Leveraging eID in the Private Sector

D7.3 Roadmap & recommendations for long-term sustainability

Document Identification			
Status	Final	**Due Date**	30/11/2018
Version	1.0	**Submission Date**	30/11/2018

Related WP	WP7	**Document Reference**	D7.3
Related Deliverable(s)	D7.1, D7.2	**Dissemination Level (*)**	PU
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Keywords:
Sustainability, eIDAS roadmap, e-identity

This document is issued within the frame and for the purpose of the *LEPS* project. This project has received funding from the European Union's Innovation and Networks Executive Agency – Connecting Europe Facility (CEF) under Grant Agreement No.INEA/CEF/ICT/A2016/1271348; Action No 2016-EU-IA-0059 The opinions expressed and arguments employed herein do not necessarily reflect the official views of the European Commission.

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Document History			
Version	Date	Change editors	Changes
0.1	16/05/2018	ATOS	Table of content
0.2	14/09/2018	ATOS	First draft
0.3	26/10/2018	ATOS	Second draft
0.4	14/11/2018	ATOS	Final draft
0.5	27/11/2018	NTUA	Peer review comments
0.6	28/11/2018	ATOS	New version according the comments and final version ready for quality review
0.7	29/11/2018	ATOS	Quality Review
1.0	29/11/2018	ATOS	FINAL VERSION TO BE SUBMITTED

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List of Acronyms

Abbreviation / acronym	Description
EC	European Commission
Dx.y	Deliverable number y belonging to WP x
WP	Work Package
IAM	Identity and Access Management
IdM	Identity Management
LoA	Level of assurance
SAML	Security Assertion Markup Language
SLA	Service level agreement
GDPR	General data protection regulation
CEF	Connecting Europe Facility
SP	Service provider
eIDAS	Electronic Identification and Signature
OTP	One Time Password
IPV	Identity Proofing and Validation
CIAM	Consumer Identity and Access Management
API	Application Programming Interface
EUPL	European Union Public Licence
eCATS	eIDAS Connectivity Automated Testing Suite
JWT	JSON web token
JSON	JavaScript Object Notation

Executive Summary

As a part of LEPS project, a number of activities, focused on uptake of eIDAS e-ID service in private sector, were executed and reported in different deliverables. These activities include market analysis, value network and value proposition assessment, business plan drafting, cost benefit analysis and others. Based on conclusions from these activities, dedicated roadmap and recommendations have been elaborated. In this context, the term "roadmap" denotes a set of possible future directions with specific steps and goals to fulfil in order to reach the sustainability of LEPS results. However, these results are intrinsically linked to the future of eIDAS infrastructure, with eIDAS nodes, their stability and modus operandi, serving as the main pre- requisite for LEPS project sustainability. Having this in mind, LEPS project partners, elaborated a set of challenges from the sustainability point of view, and tried to identify main factors. Initial sustainability factors included:

- the user adoption of notified e-ID services in their own countries (not in a sense of having e-ID, but using it in regular online transaction with private service providers in their own countries)
- trust in identity providers, but also for brokers that might emerge in eIDAS ecosystems (eIDAS nodes, and possible future sector specific brokers)
- service provider need to elevate level of assurance (LoA), especially in case of cross-border services that are actually requesting substantial or high LoA
- policy alignment, including sector specific policies that make explicit mention of identification or authentication services.

As a part of the recommendation and road mapping activities, an external industry monitoring group (IMG) has been established in the early stage of the project. The feedback of IMG members was used during the project execution, for example during market analysis activity. At the end of the project IMG members were invited to the final event, where demonstration of the main project achievements and presentations of a draft sustainability strategy was done. Comments received from IMG were clustered into the three main categories, namely:

- LEPS context or surrounding factors, such as of eIDAS ecosystem, especially in countries different than Greece or Spain
- Market factors, such as cost, pricing strategies, marketing etc.
- LEPS technical evolution

In parallel to sustainability challenges analysis, gap analysis was performed. Initially, it was based on conclusions from previous deliverables about market or cost benefit assessment. After the feedback from IMG was incorporated the description was adapted to fit three clusters previously defined.

- Among LEPS context gaps, the situation with notified e-ID adoption in home countries is still below expectations, while the infrastructure including eIDAS nodes is not sufficiently stable. The changes occurred during the LEPS project execution (migration from eIDAS node version 1.2 to 2.0), while the advance in service level agreement that is needed for uptake of private service providers, was not satisfactory. The lack of transparency around decision making related to eIDAS ecosystem was also perceived an important gap for the adoption of eIDAS eID services by private service providers.

- Market factors contain important gaps for LEPS sustainability since the dominant e-ID providers, such as social networks or search engines, offer easy and low-cost connectivity to their e-ID services for service providers. Cost model in LEPS project needs further improvement and finetuning, maybe in relation to different sustainability options: “eIDAS connectivity as a service” operated by a broker, integration in CIAM and similar solutions, and separation of identity proofing and verification, as a separated service in another member state, seem like the most important roadmaps to explore. In addition, the situation related to notified mobile e-ID should be closely monitored.
- Finally, technical evolution or extension of LEPS results are perceived also as an important factor of sustainability. While some services have already been explored during the project execution (e.g. application of formal methods to assure that LEPS results have no vulnerabilities), the other were mentioned as a possible target for the future.

The next step was the elaboration of alternative roadmaps and sets of recommendations for the future sustainability of LEPS project results. In line with the previous classification of challenges and gaps, three visual roadmaps have been drafted, namely:

- One-time LEPS results transfer to an external organization, a scheme that is drafted generic enough to cover both “caretaker” type (e.g. public sector such as eIDAS node operator or EC), as well as broker type or organisations.
- Plan, pilot and production roadmap for service providers with LEPS partners assistance. This roadmap is targeting “LEPS at different speeds” scenario where early consulting services could be offered for one group of SP, while the other service providers could be already at production stage.
- Continuous LEPS improvement roadmap targets mainly the integration into other solutions, not least consumer IAM (CIAM), while the project partners align their interests in an ad-hoc manner according the specific business opportunity

Together with these three alternative roadmaps, a set of generic and specific recommendations has been made, namely the community management of open source LEPS results, the deployment of “eIDAS connectivity as a service”, the integration with the other solutions, evolution and reuse of know-how, exploring idea of sector specific e-ID broker and exploitation of LEPS results internally.

1 Introduction

The long-term sustainability is linked to many other topics, such as the desirability, feasibility and profitability (either financial or in terms of time) from all stakeholders involved. Service providers are concerned with adopting eIDAS with very small budget and there are assumptions about CEF eID infrastructure and questions if it is ready or good enough for private service provision. It is therefore also important to assess the question of desirability, both from the eID service users (citizens and businesses) and from service provider perspective. We should always have in mind that LEPS results have to be put in the context of profitability, feasibility or desirability of use of CEF e-ID services by private service providers. Without possibility that private SP connect to eIDAS node, or without proper support by eIDAS network stakeholders, LEPS results will have no uptake.

The overall methodology for the feasibility and sustainability of a project aiming to connect private SP to eIDAS nodes in order to use CEF eID services, can be defined in five steps:

- Technical question: "Is the project technically possible with this resource and within this time limits?"
- Economic: "Will it increase cost/benefits?"
- Legal: "Is the project legally viable?"
- Organizational/Operational: "Will the users accept the change?" and "How effective the project will be in solving the problem at hand?"

While the first two questions are covered in the previous deliverables, the other two are relevant for long term sustainability. A roadmap must be defined detailing the main successive deployment stages of LEPS and CEF eID adoption within different business sectors and related recommended actions to maximize the uptake by identified target stakeholder groups. In this direction, LEPS Industry eID Monitoring Group has played an important role in providing ideas for sustainable models that consider the specific demands of sector-specific service providers (i.e. service levels, liability, usability, security, support aspects). The workshop that took place at the end of the project is also described in this deliverable, along with the conclusions that helped in the finetuning of the recommendations.

The deliverable is organised into several chapters. We start with an overview of the challenges and the remaining gaps for long-term sustainability, as experienced during the project, but also reviewing feedback received from industry monitoring group. In the chapter dedicated to recommendations and road mapping we present several alternative models, before giving specific suggestions and selecting the optimal path for the future.

1.1 Purpose of the document

This deliverable is describing activities executed within the scope of LEPS project task 7.3: Roadmap & recommendations for long-term sustainability.

1.2 Relation to other project work

In deliverable D7.1, we have already explored some feasibility options, with the especial emphasis on postal and banking sector. Deliverable D7.2 took a closer view on costs and benefits with and without use of LEPS results, providing in this way a solid conclusion related to profitability. More specifically, these deliverables brought important conclusions about making the SP integration with a (proxy-based) eIDAS Node a straightforward and lean process. With a vision of "breaking connection barriers", LEPS project's Activities analysed the Service Providers' perspective of technical complexity, speed, and cost of integration with eIDAS. A cost model of SPs integrating the eIDAS Network presented in D7.2 considers in detail several fixed and dynamic parameters for two principal scenarios: a) SPs use a generic software (such as CEF provided Demo SP Connector) to connect to an eIDAS Network Node, b) SPs use Commercial off-the-shelf software to connect to an eIDAS Network Node (such as APIs provided by LEPS project). " eIDAS Connectivity-as-a-Service" strategy was also analysed as a more sustainable option, at least from SP point of view.

1.3 Structure of the document

This document is structured in 5 major chapters. Besides the introduction and conclusion chapters, the remaining work is revolving around challenges, gaps and roadmap and recommendations on how to bridge these gaps. The figure 1 shows the idea behind this structure.

Figure 1: Structure of deliverable

2 Overview of Challenges

In this chapter we look at challenges from the perspective of private sector online service provider. Why should this type of company invest in eIDAS connectivity? How strategic are these e-ID services, given a plethora of other e-ID means and services that online service providers can use? Are there additional motivation or compliance issues that would increase desirability of eIDAS connectivity?

2.1 Market Challenges for adoption of CEF eID by private sector

eIDAS (electronic IDentification, Authentication and trust Services) refers to EU regulation on electronic identification and trust services for electronic transactions in the internal market. But it also refers to an infrastructure also known in CEF as eID Digital Service Infrastructure (for example when we talk about eIDAS "nodes"). Electronic identity services provided through this infrastructure (electronic identification, authentication and signatures, for example) are sometimes referred as "eIDAS e-ID services", to distinguish them from other ancillary trust services that are regulated under eIDAS regulation.

Market challenges for adoption of LEPS results cannot be understood outside of context of market adoption of CEF eID building block or "eIDAS eID services". Therefore, we treat both challenges simultaneously, paying attention especially to challenges related to service provider (SP) connectivity to eIDAS. It is well known that e-ID market is two sides market. End users, whether citizens or businesses, are having their own set of challenges, from usability to scalability. However, in this chapter, we focus on the SP side of the e-ID market, more specifically on the subgroup of private sector online service providers. Given the fact that LEPS users are operating in postal and financial sector, we take these sectors for the analysis.

The LEPS project focus is on integrating e-services to eIDAS infrastructure through so called eIDAS adapters. Those were developed in LEPS project in order to reduce burden for service providers and to reduce integration costs. eIDAS adapters is a sort of generic name given to reusable components, such as supporting tools, libraries or application programming interfaces (detailed description of LEPS project results are given in D7.1). In this context, deliverable D7.3 is analyzing challenges and gaps related to the sustainability of the main LEPS project result – LEPS adapter in all its forms and configurations.

The connectivity to eID provider, in national or any other context, was always mentioned as an obstacle to a wider adoption of eID services. This is also the case with eIDAS infrastructure, with many node operators, heterogenous eID schemes and identity provider types. In relation to this category the **cost of connection** to eIDAS infrastructure, the **operational model** and the **stability of eIDAS environment** (including legal and organizational issues not yet solved) were identified as the main challenges.

The second group of challenges is around end **user adoption**, which indirectly affects service providers as well. Many service providers wait for the moment when citizens will activate and start to use massively their eID. In some member states the national eID card strategies have changed in order to make this "user acceptance threshold" lower: for example, e-ID features on ID cards in Germany are now activated by default, while in Italy cultural vouchers have been given to students that activated and used their e-ID. Nevertheless, the challenge still remains. The use of e-ID with high level of assurance

(LoA) is also far beyond expectations. On the positive side, the uptake of mobile ID solutions in many countries, notably in Austria, Belgium and Estonia, is growing faster than expected, so the introduction of LEPS mobile ID adapter for Spanish DNI 3.0 can be considered as “right on time” action.

2.1.1 Use of the LEPS results

In the case of Spanish services, the eIDAS Adapter is the API implemented by ATOS which allows service providers to communicate with the Spanish eIDAS node. The eIDAS adapter is based on a Java integration package provided by the Spanish Ministry for integrating e-services of the private sector with the Spanish eIDAS node This package uses the integration software delivered by the EC (see figure 2). The Spanish eIDAS adapter in LEPS provides a SP interface to the Correos’ services, and an eIDAS interface for connecting to the eIDAS infrastructure. This reusable component has JWT based security for transmitting user information, can create SAML Requests and process SAML Reponses, and is able to translate SAML 2.0 to JSON and vice versa. It is independent from SP client programming language. Regarding the deployment process, it is based on dockers and can be deployed on SP infrastructure or by a third party.

In the case of Greek eIDAS adapter, the University of the Aegean has proposed three integration ways:

1. eIDAS SP SAML Tools Library. Used in the case of Java-based SP (developed from scratch) in which there is no need for one certificate for many services within SP and in which there is no need for pre-built user interfaces (UIs). This was used to avoid extra development time for creating and processing SAML messages.

2. eIDAS WebApp 2.0. This solution is for Java or non-Java-based SP scenarios, in which there is no need for one certificate per service within SP. This allows to avoid development time for processing SAML messages, by handling complete eIDAS-based authentication flow (including UIs). It uses SP infrastructure independently and operates over a simple REST API. This method increases the security (JWT based security). This is used in Java or non-Java-based SP, and there is no need for one certificate for many services within SP

3. eIDAS ISS 2.0. This solution is for Java or non-Java-based SP (developed from scratch) in which one certificate is used for many services within SP and can operate with or without SP e-Forms / thin WebApp. It is used to avoid development time for processing SAML messages supporting the interconnection of many SP services in the same domain (each service is managed via a thin WebApp). It sends SAML 2.0 request to eIDAS Node, translates the response from SAML 2.0 to JSON and other common enterprise standards (and forwards it to the relevant SP service). It supports multiple services within the same SPs sharing one certificate

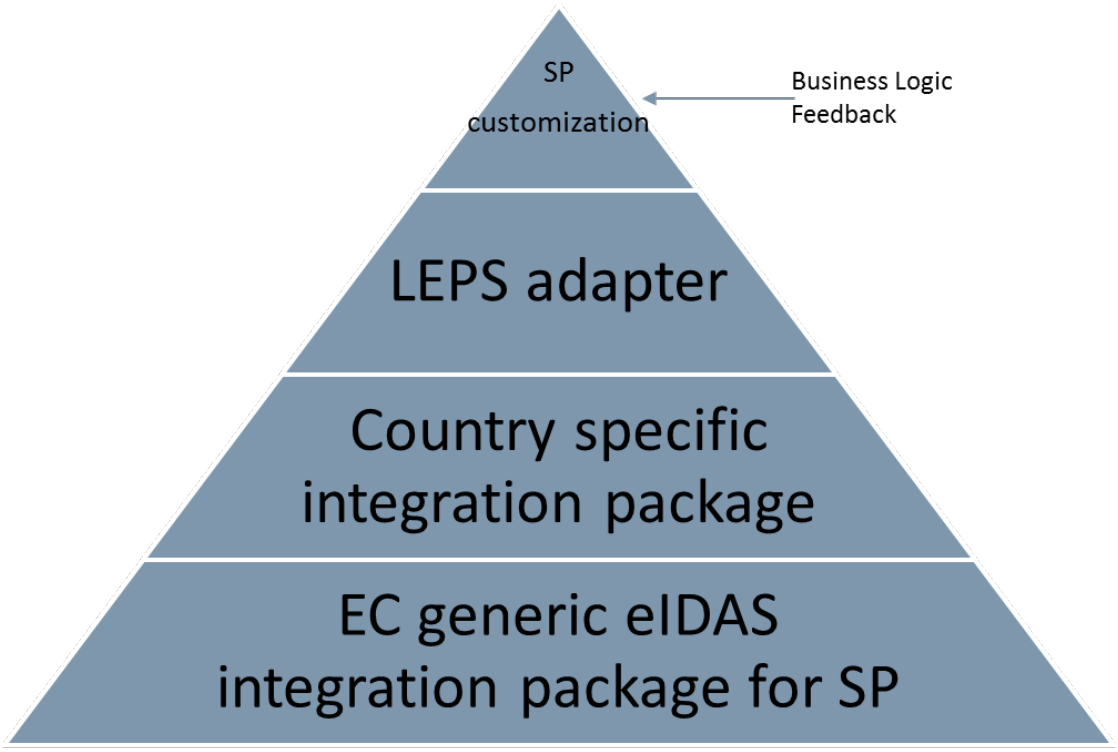

Figure 2: LEPS adapter is built on previous examples and software packages

Finally, there is also a mobile application developed by Universidad de Murcia which works with any SP offering eIDAS authentication for Spanish users. Additionally, the implementation can be easily extended to other EU Member States by adding other authentication methods beyond the Spanish DNIe. Also, the requirements for SPs to integrate the mobile application are practically minimal and are limited to the requirements of mobile environments, i.e. providing javascript

2.1.2 Reliability and replicability

Replication of of LEPS results, important for immediate viability of a project, can be achieved only if the functional (e.g. if LEPS components can be easily used in different countries by SP), but also the non-functional (security, performance) properties fit a wide range of needs and requirements. Regardless of type of service that SP provides online and requested LoA for e-ID, we can assume that LEPS adapters will be used only if all protocols are properly tested and if there are no detected vulnerabilities. While the notion of levels of assurance (LoA) is important for eID services, the Common Criteria evaluation, for example, provides product assurance based on a series of Evaluation Assurance Levels ranging from EAL1 (most basic attack-script kiddie) to EAL7 (most stringent). This more in-depth and stricter certification process also considers security during product development and if LEPS adaptor is to be accepted, some formal verification had to be done.

In order to demonstrate the replicability of the Greek and Spanish adapters for eIDAS infrastructure, a preliminary step was made by testing the integration with a set of test cases, developed during task 6.1.

This resulted in a eCATS (eIDAS Connectivity Automated Testing Suite) tool, an automated testing tool, based on Selenium portable software-testing framework for web applications, developed under LEPS Task 2.2 and adapted to the web environment developed for LEPS. In the second part of the project, it has been decided to package this testing tool as another LEPS project result and to try to exploit it separately. The validation against eIDAS core service platform (production level) was carried out in task 6.4 with using real notified e-ID services and token (credentials such as Spanish DNIe 2.0, and 3.0 supporting NFC for Spanish IdP, user/password for ERMIS IdP, and user/password + OTP for ATHEX IdP), and protocol verification using formal methods, performed by NTUA and UAEGEAN, can contribute to the reliability and robustness of the design. This knowledge can also be reused in a case that some other country-specific adapters need security properties verification.

2.2 Feasibility and Sustainability Factors

The Sustainability Analysis of LEPS is comprised of two approaches: 1) feasibility (short and mid-term) and sustainability (long-term). Thus, in order to make a recommendation related to the sustainability, the indicators or factors need to be defined together with a method to calculate the feasibility (see D7.2 cost benefit analysis). The result of that analysis will be used in order to calculate the sustainability. Besides these factors, the objective of evaluating the sustainability of the LEPS results will also be based on the socio-economic environment of the eID service adoption by citizens, for example the state of technological infrastructure, the legal or organizational environment etc.

For many EU citizens, the concept of an Electronic Identity National Document is not new. While in many member states the usability challenge is treated with new generation of mobile ID solutions, in Spain decision was made to preserve smart card format that resembles previous ID card format. The novelty in DNI 3.0 was introduction of NFC technology that enables contactless use of e-ID card on smartphones and tablets. Very soon specific apps emerged that allow, for example, signing of documents between private entities through NFC technology. At the moment it is difficult to estimate the actual use of DNI 3.0 in Spain and the situation is similar in the other countries. This figure is very low (in 2014 it was reported as low as 0,02% in interaction with public administration)[1]. Data is, however, available for CL@VE (figure 3) that integrates DNI together with other means of authentication. Cl@ve is an identification, Authentication and Electronic signature service for citizens shared by the whole State Public Administration Sector, and based on the use of set keys, including centralised digital certificates, that is, cloud-based certificates stored and kept in custody by the General Government. Although the important growth from 2017 to 2018 number of authentications through CL@VE is not likely to be extrapolated to DNI3.0, we have positive attitude towards the challenge of wide user adoption. While the use base is large (eventually 100% of citizens will have an e-ID), we include “active use” as one of the main sustainability factors for LEPS adoption.

[1] https://cincodias.elpais.com/cincodias/2017/11/13/midinero/1510576751_274226.html

Use of common services				
@firma - e-signature Platform	**Units**	**Scope**	**May 2018**	**2017**
Applications using @firma	No. of applications	Spain	1.622	1.576
Transactions	No. of transactions	Spain	191.797.714	368.070.744
CL@VE	**Units**	**Scope**	**May 2018**	**2017**
Registered users	No. of users	Spain	6.298.321	5.163.494
Total authentications	No. of transactions	Spain	66.475.968	8.405.259
Authentication through Cl@ve PIN	No. of transactions	Spain	1.344.895	441.834
Authentication through Cl@ve Permamente	No. of transactions	Spain	2.528.503	1.489.703
Authentication through @firma	No. of transactions	Spain	22.840.395	6.471.976

Figure 3: actual use of CL@VE platform in 2018

The second sustainability factor is trust. It is dynamic issue and citizens in some countries trust government more than banks, for example, at the certain point of time, but the other way around in some different time period. Therefore, trust in an eID provider, as a function of who, where, when and how, is an important challenge and should be considered in detail for the future roadmap. In LEPS project, more specifically, we examined the role of Post offices, organisations that citizens are familiar with, offering identity verification services already for many years. Trust in Postal operators is relatively high, given that citizens are familiar with the way it works and their relative ubiquity is additional factor that could position them as an important stakeholder in the overall e-ID ecosystem. Introducing postal service operator, either as an e-ID provider (which is already the case in Italy, UK, France or Switzerland) or as an operator of "eIDAS connectivity hub" on service provider side (either with LEPS adapter or with other software) should not be seen as competitor for government. In this sense, full ecosystem that includes trust framework, roles of stakeholders, and the procedures, should be in line with present and future policies, and is presented in figure 4 as another important challenge. Finally, the demand for more online security, common for end users and service providers, is the last, but not least sustainability factor that needs to be considered in the recommendations and future roadmap. It is important to stress, that more security does not come exclusively in the form of higher level of assurance (read; better and more trustworthy technology), but also in the optimal split of roles and procedures. Onboarding to digital banking with remote identity verification, out of channel transaction confirmations and other are examples of how to increase security without choosing e-ID that has higher LoA. The observation of market movements in this sense is therefore also a key factor, as it changes fast and many previously considered e-ID providers with low level of assurance change their offerings and technologies behind e-ID service provisioning.

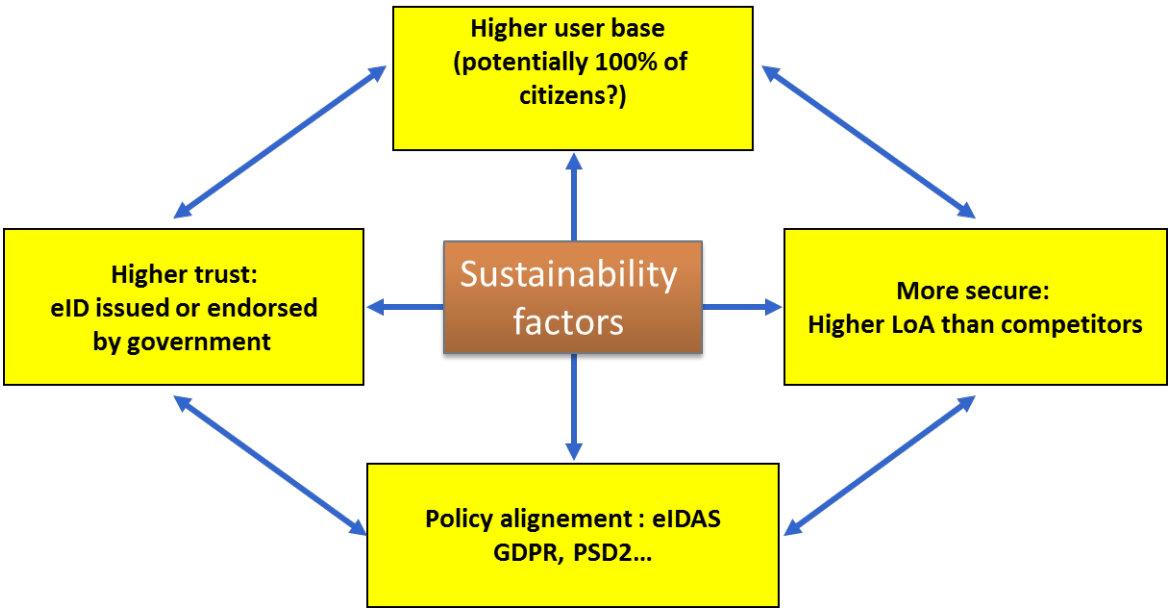

Figure 4: Initial sustainability factors

2.3 Feedback from IMG

Besides publicly available data, information gathered from partners and pilots, as well as outcomes of market analysis, the LEPS project has an additional channel to gather information about challenges, gaps and recommendations for the further reuse and uptake of eID by private service providers and in a narrower sense, uptake of LEPS results by service providers. This is activity of Industry eID Monitoring Group (IMG), englobed within the related feasibility assessment and road mapping exercise. Feedback from IMG was pro-actively sought while the exchange of views and opinions was fostered through distribution of newsletter, e-mail communication, conference calls and organization of the workshop in Murcia at the end of the project. The table 1 lists all IMG members.

Table 1: List of IMG members

Name	Organisation
Marta Ienco	GSMA
Eduardo Galvão	SIBS
Jacques Bus	Digital Enlightment
Tiago Costa	Sonae
David Mitzman	Infocamere
Marc Norlain	AriadNEXT
Sigurður Másson	Advania
Kalev Pihl	SK ID SOLUTIONS AS
Esther Groen	Innopay
Don Thibeau	OIX
Gustavo Damy	Universal Postal Union
Thierry Barba	Orange

During the project issues and contributions from IMG members include:

- Pricing of eID services: Identification and authentication services in Iceland, for example, are provided for free, which does not make certification authority (CA) happy so in the future there could be some charge for high levels of assurance (LoA).
- Marketing: IMG recommends not to use term "Connector" for LEPS results to avoid confusions as part of the eIDAS node uses this term already as part of standard eIDAS terminology. IMG member also indicated that different models could be considered to ease integration of SPs. Marketing should be improved with attractive videos that could also be placed on public site like YouTube. Once again marketing was mentioned at the final event, in relation to the estimated cost of integration through LEPS adapters, which was compared to the other options (connector building from scratch and reuse of eIDAS library). The number of days mentioned in unique selling proposition should be few days and not "save xx days compared to the other options" since service provider is not interested in relative advantages but will rather compare eIDAS with Facebook or Google ID connectivity requirements.
- Scope extension: It is also recommended to explore how to ensure that a person that has lived in more than one European country and uses different identities issued in those countries can be verified to be the same person for a Service Provider. This scenario can become more and more common with increased citizen's mobility across the EU. From the KYC point of view very interesting feature for banks. Working group between eIDAS and others exist to treat KYC issues related to the use of eIDAS. In the next version banks will not be responsible for info they get from eIDAS nodes. Interoperability with existing eID solutions at service providers and need for reconciliation was also mentioned as open challenge. While there might be countries

not able to do it, a single service at EU level could be recommended e.g. to ask about eID and get response about surrounding metadata – a sort of equivalent to TSL

- Choice of platform for mobile interface – it was explained that in LEPS there is a need to interface with NFC functionality and this was better supported under Android (which also has more users than iOS). The project extends existing libraries for Spanish mobile eID which are available for Android. The commercial offering, however, should make an assessment and take into iOS.
- Stability of eIDAS infrastructure and service level agreement - Private companies need stable environment with clear service level agreement (SLA), software without bugs, assurance and legal guarantees. This is not the case at the moment with eIDAS eID services, that do not come with SLA guarantees needed by private service providers. How to explain to private customer, such as a bank in Greece that they cannot access the service due to problems of Greece Proxy/Spanish eIDAS node/Spanish eID provider availability? This issue was raised during the first IMG confcall in January 2018 and was discussed again in October 2018. There is still high risk for service providers given the situation with eIDAS. There should be some roadmap to reduce risk for service providers that involves public sector investment in infrastructures beyond CEF support to Digital Service Infrastructure (DSI). Some ideas could be brought from governmental approach to physical infrastructure e.g. concession of highways to private operators, after initial build-up phase.
- Transparency - There is no good visibility in the eIDAS ecosystem and commitment of member states differs. The monitoring and commitments of governmental bodies to make the solution more attractive is needed. During the final event, IMG members mentioned again problems of transparency and communication from eIDAS node providers, as well as from Cooperation Network. For stakeholders “outside of network”, it is difficult to get information on time, as it was case of migration to eIDAS node 2.0.
- Maintenance – if LEPS, that is developing on top of existing eIDAS nodes, has three “connector” or adapter models, this also multiplies maintenance costs.
- Finetuning of target audience for the LEPS solutions can be done, in terms of size and sector of service provider. Most of the midsize and up companies are very OK, with their eIDAS integration as foreseen today by the EC, but the larger service providers would typically not need LEPS adapters.
- Value proposition - focus on the reduction of cost was brought out as the main objective to facilitate the broader acceptance in the private sector, yet the driving force in most of the companies is revenue, so it should be brought more strongly into focus (e.g. how the wider customer base could earn more money that only local one etc). Tools and case studies to support the improved revenues are to be created as well.
- Joint dissemination and marketing - sharing the projects plans and priorities in the private sector and in international forums with Open Identity Exchange, providing international private sector with "up-take" support through social media, conferences, etc.
- Shape of PPP – should private sector lead public private partnership (PPP), or is the government taking the lead of the PPP in an attempt to create identity services ecosystem and market? In the Nordics and Canada, the early involvement of the banks and relying parties provided for the development of a trust framework, address liability upfront and the success to date.

- Standardization – IMG suggested OASIS Electronic Identity Credential Trust Elevation Methods (Trust Elevation) TC to define a set of standardized protocols that service providers may use to elevate the trust in an electronic identity credential presented to them for authentication. During the final event there was also some discussion about Universal postal Union presentation, more specifically about their standard S68 and possible bridge to eIDAS. One recommendation is that ELTA and Correos explore the future of postal e-identity and whether it needs to be taken into account in the roadmap
- User experience – IMG members found that user experience is not optimal and maybe there is a possibility to reduce redirecting between different pages. There is redirecting in the background that causes delay. Number of pages for user interaction in Facebook ID, for example, is 2 but LEPS could also do that if consent is included in the same page like logon page. One related recommendation is to include parameters or public data about user abandonment rates due to poor user interface experience. These parameters would have impact on the more detailed cost calculations.
- Business model - Identity connectivity as a service was perceived as a good idea for more sustainable business model, but the right operator of this eIDAS CaaS needs to be found. One recommendation is to check suitability to have either national eIDAS broker for service providers or sectorial brokers. During the final event IMG experts mentioned that business model from national eID schemes is not necessarily applicable to cross-border scenario

After these comments, and the remaining feedback and analysis of material provided by IMG members, together with the previous conclusions coming from D7.1 (see chapter 2.1), the initial factors from figure 4 were expanded and grouped into three “domains” of factors or categories. Based on these three groups, general recommendations were made, depending on impact on feasibility and sustainability:

- Surrounding factors (status of eIDAS ecosystem and infrastructure, maintenance, adoption of eID by EU citizens etc)
- Market factors (cost, business model, pricing, marketing etc)
- LEPS evolution (technical improvements e.g. user interface, scope extensions etc)

In the next chapter, results of gap analysis for each of these categories of factors has been describes.

3 Sustainability Gap Analysis

3.1 Surrounding factors

In chapter 2 we have already seen some figures related to eID uptake in Spain, while the uptake by service provider was presented in more detail in D7.1. The expectation related to notification under eIDAS regulation by 29 September 2018 was high and some service provider were disappointed to see that only two member states had actually notified eID schemes on that date[2]. While Spanish eID schemes are pre-notified, Greek notification of eID is still uncertain. The full eIDAS ecosystem is still far from being operational, also on demand side, including intermediaries and facilitators. This is perceived as a lack of commitment by service providers, and a source of uncertainty which delays decision to migrate or adopt eIDAS eID services.

During the execution of LEPS project, CEF Digital (responsible for maintaining the eIDAS-Node integration package) has released a new version of eIDAS-Node sample software (eIDAS-Node 2.0) that had impact on the project. The SAML 2.0 protocol has been replaced by a sample JSON protocol for demo purposes and the decision for secure protocol selection and implementation responsibility is delegated to the member states. Migration to eIDAS poses problem since the default client facing protocol in eIDAS-Node 2.0 is not backward compatible with previous versions. On a short term, some member states decided not to migrate, but the issue of consensus and transparency was raised among LEPS project partners and IMG members. There is no sufficient transparency, as commented by IMG members, about process and procedures, at EU level, and it seems there are gaps in the information flow from eIDAS Technical Sub-group and Cooperation Network meetings. On the other side, eIDAS nodes do not give sufficient insight in service level agreement and support services, so service providers are often not sure “who is in charge of what”. The issue of eIDAS ecosystem stakeholder ability to convince others about their capacity to provide a verifiable service with simplified functionality and a standard set of guarantees, including service level agreements tailored to the need of private sector service providers, is essential step for the wider uptake of eID services. In parallel, Cl@ve also had migration to version 2.0. Cl@ve is a Spanish system aimed to allow citizens to identify themselves. The design of Cl@ve is based on a federated electronic identities system, which comprises also eIDAS node, and the private service provider can only access eIDAS through it. The kit of integration of Cl@ve 2.0 is available for Java 8, Java 7, PHP and .Net. In some sense, Cl@ve can be considered also as a candidate for eID reconciliation or trusted intermediary for validation of different eID provider services.

The Commission mentioned it will also explore the need to facilitate the usage of remote identification and secure authentication in many sectors, including transport, retail or financial services, and in the autumn of 2018 many webinars have been organized. The Communication on Online Platforms and the Digital Single Market (COM(2016)288) launched an action "to encourage online platforms to recognize other eID means”. While there are lot of actions regarding awareness and encouragement, gap seems to be in the response to those early adopters that need support for operational connectivity to production

[2] Up to date list is available on https://ec.europa.eu/cefdigital/wiki/display/EIDCOMMUNITY/Overview+of+pre-notified+and+notified+eID+schemes+under+eIDAS

or pre-production environments. On a policy level stronger push to include eId services in sector specific legislation, such as the case of PSD2 directive, might increase demand for strong customer authentication. eID has already been singled out as one of the a major enabler to drive innovation and digital transformation in several sectors. For example, when AML4 is finally adopted, it will be possible to use "notified" eID means of appropriate assurance level for secure remote cross-border identification of customers, thus facilitating bank's compliance with the new know-your-customer requirement.

On the other hand, user-centricity and usability has become a priority and the issue of user experience (UX) regarding eIDAS eID has been also raised in eIDAS Technical Sub-group and Cooperation Network meetings, as well as LEPS IMG. While experience of the end to end user journey for citizens (from initial onboarding, to awareness & understanding, to cross-border authentication) has been recognized as a key challenge for increasing uptake of eID by citizens, there is a considerable gap, when compared to low level of assurance (e.g. social network) eID services. An interesting project that closes the gap is Mobile Connect eIDAS pilot, aiming to create an operational forum for public–private cooperation to accelerate eIDAS implementations/notifications for mobile operators and the wider digital identity ecosystem.

Finally, when it comes to the situation related to LoA, some doubts are also creating mistrust among service providers. Recent solutions for identity proofing and verification (see also chapter 3.3) assign LoA substantial or even high, without passing formal test or accreditation. It was reported that verification through online video session can be considered sufficient for high LoA in Italy, but not in the Netherlands. In this sense, control through NFC for Spanish DNI 3.0 is a great step forward.

3.2 Market factors

Many conclusions for gap analysis come from study performed under task 7.2 about cost and benefit analysis. While it was agreed, already at an early stage of the project, that all software in LEPS will be published under open source EUPL license, the other factors, such as value proposition, target audience and marketing, were discussed in several occasions.

The essential gaps that have been perceived are around cost- benefit expectations and market reality. The cost and the operational effectiveness of the adoption of an eIDAS compliant eID service is one of the main concerns of the private Services Providers and while LEPS (and other CEF projects with similar goals) are perceived as a significant contribution to improve eIDAS connectivity cost-effectiveness, there is still gap in comparison with connectivity to low LoA eID services from social network providers. When it comes to mobile identification and authentication, which has become the most visible trend related to the adoption of notified e-ID solutions, LEPS contributes with the Mobile application (Android OS App) that allows the access to the e-services of Greek Service Providers with Spanish e-ID card DNI 3.0 that has possibility of contactless use. Since there are many different implementations in EU member states (e.g. NFC enabled smart card, e-ID on SIM card, e-ID downloaded on the phone etc), it is questionable what is the best way to reduce e-IDAS connectivity cost for mobile services.

Considering higher level of assurance provided by some notified eID schemes, the cost-efficient connectivity to eIDAS ecosystem seems not to be sufficient for a wide market uptake. Decision on whether to request and implement e-ID services with a higher LoA is always on service provider, but except for several business cases (e.g. compliance with regulations, such as know your customer in

financial sector), there is no demand for "trust elevation" by means of switch to higher LoA. On a positive side, easy integration of the components of LEPS, together with technical guidance to Service Providers on lowering technical complexity and cost of integration, might contribute to speed up attitude and change process.

A cost model of SPs integrating the eIDAS Network, that has been done in LEPS, considers technical and non-technical costs and compares with the eIDAS adoption in two ways: using a generic software (such as CEF provided Demo SP Connector) and by using APIs provided by LEPS. Exploration of the ways that the "eIDAS Connectivity-as-a-Service" Strategy can reduce the complexity and operational burden associated with customer authentication process is also an important step to close this gap. Recommendations from IMG related to marketing statements (number of days needed to connect to eIDAS) should also be considered.

Separation of IPV provisioning looks as a promising approach, if it is SP for foreign IdP, but IdP for home SP. This trend already happens in eIDAS ecosystem, most notably in Germany that was also the first country to notify e-ID scheme. LEPS should be looking at partnership opportunities and postal sector is a very good candidate to find future partners. Another group of potential partners is among vendors of Customer Identity and Access Management (CIAM) that look for "window of opportunity" for eIDAS services.

3.3 LEPS evolution

When the service provider verifies the identity of foreign citizens it performs identity reconciliation with the proper records if such records are available. Additional steps are necessary to avoid duplication e.g. eID internal in Correos and eID as received through eIDAS. There are some ideas and prototype solutions for matching name matching or even data mining services to improve identity reconciliation, so it was also suggested as one of the future directions for LEPS adapter.

Another possible evolution is related to the use of blockchain. eIDAS notified eID providers are susceptible to single point of failures thereby making it hackable. Blockchains applied to eID is distributing the data in ways that there is no single point of failure. Identity solutions using standards like W3C DID and Verifiable Credentials, Decentralized Identity Foundation (DIF), Oasis and others have been discussed in LEPS, but so far, the only pilots, or even suggestions for pilots, have been done in relation to referendums and "active citizen" platforms.

Something similar has been discussed in relation to biometrics. While some service provider already have experience with it (e.g. Correos Express uses biometric signature), the future extension of eID services and maybe LEPS adapters is very unlikely. On the other hand, use of ID Token, such as JSON Web Token (JWT) that contains user profile information (like the user's name, email, and so forth), represented in the form of claims, seems more likely trend of relevance to LEPS future. ID token in OpenID Connect (OIDC) that is already introduced in eIDAS 2.0 can be considered as an equivalent of "assertion" used in SAML. The use of SAML front channel (browser) was also questioned by LEPS IMG members. For mobile applications, this is not feasible.

Finally, the growth of identity proofing and verification services and derivation of virtual identities from (cross-border) eID with high LoA, is something which looks very likely. In this direction, a strategic study of the possibility of emergence of Identity broker Providers providing "eIDAS Connectivity as a

Service", could be very good idea for the sustainability. Sectors that are essentially exposed to cross-border transactions, such as banking, insurance and e-commerce and familiar with the use of standard third-party services, are primary target for customized LEPS broker platforms.

A formal verification model for "eIDAS Connectivity as a Service" that was partially explored in LEPS is another path worth to explore, especially if cybersecurity labelling becomes ubiquitous.

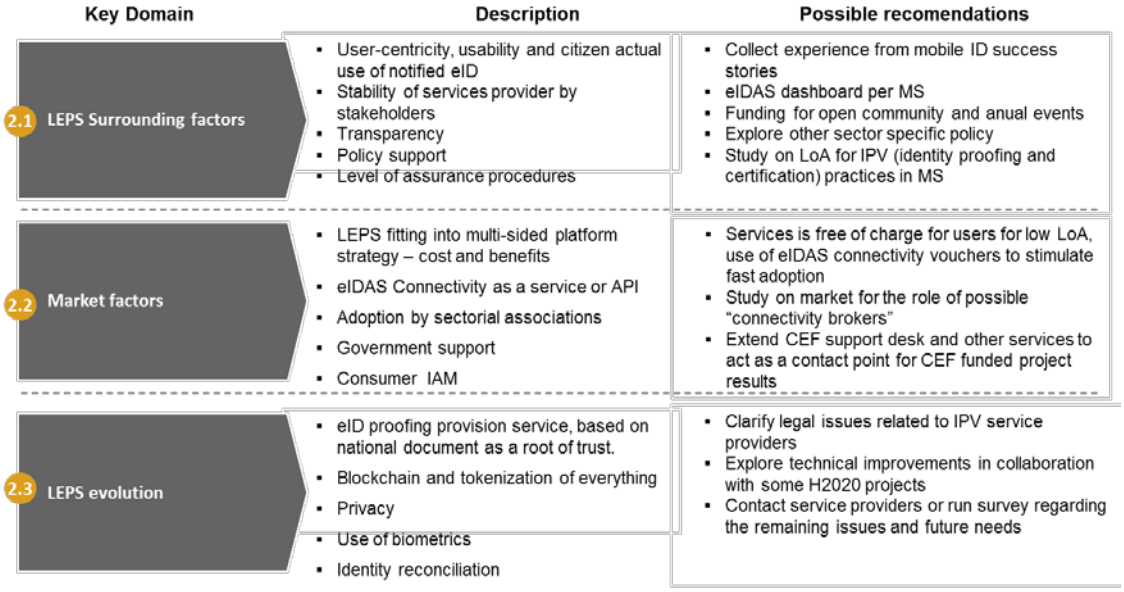

Figure 5: Sustainability factors, gaps and recommendations

4 Recommendations and Roadmap

4.1 Alternative Roads for the Future of LEPS Results

During the execution of LEPS project several packaging solutions for adapters, explained in more details in D7.1, were considered, namely separated libraries, API and LEPS-as-a-service, or more generically named eIDAS connectivity as a service, where a broker operates LEPS proxy at service provider side. These options, however, depend on market interest, as well as partners resources, intentions and motivations. Cost benefit analysis presented in D7.2 tries to shed some light on short term feasibility by looking at value proposition around cost effectiveness and cost efficiency. The previous chapters, in addition, brought several conclusions and possible recommendations for the future directions that would make LEPS not only feasible, but also sustainable.

All these inputs are combined in this chapter into three strategies, here denominated "LEPS roadmaps", that make an illustrative attempt to put together different bits and pieces. The strategies and resulting roadmaps are:

- One-time LEPS results transfer to an external organization
- Plan, pilot and production roadmap for service providers with LEPS partners assistance
- Continuous LEPS improvement

The intention of these alternatives is to analyses the most attractive, but also realistic option that fits, or at least considers external sustainability factors (therefore it is flexible roadmap), market factors (therefore it is a pragmatic roadmap) and evolution factors (any roadmap is forward-looking).

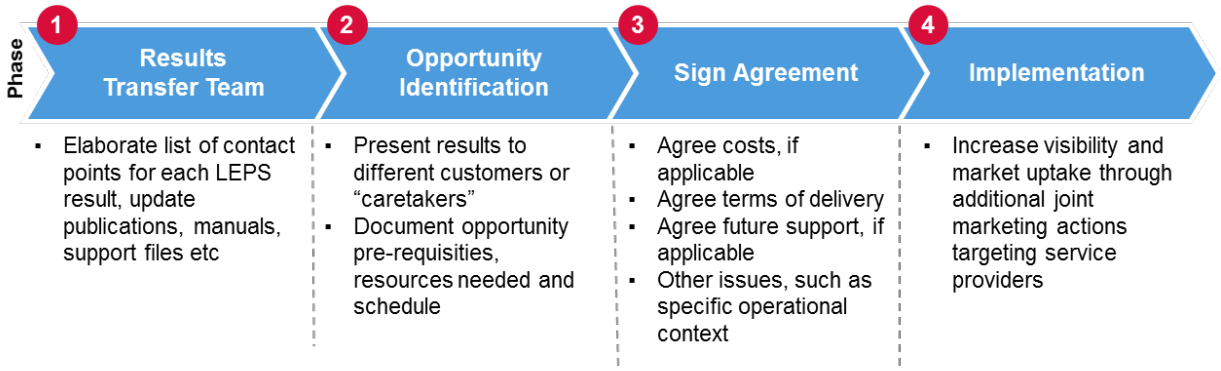

Figure 6 LEPS transfer roadmap

In figure 6 the situation where results are transferred to a third party is depicted. It is made in a generic way, without specification if it is customer (e.g. sectorial association that wants to operate "eID broker" for its members) or "caretaker" to whom LEPS results are given for free, such as European Commission or member state ministry that could make open source distribution for service providers, similar to what is already done with eIDAS integration package. For LEPS partners difference consist in possible monetary payback, or in visibility regarding future service provision, whether it is consulting, system integration or training. In the case of a transfer to some public entity, no direct monetary return is expected, but the acknowledgement (all open source code has copyright anyway) is considered as a

sufficient to create future opportunities. Therefore, the value is mainly in the reduction of cost for future marketing and awareness about LEPS adapters. The similar holds for a private entity, although the target audience are mainly non-profit entities such as associations, that would at the end have a similar role of "promotor", but with a laser focused on specific sector and service providers. Given the fact that these non-profit entities do have capacity to enter into partnerships, they are also considered as LEPS customers, although the revenue might come indirectly through service contracts.

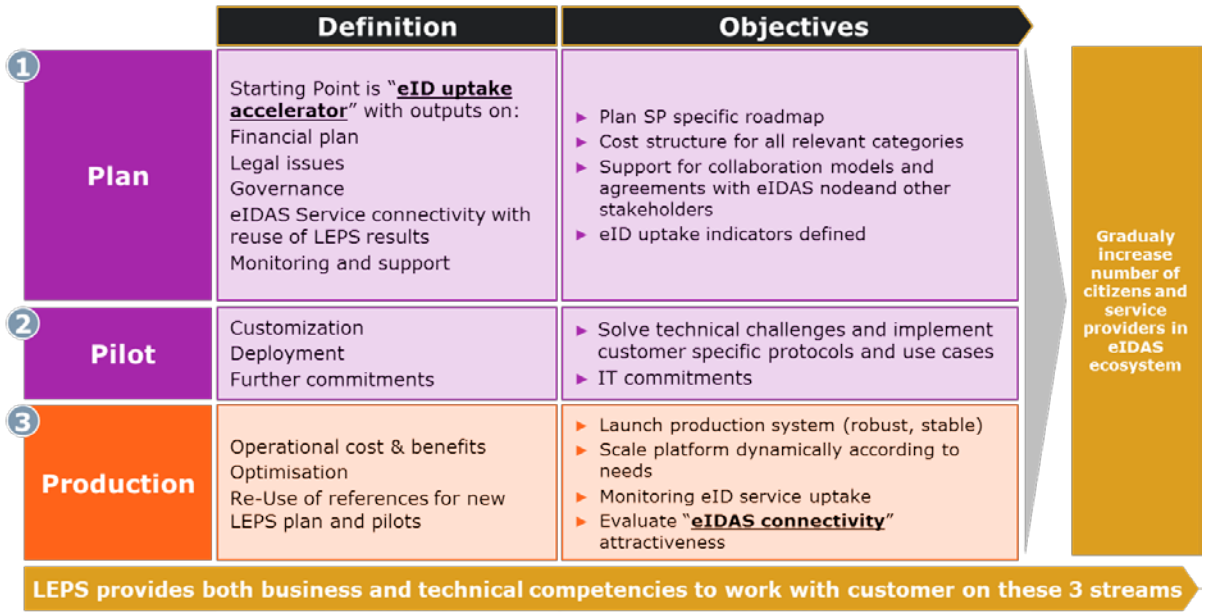

Figure 7: LEPS pilot to production roadmap

In figure 7 we present idea for the roadmap that targets uptake by service providers with a rather consulting-driven approach. It starts with planning phase, where "accelerator" role is executed by a consulting company (it could be Atos or some external company), followed by pilot and production phases, like what was already done in LEPS with three service providers. In addition, suggested addition refer to monitoring of uptake and feedback, which means there should be a reasonable timeperiod of LEPS partner engagement. While this roadmap looks straightforward, it is likely that only small and medium enterprises would be interested in LEPS value proposition, focus on eIDAS integration cost savings. In a large company such as Atos, SMEs are not considered as a direct client, so maybe a combination of the first and this second roadmap could be more beneficial.

Finally, the circular roadmap in the figure 8 represents situation where partners might have different, sometimes contradictory interest, but could still work together when a business opportunity arises. This business opportunity is not defined by the type of target audience (such as caretaker, association or service provider), and can also consider new EU projects, including research projects, where some of evolution factors, mentioned in the previous chapter are addressed.

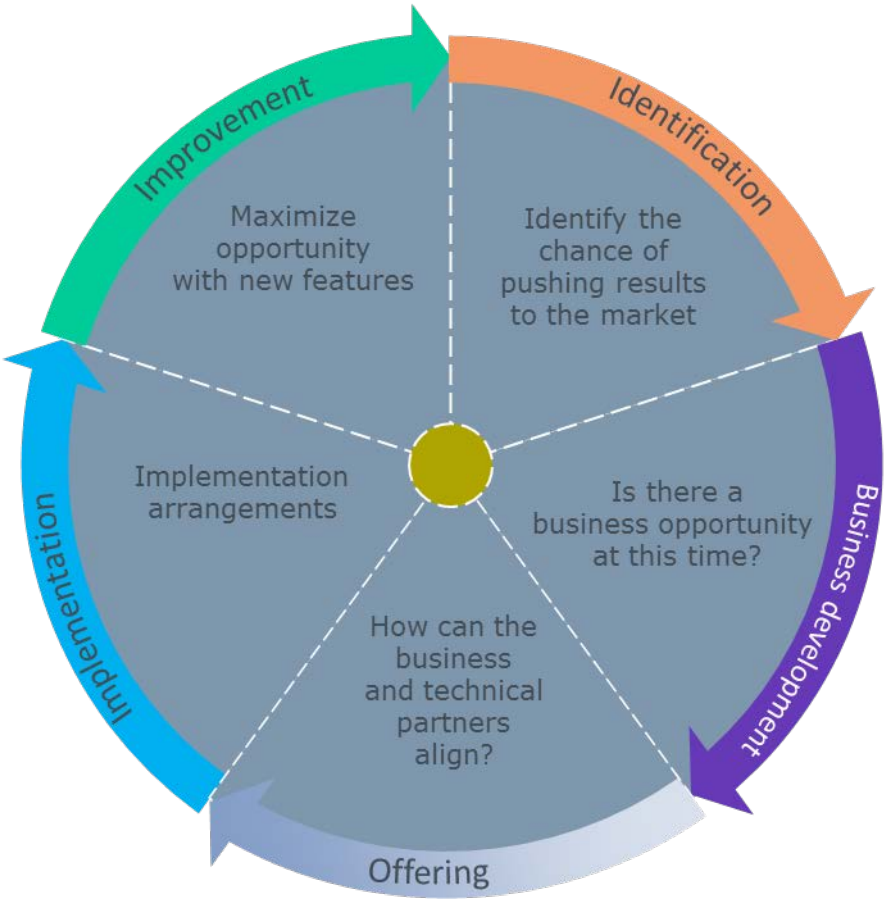

Figure 8: LEPS continuous improvement

In this roadmap, there is a possibility to use commercially some of LEPS results by a single partner and/or to integrate them into an existing CIAM (consumer identity and access management). Some of CIAM vendors have been already mentioned in D7.1. The offering, below in the circle, is not fixed and could involve ad hoc constellation of LEPS, but also external partners, that join their forces to satisfy specific demand or answer to the opportunity.

4.2 General Recommendations

4.2.1 Community management of open source results

One of the most important challenges for the sustainability of open source results is to provide the resources to spread awareness, maintain forge and updates, manage contributions etc. Definition of LEPS open source community is done by Aegean University and the monitoring of the open source lifecycle is central to the community operation. The LEPS community administrator must identify the contributors which are relevant for either retrieving or posting information. Deciding upon one of the existing channel (such as CEF, JoinUp or national open source community) and approaches of LEPS partner involvement (implicit and explicit) has implications into the underlying mechanisms such as the promotion. Furthermore, issues like the monitoring of the communities raise issues regarding persistence and privacy, so the option of joining some existing community might be preferred. Software provided by UMU has been assessed as sufficiently mature, with TRL7, and is available at https://gitlab.atica.um.es/emtg.um.es/eu_leps_eIDASbrowser. As part of the OLYMPUS H2020 project UMU is discussing possible integration in banking and driver license solution. They also plan to extend it to operating systems other than Android.

Proposition	Free Access to LEPS results
Target audience	Online service providers that want to connect to eIDAS eID infrastructure
LEPS assets	Adapters
Activities	Publishing open source results, promotion, awareness, basic maintenance
Contribution to LEPS sustainability	Reduction of maintenance cost
Cost	One time cost related to support activities: transfer, signature of an agreement etc estimated at 500 eur, periodical cost for basic support (up to 100 eur per month)
Existing relationships or links	FIWARE, Red.es, Joinup…
Leading partner	University of Aegean, Atos, UMU

4.2.2 Deploy “eIDAS connectivity as a service”

LEPS adapters used in Greek scenario were also deployed in a mode that resembles cloud delivery model, with a role of “eIDAS connectivity broker” on SP side. It was mentioned that the cost and the operational effectiveness are priorities on SP side, but from SP side it was also commented that for many

cross-border services they are not sure whether there is a strong business case, meaning that even small investment in eIDAS connectivity can be rejected. Given the fact that LEPS service providers were not able to provide estimations of cross-border users for their service[3], now connected to eIDAS, the option to pay-per-connection, or to use this broker model with connectivity as a service, was gaining strength during the project execution. Although this proposal came from University of Aegean, service providers that have been partners in LEPS project consortium, expressed their intention to keep using service for free, so the post-project agreement needs to be signed. Besides, IMG members commented that customer abandonment might be high due to cumbersome process (compared to social network logons) and this issue is also directly linked to the cost, as described in D7.2. All these factors create uncertainty for SP investments, and potential risk, which could be reduced by introduction of broker role. This role in LEPS project was played by University of Aegean, but after the project other options could be explored.

Proposition	eIDAS Connectivity as a service
Target audience	Online SP,
LEPS assets	Aegean adapter as a service
Activities	Managed operations
Contribution to LEPS sustainability	Revenue generated from annual subscription fee
Cost	Approx. 30-50 Keur
Existing relationships or links	Related projects (http://www.toop.eu/), sectorial associations
Leading partner	University of Aegean

While notified eID services and the use of LEPS adapters seem to be desirable solution for service providers, some market assumptions need to be further validated, for example cost saving regarding the use of higher level of assurance. While there is a clear case in some scenarios (e.g. anti-money laundering directive or know your customer), there are no financial justifications for investments in the others.

4.2.3 Integration with other solutions

LEPS adapters, related libraries, as well as mobile interface developed by UMU, are also good candidate to be exploited through integration with the other solutions, whether these are owned by project partners or not. During the project it was commented several times that separation of identity proofing and verification (IPV) looks as a promising approach, since IPV provider can assume role of SP in eIDAS context, but act in its home country as an IdP. ELTA in Greece and Correos in Spain could be partner in this sustainability context. Postal sector is a very good candidate and in D7.1 several examples from the EU countries have been reported. Another possibility is integration into existing Customer Identity

[3] In order to do this, stability of the whole environment (eIDAS nodes, adapters, etc.) has to be ensured

and Access Management (CIAM) that now look for "window of opportunity" for eIDAS e-ID services. On the other hand, mobile eID uptake in private sector (Estonia, Belgium etc) commented in D7.1 is also interesting opportunity, especially for results of mobile access and software developed by UMU. Finally, the main industrial partner ATOS already has a strong presence in IAM market, although it is mainly focused on business and not consumers IAM.

Proposition	Integration in LEPS existing identity broker solutions
Target audience	LEPS partner internal
LEPS assets	LEPS Spanish adapter
Activities	System integration
Contribution to LEPS sustainability	Revenue would be used to support for the further evolution of software
Cost	10% of estimated revenue
Existing relationships or links	Atos portfolio and business units (Worldline, Evidian, Agora, FIWARE)
Leading partners	Atos, UMU, ELTA, Correos

The first steps related to integration in a larger identity broker system were already taken. Spanish LEPS adapter is relatively easy to configure for the connectivity to the other eIDAS nodes in EU member states that is giving SAML response, given that only endpoint in eIDAS interface need to be changed.

4.2.4 Evolution and reuse of know-how

All partners expressed their willingness to continue participating in projects related to the uptake of e-ID, but also developing of new features and exploring of related concepts. During the execution of LEPS, some EU project have been contacted (RECRED, Future Trust, Credential, different CEF projects) and their results have been analysed. In addition, market analyst reports and predictions (Kuppinger Cole, Gartner…) were reported in D7.1, with a special emphasis on experts' view, including opinions from IMG members. Topics such as distributed e-ID and blockchain, or user management access[4] were mentioned as the future directions. Mobile biometrics, security of adaptors, customization for PSD2, and "tokenization of everything" were also mentioned by project partners as the areas to explore. Derived and partial identities, are worth to explore in connection with the future actions to be taken by eIDAS stakeholders.

Proposition	Reuse of know-how. Example is eIDAS connectivity testing and security verification
Target audience	SP

[4] https://kantarainitiative.org/confluence/display/uma/Home

LEPS assets	eCATS and formal methods know how
Activities	Consulting and testing services
Contribution to LEPS sustainability	Revenue from services
Cost	Approx 10% of revenue
Leading partners	NTUA

4.3 Specific Recommendations for Service Providers

One part of the sustainability is related to e-services that have been connected to eIDAS infrastructure thanks to LEPS projects and that are using eID services in the production environment. Detailed description of postal and financial sectors, as well as some financial projects have been presented in D7.1. Nevertheless, LEPS service providers (ELTA, Correos , ATHEX) have been requested to fill in sustainability survey (see annex) and to make statements about the future maintenance of the implemented cross-border services.

4.3.1 Sector specific eIDAS broker

Given the fact that two service providers, out of three, are postal service operators, the focus on market analysis, as well as recommendations was on postal sector. One of the members of IMG was from the Universal Postal Union (UPU) established in 1874 as a specialized agency of the United Nations (UN) that coordinates postal policies among member nations. UPU issued S64 (predecessor of PostID, and just approved S68) for postal identity management, but the bridge or some sort of mapping to eIDAS is open for the future. While S64 provides a basic understanding of identity management roles, technologies, activities and principles, standard S68 is about postal identity management trust framework, describing how systems can interoperate through the federation. Another organisation that has been approached several times, although unsuccessfully, is PostEurop. PostEurop is the trade association representing European public postal operators with 52 members in 49 countries. It could be a good candidate to promote LEPS adapter and eIDAS connectivity in general. Finding the right sectorial "proxy" could reduce operational burden from national postal service operators, so it can be considered as "specific case" of general recommendation to deploy "eIDAS connectivity as a service". However, service providers, thanks to their participation in LEPS project, acquired know-how that would enable them to act as "eIDAS connectivity champions", with a possibility to sell their services such as consulting or training.

Proposition	Training and consulting services
Target audience	Online SP, system integrators
LEPS assets	Know-how
Activities	Service provision

Contribution to LEPS sustainability	Revenue generated from services
Cost	10% of estimated revenue (efforts and personnel dedication costs)
Existing relationships or links	UPU, PostEurop, other sectorial associations
Other	ELTA, Correos, ATHEX

4.3.2 Exploit LEPS services internally

Finally, the most obvious benefit of LEPS is internal exploitation of cross-border services customized and integrated with eIDAS infrastructure, under condition that the consortium partner can continue to use project results without limitation or additional costs. Although not all of them are in production, it is expected that service providers will make most of it as the eIDAS ecosystem grows and more users start to use eID services. One of the most promising opportunities is My Notifications service, within the Correos digital suite, aiming to centralize and manage governmental notifications for one or several individuals or legal entities, that can be often from other member states. My Notifications allows a person or a legal advisor to manage IDs (either from natural or legal persons), including their own, from one single spot. To be able to use the service, there is a need for high LoA of e-ID, which makes eIDAS connectivity a "must have" feature.

Next to it there is also My Mailbox, a digital mailbox which manages subscriptions to documents such as contracts, pay sheets, notifications, bank statements, etc. Additionally, the platform can be used to store & organize any document that the user wants to keep safely and/or share with other people, which means high LoA is also "must have", although here cross-border access is maybe less of an issue.

eDelivery Hybrid Mail Service is part of the ELTA service portfolio that enables citizens to send electronic documents to non-registered recipients by using the Hybrid mail, that automates the processes of document processing, sorting of documents by destination, printing of documents by destination, enveloping and delivery of documents. HM transforms electronic documents to physical documents and delivers them, so it is truly cyber-physical service where cyber-physical identity (such as ID card with electronic data stored on a ship) is a natural fit.

ELTA aims at becoming a fully operational communication hub for cyber-physical services in Greece as a trusted third party that has all attributes for this role: proximity services, physical offices (post offices and postal agencies) in many small places remoted areas or neighborhoods due to the geographical particularities of Greece, and further facilitating the penetrations of eID services by taking advantage the know-how in digital services acquired within LEPS Project, including e-ID. Target audience are professionals, mainly Greek nationals living abroad, SMEs and any other European business or legal entity which operates in Greece and that have established formal business / legal activities with Greek entities. Hybrid Mail Service (HMS) can be perceived as "an alternative low cost courier service" since it minimizes significantly the delivery time, even up to 50% (namely from 1-2 days to same day delivery) especially in situations where, under the consent of the sender, the regional post office might print, envelop and deliver (as a registered mail service) the said document to the

recipient in the same day. The service is already offered to the ELTA customers in line with the corporate pricing policy for registered mail and hybrid mail services.

ELTA "Parcel Delivery Voucher" and "ZipCodes for Business Customers" are e-postal services that support corporate customers (especially SMEs) who operate online and need to speed up mail items dispatching to their target markets. Both services were customized in order to better meet customer needs, support and further advance e-Commerce sales in Greece which are developing in a growing pace.

ELTA Portal & e-Shop offer online postal, financial, philatelic and digital services to both businesses and individuals. Through eIDAS ELTA aims at attracting more customers online by offering secure e-services. The ELTA e-Shop aims at expanding the philatelists' database in the EU and thus enhance cross-border transactions within the European philatelic community and attract new members, especially youngsters.

ELTA sustainability statement (from survey)

ELTA will aim at leveraging the spin-off effect of LEPS partnership by using its nationwide network and its well-established reputation among customers (either business entities or individuals) and suppliers.

The deliverables of LEPS will be exploited by ELTA personnel after a 360o degrees fast track training program ("Digital Facilitators") promoting eIDAS and other value-added digital services both internally (employees) and externally (citizens, customers, stakeholders).

As regards the cross-border aspect of the LEPS Project, ELTA will take advantage of the distinctive attributes of the Greek society which is characterized by an increasing number of Greek expats who live abroad and have commercial relations in Greece and EU citizens that are establishing business entities in Greece (public sector, investors wishing to be active in Greece, etc.)

Two important success factors are:

- Increase awareness amongst SMEs
- Facilitate any eIDAS-related education.

The ELTA IT department has acquired significant experience and know-how from the other LEPS partners on the technical requirements of digital and eID services. Lessons learnt through the elaboration of emerging issues during the implementation of the LEPS project provided to the IT team necessary knowledge, skills and capabilities to come up with more sophisticated technical solutions that will support the company's broader e-services.

5 Conclusions

These deliverable reports activity made to summarize many remarks made by project partners and IMG members, as well as conclusions from D7.1 and D7.2. It also tried to reconcile and sometimes converge different views and perspectives present in LEPS project. The results are packaged in a form of roadmap and recommendations for LEPS sustainability, that hopefully can be taken up in a post-project phase.

The first step for understanding LEPS context and sustainability factors is to understand eIDAS eID service context. The stability of the overall ecosystem and infrastructure, member states commitment or professional support are often mentioned as the main constraint by public sector service providers and LEPS would not change much if these issues are not crystal clear. Under assumption that all member states notified their eID services and that eIDAS nodes are in production with guarantees and service level agreements, all other steps follow, in order to adopt LEPS or similar solution.

European SMEs, that provide online services across Europe, with need for trusted e-ID services (with substantial or high level of assurance – LoA) are considered as primary target for the use of LEPS results. Whether this will happen directly, through integration of LEPS adapters or libraries and customisation of their services, or indirectly, though a broker on service provider side, is still to be seen. Public service provider, most notably Dutch municipalities, are already using broker model to enable connectivity to several eID schemes (notably from Austria, Belgium, Portugal, Sweden, Czech Republic, Estonia, Latvia, and Finland). Thanks to CEF project[5], identity broker Conectis, enhanced the number of already available e-ID options (typical social network e-ID, Dutch national e-ID schemes) with eIDAS connectivity. This solution is conferencing two recommendations made in this document: running LEPS adapters in "eIDAS connectivity as a service" mode, and integration into the identity broker platform. Given that Atos already started exploration of broker opportunities (including the transfer to Atos Worldline[6], company partially owned by Atos).

Stakeholder engagement is also perceived as one of the critical factors for the uptake of eIDAS eID services and creation of eIDAS ecosystem. The same holds for uptake and improvement of open source code generated in LEPS. For this reason, an important recommendation for sustainability is to create community around LEPS adapters, possibly bundled with similar solutions for connectivity to other member state eIDAS nodes. A community of experts or volunteers could be approached for suggestions or even to set up a governance structure for the SP counterpart of "eIDAS cooperation network". To achieve this objective, it is necessary to devise a structured and creative SP stakeholder engagement concept, which will serve to enable commitment and mutual learning experiences for different stakeholder categories: service provider from different sectors, system integrators, researchers, eIDAS node operators and the regulator (European Commission).

In relation to specific conclusions for those LEPS e-services that have been customised and integrated with eIDAS eID services, we believe marketing plan for promotion of these services across border need to be built. The increase of awareness and the facilitation of eIDAS-related services such as training or

5 https://eidas2018.eu/

6 https://worldline.com/en/home/solutions/financial-services-equensworldline/trusted-transactions/e-identity/identity-broker-service.html

consulting could be of interest not only for building reputation as trailblazers with their own sector, but also to generate additional revenues.

References

D7.1 - Market Research and Feasibility Analysis of eIDAS services uptake by private sector

D7.2: Cost-benefit assessment of CEF eID uptake by private sector

Annexes – Sustainability Questionnaire

For SP Only (ELTA, ATHEX, Correos):

Is your online service in production? If not explain reasons?

What is the expected impact of new or improves online services (in terms of revenue increase e.g. 10% increase of revenue compared to e-service without eIDAS eID)?

Market maturity: The market for eIDAS eID services is ...

- Not yet existing
- Emerging: There is a growing demand and few cross-border services are in need for high LoA
- Mature: The market is already supplied with many eID products similar to eIDAS eID services

Market dynamics: is the market ...

- In decline
- Holding steady
- Growing

Level of innovation: What is the level of LEPS innovation?

- No innovation - other factors contribute to viability of eIDAS connectivity
- Some distinct, probably minor, improvements over existing way to connect to eIDAS
- Innovative but could be difficult to find paying customers
- Obviously innovative and easily appreciated advantages over other eIDAS connectivity options
- Very innovative satisfies a well-known need for low cost eIDAS connectivity

Market competition: How strong is competition in the target market?

- Patchy, no major players that offer similar adapters
- Established competition but none with a proposition like LEPS
- Several major players with strong competencies, infrastructure and offerings

When do you think LEPS could have commercial impact?

- Less than 1 year
- Between 1 and 3 years
- Between 3 and 5 years
- More than 5 years

For software IP owners (Atos, UMU, Aegean):

Is your software available as open source? Where can it be downloaded?

What is the estimated TRL (technology readiness level)?

Is there roadmap for technology transfer to the other organisations or other parts of company?

Did you secure any private or public investment for the maintenance and evolution of LEPS results?

Is there any roadmap or opportunity with another online service provider to make pilot, demonstration or testing of eIDAS connectivity?

Is there any possible partnership you envisage soon, to improve your LEPS software results?

What features, or functionalities would you add to your LEPS software result?

How do you plan to contact service provider that need eIDAS connectivity?

○ End user organisation in the consortium will help us to find new use cases and online service providers

○ We will contact associations, public sector or other organisations to create joint marketing and awareness activities

○ A service provider outside of the consortium is consulted and will be actively engaged in new pilots or demonstration

○ A partner that has solution where our LEPS result fit is consulted and is actively engaged in co-creating new solution

○ No consortium partner or external organisations is needed for the further sustainability of our LEPS result. We will make it sustainable by internal investment and integration in internal portfolio

Are there in the consortium internal IPR issues that could compromise the ability of a project partner to make products/solutions/services sustainable?

○ Yes

○ No

Which are the external bottlenecks that compromise the sustainability?

☐ **IPR**
☐ **Regulation**
☐ **Resources**
☐ **Standards**
☐ **Financing**
☐ **eIDAS network**
☐ **Others**