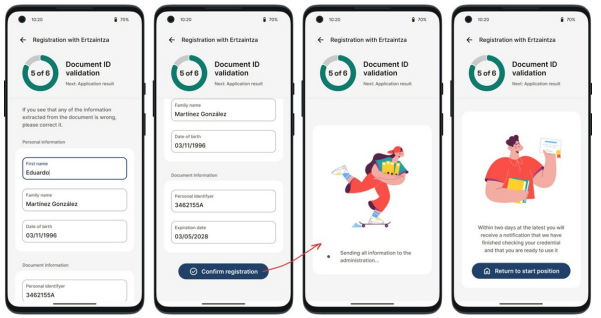
After selecting the public administration, regardless of the option to do so, users give their consent to share personal information by agreeing to the legal entity's privacy policy.

Subsequently, the IMPULSE App prompts the user to upload photos of their official ID document and a live facial scan. By transmitting the photos to the administration's Enterprise Server (ES), the data are further transmitted through AI processing for matching, and a biometric module in the IMPULSE App creates a biometric profile.



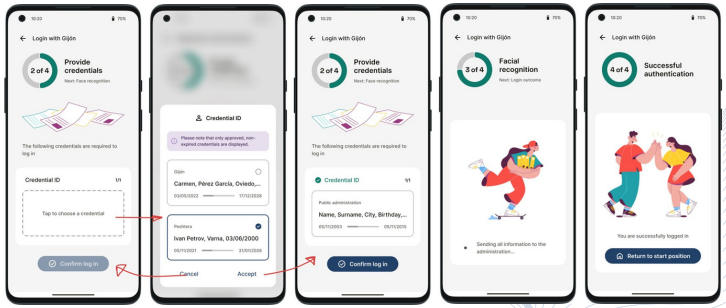
Upon successful verification, (and manual checks), the Enterprise Server promptly notifies the IMPULSE App of the completion of the onboarding process.

The IMPULSE Wallet will have received Verifiable Credentials of who the user is.



The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

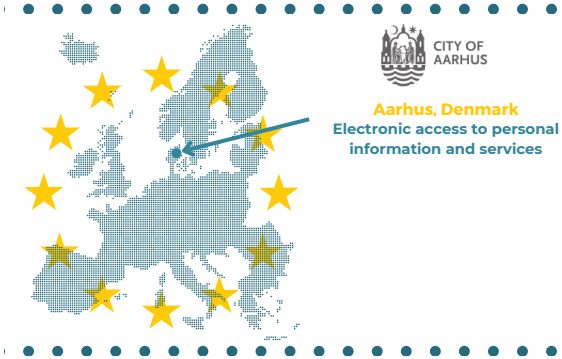
When the Enterprise Server confirms the eID (VC) presented by the user, the authentication is completed and the the access unlocked the online public service.



Impulse

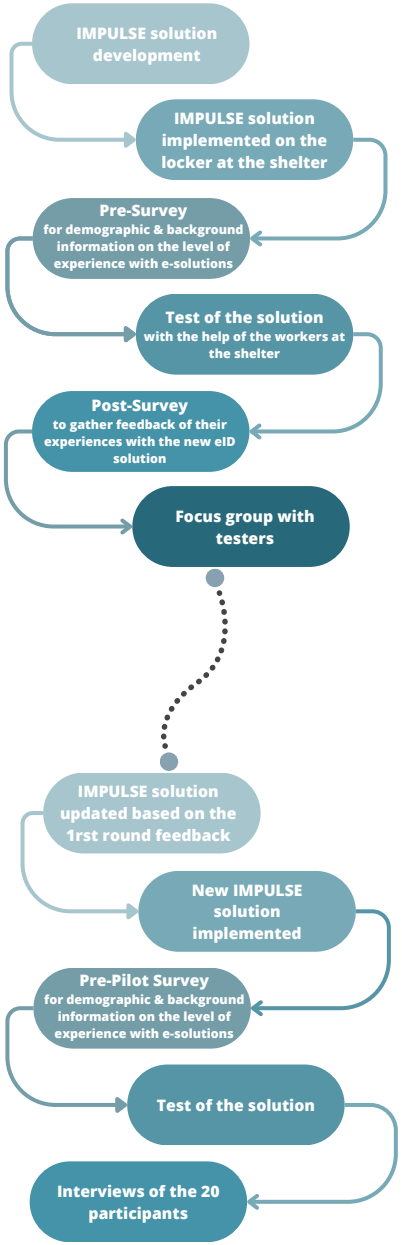
Pilot case: Aarhus

The project aims at enhancing opportunities for vulnerable citizens to use public self-services in the first place. Digital interaction between citizens and public institutions and authorities has proven beneficial to many under the right circumstances. As a result, at least all citizens should have the opportunity to use public self-services – including vulnerable citizens.



The starting point is that a common problem faced by some vulnerable citizens is the loss of identification documents. Loss of identification documents can hinder access to public self-services if also NemID/MitID access is lost. This issue constitutes a challenge for the further digitalisation of public self-services as it risks deepening the digital divide between users and non-users of digital services. A broader problem facing vulnerable citizens is difficulties in using public self-services and managing eID-services. Citizens finding it particularly difficult can be exempted from the mandatory use of public self-services.

The first pilot round aimed at testing the solution on vulnerable citizens with a broad range of sociopsychological problems, including homelessness. The user participation among this group, however, was scarce. As a result, the second pilot round focused on another group of vulnerable citizens with less severe social problems. The concept of the two pilot rounds remained the same, testing the IMPULSE solution to access personal lockers.



1 ROUND

- IMPULSE solution showed potential .
- As it was difficult to recruit participants for the first round, so the outcomes are limited.
- Registration process was more difficult than the login process.
- Participants asked for clearer instructions on how to proceed.

Considering the use-case, what if users want to store their mobile phone inside the lockers? At the current stage, users cannot use the lockers without a mobile phone.

2 ROUND

- Many found IMPULSE to be as good or slightly better than MitID.
- Most people prefer IMPULSE being developed by smaller companies and public entities instead of large corporations.
- Some would be willing to pay a monthly fee for using IMPULSE if it was used for more services (and replace MitID) but most people would go with the cheapest option regardless of whether it is better or worse than alternatives.
- Having IMPULSE be installed to the locker with an embedded camera would be more beneficial than having a separate phone app (as not everyone may have a phone).

Impulse

Findings and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aim to set the path towards a better understanding and adoption of eID solutions by and for public services.

PILOT EXPERIMENTATION

What important points has the pilot experiment highlighted?

Learnings and Recommendations on user acceptance, accessibility and usability as well as the impact of disruptive technologies to both eID public governance and public engagement from the pilot case experimentation.

1

As noted in several pilot cases, citizens were sceptical about the relevance of a new electronic identification solution such as IMPULSE **when a solution is already existing and working**.

In the Danish context, where MitID (the Danish national electronic identification system) is already in operation, IMPULSE appeared as not so relevant. However, some of the testers in the second round of the pilot suggested that there is potential in IMPULSE to be better than MitID.

The **COMMUNICATION PACK** and the description of the new eID solution must be **TAILORED** to each country and describe the advantages of a new eID over the existing technology/process.

2

Before deciding whether or not to take part in IMPULSE's pilot activities, vulnerable citizens were unsure **where their data would ultimately be stored** and were **rather reluctant to provide it**.

The people from the centre and from the municipality of Aarhus had to explain in detail but in simple terms where the data is ultimately stored. Data storage is a crucial issue, particularly in the eyes of so-called 'vulnerable people'.

COMMUNICATION about the intent, specific **SUPPORT** and **TRANSPARENCY** of the data collected and for what purpose are three important factors when dealing with vulnerable people. The necessary **DOCUMENTATION** must be provided and carers must be trained to answer any related question in the case of a physical service (in this case the locker).

3

Danish citizens generally exhibit high degrees of trust in government and public institutions, which can provide a comparative advantage when it comes to getting people to adopt a new legislation or solution.

This was reflected in the experiment, as during the pre-piloting survey as well as the interviews following the test, citizens reacted strongly to the question of whether the IMPULSE solution was vetted by the authorities.

In more mature eID markets, it is crucial to **GUARANTEE VALIDATION** (certificates/verification) by the **RESPONSIBLE PUBLIC INSTITUTIONS** in the case of a national or European-level solution, for example the Danish Agency for Digital Government or the European Commission.

To go further

Taking the IMPULSE eID system further in Denmark rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

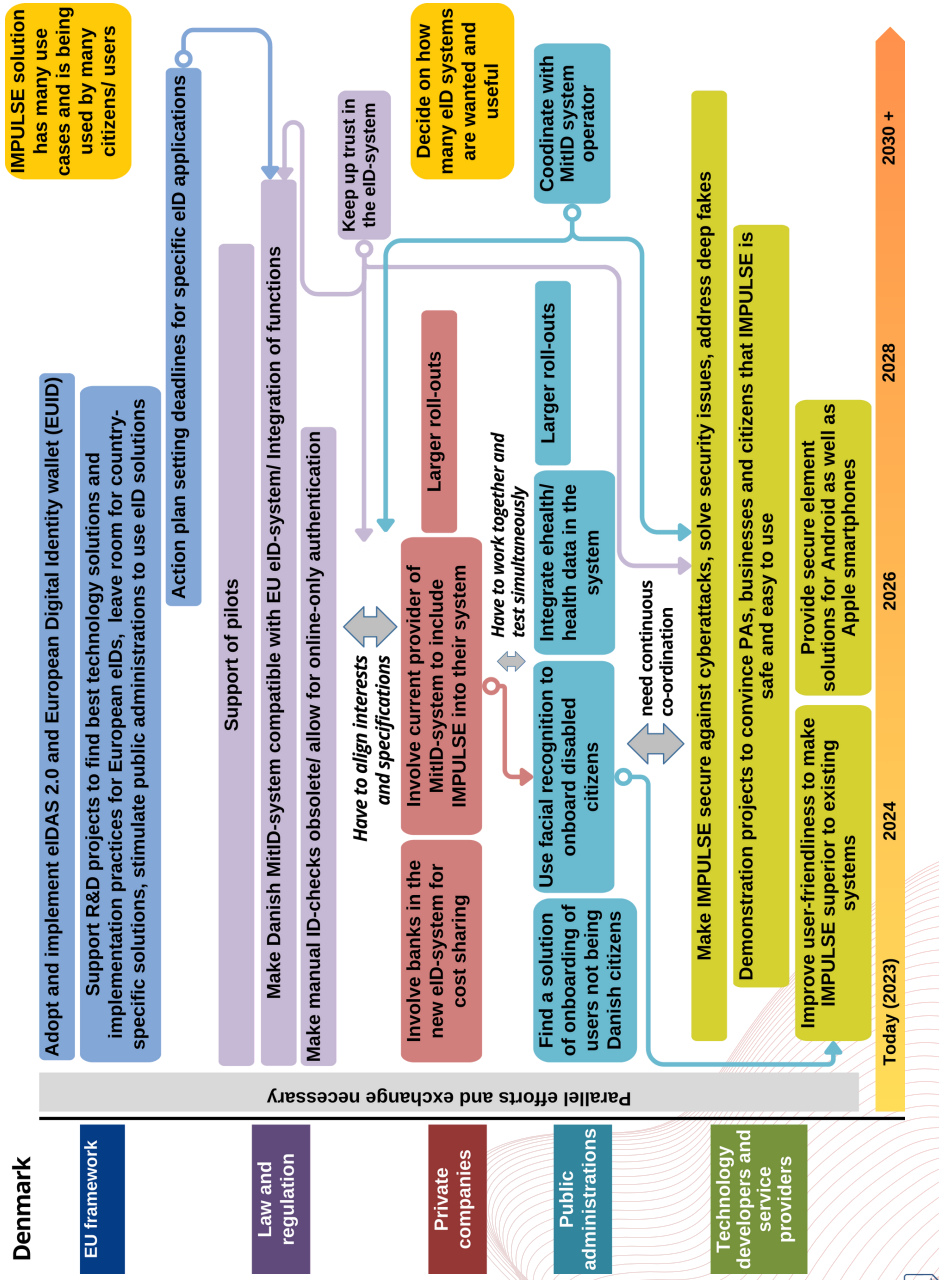
TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Danish ecosystem.

The roadmap assumes the integration into and not the competition with MitID. The roadmap shows the necessary cooperations between the different stakeholders in the future. Stakeholders are: Technology developers and service providers, public administrations, private companies, national law makers and regulatory bodies, and the European Union. The aim is to reach the goal of integrating the IMPULSE-solution into the existing Danish system by 2030+.

The timeline starts in 2023 and covers the seven years until 2030, but also provides the option „2030+" in case technical developments, adiministrative processes, and projected cooperations take longer than expected.

The roadmap was drafted on the basis of the contributions and suggestions of external experts who have participated in a workshop in March 2023 which was organized by the IMPULSE project, and reviewed by the Digital Innovation Board in November 2023 as well as by the External Advisory board in December 2023.



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To go further

OTHER ROADMAPS

Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate communication between citizens and the Police.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to the blockchain and artificial intelligence.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services could be made faster and more secure with IMPULSE.

Roadmap n°5 - Unioncamere / InfoCamere

Improve the accessibility to a “Digital Drawer” for Entrepreneurs thanks to eID.

Roadmap n°6 - Reykjavik

Exploring if using facial recognition for logging into online services makes it easier for people in vulnerable situations.

EU Roadmap

Bringing together the results of the 6 pilot cases, research and feedback from stakeholders for the global integration of eID.

RESOURCE LIST FOR DENMARK

DANISH AGENCY FOR DIGITAL GOVERNMENT

IN CHARGE OF IMPLEMENTING THE DANISH GOVERNMENT'S POLICIES FOR DEVELOPING THE DIGITAL PUBLIC SECTOR AND MAJOR PARTS OF THE DANISH PUBLIC DIGITAL SERVICE INFRASTRUCTURE.
NAME - EMAIL
OFFICE FOR EID AND APPS

DIGITAL LEAD

DENMARK'S NATIONAL CLUSTER FOR DIGITAL TECHNOLOGIES AND GATHERING POINT FOR DIGITAL INNOVATION
SIDSEL SOBORG - SIS@DIGITALLEAD.DK
SENIOR INNOVATION MANAGER

AARHUS MUNICIPALITY

JAKOB ASMUSSEN
SENIOR SERVICE DESIGNER AT CITZENS SERVICE
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Want to know more

@IMPULSE_EU
@IMPULSE project H2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

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HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Identity Management in PUblic SErvices

Impact assessment of disruptive technologies on electronic identities (eID) for the improvement of digital public services for citizens.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

Roadmap n°2

IMPULSE – Identity Management in PUbLic SErvices – is a H2020-funded project, developing a method for evaluating eID management, more specifically, the identification of persons accessing online public services with the support of disruptive technologies, i.e., artificial intelligence and Blockchain.

The project has focused its research on benefits, but also the risks, costs and limitations of such solutions. It considered the socio-economic, legal, ethical and operational impacts, both for local administrations and publics, through experimentation in real life settings. These, together with framework conditions (GDPR and eIDAS2 compliance, existing eID systems and standards), provide a wide variety of contexts.

Ertzaintza Police Departement

The origins of the Ertzaintza, as the Basque Country's autonomous police force, go back to the old municipal militias. Formalised in 1982, it reports to the Basque Government's Department of Security. It currently has its central base in Erandio and 25 police stations with a workforce of 8,000 officers spread across the different regions of the Basque Country.

The **Ertzaintza case study** aims to analyse and evaluate the possibility of establishing safe channels to facilitate the interaction of citizens with the Ertzaintza, as currently while complaints can be done online, citizens are required to go to the police station within 72 hours to identify themselves and physically sign complaint documents. The main purpose of the IMPULSE solution is to reduce the necessity of citizens going to the police station physically as well as reduce the separate need to identify people.

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Background research

In Spain, there are two eID systems that can be used nationally for e-government services: the Cl@ve-system and the electronic passport (DNIe) (the first system is described in more detail in Roadmap No. 3 - Gijón).

2006 Introduction of an electronic ID card with an integrated chip.

2021 Version 4.0 of the DNIe (Documento Nacional de Identidad electrónico) was introduced.

2023 Citizens still need a smart card reader and a PC to use the DNIe as a means to identify at e-Government platforms. However, the new DNIe also includes NFC technology which enables it to be used as a mobile means of identification.

2026 As part of the Spanish government's España Digital 2026 programme, the use of mobile identification via smartphone is planned in the near future. The "DNIe en el móvil" (DNIe on the mobile) project continues to be under development in mid-2023 ; a launch date has not yet been specified.

Public administrations in the Basque Country have been developing digital identification systems that allow a quicker, faster and easier interaction between them and citizens.

Certifications from other administrations are allowed, in addition to presenting the possibility of introducing in the smartphone all the individual cards that allow carrying out procedures with the administration.

For example, if you have a digital identification (DNI or from the Basque Government itself), you can have in your mobile terminal the health card of the Basque Country, which currently allows medicines authorised by your doctor to be purchased by the holder throughout Spain and five EU countries.

However, a great deal of work remains to be done to educate and inform the public, especially those who are usually excluded from using these technologies (the elderly, people with disabilities, etc.).

OTHER EXISTING SOLUTIONS IN THE BASQUE COUNTRY

Izenpe is the electronic identification platform of Basque administrations. It allows citizens, companies and professionals to identify themselves in a single place to carry out procedures with the public administration of the Basque Country.

BAK is a basic level electronic identification medium consisting of: a reference number matching the user's ID/NIE; a password; and an unqualified certificate issued in a secure centralised repository of Izenpe, the "cloud", which will serve for signature acts

Bakq is a means of electronic identification and signature, for persons over 16 years old, consisting of an identifier (1) and two authentication factors (a,b): user ID/NIE; a password (8 characters); and a code sent by SMS to your mobile phone.

What about the Ertzaintza Police Department?

The Ertzaintza, Police of the Basque Country, operates two digital channels of communication of non-serious crimes. One of them allows the submission of the complaint through the website; the person must go to an Ertzaintza police station to ratify the complaint after face-to-face verification of his/her identity.

Since 2022, there is another option to report the same kind of facts, especially in view of the increase in fraude and other non-serious crimes through the internet. In order to make a complaint of this type you can use one of these systems that are described:

- National Identity Document – when you get the document, they give you a key that you can change.
- Certificate in the cloud – is obtained by carrying out a process with physical identity documents.
- Digital certificate – you need to carry out the procedures in person in a public administration with a valid identity document

All these means of accreditation are much more complex, in addition to requiring, in some cases, the presence with a valid identity document.

Impulse

Technologies used

Digital identity is defined as the set of attributes and information that uniquely identifies an entity, whether it be people, organisations, devices and/or information systems in general. It defines and identifies us on the Internet, and therefore, its management must be a fundamental property in the security of information systems, as well as the basis of any service or business model provided over communications networks.

Artificial Intelligence (AI) enables biometric authentication and automated document verification to support eIDs. These technologies are currently reaching the market and can offer reliable and trustworthy solutions to publics in a transparent manner.

Digital Onboarding

The online process of registering new users on an online platform belonging to a company or government service in order to access its products and services. During this process, new users typically provide their ID, and if required, biometric information like a facial scan or fingerprint.

Biometric authentication

Biometric authentication involves the issuing of a unique physical characteristic for identification (fingerprint, facial scan, iris scan, retina scan or some other unique body part). IMPULSE requires facial scan.

MRZ Reading

Machine Readable Zones of ID documents (passports and national ID cards) are read by means of Optical Character Recognition technology.

Document verification

Verification of ID documents (passports and national ID cards), by users taking a photograph with their smartphones through the IMPULSE app. Different techniques based on AI are implemented to detect forgeries, fakes and counterfeits.

Self-Sovereign Identity (SSI) is the core concept of the IMPULSE eID system. It is a disruptive paradigm that has been gaining relevance for some time, promoting advantages over centralised approaches. It solves some of the privacy and sovereignty issues eID solutions present.

Blockchain

Distributed ledger technology that retains the information of all transactions that happen in the network and is immutable over time. In SSI, the blockchain is the means to give autonomy to the user.

Smart Contract

Programs that can be executed in the context of the blockchain. They can be used to read or register information on the Blockchain. The code is available on the blockchain itself so anyone can audit.

Digital Wallets

Software and/or hardware components that store the digital assets of the user. They can be physically placed on an end-user device (as in IMPULSE), or stored in a cloud-based environment to be accessed through an end-user device.

Data Ownership

The user is the only entity that stores their verifiable credentials, and the only entity able to present the credentials for authentication.

Qualified Electronic Seal (QSeal)

A qualified electronic seal (electronic signatures used by legal entities) is an electronic seal that is compliant with EU Regulation No 910/2014 (eIDAS Regulation).

EBSI European Blockchain Services Infrastructure, a peer-to-peer network of interconnected nodes running blockchain-based operations. The EU Digital Identity Wallet scheme suggests that all EU/EEA countries issue compliant eIDs to their residents and businesses by end of 2024, however, eID Apps under the EU DI Wallet scheme are already being trialled and implemented widely without blockchain, See for example the EU DI Wallet Pilot implementation, of which only the DC4EU trial uses EBSI to manage education certificates and access to social security benefits.

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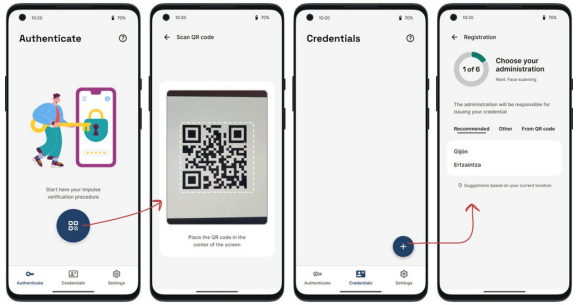
IMPULSE app

IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an alternative authentication method. It offers a robust and privacy-focused solution, guided by the concept of Self-Sovereign Identity (SSI) which forms the foundation of a user-centred eID approach.

To initiate the registration process, there are three methods available:

1. **Scan a QR Code using your mobile camera**, issued by the public administration you want to sign up for.
2. **Manually add credentials**, choosing administration from a list.



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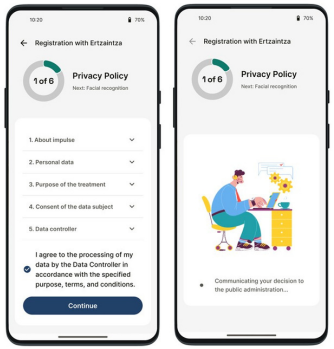

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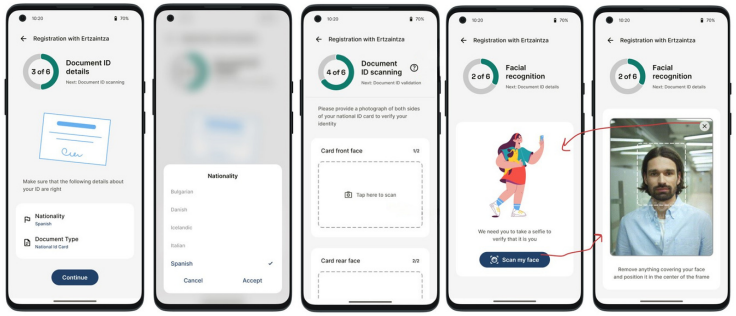

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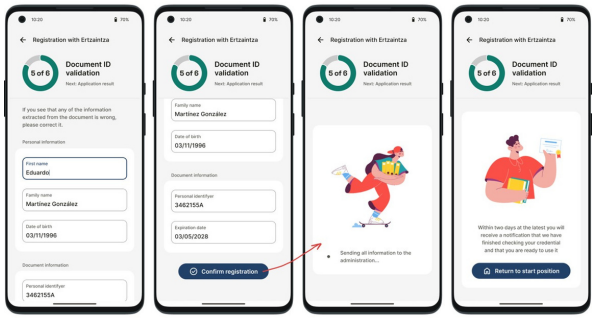

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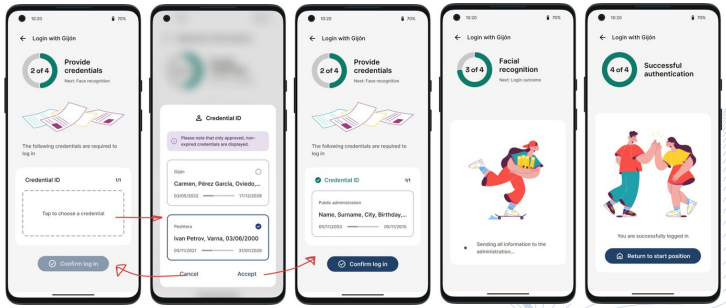
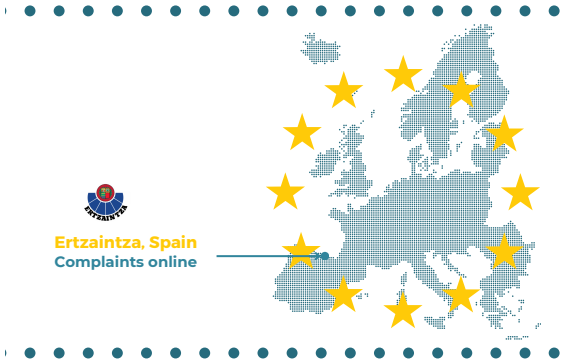


Impulse

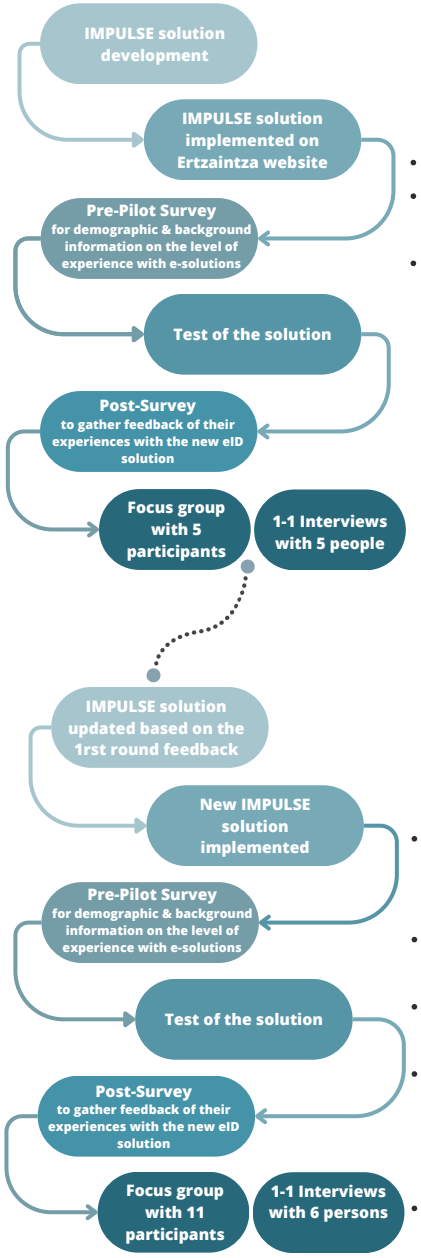
Pilot case: Ertzaintza

The aim of the project is to enable citizens to lodge a complaint fully online, based on a pre-defined list of crimes, without having to go to a police station in person, thanks to eID. Over and above this technology for citizen interaction with the police, Erztaintza is looking to assess the opportunities for facilitating and extending the capabilities of police staff, to continue to respond as effectively as possible to the needs of citizens and requirements of public order.



Basque citizens are already used to using online identification. However, on the one hand, the majority of identification uses are traditional (name/email address and password), which can sometimes be insufficiently secure, and on the other hand, the use of AI and blockchain does not seem simple or trustworthy either. The aim of this case study is threefold:

- **Explore** the possibility of reducing to 0 the time it takes to validate identity when filing a complaint online using eID (currently, the maximum time limit for going to a police station to present an identity document and complete a complaint is 72 hours).
- **Guarantee** the unfailing security of data sent by citizens to police officers, the respect for fundamental rights, ethics, privacy, transparency in order to ensure the continuity of public service and public safety even when using an online service.
- **Implement** new ways of working or expand internal possibilities for the work carried out by police officers. For example, to carry out part of the work or the management related to it from another location (home or other place to which the agent must go).



1 ROUND

- The registration process was found difficult.
- Most participants agreed that the solution does simplify and reduce the steps needed to access the service.
- Participants thought that the IMPULSE solution could be usable in the future after improvements.

Is it necessary that this type of identification like IMPULSE be supplemented by another means that reinforces this guarantee of real identification of who performs the procedure?

2 ROUND

- Overall, participants had a positive opinion regarding IMPULSE and would even be likely to use it if the solution were already available.
- However, there are still doubts about the security aspects, in particular the protection of identity data and its usurpation.
- The use of facial recognition, which brings a certain simplicity and ease of registration, was considered important.
- The ease, simplicity and speed of the process, as well as the fact that it does not require keys, PIN codes or any other type of less secure identification method, were very much appreciated.
- Participants would use te application if it were offered free of charge.

Impulse

Learning and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aims to set the path towrads a better understanding and adoption of eID solution by and for public services.

PILOT EXPERIMENTATION

What important points has the pilot experiment highlighted?

Learnings and Recommendations on user acceptance, accessibility and usability as well as the impact of disruptive technologies to both eID public governance and public engagement from the pilot case experimentation.

1 During the experiment, it was undeniable that registration was made easier thanks to IMPULSE, but there were a few operating problems when changing the terminals used.

It is only after the malfunction of certain terminals, preventing the solution from being used at the time of the test, that an analysis was launched to determine whether the problems were due to the software version of the terminal or its technical characteristics (processor, etc.).

When deploying such an e-solution, it it highly important to use it with different terminals so as to be able to **ANTICIPATE** problems. The **TEST** phase is therefore essential before an official deployment, in order to avoid the impossibility of using a public service

2 Doubts were strongly expressed as to the security of the information stored on the server (copy of the identity document and photo), because the simplicity of registration and use led some of the participants to think that there was laxity in matters of security.

What Ertzaintza wanted to make clear was that, as a public administration, transparency is a fundamental characteristic. All information held by the police is protected and secure from leaks and, as guardians of people's rights, they operate to a code of ethics and values. Individuals can access all the information and data that the police hold about them, of course, within the existing legal framework. It is important to stress that the European legal framework is very protective and serves as a benchmark for the protection of rights.

It must be made clear that simplicity has nothing to do with **ROBUST** SECURITY, particularly in public administrations which are subject to **STRICT** European and national **REGULATIONS** concerning the storage and use of citizens' data.

3 The culture that everything on the internet is free makes people not willing to pay for systems like the one of IMPULSE.

Based on the results of the second phase of the pilot, it is possible to say that the participants would prefer to keep the current process that is free (yet cumbersome, complex and insecure processes such as PIN codes, passwords, etc.) rather than pay for an application (with a technology that is nonetheless more robust, more reliable and simpler).

It is important to be as **TRANSPARENT** as possible about the **COST** of such a service to the public sector. It is not possible to cut back on any aspect (security, simplicity, speed, etc.) to ensure the quality and robustness of such a service. So the **FINANCIAL CONTRIBUTION** can be shared by both the public authorities and citizens (in a smaller amount).

To go further

Taking the IMPULSE eID system further in Spain rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

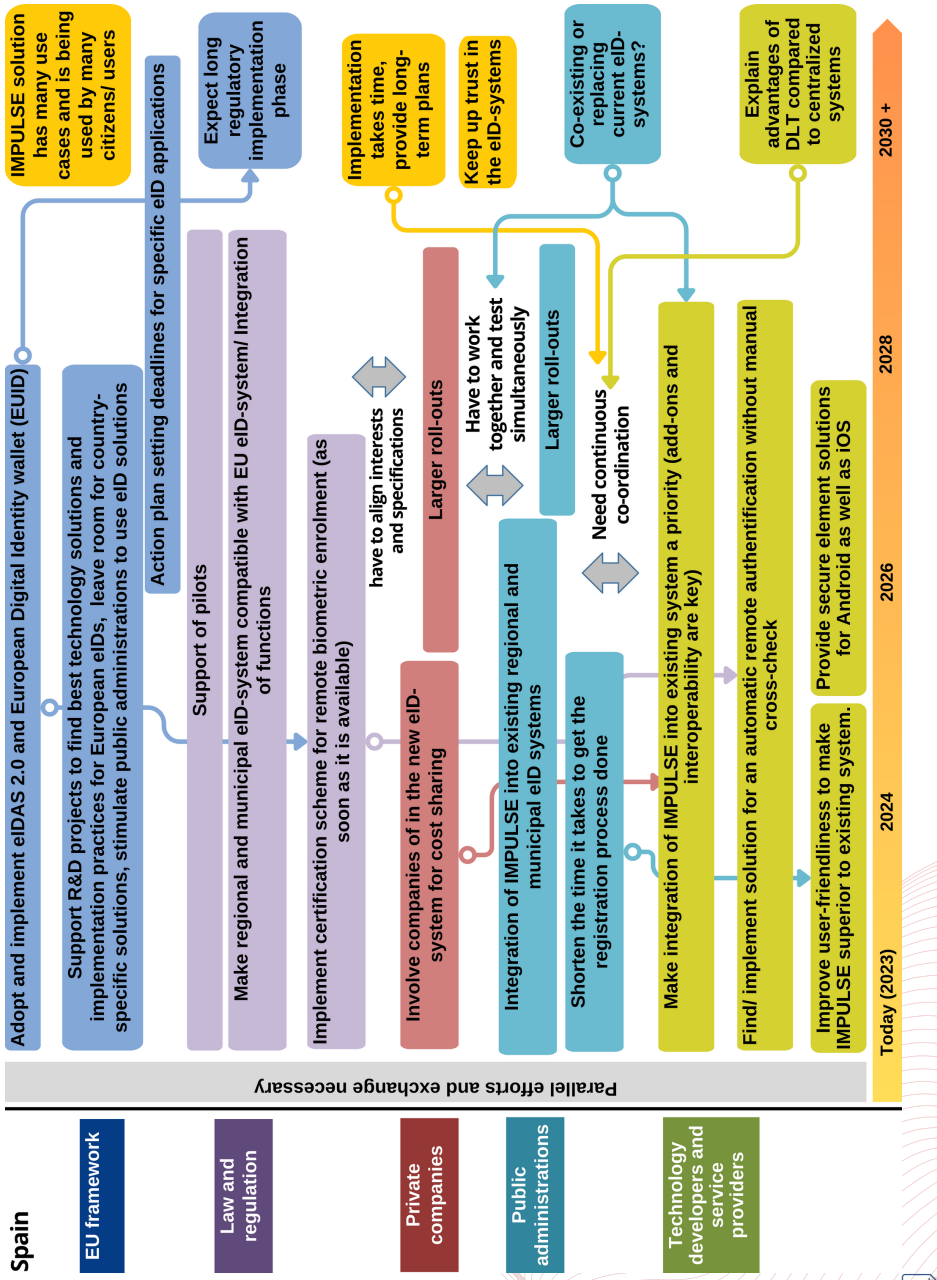
TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Spanish ecosystem.

The roadmap shows the cooperations that are necessary between the different stakeholders in the future. Stakeholders are: Technology developers and service providers, public administrations, private companies, national law makers and regulatory bodies, and the European Union. The aim is to integrate IMPULSE into existing national, regional, and municipal eID-systems in Spain by 2030+.

The timeline starts in 2023 and covers the seven years until 2030, but also provides the option „2030+" in case technical developments, adiministrative processes, and projected cooperations take longer than expected.

The roadmap was drafted on the basis of the contributions and suggestions of external experts who have participated in a workshop in March 2023 which was organized by the IMPULSE project, and reviewed by the Digital Innovation Board in November 2023 as well as by the External Advisory board in December 2023.



Impulse

To go further

OTHER ROADMAPS

Roadmap n°1 - Aarhus Municipality

How – and to which extent – an eID-solution can improve access for vulnerable citizens to public self-services.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to the blockchain and artificial intelligence.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services could be made faster and more secure with IMPULSE.

Roadmap n°5 - Unioncamere / InfoCamere

Improve the accessibility to a "Digital Drawer" to the Entrepreneurs thanks to eID.

Roadmap n°6 - Reykjavik

Exploring if using facial recognition for logging into online services makes it easier for people in vulnerable situations.

EU Roadmap

Bringing together the results of the 6 pilot cases, research and feedback from stakeholders for the global integration of eID.

RESOURCE LIST

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ORGANIZATION DESIGNATED BY THE BASQUE GOVERNMENT TO PROMOTE CYBERSECURITY IN THE BASQUE COUNTRY.
INFO@CYBERZAINTZA.EUS

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@IMPULSE_EU

@IMPULSE project H2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

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HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Identity Management in PUblic SErvices

Impact assessment of disruptive technologies on electronic identities (eID) for the improvement of digital public services for citizens.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

Roadmap n°3

IMPULSE – Identity Management in PUbLic SErvices – is a H2020-funded project, developing a method for evaluating eID management, more specifically, the identification of persons accessing online public services with the support of disruptive technologies, i.e., artificial intelligence and Blockchain.

The project has focused its research on benefits, but also the risks, costs and limitations of such solutions. It considered the socio-economic, legal, ethical and operational impacts, both for local administrations and publics, through experimentation in real life settings. These, together with framework conditions (GDPR and eIDAS2 compliance, existing eID systems and standards), provide a wide variety of contexts.

Gijón Municipality

Gijón is a Spanish city on the coast of Asturias, the autonomous community of which it is the most populous municipality. It's a town that has always looked to the sea (coal and iron exports by boat, fishing, maritime tourism), but it's also rich in history and architecture.

The **Gijón case study** aims to analyse the improvement in the use and process of digital identities (eID), thanks to the introduction of the blockchain and artificial intelligence. Currently, through the Citizen Card and the Gijón App, the city and its citizens can access a multitude of services in a modern, efficient and secure way. However, the only mechanism to register and log in to the Gijón App -and be able to request any of the services it offers- is through a Citizen Card number and a personal identification number (PIN), which is not in line with the city's desire to guarantee more digital services to its users.

Impulse

Background research

In Spain, there are two eID systems that can be used nationally for e-government services: the Cl@ve-system and the electronic passport (DNIe) (the first system is described in more detail in Roadmap No. 2 - Ertzaintza).

2007 Law 11/2007 - on citizens' electronic access to Public Services: a general identification system can be created for the General State Administration, which has led to the creation of Cl@ve.

2014 The Council of Ministers has approved an Agreement for the creation of Cl@ve, a new common platform for the state public administrative sector for electronic identification, authentication and signature.

2015 Resolution of the Directorate of Information and Communication Technologies, establishing the technical requirements necessary for the development and application of the Cl@ve system.

2023 Cl@ve has over 19 million registered users (out of nearly 49 million Spanish citizens)

Cl@ve Móvil

Electronic access system to public services that allows citizens to authenticate themselves in the procedure they are carrying out by confirming the authentication request sent to the Cl@ve mobile application.

Cl@ve PIN

It is a way of carrying out procedures over the Internet with a limited validity period that can be renewed whenever needed. This electronic identification system is based on the use of a code chosen by the user and a PIN communicated to the phone via the Cl@ve PIN app or an SMS message.

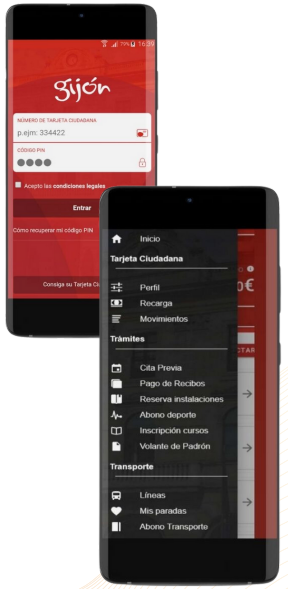
Cl@ve Permanente

This is an authentication system designed for people who need frequent access to the Administration's electronic services. It is based on the use of a user code or DNI, and a password that is established in the activation process. This requires prior registration in the system.

In addition to the two national eID systems, there are several regional and even municipal eIDs available in Spain. Most of them are Citizen Cards („Tarjeta Ciudadana") issued by the local administrations for example in **Gijon**, Palma, Zaragoza or Alicante. The Citizen Cards can not only be used for e-government services but also for public transportation and when using public facilities as they have an integrated payment function.

What about the Municipality of Gijon?

Gijón has issued over 400,000 Citizen Cards for its residents, businesses, and individuals in the surrounding area. The 'Gijón' APP is a dynamic and multifunctional tool at the service of citizens. Although it has not yet completed its first year of life, 20,338 users are already benefiting from its many features, using it in their day-to-day dealings with Gijón City Council. Citizen can for example:



- Request for appointments in person and by telephone in all the centres and municipal services of Gijón/Xixón with the possibility of cancellation.
- Carrying out numerous tasks related to urban transport.
- Payment of any type of municipal bill (in compliance with the European regulations on electronic payments).

In addition, to facilitate its use, the 'Gijón' APP allows to link and manage at the same time several citizen cards of different holders. It is also possible to access the App from different devices, both mobiles and PCs, as it is incorporated into the municipal website www.gijon.es.

Impulse

Technologies used

Digital identity is defined as the set of attributes and information that uniquely identifies an entity, whether it be people, organisations, devices and/or information systems in general. It defines and identifies us on the Internet, and therefore, its management must be a fundamental property in the security of information systems, as well as the basis of any service or business model provided over communications networks.

Artificial Intelligence (AI) enables biometric authentication and automated document verification to support eIDs. These technologies are currently reaching the market and can offer reliable and trustworthy solutions to publics in a transparent manner.

Digital Onboarding

The online process of registering new users on an online platform belonging to a company or government service in order to access its products and services. During this process, new users typically provide their ID, and if required, biometric information like a facial scan or fingerprint.

Biometric authentication

Biometric authentication involves the issuing of a unique physical characteristic for identification (fingerprint, facial scan, iris scan, retina scan or some other unique body part). IMPULSE requires facial scan.

MRZ Reading

Machine Readable Zones of ID documents (passports and national ID cards) are read by means of Optical Character Recognition technology.

Document verification

Verification of ID documents (passports and national ID cards), by users taking a photograph with their smartphones through the IMPULSE app. Different techniques based on AI are implemented to detect forgeries, fakes and counterfeits.

Self-Sovereign Identity (SSI) is the core concept of the IMPULSE eID system. It is a disruptive paradigm that has been gaining relevance for some time, promoting advantages over centralised approaches. It solves some of the privacy and sovereignty issues eID solutions present.

Blockchain

Distributed ledger technology that retains the information of all transactions that happen in the network and is immutable over time. In SSI, the blockchain is the means to give autonomy to the user.

Smart Contract

Programs that can be executed in the context of the blockchain. They can be used to read or register information on the Blockchain. The code is available on the blockchain itself so anyone can audit.

Digital Wallets

Software and/or hardware components that store the digital assets of the user. They can be physically placed on an end-user device (as in IMPULSE), or stored in a cloud-based environment to be accessed through an end-user device.

Data Ownership

The user is the only entity that stores their verifiable credentials, and the only entity able to present the credentials for authentication.

Qualified Electronic Seal (QSeal)

A qualified electronic seal (electronic signatures used by legal entities) is an electronic seal that is compliant with EU Regulation No 910/2014 (eIDAS Regulation).

EBSI European Blockchain Services Infrastructure, a peer-to-peer network of interconnected nodes running blockchain-based operations. The EU Digital Identity Wallet scheme suggests that all EU/EEA countries issue compliant eIDs to their residents and businesses by end of 2024, however, eID Apps under the EU DI Wallet scheme are already being trialled and implemented widely without blockchain, See for example the EU DI Wallet Pilot implementation, of which only the DC4EU trial uses EBSI to manage education certificates and access to social security benefits.

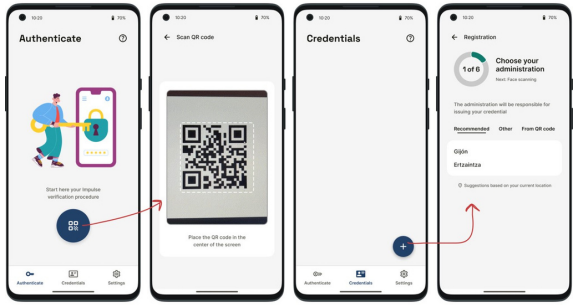
Impulse

IMPULSE app

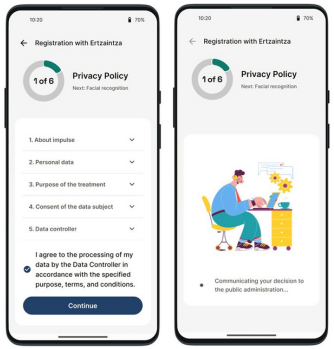
IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an alternative authentication method. It offers a robust and privacy-focused solution, guided by the concept of Self-Sovereign Identity (SSI) which forms the foundation of a user-centred eID approach.

To initiate the registration process, there are three methods available:

1. **Scan a QR Code using your mobile camera**, issued by the public administration you want to sign up for.
2. **Manually add credentials**, choosing administration from a list.

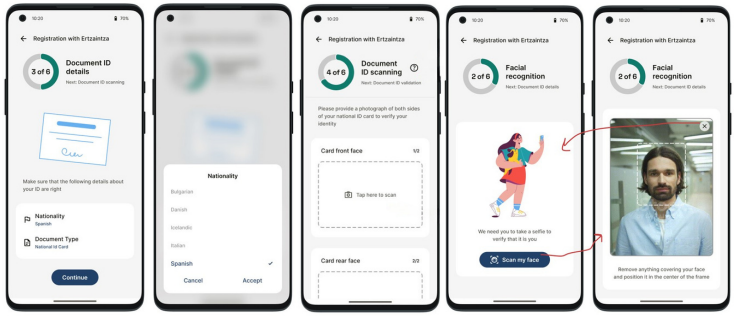


3. **Automatic initiation**: A service app displays a link to initiate onboarding with the IMPULSE App or it sends a notification to the phone, whereby tapping the notification redirects to the IMPULSE App for onboarding.



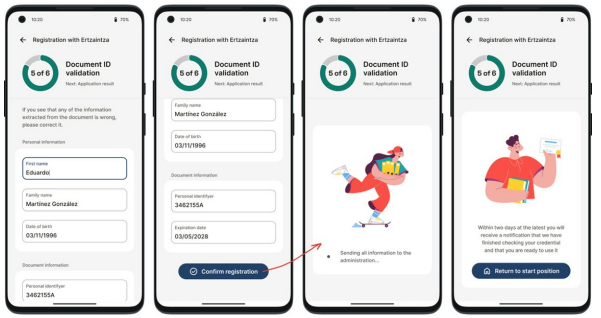
After selecting the public administration, regardless of the option to do so, users give their consent to share personal information by agreeing to the legal entity's privacy policy.

Subsequently, the IMPULSE App prompts the user to upload photos of their official ID document and a live facial scan. By transmitting the photos to the administration's Enterprise Server (ES), the data are further transmitted through AI processing for matching, and a biometric module in the IMPULSE App creates a biometric profile.



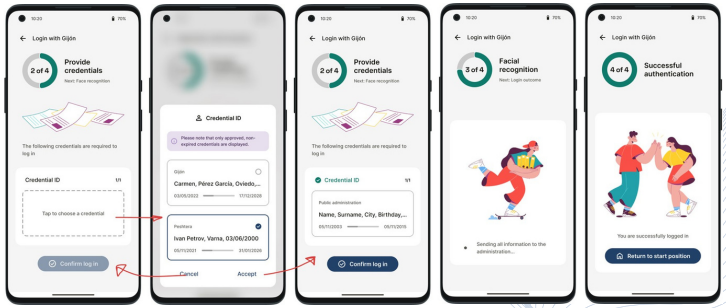
Upon successful verification, (and manual checks), the Enterprise Server promptly notifies the IMPULSE App of the completion of the onboarding process.

The IMPULSE Wallet will have received Verifiable Credentials of who the user is.



The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

When the Enterprise Server confirms the eID (VC) presented by the user, the authentication is completed and the the access unlocked the online public service.



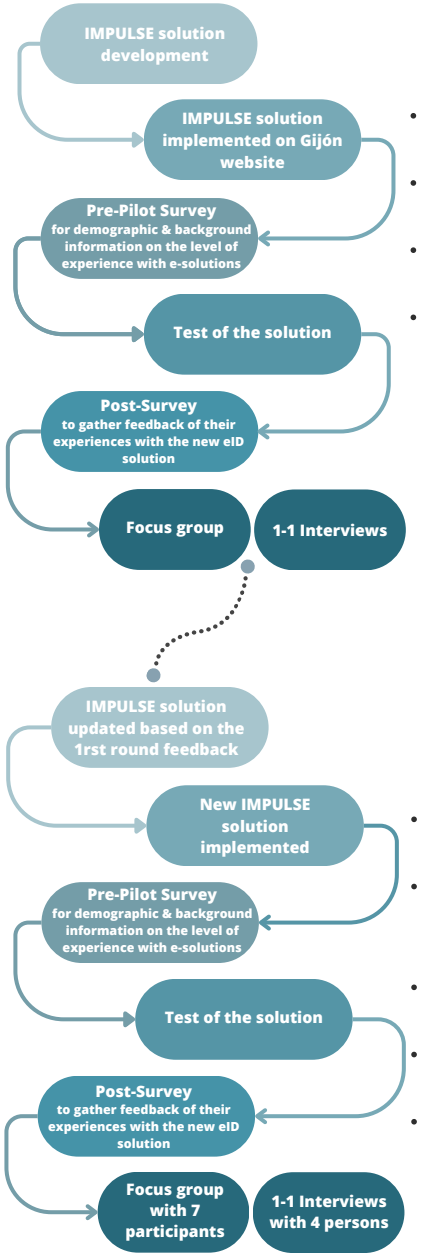
Impulse

Pilot case: Gijón

The project aims to investigate how IMPULSE technologies can address security gaps and weaknesses, with a focus on empowering citizen participation in e-government processes (particularly e-voting initiatives), which need to be supported by sufficient security measures to ensure they function properly (e.g. a single valid vote, anonymisation, etc.).

Gijon's Citizen Card allows access to municipal services requiring identification, both electronic as well as physical, and is personal and non-transferable. However, the methods used to verify identity have weaknesses (blurred images, deteriorated text, codes that are difficult to memorise, etc.).

With a solution like IMPULSE, citizens would benefit from a more secure environment as biometrics would replace both the PIN and operation code. This would also allow developing new services that nowadays require the citizen's presence. For Gijón the latter will result in a more efficient management by the administration, and thus, more resources available. Likewise, it would guarantee that non-holders will not be able to advantage of special fees or conditions reserved for specific groups (e.g., youths at risk of exclusion, retired people, etc.) significantly reducing fraud.



1 ROUND

- Facial recognition felt secure though there was some worry of faking identities.
- At first, participants had some troubles getting the IMPULSE solution to work properly.
- Lack of iOS support and lack of in-app information were the main weaknesses.
- Most would consider using the IMPULSE solution in the future as it does not require passwords.

"How could the IMPULSE solution be used to replace the functionalities of the physical Citizen Card, such as payment of bus rides?"

2 ROUND

- Most participants preferred the online services (and the e-ID card).
- They found positive things in IMPULSE, but not necessarily clear advantages over the Gijon application. Nevertheless, they might recommend IMPULSE to others.
- Although this was the second round, some participants needed help during the testing phase.
- The company offering IMPULSE should not be a large one (such as those in Silicon Valley).
- The popularity of a solution has a major influence on the willingness to use it.

Impulse

Learning and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aims to set the path towrads a better understanding and adoption of eID solution by and for public services.

PILOT EXPERIMENTATION

What important point has the pilot experiment highlighted?

Learnings and Recommendations on user acceptance, accessibility and usability as well as the impact of disruptive technologies to both eID public governance and public engagement from the pilot case experimentation.

1 During the experiment, participants said that there are too many interactions with the application, which asks for consent on numerous occasions (consent to register with IMPULSE and consent(s) to use one or more different services).

The various validation processes appeared to be too slow due to the need to accept the terms and conditions and select the identification method each time a new service wanted to be used.

Although necessary and in line with the obligation to display **TERMS** and **CONDITIONS**, reading and validating them is often botched or omitted. It is important to make **DISPLAY** and **ACCESS CLEAR**, **SIMPLE** and **QUICK** for both information and understanding, in order to guarantee constant security.

2 The Gijón App allows access to sensitive data and the processing of certain procedures, so precise identification must be ensured. Facial recognition technology, although gaining popularity among the population, still has its flaws in certain situations, such as with identical twins or individuals with very similar features.

To increase the public's confidence in the use of the app, several levels of access have been distinguished. For this pilot, validation through IMPULSE does not grant access to sensitive information. To enable the regular use of the app, an additional validation using more traditional techniques like two-factor authentication has been activated, allowing access to this more protected data.

Public administrations are the guarantors of the protection of citizens' data. It is therefore important to assess the **QUALITY** and **QUANTITY** of the different data required (in line with the GDPR's principles of proportionality and relevance). In addition, they have the duty to guarantee the continuity of services. If a solution does not meet current needs, it may be preferable to go **STEP BY STEP** before implementing “disruptive” solutions.

3 Both the Gijón APP and the IMPULSE App are two separate mobile systems, making their use on the same device challenging.

Since the possibility of running both applications on the same mobile phone was not available in this phase of the project, identification has been enabled only in the web version. Participants had to access the app using a computer and a web browser, with the mobile device used solely for identity management and facial validation through the IMPULSE solution.

It is advisable to have the solution already available on the app on which identification is required and not on another device, to **AVOID DUPLICATION** of operations. A **DIRECT CONNECTION** must be established between the identification application, which can still operate independently, and the public service.

To go further

Taking the IMPULSE eID system further in Spain rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Spanish ecosystem.

The roadmap shows the cooperations that are necessary between the different stakeholders in the future. Stakeholders are: Technology developers and service providers, public administrations, private companies, national law makers and regulatory bodies, and the European Union. The aim is to integrate IMPULSE into existing national, regional, and municipal eID-systems in Spain by 2030+.

The timeline starts in 2023 and covers the seven years until 2030, but also provides the option „2030+" in case technical developments, adiministrative processes, and projected cooperations take longer than expected.

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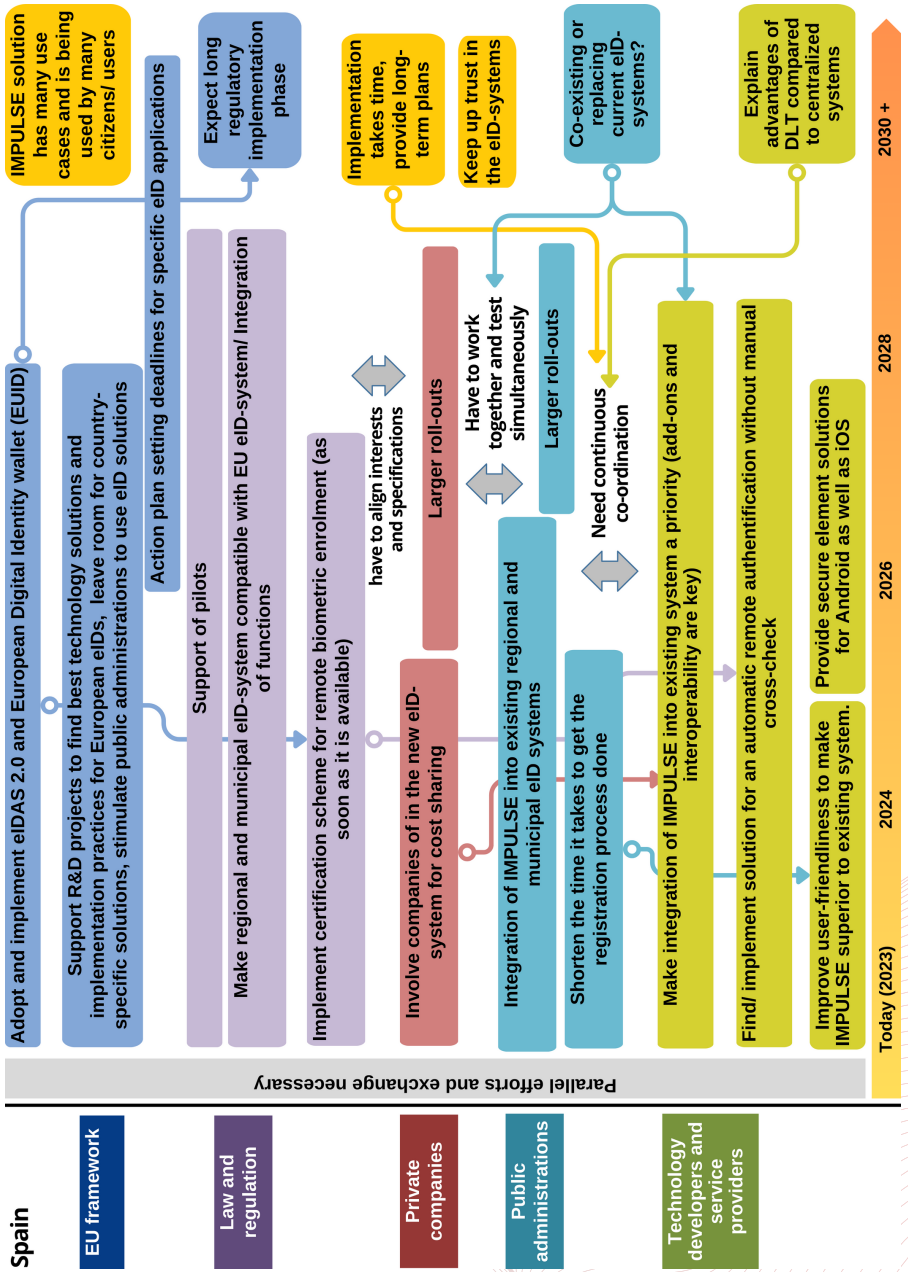

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To go further

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How – and to which extend – an eID-solutionn can improve access for vulnerable citizens to public self-services.

Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate between citizens and the Police.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services could be made faster and more secure with IMPULSE.

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RESOURCE LIST

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HEAD OF COMMUNICATIONS AND NEW PROJECT SERVICE

PEDRO LÓPEZ SÁNCHEZ

PLOPEZ@GIJON.ES

GIJÓN CITY COUNCIL

GOVERNMENT ORGANISATION RESPONSIBLE FOR PROVIDING PUBLIC SERVICES TO CITIZENS.

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Roadmap n°4

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Municipality of Pesthera

The municipality of Peshtera (MOP) is one of the 12 municipalities comprising Pazardzhik Province, and located in South Central part of Bulgaria. The town of Peshtera is located in the Rhodope Mountains. The municipality comprises in total 3 settlements: town of Peshtera which is the administrative centre and two villages: Kapitan Dimitrievo and Radilovo. The population is about 18,000 citizens, and the municipal administration is about 65 people.

The **Municipality of Pesthera case study** aims to assess whether the process of issuing civil registration services (e.g. requesting certificates relating to name, property or address) already available on the counter could be made faster and more secure with IMPULSE. The objective is to see whether it is possible to move from a set of tasks to be completed (uploading a document, electronic signature, examination by a registrar and issue of the certificate within 7 days) to live issue thanks to digital identification.

Impulse

Background research

Bulgaria is a special case insofar as the country has faced several events that have delayed the full use of e-government services and the implementation of any eID solutions.

2016 The Digital Identification Act was adopted providing the basis for the establishment of a national digital identification scheme for any persons over 14 years of age to be able to obtain a digital/electronic Identity (eID). It unfortunately failed to live up to initial expectations.

2017 Bulgarian Personal Documents Act stipulates that the identity card may also serve as a digital mean of an eID certificate (unless the person explicitly refuses to do so). This means that when issuing an ID card, an digital identity certificate will be issued, which will be incorporated into the card. As a result of several delays, it has not yet come into force.

2019 Revelation of a massive data breach of the National Revenue Agency (NRA) of Bulgaria, which is one of the very few entities that provide e-government services to citizens.

2023 Expected year of introduction of e-Governance in Bulgaria. This will allow more citizens to access and take advantage of different digital services offered by public administrations in Bulgaria at local, regional and national level.

However, there are two private eID-systems available in Bulgaria: B-Trust and Evotrust. For identification, both systems require a personal visit at one of the companies´ offices, for the mobile app, a videoident procedure is being offered. B-Trust and Evotrust can be used to identify users for online banking, digital tax declarations, and for digitally submitting documents to state and municipal authorities.

At present in Bulgaria, the national context does not appear to be very favourable for the use of eID and online public services:

- E-Government services are available in Bulgaria but they are currently not widely used by citizens because there is not an easy-to-use eID/e-signature-system in place.
- Many state employees do not have the necessary e-skills and/or often do not know whether specific e-government services exist or not.
- Citizens remain afraid of leakages of personal data and are afraid to use digital services, and especially public services

The municipality of Peshtera is currently offering more than 70 different digital public services to its citizens

What about the Municipality of Peshtera?

At the beginning of 2021 and coinciding with the start of IMPULSE, The municipality of Peshtera launched a digital services platform (DSP) offering 70 public services to its citizens. The number of users remains low because citizens prefer “over-the-counter” physical visit, instead of online digital services.

There are few reasons for that, but the main one is that the only way to use the DSP is by having the so called “digital signature”, which is paid and has an annual subscription fee. This makes the deployment of digital services use sluggish.

The Municipality of Peshtera is in the process of searching for alternative solutions like IMPULSE for digital identification of citizens, which will facilitate the procedure on eID, and will significantly facilitate the use of the municipal DSP, and eventually, this will lead to an increase in the number of citizens who use the Platform.

Technologies used

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Impulse

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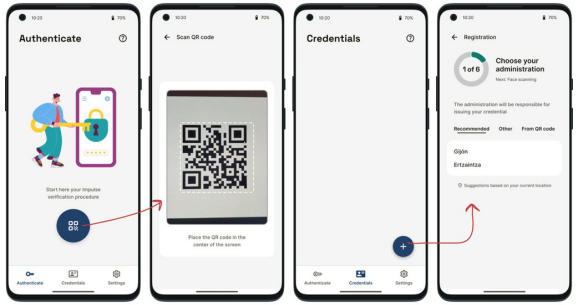

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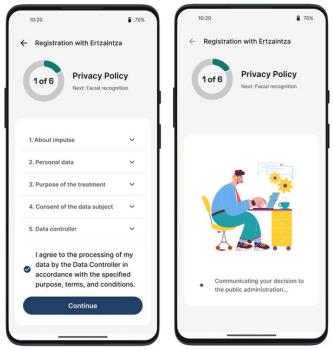
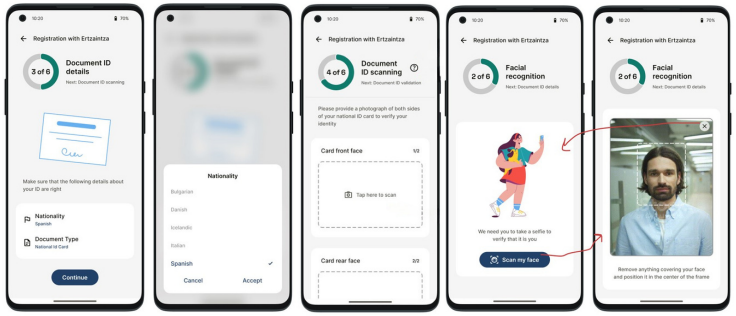


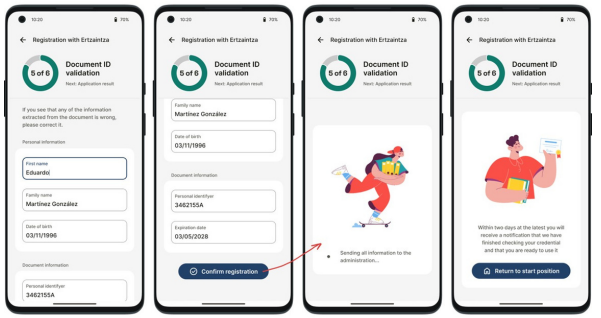
After selecting the public administration, regardless of the option to do so, users give their consent to share personal information by agreeing to the legal entity's privacy policy.

Subsequently, the IMPULSE App prompts the user to upload photos of their official ID document and a live facial scan. By transmitting the photos to the administration's Enterprise Server (ES), the data are further transmitted through AI processing for matching, and a biometric module in the IMPULSE App creates a biometric profile.



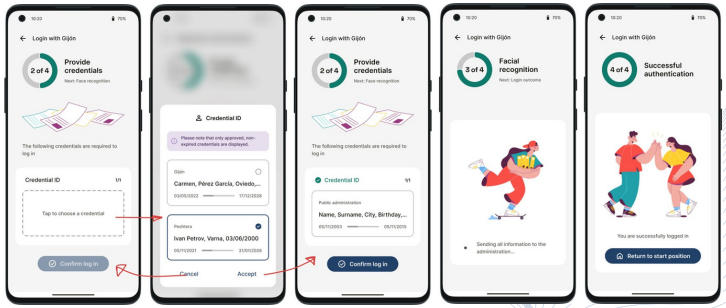
Upon successful verification, (and manual checks), the Enterprise Server promptly notifies the IMPULSE App of the completion of the onboarding process.

The IMPULSE Wallet will have received Verifiable Credentials of who the user is.



The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

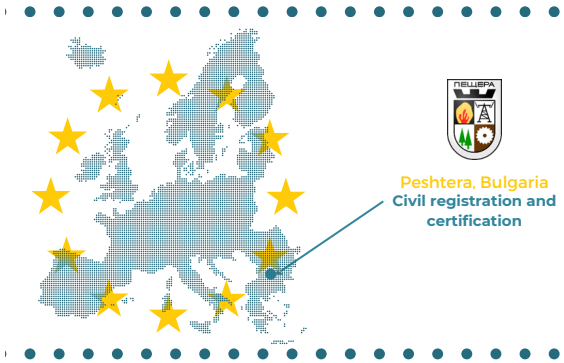
When the Enterprise Server confirms the eID (VC) presented by the user, the authentication is completed and the the access unlocked the online public service.



Impulse

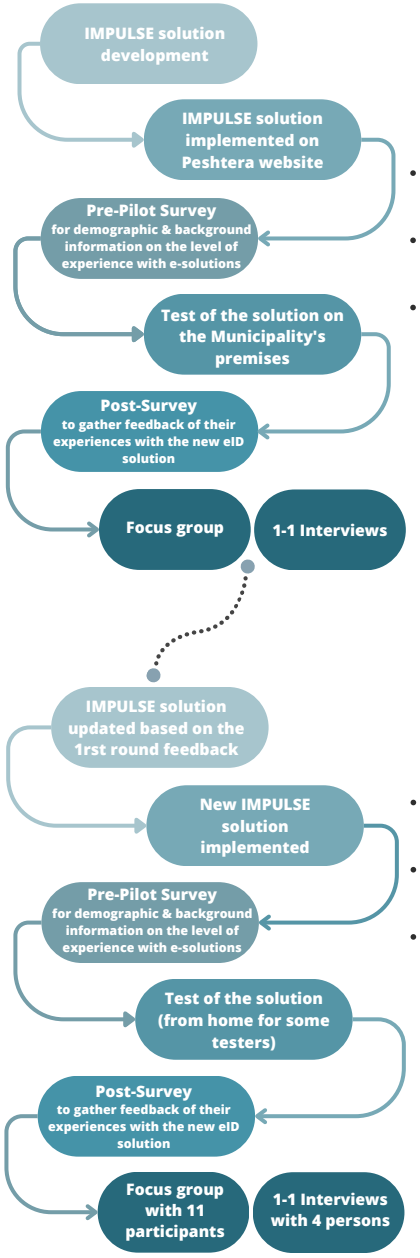
Pilot case: Peshtera

The Peshtera municipality local pilot aims to increase the number of citizens who use digital services of the municipality, the confidence in services/processes offered by municipality in digital format and awareness among citizens of Peshtera about advantages of secure eID solutions and e-services.



Peshtera aims to improve efficiency of services offered to its citizens, as well as unify citizen's information to the different council services. By this, a quicker and more efficient transfer of information between municipal departments will be enabled while ensuring privacy and protection of personal data.

The services selected for IMPULSE to operate in the pilot are related to address and name certification due to their close relation to identity management, and frequency of use. The Municipality takes also advantage of its participation in the EU project DEFeND which aims to ensure compliance with the GDPR and provide GDPR governance and guidance, building synergies between both projects, so the IMPULSE solution tested on this innovative GDPR Platform will allow the validation of an innovative and holistic blockchain-based GDPR-compliant eID management solution with improved security and stability.



1 ROUND

- The IMPULSE solution was positively received as it provided a fast and more convenient access to the online service.
- Major improvement was requested on receiving notifications during signup and login.
- Onboarding process required technical support.

Would a two-factor identification be enough as a first step into using digital public services?

2 ROUND

- All users reported that the process was quite smooth and user-friendly with no bugs being detected.
- IMPULSE is easier and better than the current method of identification, a majority of testers would rather use IMPULSE.
- Participants were worried about hackers and stolen phones.

Impulse

Learning and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aims to set the path towrads a better understanding and adoption of eID solution by and for public services.

PILOT EXPERIMENTATION

What important point has the pilot experiment highlighted?

Learnings and Recommendations on user acceptance, accessibility and usability as well as the impact of disruptive technologies to both eID public governance and public engagement from the pilot case experimentation.

1

During the pilot experimentation as well as in the research carried out as part of the project, it is noticeable that **elderly people are more hesitant to adopt new solutions**.

However, we learnt that a great share of them is using computers and smartphones for various activities, mainly for social networks, communication, and chatting with their friends and relatives.

A targeted **TRAINING** and **AWARENESS** raising campaign can significantly improve the perception for new technologies among a specific target group.

2

Citizens of Peshtera were reluctant to take part in the pilot tests when they understood that an image of both sides of their ID card was taken during the on-boarding process. We can therefore legitimately assume that people will be **more reluctant to use a solution that requires a photo of their identity document** rather than a password.

Despite the fact that this situation can be partially explained by the data leakage in 2019, leading people to feel more cautious about technology, this highlights a more general fear, also identified in other pilot cases. As for Pesthera, the civil servants had to approach each citizen separately and explain in a bilateral meeting on how data is processed, where it is being stored, for how long, and all the GDPR rights to ensure that all of them are fully aware of how their data is being used.

SIMPLE, **VISUAL** and **UP-TO-DATE** explanatory **DOCUMENTATION** on **DATA PROTECTION** should be available to citizens on the administration's website and its premises even before the solution is implemented, as well as on the app.

3

There is already a plethora of solutions on the market, so a new electronic identification solution must offer citizens **new or better benefits** than existing solutions.

In the case of this pilot project, the aim was to promote the simplicity of the solution compared with the existing one: it eliminates the need to install additional software on local PCs or memorise passwords, provides rapid access to online public services thanks to easy facial identification and, finally, allows users to decide how much personal data they wish to share. But also to promote new technologies such as the QSE used in the solution, useful in Bulgaria for accessing and viewing medical records.

To ensure that the digital solution is used, not out of obligation but out of acceptance, it is essential to **SHOW**, **PROVE** and **EXPLAIN** the **ADVANTAGES** over existing technologies.

To go further

Taking the IMPULSE eID system further in Bulgaria rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

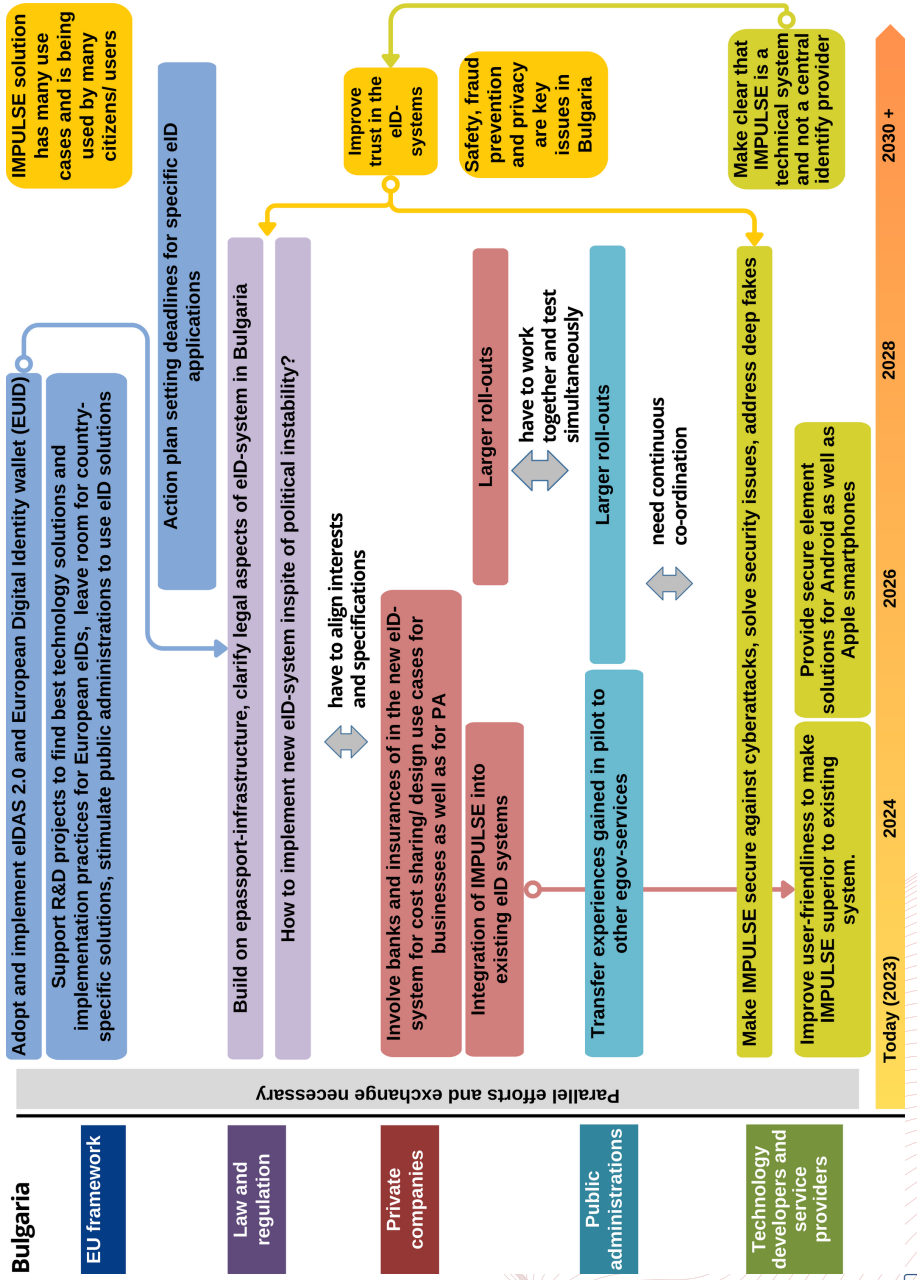
TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Bulgarian ecosystem.

The roadmap shows the cooperations that are necessary between the different stakeholders in the future. Stakeholders are: technology developers and service providers, public administrations, private companies, national law makers and regulatory bodies, and the European Union. The aim is establish IMPULSE as a new eID system or to integrate central parts of the system into existing eID-systems in Bulgaria by the year 2030+.

The timeline starts in 2023 and covers the seven years until 2030, but also provides the option „2030+“ in case technical developments, adiministrative processes, and projected cooperations take longer than expected.

The roadmap was drafted on the basis of the contributions and suggestions of external experts who have participated in a workshop in March 2023 which was organized by the IMPULSE project, and reviewed by the Digital Innovation Board in November 2023 as well as by the External Advisory board in December 2023.



Impulse

To go further

OTHER ROADMAPS

Roadmap n°1 - Aarhus Municipality

How – and to which extend – an eID-solutionn can improve access for vulnerable citizens to public self-services.

Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate between citizens and the Police.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to blockchain and artificial intelligence.

Roadmap n°5 - Union Camere / Info Camere

Improve the accessibility to a "Digital Drawer" to the Entrepreneurs thanks to eID.

Roadmap n°6 - Reykjavik

Exploring if using facial recognition for logging into online services makes it easier for people in vulnerable situations.

EU Roadmap

Bringing together the results of the 6 pilot cases, research and feedback from stakeholders for the global integration of eID.

RESOURCE LIST

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Want to know more

@IMPULSE_EU

@IMPULSE project H2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

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HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Identity Management in PUblic SErvices

Impact assessment of disruptive technologies on electronic identities (eID) for the improvement of digital public services for citizens.

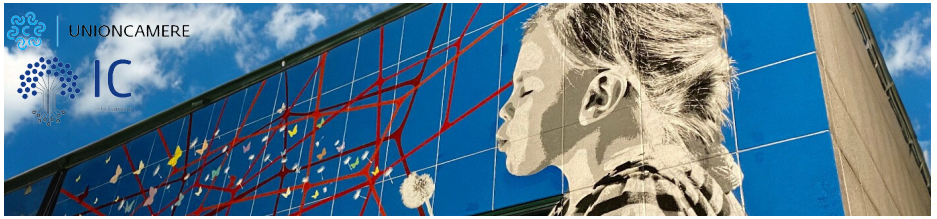
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

Roadmap n°5

IMPULSE – Identity Management in PUbLic SErvices – is a H2020-funded project, developing a method for evaluating eID management, more specifically, the identification of persons accessing online public services with the support of disruptive technologies, i.e., artificial intelligence and Blockchain.

The project has focused its research on benefits, but also the risks, costs and limitations of such solutions. It considered the socio-economic, legal, ethical and operational impacts, both for local administrations and publics, through experimentation in real life settings. These, together with framework conditions (GDPR and eIDAS2 compliance, existing eID systems and standards), provide a wide variety of contexts.

UnionCamere & InfoCamere



Unioncamere (UC) - the Italian Union of Chambers of Commerce, Industry, Crafts and Agriculture - is the public body that unites and institutionally represents the Italian chambers' system. Founded in 1901, it creates and manages services and activities of interest to the Chambers of commerce and economic categories, coordinating the initiatives of the System through directives and addresses to the bodies that are part of it. InfoCamere (IC) is the digital innovation company for the Italian Chambers of Commerce.

The **UC/IC pilot case** aims to improve the accessibility of the "Digital Drawer" for the Entrepreneurs. The "Digital Drawer" is a digital service enabling entrepreneurs to check information about their business. Thanks to IMPULSE, a better user experience accessing the service and leveraging European standards and infrastructures will be provided.

Impulse

Background research

As far as the regulatory framework is concerned in Italy, public authorities are re-thinking the approach used so far according to the inputs coming from Europe; in particular the EU regulation (EIDAS 2.0) and the European Digital Identity Wallets under discussion that redesign the digital identity system in Europe. Following the path undertaken since 2014, Italy is among the more "virtuous" countries where digital identity is more widespread among the population. Furthermore, it is the most advanced country for the presence of Qualified Trust Service Providers.

In Italy, there are two eID systems in place that can be used to identify for e-government services:

The **Carta d'Identità Elettronica** (CIE) issued by the italian Ministry of the Interior. Since 2016, NFC capabilities are integrated in the passport, allowing the storage of personal information. The CIE allows Italian citizens to access e-government services through three authentication levels of increasing security.

1 Username and password

2 Level 1 credentials and one-time-password

3 Smart card reader connected to a PC or an NFC-enabled smartphone that reads the passport information stored on the chip

Sistema Pubblico di Identità Digitale (SPID) is an access key providing a pair of credentials that represents the digital and personal identity of each citizen. With it, he/she is recognized by the Public Administration to use digital services. To obtain SPID credentials, citizens have to contact one of the identity providers accredited by the Italian Agenzia per l´Italia Digitale.

Authentication is possible with a username and password, along with several variants of one-time-passwords, smart cards, etc, leading to varying levels of assurance.

IMPULSE project counts among its members 2 Italian identity issuers: InfoCamere and Infocert.

What about Unioncamere and InfoCamere?

The "Digital Drawer" is a digital service enabling entrepreneurs to check, download and deliver official information such as Business register certification, financial statements, etc. directly using the smartphone / tablet. This service is provided by the Italian Chambers of commerce throughout InfoCamere. It is available free of charge at impresa.italia.it and today is used by more than 2 million of enterprises. Thanks to the service, entrepreneurs who use it have been able to download up to now – at no cost – 7.3 million official documents of their companies.

From a certain point of view the Digital Drawer anticipates the rules of the EU Wallet by adopting a Self-Sovereign Identity model in which data management is under the control of the owner/businessman so for that reason all that matter is under study by R&D Infocamere. A natural evolution is to link that service to the IMPULSE app.

Technologies used

Digital identity is defined as the set of attributes and information that uniquely identifies an entity, whether it be people, organisations, devices and/or information systems in general. It defines and identifies us on the Internet, and therefore, its management must be a fundamental property in the security of information systems, as well as the basis of any service or business model provided over communications networks.

Artificial Intelligence (AI) enables biometric authentication and automated document verification to support eIDs. These technologies are currently reaching the market and can offer reliable and trustworthy solutions to publics in a transparent manner.

Digital Onboarding

The online process of registering new users on an online platform belonging to a company or government service in order to access its products and services. During this process, new users typically provide their ID, and if required, biometric information like a facial scan or fingerprint.

Biometric authentication

Biometric authentication involves the issuing of a unique physical characteristic for identification (fingerprint, facial scan, iris scan, retina scan or some other unique body part). IMPULSE requires facial scan.

MRZ Reading

Machine Readable Zones of ID documents (passports and national ID cards) are read by means of Optical Character Recognition technology.

Document verification

Verification of ID documents (passports and national ID cards), by users taking a photograph with their smartphones through the IMPULSE app. Different techniques based on AI are implemented to detect forgeries, fakes and counterfeits.

Self-Sovereign Identity (SSI) is the core concept of the IMPULSE eID system. It is a disruptive paradigm that has been gaining relevance for some time, promoting advantages over centralised approaches. It solves some of the privacy and sovereignty issues eID solutions present.

Blockchain

Distributed ledger technology that retains the information of all transactions that happen in the network and is immutable over time. In SSI, the blockchain is the means to give autonomy to the user.

Smart Contract

Programs that can be executed in the context of the blockchain. They can be used to read or register information on the Blockchain. The code is available on the blockchain itself so anyone can audit.

Digital Wallets

Software and/or hardware components that store the digital assets of the user. They can be physically placed on an end-user device (as in IMPULSE), or stored in a cloud-based environment to be accessed through an end-user device.

Data Ownership

The user is the only entity that stores their verifiable credentials, and the only entity able to present the credentials for authentication.

Qualified Electronic Seal (QSeal)

A qualified electronic seal (electronic signatures used by legal entities) is an electronic seal that is compliant with EU Regulation No 910/2014 (eIDAS Regulation).

EBSI European Blockchain Services Infrastructure, a peer-to-peer network of interconnected nodes running blockchain-based operations. The EU Digital Identity Wallet scheme suggests that all EU/EEA countries issue compliant eIDs to their residents and businesses by end of 2024, however, eID Apps under the EU DI Wallet scheme are already being trialled and implemented widely without blockchain, See for example the EU DI Wallet Pilot implementation, of which only the DC4EU trial uses EBSI to manage education certificates and access to social security benefits.

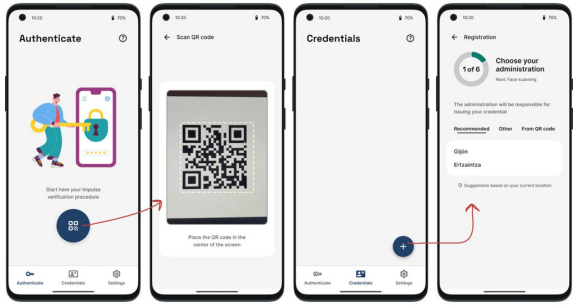
Impulse

IMPULSE app

IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an alternative authentication method. It offers a robust and privacy-focused solution, guided by the concept of Self-Sovereign Identity (SSI) which forms the foundation of a user-centred eID approach.

To initiate the registration process, there are three methods available:

1. **Scan a QR Code using your mobile camera**, issued by the public administration you want to sign up for.
2. **Manually add credentials**, choosing administration from a list.



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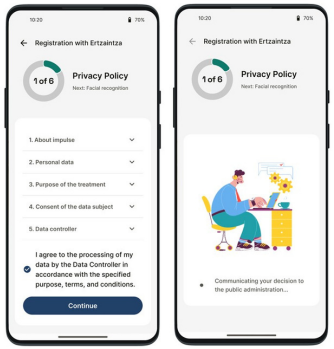

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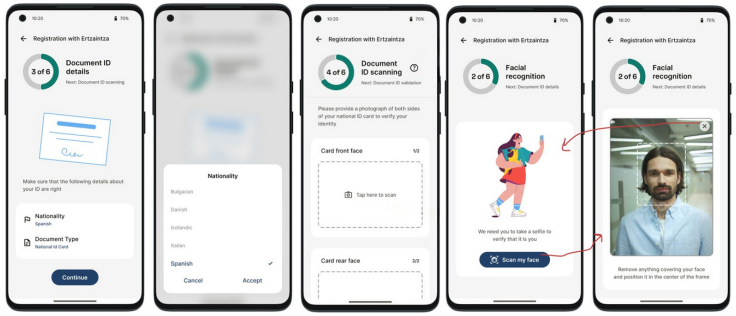

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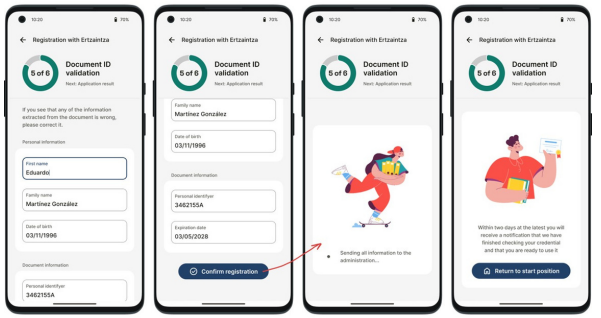

The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

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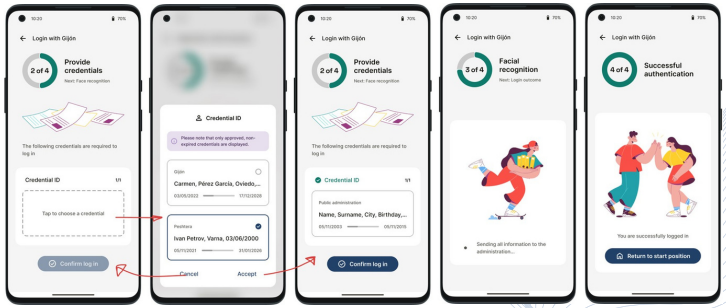
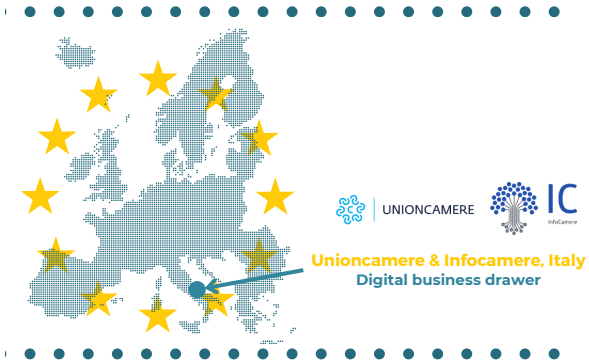


Impulse

Pilot case: UC / IC

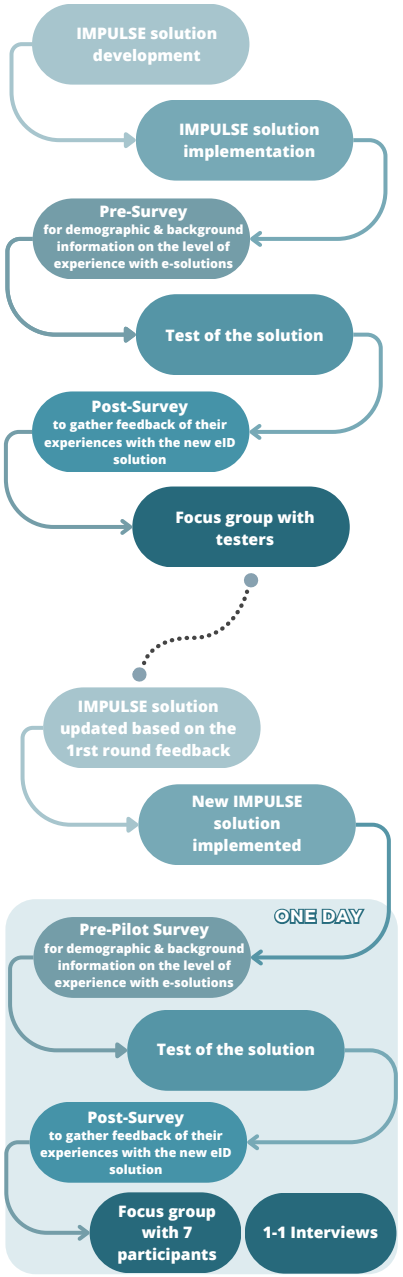
The project aims to develop a better user experience for entrepreneurs when accessing their "Digital Drawer" on which they can obtain information such as company profile, financial statements, status about requests to the public administration, etc. The objective is both to provide a safe and useful service for users while guaranteeing the reduction of information errors and fraud.



The starting point is an interest of the Italian Chamber of commerce in exploring and experimenting disruptive technologies in the field of digital identity as they might:

- Enhance efficiency: streamlining identity verification and authentication procedures
- Improve user experience: simpler, faster and user-friendly ways to authenticate
- Strenghten security: immutable and tamper-proof identity records
- Enable interoperability: adoption of standardized protocols and open frameworks
- Foster innovation and competitiveness: forward-thinking and innovative entities
- Adapt to regulatory landscape: regulatory discussions and frameworks related to eID

The particularity of this pilot is that it concerns business representative persons ("Person of business"). Hence, the pilot addresses the case where persons of business can access public/private services online and provide proofs that specific business requirements are met.



1 ROUND

- IMPULSE project generated interest and the audience considered the IMPULSE app as a convenient way to access Public Services. In Italy as the use of the SPID is widely spread some participants were confident in using IMPULSE too.
- Other people expressed their concern about privacy and data management which, at the moment of the execution, were indeed not stressed enough in the app.

How to ensure that the data transmitted to the public service are only those necessary to benefit from the service, in compliance with the principle of "minimization" of the GDPR?

2 ROUND

- All participants prefered online services instead of on-site.
- Even if everyone had read the Terms of Service and knew how the data is shared, concerns were expressed: they would have preferred to have more information on where facial data is stored as well as the data encryption policy during onboarding for increased security.
- Two questions remained: Why must the onboarding process be carried out on each user's devices? How did the system work with old identity documents?
- Respondents were split between SPID and IMPULSE. Both were equally good, but no added value was really noticed with IMPULSE, so participants would have no reason to switch.

Impulse

Learning and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aim to set the path towards a better understanding and adoption of eID solution by and for public services.

PILOT EXPERIMENTATION

What important points has the pilot experiment highlighted?

Learnings and Recommendations on user acceptance, accessibility and usability as well as the impact of disruptive technologies to both eID public governance and public engagement from the pilot case experimentation.

1 During the experiment, some users tried and succeeded to log into the public service using a photo instead of taking a selfie.

Facial recognition can have a positive impact on facilitating online identification, however it must be accompanied by safeguards and transparency for both the administration and citizens, in order to limit fears, bias and misuse. As of today, studies shows that error rates still differ across demographic groups, with the lowest accuracy generally recorded among female gender, black people, and people aged 18 to 30.

Having **ROBUST**, **RELIABLE**, **ETHICAL**, **IMPARTIAL** and **ANTI-FRAUD** facial recognition and OCR (optical character recognition) technology is very important from a privacy and security perspective.

2 During the focus group and interviews, many questions were asked by users in reference to the current SPID (digital access key in Italy).

The SPID, introduced in 2016, saw little growth until 2020 (just over 5 million users), but the COVID period saw it boom, with over 33 million users in 2023 (out of a population of around 60 million). The comments collected from users during the pilot highlighted that the blockchain concept is generally difficult to understand. Everybody would define it as a disruptive technology, but few people could easily explain it. The current framework remains easier to be accepted because there are government-certified providers ensuring trustworthiness and reliability.

It is important to **TAILOR** the **SALES PITCH** to the audience. It may not be appropriate to explain all the technologies of the solution component by component to end users. More often than not, end-users prefer to know how the technology works as a whole, how it can facilitate their use of online services and, above all, how data collection, storage, use and protection are guaranteed.

3 When interviewed, users asked a lot of questions about the technology robustness compared to giant tech like Apple (Face ID) and Google.

Competition with the technology giants (Apple, Google, Microsoft, etc.) in a very crowded market must be taken into account, but participants stressed the fact that a company offering the service must have a good reputation or no reputation at all, as large companies, despite occupying a large share of the market, sometimes seem untrustworthy.

In order to compete with other technology providers, it is important to study the **MARKET** and choose the **SEGMENT** in which to operate. It is also preferable to offer a secure and robust solution and to take the time to **BUILD** a **REPUTATION** on this basis, rather than rushing in and squandering opportunities.

To go further

Taking the IMPULSE eID system further in Italy rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Italian ecosystem.

.The roadmap shows the cooperations that are necessary between the different stakeholders in the future. Stakeholders are: Technology developers and service providers, public administrations, private companies, national law makers and regulatory bodies, and the European Union. The aim is to integrate IMPULSE into existing systems in Italy by 2030+.

The timeline starts in 2023 and covers the seven years until 2030, but also provides the option „2030+“ in case technical developments, adiministrative processes, and projected cooperations take longer than expected.

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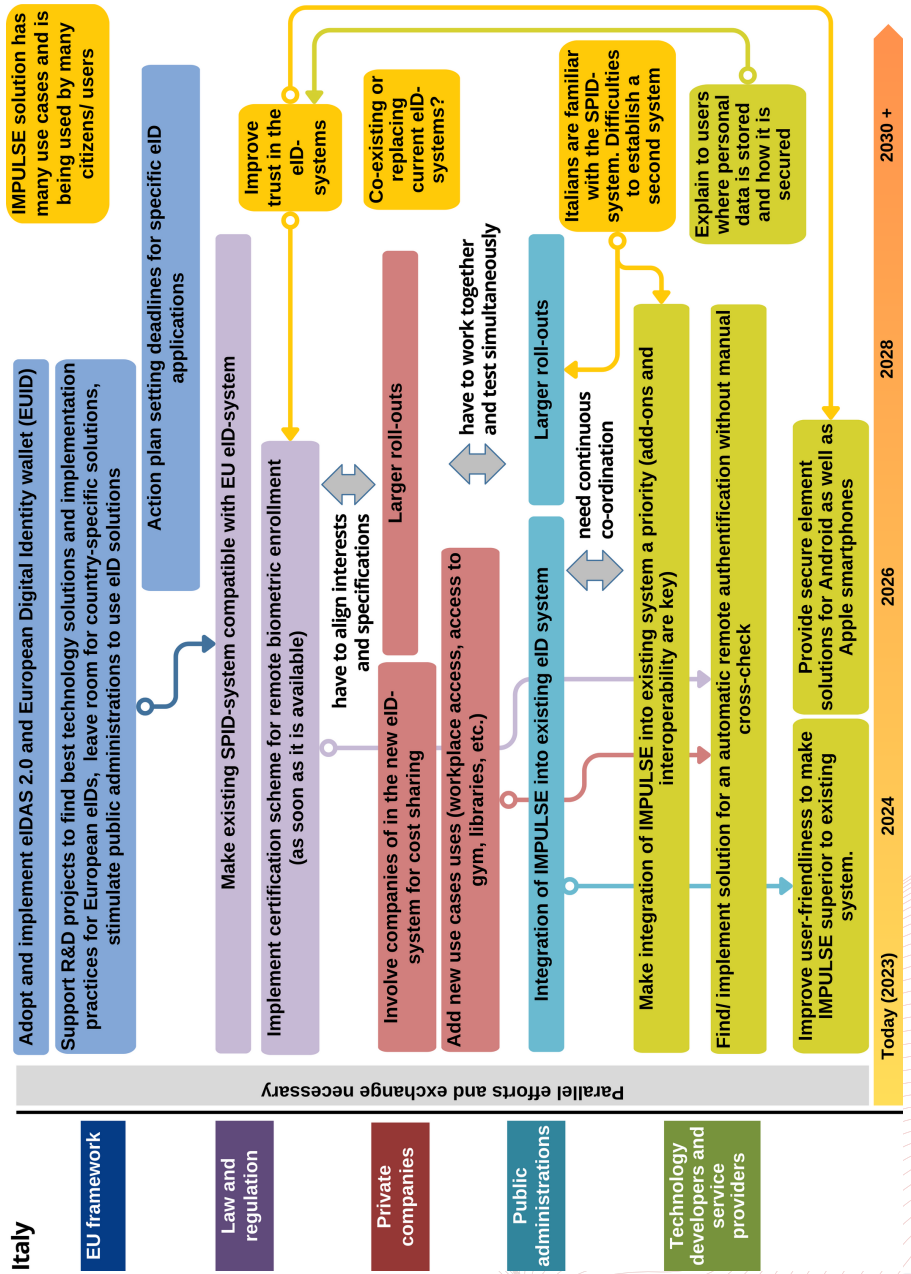

Impulse

To go further

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Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate communication between citizens and the Police.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to the blockchain and artificial intelligence.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services could be made faster and more secure with IMPULSE.

Roadmap n°6 - Reykjavik

Exploring if using facial recognition for logging into online services makes it easier for people in vulnerable situations.

EU Roadmap

Bringing together the results of the 6 pilot cases, research and feedback from stakeholders for the global integration of eID.

RESOURCE LIST

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Want to know more

@IMPULSE_EU
@IMPULSE project H2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

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HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Identity Management in PUbLic SErvices

Impact assessment of disruptive technologies for electronic identities (eID) and the improvement of digital public services.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004459

Roadmap n°6

IMPULSE – Identity Management in PUbLic SErvices – is a H2020-funded project, developing a method for evaluating eID management, more specifically, the identification of persons accessing online public services with the support of disruptive technologies, i.e., artificial intelligence and Blockchain.

The project has focused its research on benefits, but also the risks, costs and limitations of such solutions. It considered the socio-economic, legal, ethical and operational impacts, both for local administrations and publics, through experimentation in real life settings. These, together with framework conditions (GDPR and eIDAS2 compliance, existing eID systems and standards), provide a wide variety of contexts.

Reykjavik Municipality

The City of Reykjavík is the northernmost capital in the world (64°08'N), established in 1786, The registered population is roughly 143.000, but a quarter of a million or so live in the Capital Region or close to 64% of the total population (Registers Iceland, Dec 2023).

The **Reykjavík case study** investigated if using facial recognition when issuing credentials and logging into services is easier, more convenient and/or preferable to people in vulnerable situations. It also investigated responses from pilot participants in assessing the value of the IMPULSE App as an alternative authentication method, while the broader implications of integrating IMPULSE is inseparable from an existing ecosystem of government-issued eIDs, certification and standards compliance.

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Background research

Two types of physical IDs are most common in Iceland, the passport and the driver's license. A national identity card (nafnskírteini) is available, however, very rare obtained. A federated phone-based eID is obtained at the offices of banks, telecommunications services, the State eID Provider (IdP) or Registers Iceland, i.e., by issuing a physical ID matched against the centralised Registers Iceland record and a live observation of the person's face.

2000 Digital identity cards are distributed to a limited number of people, i.e., employees in government, large corporations and healthcare staff.

2008 Introduction of the digital identity card to a wider audience.

2013 A phone-based eID first issued, verified credentials stored on the SIM.

2018 "Digital Iceland" is founded by the Ministry of Finance and Economic Affairs to further encourage and support the development of online services, by assisting public institutions in improving their digital (self-)service, making them clearer, simpler and faster.

2021 A phone-based eID App / Wallet is introduced.

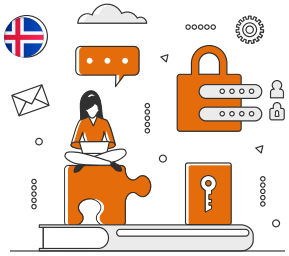
2021 The Icelandic Government published a digital strategy on public services to increase competitiveness, providing better public services while ensuring a safer infrastructure and a more modern work environment.

2023 Three versions of government issued eIDs exist:

- eID card: private card connected to a computer and requiring a card reader.
- Phone-based eID: ID credentials reside on the SIM, requiring the phone number and a PIN for logins.
- Phone-based eID App / Wallet. EU DI Wallet & eIDAS2 compliant. Available to onboard by reading the biometric template of the chip of the person's passport, matched with live facial scan.

The Icelandic State mandates a federated identity model that separates completely the digital online (self-)services requiring absolute proof of identity from the identity management system used to provide that proof.

- A state-owned eID Provider serves as the obligatory passage point for accessing – in principle – all available digital services. An eID Provider has to be vetted by the Icelandic Data Protection Authority (DPO) and a state-supervisory agency called 'Iceland root', providing eIDAS-compliant certificate (CRT) and a rolling e-Certificate Revocation List (CRL) of lost and stolen eIDs.



- The Ministry of Finance and Economic Affairs supervises the island.is platform, a one-stop authentication for those who have been issued a federated eID.

In 2022, 97% of the eligible resident population in Iceland had an active eID

What about the Municipality of Reykjavík?

The City of Reykjavík has no real say in the governance of eIDs. However, City Department of Welfare and Department of Services and Innovation, are concerned about vulnerable clientele, maintaining good working relations with their independent associations and the State institutions in charge of eIDs. Periodic consultations underpin deliberate efforts to ensure greater accessibility to entitled services that require an eID to access them.

The City is faced with considerable challenges with respect to those who – for one reason or other – cannot be independent users of eIDs and online (self-)services. Access is physically impossible or barred, raising concerns about personal autonomy and self-sovereignty, and the legal and ethical conundrums surrounding second-hand access.

The Icelandic State now issues eIDs to designated spokespersons and legal guardians, with clear guidelines about operating on behalf of others in matters often most sensitive and safety-critical to the person being served.

Technologies used

Digital identity is defined as the set of attributes and information that uniquely identifies an entity, whether it be people, organisations, devices and/or information systems in general. It identifies us on the Internet and, therefore, its management must be a fundamental property in the security of information systems, as well as the basis of any business model and service designed for communications networks.

Artificial Intelligence (AI) enables biometric authentication and automated document verification to support eIDs. These technologies are currently reaching the market and can offer reliable and trustworthy solutions to publics in a transparent manner.

Digital Onboarding

The online process of registering new users on an online platform belonging to a company or government service in order to access its products and services. During this process, new users typically provide their ID, and if required, biometric information like a facial scan or fingerprint.

Biometric Authentication

Biometric authentication involves the issuing of a unique physical characteristic for identification (fingerprint, facial scan, iris scan, retina scan or some other unique body part). IMPULSE requires facial scan.

MRZ Reading

Machine Readable Zones of ID documents (passports and national ID cards) are read by means of Optical Character Recognition technology.

Document Verification

Verification of ID documents (passports and national ID cards), by users taking a photograph with their smartphones through the IMPULSE app. Different techniques based on AI are implemented to detect forgeries, fakes and counterfeits.

Digital Onboarding in Iceland is the exclusive issuing of an eID, for which it is entirely unnecessary to onboard or register onto some public administration platform or link the eID specifically to one or other service provider.

Self-Sovereign Identity (SSI) is the core concept of the IMPULSE eID system. It is a disruptive paradigm that has been gaining relevance for some time, promoting advantages over centralised approaches. It solves some of the privacy and sovereignty issues eID solutions present

Blockchain

Distributed ledger technology that retains the information of all transactions that happen in the network and is immutable over time. In SSI, the blockchain is the means to give autonomy to the user.

Smart Contract

Programs that can be executed in the context of the blockchain. They can be used to read or register information on the Blockchain. The code is available on the blockchain itself so anyone can audit.

Digital Wallets

Software and/or hardware components that store the digital assets of the user. They can be physically placed on an end-user device (as in IMPULSE), or stored in a cloud-based environment to be accessed through an end-user device.

Data Ownership

The user is the only entity that stores their verifiable credentials, and the only entity able to present the credentials for authentication.

Qualified Electronic Seal (QSeal)

A qualified electronic seal (electronic signatures used by legal entities) is an electronic seal that is compliant with EU Regulation No 910/2014 (eIDAS Regulation).

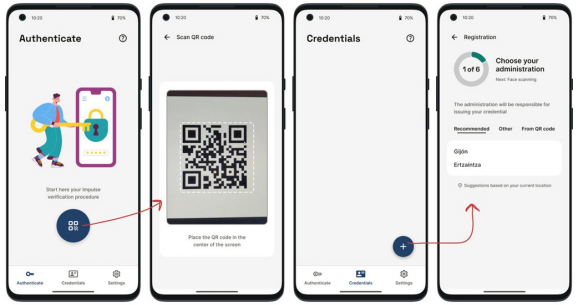
EBSI European Blockchain Services Infrastructure, a peer-to-peer network of interconnected nodes running blockchain-based operations. The EU Digital Identity Wallet scheme suggests that all EU/EEA countries issue compliant eIDs to their residents and businesses by end of 2024, however, eID Apps under the EU DI Wallet scheme are already being trialled and implemented widely without blockchain, See for example the EU DI Wallet Pilot implementation, of which only the DC4EU trial uses EBSI to manage education certificates and access to social security benefits.

IMPULSE app

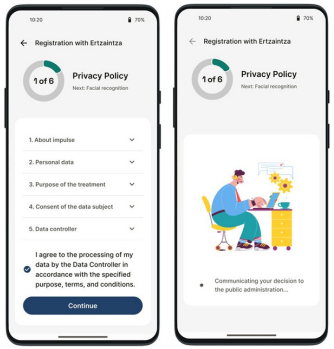
IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an alternative authentication method. It offers a robust and privacy-focused solution, guided by the concept of Self-Sovereign Identity (SSI) which forms the foundation of a user-centred eID approach.

To initiate the registration process, there are three methods available:

1. **Scan a QR Code using your mobile camera**, issued by the public administration you want to sign up for.
2. **Manually add credentials**, choosing administration from a list.

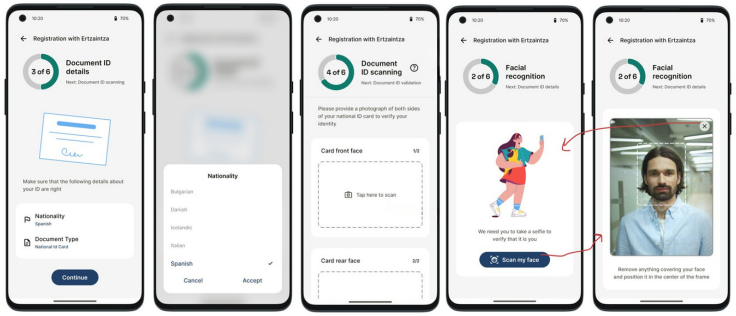


3. **Automatic initiation**: A service app displays a link to initiate onboarding with the IMPULSE App or it sends a notification to the phone, whereby tapping the notification redirects to the IMPULSE App for onboarding.



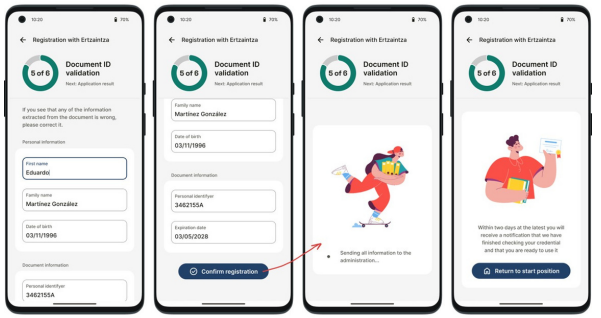
After selecting the public administration, regardless of the option to do so, users give their consent to share personal information by agreeing to the legal entity's privacy policy.

Subsequently, the IMPULSE App prompts the user to upload photos of their official ID document and a live facial scan. By transmitting the photos to the administration's Enterprise Server (ES), the data are further transmitted through AI processing for matching, and a biometric module in the IMPULSE App creates a biometric profile.



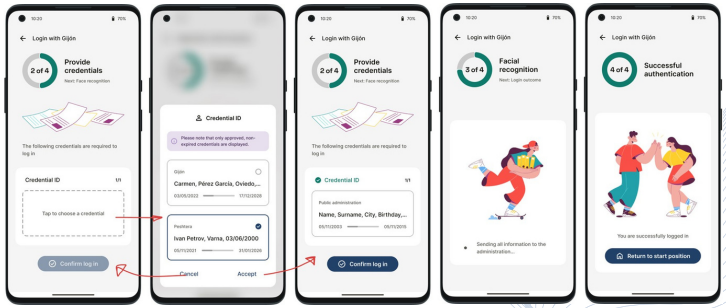
Upon successful verification, (and manual checks), the Enterprise Server promptly notifies the IMPULSE App of the completion of the onboarding process.

The IMPULSE Wallet will have received Verifiable Credentials of who the user is.



The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

When the Enterprise Server confirms the eID (VC) presented by the user, the authentication is completed and the the access unlocked the online public service.



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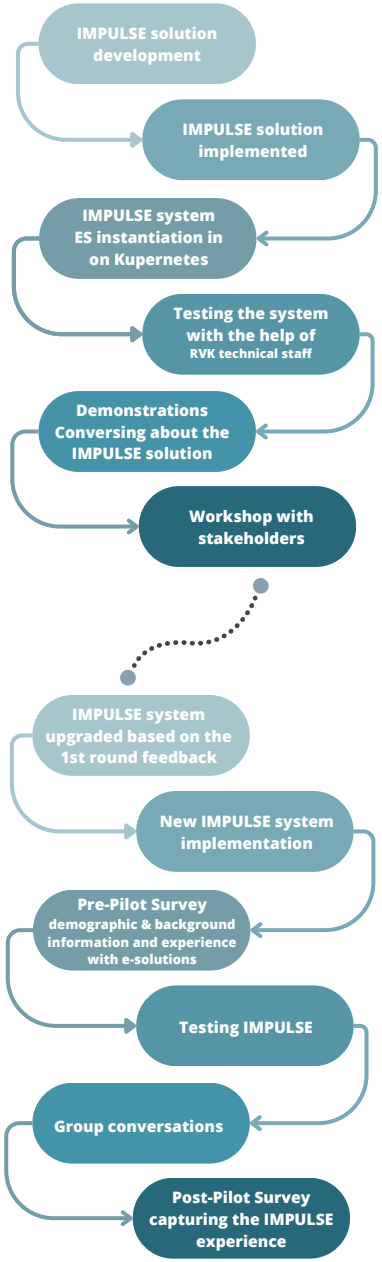
Pilot case: Reykjavik

The Reykjavík pilot was originally conceived as part of wider efforts within the administration, of enhancing opportunities for all to use the online public (self-)services. The growth of digital interactions in recent years, between the resident population, public institutions and authorities has proven practical and making lives easier, hence, the growing pressure to ensure universal accessibility.

What provides the context for the Reykjavík pilot is the mapping of the Icelandic eID and eGov ecosystem — work that involved desktop research, including document sourcing and analysis, informal conversations and stakeholder (elite) interviews, all key components in preparation for the pilots.

The definition of users in vulnerable situations turns on the environment not being adapted to mobility, sensory and/or cognitive challenges. This applies equally to physical and digital environments, the worst of the latter literally barring people from obtaining an eID, hence, from the online services requiring an eID.

The State began issuing eIDs to designated spokespersons and legal guardians in 2022, However, the IMPULSE App may still be a realistic alternative, offering more convenience, safety and acceptability to some users. It also remained to be seen if IMPULSE or similar apps can be integrated into the existing ecosystem of eID and eGov practices as a fully certified alternative authentication method.



1 ROUND

Valuable insights were gleaned from workshop demonstrations and in-house conversation:

- Discussing the value of autonomy in everyday life - who should be accessing services on behalf of others, casting eyes and operating.
- Discussing accessibility in terms of societal participation, albeit, autonomy is only achievable with and through others.
- Emphasising inclusion in early-stage designs of assistive online tech and in early-stage policy developments.
- Discussing concerns that the IMPULSE system is yet another gadget lacking in adaptability to <u>all</u> types of users.
- Discussing concerns about security, fraud and other vulnerabilities, supported with numerous examples in participants' experience.

<u>Functional advantages</u> are assessed by comparison with something else. What if the IMPULSE App is seen as too complicated, not convincing, nor trustworthy?

2 ROUND

- Most participants were able to onboard without direct instructions.
- All participants made similar comments about the number of steps for onboarding and login process. Additionally, task to scan the passport could be improved.

Discussions

- Most participants found facial biometrics very attractive.
- The IMPULSE App is not easy to use for persons with motor disabilities or visual impairment.
- All prefer obtaining once an official eID for universal use.
- Participants raised doubts about the functional capabilities of IMPULSE.

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Findings and recommendations

Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, best practices and recommendations aim to set the path towards a better understanding and adoption of eID solutions by and for public services.

PILOT EXPERIMENTATION

What important point has the pilot experiment highlighted?
Findings and recommendations based user experience about accessibility and usability, as well as assessment of the impact of disruptive technologies on eID governance and public engagement in the pilot case experiment.

1 As noted in other IMPULSE pilots, 7/9 participants in Reykjavík expressed scepticism about the relevance of a new eID such as IMPULSE, given they already own a universally applicable government-issued eID.

A federated eID scheme is already used by 97% of the eligible population. It is **free of charge** and simple to use. It provides absolute proof of identity, nothing more. Logging into various services with this eID hinges on those selfsame services offering it as a login option. The eID scheme does not include the use of facial biometrics, while the IMPULSE App does. On reflection, the responses to IMPULSE indicate that using facial biometrics is appealing, possibly more desirable and user-friendly than existing eIDs.

Communicating the IMPULSE system could benefit from greater emphasis on facial recognition as a **FUNCTIONAL ADVANTAGE** over existing government-issued solutions, however, with a clear trajectory of meeting all the technical safety, legal and regulatory requirements.

2 Participants in the trial made a point of probing the IMPULSE App for vulnerabilities and performance failures, apparently as an entertainment, but also a matter of concern and consequence. Performance was discussed in group conversations.

CONCEPTUAL ENGAGEMENT is crucial in early stages of service design where working technical functions are not necessary, while a service product in later stages of technical development is assessed with **HIGH EXPECTATIONS** of its functional capabilities. Lacking in the expected performance risks losing **TRUST** which is already very hard to earn.

3 The question is very prominent of who decides on eID and eGov developments. Icelandic State institutions have been in the driving seat since the eve of the 21st Century, in cooperation with big market players who deal in performance- and safety-critical operations, such as the banking and telecommunications sectors. The State's role has become even more prominent in Nordic/Baltic collaboration on future developments, considering also European-wide compliance with eIDAS2 and the EU DI Wallet scheme.

This question was raised during testing and in workshops, for instance, if the IMPULSE App would be offered in the same way as the existing eIDs, if the government was planning to make it available, if we did know when the App would become available, and similar. Notably, the framing of these questions always assumes that eIDs can only be issued if vetted by the agencies that govern them.

Anyone attempting to break into a mature eID market will first have to pass all required **CERTIFICATION** (validation/verification) issued by the local **GOVERNING INSTITUTIONS**, to ensure the product meets all the official technical standards specifications, safety and security demands.

To go further

Taking the IMPULSE eID system further in Iceland rests on its potential to meet existing demands at different levels, its ability to be an absolute proof of certified identification alongside other authentication options, without compromising what is well-established in terms of governance, in line with legislation and technology while guaranteeing unwavering security.

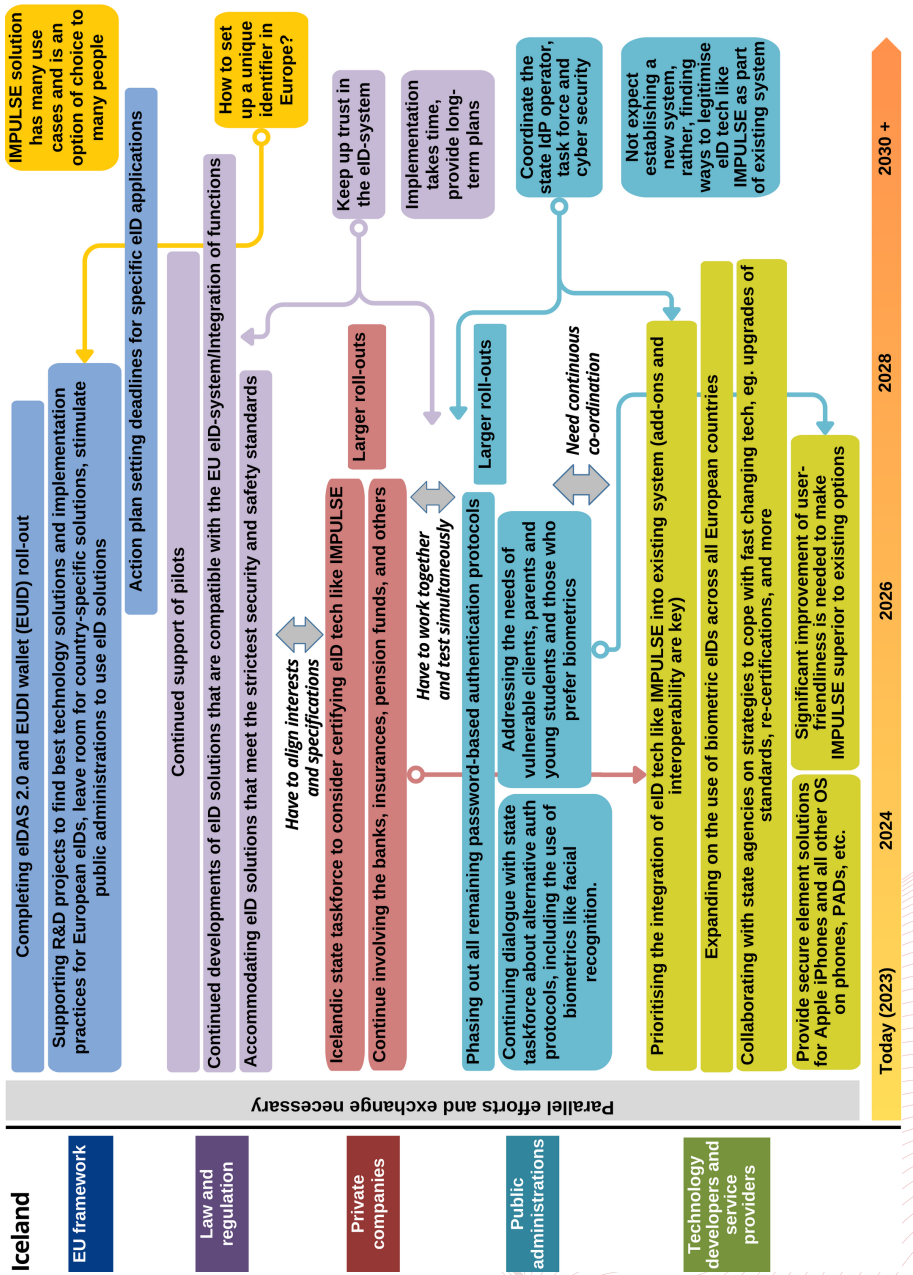
TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the Icelandic ecosystem.

The roadmap indicates the networks of different agencies and co-operation between them in order to reach this goal. Stakeholders include technology developers, public administrations, private and public companies, national law makers and regulatory bodies who operate in reference to the regulatory demands of the EU/EEA Internal Market.

The aim of this imaginary is to complete the integration by 2030 on a timeline that starts in 2023, but also provides a "2030+" option in case technical developments, administrative processes, and projected co-operation need more time.

The roadmap was drafted on the basis of the contributions and suggestions of external experts who have participated in a workshop in March 2023 which was organized by the IMPULSE project, and reviewed by the Digital Innovation Board in November 2023 as well as by the External Advisory board in December 2023.



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To go further

OTHER ROADMAPS

Roadmap n°1 - Aarhus Municipality

How – and to which extent – an eID-solution can improve access to public self-services for vulnerable people.

Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate between publics and the Police.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to blockchain and artificial intelligence.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services could be made faster and more secure with IMPULSE.

Roadmap n°5 - Union Camere / Info Camere

Improve the accessibility to a “Digital Drawer” for Entrepreneurs thanks to eID.

EU Roadmap

Bringing together the results of the six pilot cases, research and feedback from stakeholders for the global integration of eID.

RESOURCE LIST

DIGITAL ICELAND

PROJECT OFFICE ESTABLISHED IN 2018. TASKED WITH ASSISTING PUBLIC INSTITUTIONS IN IMPROVING THEIR DIGITAL (SELF-)SERVICES, DIGITAL INFRASTRUCTURE AND COMMUNICATIONS.
WEBSITE - THE TEAM

AUÐKENNI

STATE-OWNED IDENTITY PROVIDER AND LONG-TERM LEADER OF EID DEVELOPMENTS IN ICELAND
WEBSITE - CEO OF AUÐKENNI - ABOUT EID IN ICELAND

EDIH ICELAND

ICELANDIC NATIONAL EDIH TO BE ESTABLISHED IN COLLABORATION WITH THE NATIONAL TECHNOLOGY TRANSFER OFFICE, MAJOR UNIVERSITIES, ICELANDIC CENTRE FOR RESEARCH, INDUSTRY REPRESENTATIVES AND THE ICELANDIC GOVERNMENT - WEBSITE - LINKEDIN
SVERRIR GEIRDAL <SVERRIR@TTOICELAND.IS>

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Six case studies were carried out by public administrations in five countries:

- Denmark, with the Municipality of Aarhus,
- Spain, with Ertzaintza and the Municipality of GIjon,
- Italy, with UnionCamere and InfoCamere,
- Bulgaria, with the City of Peshtera,
- Iceland, with the City of Reykjavik.

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IMPULSE context

IMPULSE revolutionises electronic identity management (eID) systems by seamlessly integrating with online public services as an innovative alternative. Unlike conventional centralised eID systems, IMPULSE offers a robust and privacy-focused solution that addresses existing challenges. At its heart lies the self-sovereign identity (SSI) concept, which forms the foundation of IMPULSE's user-centric eID approach.

An identity management model empowered by **Self-Sovereign Identity** (either individual or corporate), shifts the model of personal data ownership from the government to the eID owner.

Individuals have access to their personal information and are able to authorise (to the extent permissible by law) who can access the information, and in what form.

The single-sign-on approach enables access to public services just providing soft proofs of identity for personal identification and authentication, an easier and friendlier process for most people, than complex interactions involving different devices/services (email, SMS, code cards) or long passwords that must be updated periodically to ensure their safety.

IMPULSE enables private companies and publics to register their identity only once with public administrations.

Their identity is verified and stored securely on the blockchain, simplifying access and the identification process.

The design, evaluation and adoption by public services of an AI- and blockchain-based eID system like IMPULSE, is suggestive of significant opportunities in the current EU context:

eID as the cornerstone of commerce, administration and interaction: simplification of communication and data exchange can give a boost to the economy and increase trust amongst publics, administrators and businesses.

New trust model: Digital identities on a blockchain-based system guarantees the trustworthiness of identities and credential, hence, enables a new trust model.

Simplification of inter-institutional communication and data exchange: Blockchain as a decentralised network enables anyone authorised to access validated digital identities (checked by IMPULSE), facilitating the participation of public administrations at different levels of governance: federal, regional and local, but also the interactions with private companies and publics at large.

Automatisation of e-registries: IMPULSE, with blockchain-based digital identities, enables the next step in digitisation of public registries, advancing from static to dynamic registries without complex additional solutions.

Re-usability of EU approved eID-systems, digital identities and authentication protocols as accelerators for eIDAS2 and public services: In opposition to existing national eID-systems, IMPULSE explores the use of blockchain as the backbone of an EU digital identity system, in connection to national eID schemas (assuring reusability), and in compliance with eIDAS as the basic requirement for EU and EFTA-wide acceptance.

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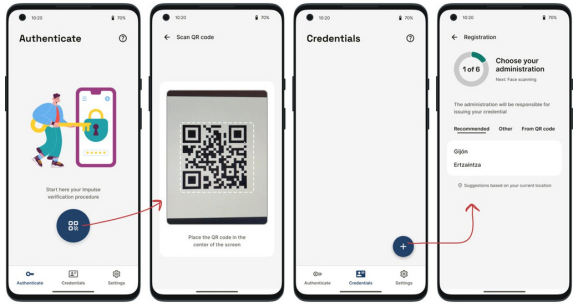

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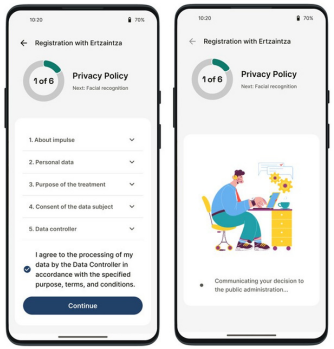
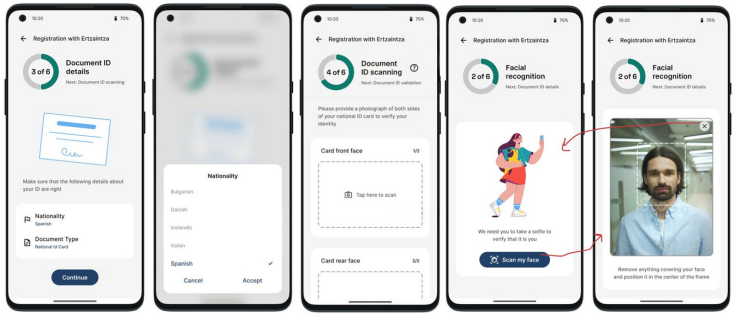


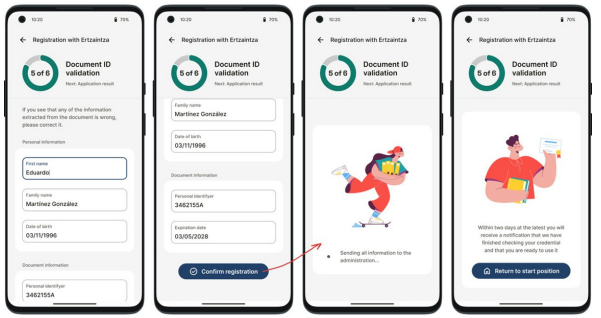
After selecting the public administration, regardless of the option to do so, users give their consent to share personal information by agreeing to the legal entity's privacy policy.

Subsequently, the IMPULSE App prompts the user to upload photos of their official ID document and a live facial scan. By transmitting the photos to the administration's Enterprise Server (ES), the data are further transmitted through AI processing for matching, and a biometric module in the IMPULSE App creates a biometric profile.



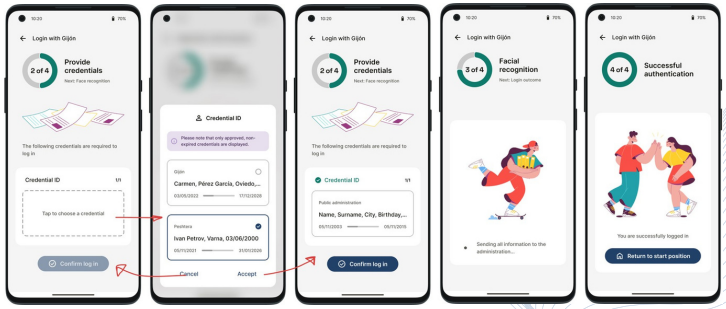
Upon successful verification, (and manual checks), the Enterprise Server promptly notifies the IMPULSE App of the completion of the onboarding process.

The IMPULSE Wallet will have received Verifiable Credentials of who the user is.



The user can now authenticate themselves using the Verifiable Credentials and issuing a live selfie to compare with the biometric profile generated during the onboarding process.

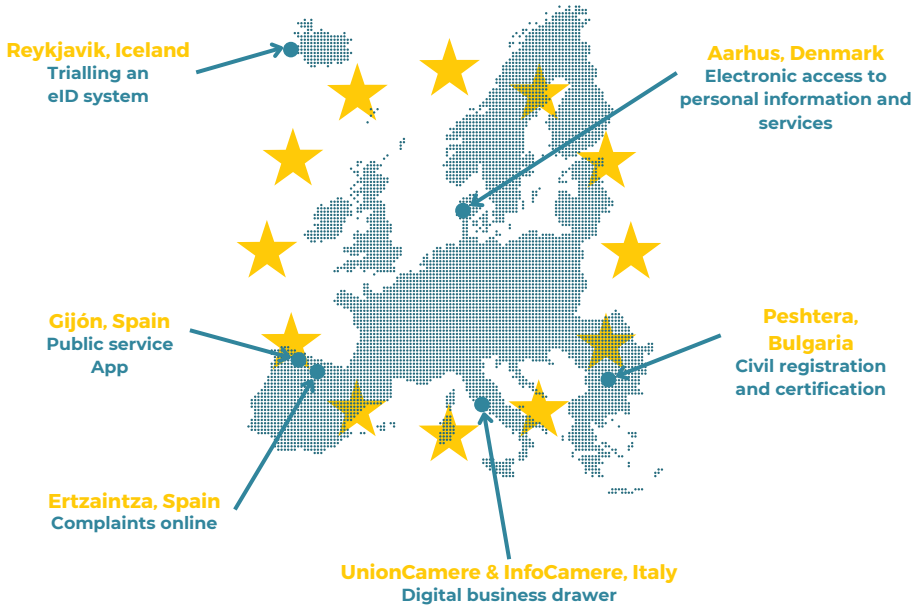
When the Enterprise Server confirms the eID (VC) presented by the user, the authentication is completed and the the access unlocked the online public service.



Impulse

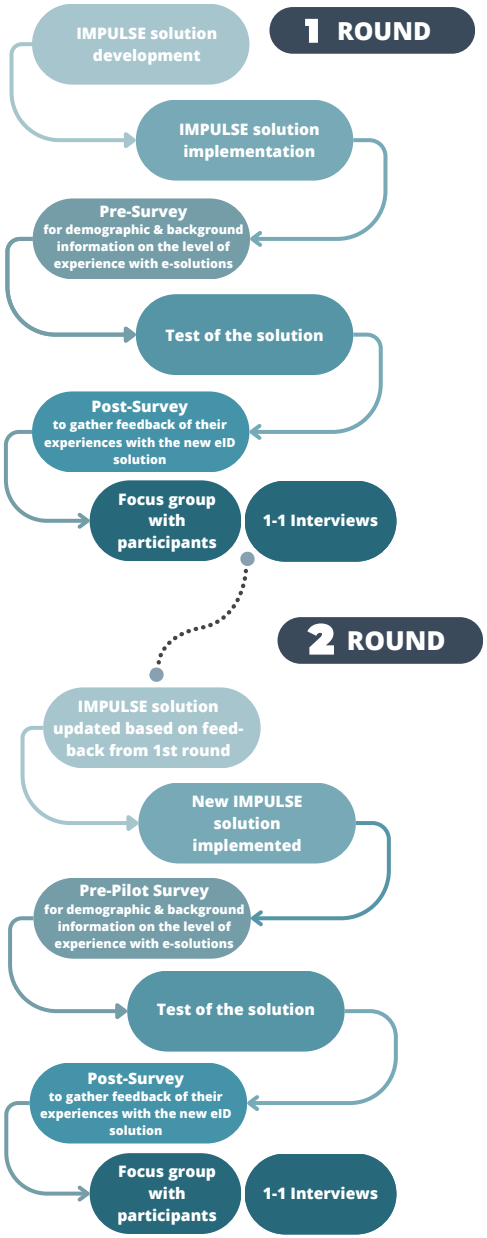
Pilot cases

The project looked at enhancing opportunities for users who struggle to use eIDs and online self-services for one reason or other. Digital interactions between public institutions, authorities and resident populations have proven beneficial under the right circumstances. Accordingly, everyone who is eligible should have the opportunity to use digital self-services, including vulnerable persons.



IMPULSE brings together a set of representative and innovative processes as six case studies in five countries provide a variety of contexts (cultural, operational, legal, procedural, social) and address the whole cycle: input, business workflow, output and archiving.

For more details on each case, you can refer to the six case study roadmaps (more information on the last page).



Each case location was provided with surveys, interview topics and focus group scripts for the pilot activities. The main goal was to collect both quantitative and qualitative data. Based on all the activities, the participant views, feedback and some KPI criteria were evaluated (acceptance, usability). The second round of pilots aimed to show if there were any improvement in the KPIs after the IMPULSE solution had been modified on the bases of feedback from the first round.

COMMON RESULTS

- Most users reported that the process was quite smooth and user-friendly.
- Users would be willing to pay for IMPULSE if it offered significant improvements over current systems in the pilot case countries.
- The company offering IMPULSE should not be large but if so, it should have a good reputation.

Impulse

Findings and recommendations

IMPULSE focuses on the use of disruptive electronic identification technologies for advanced identity management in public services. While the disruptive technologies are key instruments, the research objectives bring together multidimensional perspectives. They address operational, legal, ethical and socio-economic/political aspects from the point of view of public authorities, civil servants, general publics, external stakeholders and experts, all combined with academic research perspectives.

It has been possible to draw lessons to formulate recommendations and highlight best practices during the life of the project. These form the basis for adoption, escalation and sustainability of advanced eID technology in the hands of public services in the European ecosystem and in individual countries at different levels (local, regional, national, and cross-border).

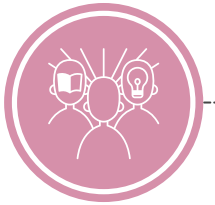
Best practices are a set of guidelines, ethics, or ideas that represent the most efficient or prudent course of action in a given situation, while recommendations are suggestions or proposals as to the best course of action. Overall, the best practices and recommendations aim to set the path towards better understanding and the adoption of the eID solution by and for public services.

PILOT EXPERIMENTATION

What important point have the pilot experiments highlighted?
Findings and recommendations regarding user acceptance, accessibility and usability, and the impact of disruptive technologies in public engagement surrounding the pilot case experimentation and on eID public governance.

PROJECT RESEARCH

What are the results of the research carried out?
Findings and recommendations regarding standards, ethical, legal, economic, social and privacy issues arising from the IMPULSE method for the implementation of disruptive technologies in the field of eID management for public services, and potential extension to other types of practice.



EXTERNAL EXPERTS

What did our experts and panels have to say?
Findings and recommendations regarding the implementation of eID technologies in public services, including municipal administrations, data protection authorities, public-sector organisations, front line civil service, general user services and other service providers, as well as Govtech.

Impulse

Findings and recommendations

PILOT EXPERIMENTATION

What important point have the pilot experiments highlighted?

Findings and recommendations regarding user acceptance, accessibility and usability, and the impact of disruptive technologies in public engagement surrounding the pilot case experimentation and on eID public governance.

1. Many participants were reluctant to take part in the pilots when they understood that an image of both sides of their ID card would be taken during the on-boarding process.

It is clear that people feel more and more cautious about technology and data processing. The facilitators during had to explain to participants how data is processed in the app, where it is being stored, for how long, and all the GDPR rights to ensure that all of them are fully aware of how their data is being used. Learning about this and knowing that others had already tested the solution, participants became more accepting performing the tests.

✓ **ENSURE** sufficient **TRUST**. This involves ensuring transparency, but also other factors: recruiting trusted multipliers (individuals, organisations) to use the solution; having **TRUSTED ACTORS** vouch for the quality and security of the solution (e.g. data protection authorities, consumer rights organisations)

2. As noted in several pilot cases, participants were sceptical about the relevance of a new electronic identification solution such as IMPULSE when a solution is already existing and working well.

In Denmark (with MitID, the Danish national electronic identification system) and in Italy (with SPID, Sistema Pubblico di Identità Digitale), effective solutions are already in operation, IMPULSE appeared as not so relevant. However, some of the testers in the second round of the pilot suggested that there is potential for IMPULSE to provide added value as an alternative.

✓ It is important to **TAILOR** the **SALES PITCH** to the audience and most importantly to each country, and describe the advantages of a new eID over the existing technology/process if one already exists.

3. During the experiments, participants said that there are too many steps in the interactions with the application, especially for logins. For instance, the asks for consent on numerous occasions (consent to register with IMPULSE and consent(s) to log into available services).

The various validation processes appeared to be too slow due to the need to accept terms and conditions and select the identification method each time the participant wanted to log into a service.

✓ Although necessary and in line with the obligation to display **TERMS** and **CONDITIONS**, reading and validating them is often botched or omitted. It is important to make **DISPLAY** and **ACCESS CLEAR**, **SIMPLE** and **QUICK** for both information and understanding, in order to guarantee constant security. In addition, the GDPR principle of **PROPORTIONALITY** of data must be taken into account, so that only data that is exclusively necessary for operations is collected.

Findings and recommendations

PROJECT RESEARCH

What are the results of the research carried out?

Findings and recommendations regarding standards, ethical, legal, economic, social and privacy issues arising from the IMPULSE method for the implementation of disruptive technologies in the field of eID management for public services, and potential extension to other types of practice.

1 RESULTS FROM THE POLICY ROUNDTABLES

Users want to use IMPULSE or some other eID app to access a service. They are asked to consent to the use of their data and read an explanation of the purposes of the data collection. They must decide whether to give the consent. Having to register and access multiple services during the day, They are continuously asked to think about their data and decide whether to give or deny their consent. In the end they give consent without even looking at what they are doing, because they are annoyed and do not want to waste time

It is very important to take into consideration the **COGNITIVE OVERLOAD** of users when creating an e-solution. Users are overloaded with responsibilities and requests, to make decisions, to be informed and aware of what will happen to their personal data. It should be the other way around: the institutions should safeguard users, take care of their personal data, leaving them free to use online services without clutches or fears.

When a digital identity system is introduced as optional, people and service providers may freely decide whether to use it or not. But when it clearly offers better access to key services, it is quickly adopted by the vast majority of people until it is no longer perceived as optional. One real life example of this is the Aadhaar system in India (12 digit identification numbers issued by the Unique Identification Authority of India on behalf of the government of India).

USABILITY and access to greater **ADDED VALUE**, and useful services (not only public), are key factors in the acceptance and success when introducing a new digital identity system.

2 RESULTS FROM THE ECONOMIC ANALYSIS

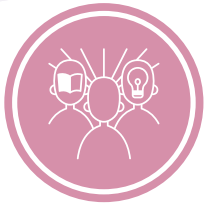
If you look closely, use of public services, whether on-site or online, is rather sporadic (change of passport, civil status, tax reporting, etc.). Hence, involving the private sector in building up an e-solution, is crucial, because people use private services much more intensively and more often than public sector services.

Involve important **PRIVATE-SECTOR** use cases and make the solution interoperable across domains to ensure that a sufficiently large number of heavily-used use cases exists to make it worth while to adopt the system.

The market for digital solutions for public services and the resident population is already substantial. These include solutions from private companies as well as government solutions (SPID in Italy, MitID in Denmark). So, in order to be able to offer a new solution, it is important to analyse user needs, and then perhaps build upon and adapt existing solutions that work, including from other countries.

Have a clear and significant **VALUE PROPOSITION**: the solution must add significant value to users' lives and ensure sufficient scale of use - large number of users and use cases - to spread costs and make small savings add up.

Findings and recommendations



EXTERNAL EXPERTS & PANEL

What did our experts and panels have to say?

Findings and recommendations regarding the implementation of eID technologies in public services, including municipal administrations, data protection authorities, public-sector organisations, front line civil service, general user services and other service providers, as well as Govtech.

1 Iratxe Martin - BASQUE CYBERSECURITY AGENCY

Spain - Promote cybersecurity in the Basque Country.

The GDPR is an indisputable guarantee for the EU in terms of data protection, but compliance with the rules is sometimes inadequate due to a lack of clear, comprehensible information. For example, some hotels make photocopies of guests' identity cards. According to the GDPR, data may only be consulted or taken from an identity document by accredited services (e.g. police, airport, municipality, etc.).

The principle of **PROPORTIONALITY** in the collection of data must apply everywhere, and therefore to public administration services. Users should only be required to provide data that is necessary for the smooth running of the service. For its part, the public authorities must define what data is necessary and then guarantee its security once it has been collected.

It is important to take into account that identity is highly relevant for cyber attacks. It ranks in the top 5 of stolen data online. One of the most common incidents that the Basque Cybersecurity Agency has to deal with is fraud (usually identity-related). For example, in the case of fishing, when linked to identity, the theft is twofold. Firstly, the identity stolen is that of the organisation (its name, logo, email formatting), which is then used in a fraudulent email, sometimes leading to the theft of personal data from people who, believing they are dealing with their administration, are not suspicious and freely give away their personal information.

DIGITAL TOOLS are definitely needed to protect users from cyber attacks, but it is also a question of **ACCULTURATION**. Both public administrations and service providers should provide enough information to users regarding the importance of protecting and not sharing their data. This is even more important for vulnerable people, such as young people as they are tomorrow's fraud targets.

2 Thomas Moser - DIH Ost - Fachhochschule St. Pölten

Austria - DIH whose mission is to increase the transformation capacity and transformation speed of SMEs in Eastern Austria

Protection against identity theft is an obligatory subject when it comes to an electronic identification solution. Nowadays, multi-factor identification is commonly used to guarantee the identity of the person wishing to access data. Facial recognition could be one of these added factors. Particularly as far as facial recognition via a personal mobile is concerned, the new generation of smartphones is not easy to unlock with a simple photo; you need a face in motion, which can guarantee good level of security.

It's worth looking at what at what smartphone manufacturers and other technology providers are doing, because without this, it may be difficult to implement a solution in isolation that will not quickly become obsolete.

Findings and recommendations

3 Hervé Jean - IDETHIC

France - Idethic designs and produces 'Idego one' to help companies take control of their digital identity.

A solution can be considered viable when the take-up rate is around 80%. It is particularly important to identify which services are needed and for which type of person, in order to prioritise the implementation of digital solutions and encourage uptake. It is not necessary to make all services available digitally in a single step. For example, for people who are rarely available during opening hours, switching to an online solution without having to go to the administration's premises beforehand to have their identity confirmed could result in higher uptake. As for the remaining 20%, a so-called "classic" solution, i.e. going onsite, will have to remain in place until the digital solution becomes the "new normal".

Matching the **NEED** with the **OFFER** is important when it comes to getting people to sign up to a new solution, in this case an eID solution. The service provided will then be the most appropriate and most easily accepted. As for people who are resistant to a new service, in the event of Internet problems or simply inability to use the new service, it is still be necessary to maintain a face-to-face service to guarantee the continuity of the public service.

As far as data storage is concerned, depending on the solution selected to protect it, it will be more or less secure. In any case, we can see that all current systems are or can be subject to online attacks, especially public services as they may not be as well protected as eID apps.

When it comes to security and protection, we need to consider the entire **VALUE CHAIN** (app for authentication, online public services and end-user devices). At each link in the data architecture, you need to ensure that the security padlock is closed, so that a breach does not allow hackers to infiltrate the system. It might even be worth working with hackers, who will try to infiltrate the application (at any stage in the value chain) to uncover any loopholes.

4 Drs R. Brand - Senior Policy Officer

The Netherlands - Directorate for Digital Economy at the Ministry of Economic Affairs and Climate Policy

A lot of attention is given to the European Digital Identity Wallet for natural persons. Nevertheless, the eIDAS revision states that just like natural persons, also legal persons must be able to use these wallets to authenticate and to share attributes. There are service providers that are very interested in especially the EUDI Wallet for legal persons and see the advantages of become relying parties. One thing that fundamentally is different between both types is the applicability of the GDPR, since this does not relate to company data. Another difference is that without a structure for representation a wallet for legal person does not work. Representation can be divided into "vertical" representation (person X within a given company is authorized for process p) and "horizontal" representation (company A authorizes company B for process q).

Therefore it could be good to **ANALYSE** how **LESSONS** from the natural persons cases can be applied to the wallet for legal persons. A successful implementation of this framework – like The Netherlands has done in the notified identity scheme for legal persons eHerkenning - takes time, therefore the recommendation is to **START THINKING ABOUT IT**.

To go further

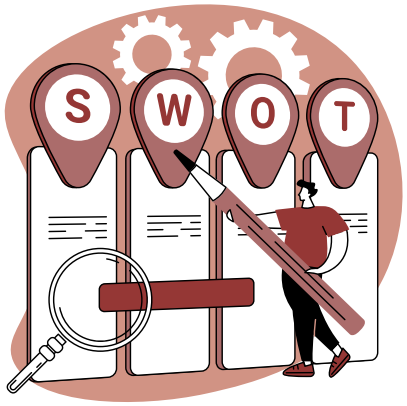
Fostering innovation projects in the fields of eID security and management and further escalate long-term sustainability based on realistic business plans and exploitation strategies, considering the variety and particularities of different potential ecosystems.

SWOT ANALYSIS

To promote the adoption of the IMPULSE eID solution, as well as to enhance/suggest future developmental directions, the SWOT analysis result is as follow:

Considering the results of the SWOT analysis, promoting IMPULSE adoption should begin with commercialising basic, fast and simple eID offerings, progressing to advanced eID functionality. It is critical to establish trust through early adopters from the public and/or private sectors.

Meanwhile, as learned from COVID-19, opportunistic exploitation possibilities should be examined. Last but not least, the micro-credentials realised by IMPULSE have the potential to offer unique and novel business models.



Strengths

- IMPULSE is secure and convenient since it not only allows users to manage their own identities
- Avoids unnecessary journeys to the public administration
- Widespread use of smartphones and facial recognition technology can facilitate wider adoption of IMPULSE

Weaknesses

- Lower privacy as it offers insufficient privacy compared to for example using token identification.
- Will be required to develop IMPULSE from basic eID to advanced eID in order to broaden the application range.
- More legal-regulatory certification will also result from this.

Opportunities

- Private usage of Facrial Recognition Technology (FRT) is popular, which might help in determining the target customer and market for IMPULSE.
- 'Acceptance potential' is higher in more sensitive/security-dependent context, which implies the prospective application context, such as government service.
- Finally, the pandemic emphasised the need to prepare for a future crisis, which might be a market to consider for IMPULSE due to its contactless and hygienic nature.

Threats

- There are multiple similar products/services competing on the market, and the number is still growing.
- Concerns about the reliability of the technology, the privacy of the application, and trust in the service/product provider.
- Insufficient range of digitised and connected public services/systems
- Maturity level of eID adoption varies across countries, which will have a negative impact on marketing IMPULSE if not carefully planned.

To go further

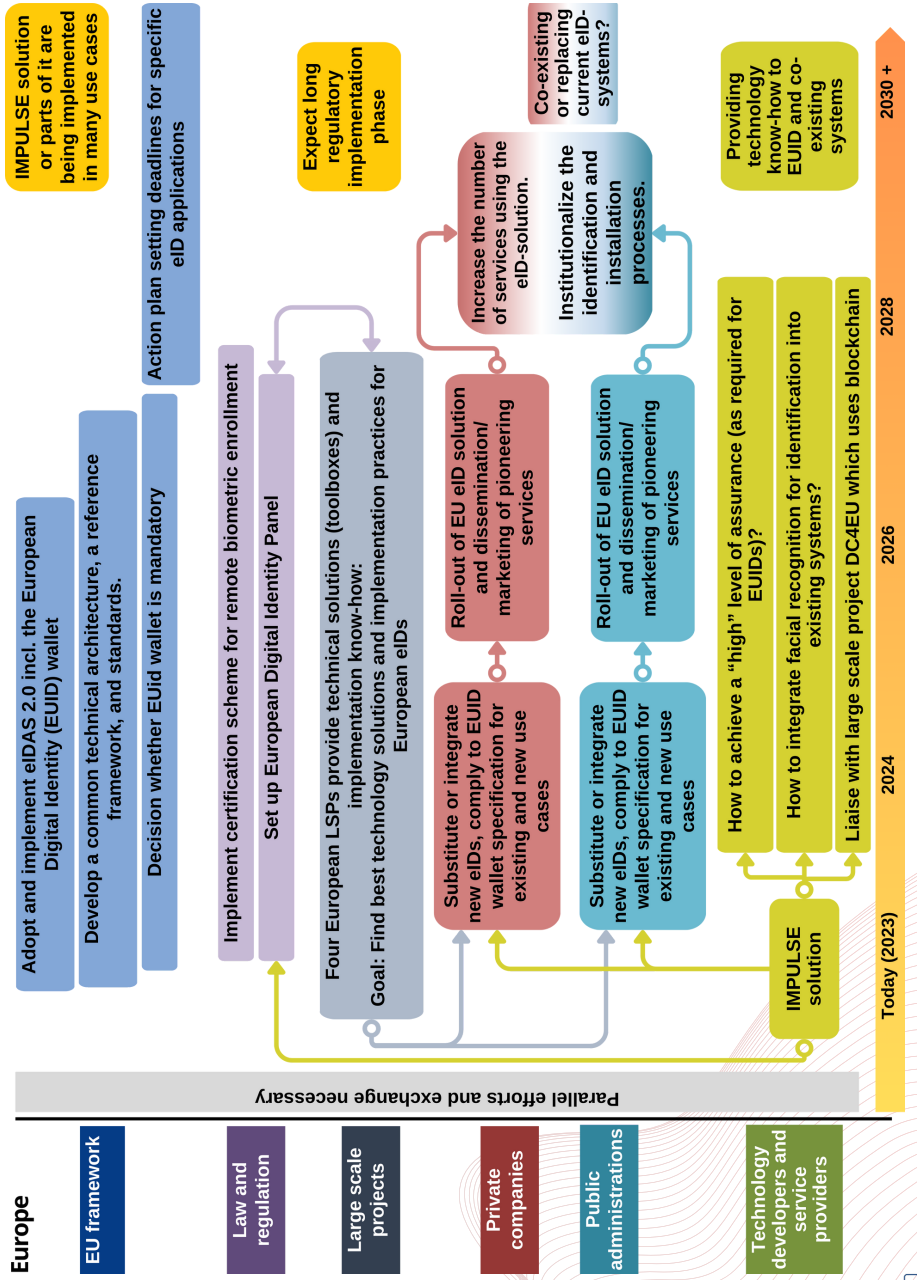
TIMELINE FOR ADOPTION

The roadmap on the right is speculative, however, it details the different steps necessary on the road to integrating IMPULSE (or similar solution) into the European ecosystem.

The roadmap shows the co-operation necessary between different stakeholders.

The timeline of the roadmap starts in 2023 and covers the seven years until 2030, but also provides the option "2030+" for long-term developments and in case of delays in technical developments, administrative processes, and projected agreements.

The roadmap was drafted on the basis of the contributions and suggestions of external experts who have participated in a workshop in March 2023 which was organized by the IMPULSE project, and reviewed by the Digital Innovation Board in November 2023 as well as by the External Advisory board in December 2023.



Impulse

To go further

OTHER ROADMAPS

Roadmap n°1 - Aarhus Municipality

How – and to which extend – an eID-solution can improve access to public self-services for vulnerable people.

Roadmap n°2 - Ertzaintza - Police Department

Analyse and evaluate the possibility of establishing safe channels to facilitate between publics and the Police.

Roadmap n°3 - City of Gijón

Analyse the improvement in the use and process of digital identities (eID), thanks to blockchain and artificial intelligence.

Roadmap n°4 - Municipality of Peshtera

Assess whether the process of issuing civil registration services can be made faster and more secure with IMPULSE.

Roadmap n°5 - Union Camere / Info Camere

Improve the accessibility to a "Digital Drawer" to the Entrepreneurs thanks to eID.

Roadmap n°6 - Reykjavik

Explore if using facial recognition for logging into online services makes it easier for people in vulnerable situations.

RESOURCE LIST

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Alicia Jiménez González - Head of European Programmes at GRADIANT

Want to know more

@IMPULSE_EU

@IMPULSE project H2020

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