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LEILA Sustainability Plan

Deliverable D4.1

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List of Abbreviations

Acronym	Explanation
API	Application Programming Interface
e-CODEX	e-Justice Communication via Online Data Exchange
EC	European Commission
EIF	European Interoperability Framework
EU	European Union
eu-LISA	European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice
HA	High Availability
IP	Intellectual Property
IPRs	Intellectual Property Rights
IT	Information Technology
KER	Key Exploitable Result
KPI	Key Performance Indicator
LDAP	Lightweight Directory Access Protocol
LEILA	'LEILA – towards a multilingual European platform for judicial Auctions' Project, Grant Agreement No 101007385
LRI	Large-scale Research Infrastructure
MS(s)	Member State(s)
PET	Privacy Enhancing Technology
SLA	Service Level Agreement



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Executive Summary

The 'LEILA - towards a multilingual European platform for judicial Auctions' (LEILA) Project, an initiative underpinned by European resources, stands at the forefront of justice digitalization across Europe. This initiative goes beyond just the transient phase of European funding. Instead, it's anchored in the vision of enduring sustainability, ensuring that the outcomes we achieve today serve us well into the future.

LEILA was conceived from a collaborative spirit, a melting pot of ideas from a varied consortium of partners. Through shared vision and intertwined objectives, this collaborative synergy has surfaced unique opportunities pivotal for the strategic longevity of the Project. Our heart beats for change. With the introduction of the European Platform for Judicial Auctions ('the Platform'), our aspirations are set on propelling the digital judicial system forward. By optimizing accessibility and efficiency, we anticipate a ripple of impactful results cascading over short, medium, and extended timelines.

Our benchmark for success lies in tangible, measurable outcomes. To this effect, Key Performance Indicators (KPIs) have been instituted for LEILA, serving as a yardstick to gauge the Platform's informational quality, user engagement, and the broad-spectrum impact it forges. But our lens on sustainability are not myopic; we peer beyond just the impact. Technical robustness is paramount. A discerning eye has been cast on the system's architecture, ensuring resilience. Given Europe's linguistic mosaic, an automatic translation mechanism is in the pipeline for LEILA, ensuring content accessibility without compromising precision. Energy consumption, too, is on our radar, with strategies in play to enhance portal efficiency.

The Project is based on the contribution of our stakeholders who are invaluable and play a key role in its sustainability. The LEILA Consortium has developed an ongoing engagement approach to ensure that they remain connected to and support our shared vision.

On this journey, the results that have been achieved require protection of our intellectual property. Guidelines have been drawn up to manage, protect and capitalise on these achievements. To bolster project continuity, we have delved into the fiscal backbone, discerning the minimum operational expenditure, which will steer our future resource deployment.

The ambitious core of LEILA would envision a consolidated one-stop-shop marketplace for all judicial sales in Europe. Beyond merely sculpting a reliable multilingual engine for



judicial auctions, LEILA's gaze is projected towards a durable, ever-evolving system, resilient even post the Project's tenure. We envision a system interlinked with diverse sources, enhancing search result usability, bolstering end-user effectiveness, and laying groundwork for a comprehensive European online judicial auction platform, potentially branching out to varied auction types.

With technical and functional requisites identified in recent months, multiple solutions have been probed, bearing LEILA's adaptability across nations with distinct technical and regulatory landscapes. An EU-wide sustainability blueprint is being crafted by our team, aimed at guaranteeing the multilingual platform's future and its endorsement by key EU stakeholders. All solutions are being tailored to resonate with the minimal managerial requisites of EU institutions.

In this document, light is shed on recent strides in European justice digitalization, spotlighting the e-CODEX system¹ and the European e-Justice Portal². The narrative orbits around LEILA's positioning within current European digital justice policies and ponders on the sustainability of the cross-border collaboration model this Project introduces.

Overall, LEILA introduces an important innovation on the European judicial landscape that goes far beyond the results achieved during the Project, so ensuring the sustainability of its results after this phase is crucial, especially given the interest shown from stakeholders.

¹ The e-Justice Communication via Online Data Exchange (e-CODEX) system enables digital connectivity between European Union (EU) Member States' national judicial systems allowing its users (competent judicial authorities, legal practitioners, and individuals) to electronically send and receive documents, legal forms, evidence, or other information swiftly, securely and reliably. It is formally established under Regulation (EU) 2022/850 of the European Parliament and of the Council of 30 May 2022 on a computerised system for the cross-border electronic exchange of data in the area of judicial cooperation in civil and criminal matters (e-CODEX system) and amending Regulation (EU) 2018/1726 (OJ L 150, 1.6.2022, pp. 1–19), applying since 21 June 2022.

² The European e-Justice Portal is conceived as an electronic one-stop shop in the area of justice, currently providing information on justice systems and improving access to justice throughout the European Union, in 23 languages. Available at <https://e-justice.europa.eu/>



1. Introduction

LEILA's main ambition is to set up the conditions for the consolidation of a one-stop-shop marketplace for all judicial sales in Europe by making it easier for European citizens and businesses to access relevant information. For this reason, the goal of the project is not only to create a single, reliable, accessible, and up-to-date multilingual engine to search for assets to be sold at court auctions in the EU. The ultimate goal is to make this platform durable, self-sustainable over time and open to developments even after the project's duration has come to an end.

The underlying idea is to work towards the definition of a platform that can potentially be linked to other sources and sites, so as to improve the usability of the search results, increase the overall effectiveness for end users, and lay the foundations for a pan-European online judicial auction platform, possibly open to other types of auctions.

To this end, based on the technical and functional requirements detected by the project team over the last months, a variety of solutions are currently under study to ensure that LEILA is going to provide for a system that might be easily integrated and used by countries with different technical and regulatory backgrounds.

Accordingly, an EU-wide adoption plan (a road map) is to be elaborated by the LEILA Project team, so as to secure the future of the multilingual platform for judicial actions and its adoption by relevant stakeholders operating at EU level. The solutions adopted will also be geared to meet the management needs of the EU institutions, which will have to be minimal.

In the following pages, some of the latest developments concerning the digitalisation of the justice in Europe are taken into consideration, particularly those regarding the e-CODEX system and the European e-Justice Portal. The aim is to offer some general thoughts on the positioning of LEILA in the context of current European policies on the digitisation of justice, as well as reflections on the sustainability of the cross-border cooperation model proposed by this project within the broader context of cross-border cooperation in this field.

As any project's ultimate aim is to generate value and to maximize value by its longevity, a long-lived project can extend its results to a broader range of stakeholders, producing welfare and growth in various sectors, such as economic and social. For this purpose, a well-structured plan is crucial to guide project management models, activities, and results. Therefore, the present Deliverable D4.1 'LEILA Sustainability Plan' describes elements that



determine the Project's longevity. Specifically, the LEILA Sustainability Plan focuses on ensuring the existence of the European multilingual platform for judicial actions, developed within the Project, beyond its duration. This plan encompasses:

- Operations management and system maintenance strategies on the EU/MS level
- Advocacy meetings to assess potential cooperation with stakeholders.
- Identifying relevant authorities or organizations to adopt the Project results in the future.
- Selecting organizations to continue the development and evolution of the European Platform for Judicial Auctions beyond the project's term.
- Refining the KPIs to ensure the validity and reliability of LEILA's results.
- Developing mechanisms to amplify the Project's outcomes.

The Sustainability Plan is crucial during the Project's life, serving as a road map to guide its implementation and economic-financial management.

Considering dynamic factors such as technology, economy, and social context that can influence LEILA's sustainability, the Sustainability Plan also outlines necessary activities and strategies over time. This includes establishing goals, implementation modes, strategic drivers, specific activities, and managing financial resources. Such considerations ensure that LEILA's outcomes continue to evolve, facilitating future sustainability.



2. Digitalisation of Justice in the EU

Improving access to justice and facilitating cooperation between Member States are among the main objectives of the EU area of freedom, security, and justice, as enshrined in the Treaty on the Functioning of the European Union³.

Effective and accessible justice systems are essential for the functioning of the internal market and a prerequisite for economic growth. Access to justice must therefore be maintained and must keep pace with change, including the digital transformation that affects all aspects of life.

Against this background, over the last decade the European Commission and the Member States have stressed the need for effective justice systems and taken a number of initiatives that have contributed towards this goal by supporting a process of digitalisation of justice.

This path seems even more necessary in the light of unexpected and critical events that has created a wider variety of challenges also for the justice systems of the EU and beyond its immediate borders.

2.1. Recent Trend and Developments

As part of her policy guidelines, the President of the European Commission, Ursula Von Der Leyen, has pledged to ensure that Europe “strives harder” to seize the opportunities of the digital era within safe and ethical boundaries. The recent 2020 Strategic Foresight⁴ report also recognises the crucial importance of the digital transformation of public services and justice systems across the EU, suggesting that the digital transition should work for everyone, putting people first and opening up new opportunities for different stakeholders.

³ Available at <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12012E/TXT:en:PDF>

⁴ See https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy/strategic-foresight/2020-strategic-foresight-report_en



In line with this statement, also the Council of the EU⁵ and the EU Parliament set out specific proposals for the mutual reinforcement of policies relating to effective access to justice and digitalisations.

In this context, it is essential that the EU brings the digitisation of justice up to speed. Although much has already been done, much work remains to be completed at both national and European level to further strengthen the resilience of justice systems and increase their capacity to work online. Digital transformation is indeed one aspect of structural reforms of justice systems that should have a positive impact on systems. As part of these reforms, the processes and the design of the systems that support them must always be developed with citizens and businesses in mind.

e-Justice is an important tool for policy development, through which access to legal information is simplified and improved, and cross-border legal procedures can be digitised and thus made simpler and more accessible. This also aims to enable judicial authorities to use electronic means of communication within the various existing EU procedures. e-Justice is an independent specific area within the European e-Government policies, as it aims to improve judicial cooperation at EU level. It is not limited to a particular field of law, but is a cross-cutting area, encompassing all fields of law that have cross-border dimensions in the areas of civil, criminal, and administrative law.

This is why the European Commission has set out a new approach to the digitisation of justice in 2020. Such an approach is based on a ‘toolbox’ - a comprehensive set of legal, financial and IT tools to be used by the different actors in our justice systems according to their needs.

There are several inherent challenges and differences between Member States. These include a lack of planning and coordination between the various national IT tools, resulting in challenges to achieve rapid cross-border interoperability. On this purpose, an essential part consists in reaching interoperability between Member States.

To address this problem, a lot of work has been done in this respect and the consolidation of the existing building blocks of digital Europe has continued. The European e-Justice Strategy⁶, the European Interoperability Framework⁷ (EIF) and the former Large-Scale Pilots, supported by the European Commission, laid the foundations. However, it has mainly been Member States that, while protecting investments already made, have

⁵ The Council Conclusions on Access to justice — seizing the opportunities of digitalisation of 13 October 2020 and A roadmap for recovery – towards a more resilient, sustainable and fair Europe, endorsed on 23 April 2020

⁶ See <https://eur-lex.europa.eu/EN/legal-content/summary/european-e-justice-strategy-and-action-plan-2019-2023.html>. The European e-Justice Strategy for the 2024-2028 period is currently under development.

⁷ See https://ec.europa.eu/isa2/eif_en/



explored various approaches to the digitisation of cross-border judicial cooperation. These attempts have mostly taken place as voluntary initiatives between Member States, associations of legal practitioners and the EC. At present, the most important achievement in this field is the e-CODEX system.

While this cooperation has produced a number of effective tools, Member States have not yet made consistent use of these solutions. Now the next step is required to unlock the potential of cross-border e-Justice services and further define the standards. As an example, to achieve a long-term impact, the Commission aims to make the e-CODEX system (in short, e-CODEX) the gold standard for secure digital communication in cross-border judicial proceedings.

e-CODEX is currently the main tool for establishing an interoperable, secure, and decentralised communication network between national IT systems in cross-border civil and criminal proceedings. It is a software package that connects national systems, allowing users, such as judicial authorities, legal professionals, and members of the public, to send and receive documents, legal forms, evidence, and other information quickly and securely. e-CODEX is already used by the e-Evidence Digital Exchange System⁸ (e-EDES) and other use cases, some of which are still at pilot stage. It is also intended to support the decentralised IT system that will be set up in the context of the new Regulations on the service of documents⁹ and the taking of evidence¹⁰.

Currently, a consortium of member states and other organisations manages e-CODEX. However, to ensure its long-term sustainability, the Commission has adopted a proposal to entrust its further development and maintenance to the European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice (eu-LISA)¹¹. Currently, the takeover of e-CODEX by eu-LISA is underway with proactive support from the Commission.

⁸ A reference implementation portal serving as a tool for secure communication between competent Member State authorities for the purpose of obtaining evidence and providing mutual assistance in criminal matters. See also https://e-justice.europa.eu/37138/EN/eevidence_digital_exchange_system

⁹ Regulation (EU) 2020/1784 of the European Parliament and of the Council on the service in the Member States of judicial and extrajudicial documents in civil or commercial matters (service of documents), OJ L 405, 2.12.2020, p. 40–78. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R1784>

¹⁰ Regulation (EU) 2020/1783 on cooperation between the courts of the Member States in the taking of evidence in civil or commercial matters (taking of evidence), OJ L 405, 2.12.2020, p. 1–39. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R1783>

¹¹ <https://www.eulisa.europa.eu/>



In addition, the EU cyber security strategy provides a cross-cutting framework, accompanied by legislative proposals to further improve the security of network and information systems.¹²

2.2. e-CODEX Regulation

The e-CODEX system is one of the key components of the Commission's e-Justice policy to improve access to and the efficiency of justice in the Member States and is included in the European e-Justice action plan for 2019-2023¹³. It is also confirmed as the main tool for secure digital communication in cross-border judicial proceedings in the Commission's Communication 'Digitalisation of justice in the European Union – A toolbox of opportunities'¹⁴.

Considering the relevance of the e-CODEX system for cross-border exchanges in the area of judicial cooperation in the Union, the Commission is of the view that the e-CODEX system should be established through a sustainable legal framework of the Union which provides for rules concerning its operation and development.

The consortium of Member States and other organisations that currently ensures the IT development and maintenance of the e-CODEX building blocks will not provide long-term operational management of the system. The use of temporary action grants to operate the system is not a sustainable solution, nor one that could enable e-CODEX to become the default system for cross-border civil and criminal proceedings in the future.

In order to ensure sustainable and long-term operational management of the e-CODEX system, on 13 October 2020, the Council of the EU invited the Commission to present a legislative proposal to ensure the sustainability of e-CODEX with an appropriate governance and management structure compatible with eu-LISA that respects the independence of the judiciary and the constitutional requirements of the Member States, while ensuring adequate representation of EU and Member States' judicial authorities, as well as key stakeholders.

The European Commission has therefore put forward such a legislative proposal in 2020, with the aim to establish a stable governance solution for the system as well as to clearly define and frame the components of the e-CODEX system, to ensure its technical sustainability and security.

¹² Further information is provided herein: <https://digital-strategy.ec.europa.eu/en/policies/cybersecurity-policies>

¹³ [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313\(02\)&rid=6](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313(02)&rid=6)

¹⁴ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52020DC0710>



In December 2021, the Council Presidency and the European Parliament reached a provisional agreement on the proposal for a regulation on the e-CODEX system, and the latter was adopted in 2022 (referred to herein as ‘the e-CODEX Regulation’).¹⁵

Under the terms set out in the Regulation, in addition to the composition of e-CODEX system, several other main points were considered.

Responsibilities of the Commission, Member States, and the Entities Operating Authorised e-CODEX access points

It is noteworthy that the Regulation provides for measures detailing duties and obligations that all the other entities involved in the e-CODEX running. The Commission, for example, is called to establish a variety of documents concerning technical specifications and standards underpinning the components of the e-CODEX system, as well as the service level requirements for the activities to be carried out by eu-LISA, including the specific arrangements for the handover and takeover process. The Commission maintains a Use Case list of authorised e-CODEX access points (and correspondents) which are operated by Union institutions, bodies, offices, and agencies and of the digital procedural standards which each of those authorised e-CODEX access points applies.

Member States, on the other hand, are required to authorise and periodically check the e-CODEX access points for connected systems on their territory and to keep a list of these access points as well as the applicable digital procedural rules.

The e-CODEX Regulation also does not fail to clarify the duties of each entity called upon to manage e-CODEX access points in terms of system operation and security. Such responsibility includes the necessary adaptations of the connector, to make it compatible with any connected systems, as well as liability for any damage.¹⁶

The life cycle of the e-CODEX system is a responsibility of eu-LISA. Since stable governance for the e-CODEX system is a mandatory requirement to establish it as the default system for exchanging electronic messages for judicial cooperation at EU level, eu-LISA has to be able to adapt the e-CODEX system to the technical needs emerging from the Member States that use e-CODEX, with the aim to avoid any asymmetric developments at national

¹⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0850>

¹⁶ The e-CODEX system consists of two software elements: a gateway for the exchange of messages with other gateways; and a connector, which provides a number of functionalities related to the exchange of messages between national IT systems. Currently, the gateway is based on a building block of the Connecting Europe Facility maintained by the Commission known as ‘eDelivery’, while the management of the connector is carried out by the entity managing the e-CODEX system. The connector provides functions such as verification of electronic signatures via a security library and proof of delivery. In addition, the entity managing the e-CODEX system has developed data schemas for digital forms to be used in the specific civil and criminal procedures for which it has piloted the e-CODEX system.



level that could potentially impinge on the interoperability between Member States' national systems.

The eu-LISA (also referred to as 'the Agency') is also to ensure the e-CODEX system's operational management and is responsible for the components of the e-CODEX system. In this regard, the Agency is in charge of preparing, maintaining, and updating the documentation relating to the e-CODEX components, its supporting software products, and other assets, and distributing that documentation to the entities operating authorised e-CODEX access points. This includes making technical changes and adding new features to the e-CODEX system, to respond to emerging requirements, as well as developing, deploying, maintaining, and updating the digital procedural and security operating standards based on which e-CODEX access points have to operate. Moreover, eu-LISA is an important reference point for both the Commission and e-CODEX correspondents, to whom it provides assistance and technical support. As the Agency is responsible for the e-CODEX system's operational management, eu-LISA also has to provide personnel and technical environment necessary for the tasks described above.

Once eu-LISA takes over responsibility for the system (ongoing process, expected to be completed by the end of 2023), it will have to ensure, on the basis of technical and service-level requirements set out in e-CODEX Regulation's implementing acts, that the existing software remains functional in a changing technical environment and is adapted to evolving user needs. Moreover, eu-LISA is expected to maintain or update the digital templates for the different procedures where e-CODEX is used to respond to legal or organisational changes and create new ones for those instruments within the scope of the regulation in which e-CODEX is introduced. The Commission will then ensure that these templates are laid down in an implementing act establishing detailed specifications on the use of e-CODEX for such procedures.

Legal Framework for the Security of the e-CODEX System

After the e-CODEX system is fully integrated, eu-LISA is to be responsible for maintaining a high level of security in the performance of its tasks, including the security of the IT hardware and software infrastructure. In particular, eu-LISA will develop and maintain an e-CODEX security plan and ensure that the e-CODEX system is operated in accordance with this security plan. The latter shall provide for regular inspections and audits of security and of the e-CODEX system with the participation of the entities operating the authorised access points.

Entities operating authorised e-CODEX access points, for their part, are to be solely responsible for setting them up securely and operating them in a secure manner, including



for the security of the data transmitted through them. They shall notify, without delay, any security incident to eu-LISA, so that the security incident can be promptly analysed, and the appropriate bodies informed.

Monitoring System

Once the e-CODEX Regulation entered into force, a monitoring system came into operation to ensure that technical and security aspects were kept under review. In particular, it is foreseen that two years after assuming responsibility for the e-CODEX system, and every two years thereafter, eu-LISA is to submit a report to the Commission on the technical functioning and use of the e-CODEX system, including the security of the e-CODEX system.

In this report, the Agency is to consolidate and systematise all data received from both the Commission and the Member States during the previous period of operation and provide details on a variety of aspects ranging from the digital procedural rules for which the e-CODEX system was used during the reporting period, to the number and type of incidents affecting the security of the e-CODEX system, and information on compliance with the e-CODEX security plan.

In addition to this type of monitoring by eu-LISA, the Commission should also periodically produce an overall evaluation of the e-CODEX system, which should include an assessment of the application of the e-CODEX Regulation and a review of the results achieved against the objectives pursued.

This evaluation should include an assessment of the application of the e-CODEX Regulation and an examination of the results achieved against the objectives pursued and may propose possible future actions. This report is to be submitted to the European Parliament and the Parliament and the Council.

2.3. The e-Justice Portal as a New Hub for Judicial e-Auctions in Europe

Along with e-CODEX, one of the most tangible results in the direction of digitalisation of justice so far is the European e-Justice Portal, which regards all justice matters and contains valuable information on a wide variety of topics, as well as a number of online tools.



On one hand, it improves the availability of information in the field of justice in the European Union, including information on citizens' rights, EU law and national law transposing EU law; on the other hand, it provides search tools for professionals and (judicial) authorities, dynamic forms, instruments to identify national authorities competent for judicial or extra-judicial proceedings, and also access to publicly available information contained in national registers.

The European e-Justice Portal is targeted at citizens, businesses, legal practitioners, and the judiciary. Citizens enjoy the same access to justice in other Member States as they would in their own and the European e-Justice Portal contributes in a practical way to the removal of barriers, such as providing information in 24 languages and a wealth of links to relevant websites and documents.

The 2019-2023 Strategy on European e-Justice¹⁷ emphasises this, by giving the e-Justice Portal a key role in achieving the objective of improving access to justice for citizens and businesses, thus contributing to the development of the digital single market.

Following this policy approach, the e-Justice Portal has been enriched over time with additional information pages and functionalities and its design has been recently revamped, in an attempt to improve and facilitate the user experience. As an example, new features in the e-Justice Portal include the Fundamental Rights Interactive Tool (i.e., Clarity) – originally developed by the Fundamental Rights Agency (FRA) – which offers information to citizens on fundamental rights issues in an interactive and user-friendly way, as well as the launch of the access point to the e-CODEX system on the e-Justice Portal that allows users to submit claims electronically under the European Small Claims procedure and the European Payment Order.

Such a development is conducted following a 'digital-by-default' approach, by striving to provide citizens and businesses with the possibility to interact digitally with authorities, as well as by integrating a 'digital-by-default' approach into national and EU legislation, in order to ensure relevant legal provisions and thus guarantee legal certainty and seamless interactions in a national and cross-border context.

The European Platform for Judicial Auctions developed as a result of the LEILA Project is designed to be embedded within this technological, governance and policy context, thus becoming another component of the whole series of operational tools that are made available to citizens, professionals and businesses with the aim of making justice more

¹⁷ [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313\(01\)&rid=7#:~:text=E%2DJustice%20should%20facilitate%20electronic,with%20the%20existing%20legal%20framework](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313(01)&rid=7#:~:text=E%2DJustice%20should%20facilitate%20electronic,with%20the%20existing%20legal%20framework)



accessible and closer to its users and so more reliable, also with a view to boosting the development of economic growth in the European territory.

Making information on judicial auctions more easily accessible to the European citizen is a long-standing objective at European level, which is closely related to the development concerning insolvency law in the EU and is considered fundamental to achieving the complete effectiveness – even in the field of enforced sales – of the Single Market. Since 2015, a group of experts on judicial auctions, operating within the Council of the EU's Working Group on e-Justice, has been promoting this idea and helping to create the conditions for its realisation.

More precisely, an Expert group on judicial auctions was set up as a follow-up to the e-Justice Action Plan 2014-2018¹⁸. In just its first year of operation, this group met five times to discuss the possibility of creating new information pages on judicial auctions on the European e-Justice Portal and produced (i) general content in this regard, including a definition of a judicial auction and a multilingual glossary of the most frequently used technical terms in the judicial auction's context, and (ii) national pages with information on judicial auctions in the Member States concerned¹⁹ (both aspects were incorporated on the Portal by the EC).

Under the European e-Justice Action Plan 2019-2023 (2019/C 96/05)²⁰ a renewed impetus was given to this objective. The plan emphasises the need to improve access to and enable the interconnection of datasets relevant for access to justice, and specifies, as one of its measures (No. 5) the creation of a common search engine for judicial sales announcements published in the Member States, to be made available on the European e-Justice Portal.

Many discussions continued in an Expert Group's meetings held on the layout of the future LEILA Project.²¹ Following the input received by delegations during those meetings, a version of the description of the future project's possible structure has also been presented by the Italian delegation²². In 2020, the Chair of the Expert Group on Data Sets (Judicial Auctions) has submitted a project proposal to the Commission in the framework

¹⁸ Mandate of the Group is described in the 8278/15 (ST 8278 2015 INIT – NOTE).

¹⁹ Report from the Working Party on e-Law (e-Justice) to Coreper/Council, 14498/1/16 REV 29 November 2016(OR. en).

²⁰ [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313\(02\)&rid=6](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52019XG0313(02)&rid=6)

²¹ ST 2782/19, 28h February 2019.

²² Note from the Italian delegation to the delegations: Judicial Auctions - Description of the project, Brussels, 2 July 2019 (OR. en), 10898/19



of an ongoing call for proposals, so that Member States could express their interest and provide as much support for the project as possible²³.

2.4. LEILA as a Sustainable Model of Cooperation

The above shows that the LEILA Project is a response to specific needs that have developed in recent years in the field of integration of legal and justice systems, including by means of technology and digitalisation of procedures. Once operational, the European Platform for Judicial Auctions, developed under the LEILA Project, is expected to provide citizens and businesses with easy access, without intermediaries, to information on assets offered for sale at judicial auctions, through a simple and intuitive user interface that will allow users to compare search results in different languages.

Irrespective of the rules governing judicial auctions in the EU Member States, which will remain substantially different (and sometimes complicated), the European Platform for Judicial Auctions will help to reduce the existing fragmentation, developing a one-stop-shop EU marketplace that can have a positive impact on competition, the value of the sale and the time needed to conclude it, to the benefit of those with an interest in seeing the sale concluded.

To achieve this far-reaching result, it is not sufficient to think in terms of technical and management functionalities. The LEILA Project must create the foundations for a system of cross-border cooperation that can be sustainable in the long run.

²³ Intermediary report on the implementation of the 2019-2023 e-Justice Portal - January 2020, Brussels, 21 January 2020, 5411/20



3. LEILA Sustainability Framework and Topics

The definition of sustainability may differ depending on the context, business, area of studies and research. In the frame of sustainability of a EU-funded project, a project could be considered sustainable when “it continues to deliver benefits to the project beneficiaries and/or other constituencies for an extended period after the Commission’s financial assistance has been terminated”²⁴.

With the present sustainability analysis, the LEILA Project team determines project’s relevance, acceptability, viability, and adaptability. Other factors such as (a) governance and legal aspects, (b) stakeholder engagement and continuous dissemination strategy, (c) support service and business continuity, (d) translation services and their sustainability analysis, (e) architecture and its evolution (including e-CODEX dependencies), (f) high availability for the LEILA solution(s), (g) blockchain-driven sustainability, (h) accessibility for challenged users, (i) impact and long-term outcomes, aim to help determining the sustainability of the LEILA Project. The factors listed above are nested into four sustainability frameworks discussed in the present documents:

- Governance and legal sustainability,
- Technical sustainability,
- Functional sustainability, and
- Possible future extensions of the LEILA Project.

These **sustainability pathways** are analysed through the prism of two LEILA Project’s objectives related to its sustainability:

- Ensuring the future self-sustainability of the project outcomes through synergies with the European e-Justice Portal, and the Member States not participating in the project; and
- Enabling the future developments correlating information with other sources and sites in order to enhance the usefulness of the results, increasing the overall effectiveness for end users, laying the ground towards judicial auctions interconnection across EU, and creating the basis for a pan-European platform for on-line judicial auctions, potentially open to other kinds of auctions.

²⁴ <https://www.emdesk.com/horizon-2020-horizon-europe-basics-guide/quick-guide-to-ensure-sustainability-of-a-horizon-europe-project>



3.1. Governance and Legal Sustainability Framework

3.1.1. European Judicial Digitalisation Strategy

Recent developments in digital justice appear as real opportunities to improve the quality and efficiency of justice. At the same time, they constitute new challenges for the respect of the fundamental principles of the trial and the essential guarantees of judicial systems, such as the primacy of the rule of law, the independence and impartiality of the judge, the principle of adversarial proceedings, the protection of fundamental freedoms, and access to justice.

Since 2008, the European Commission and the Council of the EU have been working closely together towards establishing a number of cross-border digital initiatives in the area of justice.

A first result of the political commitment to making access to national and European e-Justice easier and more accessible was the adoption of the first Multiannual e-Justice Action Plan 2009-2013. This first instrument identified a number of priority actions for joint work. Following its completion, a subsequent e-Justice Strategy and Action Plan were adopted for the 2014-2018 period. These ended in 2018 and have in turn been superseded by the 2019-2023 e-Justice Strategy and Action Plan.

One of the most tangible results in the direction of digitalisation of justice so far is the European e-Justice Portal. It is a one-stop-shop for all justice matters and contains valuable information on a wide variety of topics, as well as a number of online tools.

Also, the EU Justice Scoreboard²⁵ aims to support Member States in their efforts to achieve justice that is more effective. In this context, it presents comparative data on various aspects of digitalisation of justice at national level.

In order to reply to the current challenges, the European Commission presented a Communication²⁶ aiming at seizing the opportunities offered by digital technologies with

²⁵ https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/eu-justice-scoreboard_en

²⁶ https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/digitalisation-justice/communication-digitalisation-justice-european-union-and-proposal-e-codex-regulation_en



the objective of improving the access to and the functioning of justice systems. The Commission has also carried out a mapping²⁷, which accompanies the Communication, to establish a clear baseline of the level of digitalisation of justice in the Member States of the EU.

One important element supporting the digitalisation of cross-border judicial cooperation at the time was the Proposal for a Regulation on a computerised system for communication in cross-border civil and criminal proceedings (e-CODEX system), being the future the e-CODEX Regulation.

Within the various MSs, in terms of civil proceedings, digitization has included the possibility to create documents in electronic format, in particular minutes of the hearings, orders, and judgments, to digitally sign them and to send and receive them by e-mail or through online platforms. Over the last few years, the health crisis accelerated the development of e-justice at European level because it has been considered necessary to guarantee the ongoing functioning of judicial systems.

The use of electronic tools in civil enforcement is the natural consequence of this digital evolution. The poor functioning of enforcement proceedings could undermine not only the creditor's right to be satisfied within a reasonable time but also the reliability of a state on the international markets. e-Auctions have been deemed the best way to achieve these targets, as confirmed by the increase in their diffusion at European level.

3.1.2. Diffusion of National Platforms Dedicated to Judicial e-Auctions.

The health emergency that had started in 2020 has given a great impetus to the development of electronic judicial auctions around Europe. They have been a suitable tool to simultaneously guarantee the continued functioning of enforcement systems and keep people safe by avoiding physical contact. Between 2019 and 2023, the number of MSs that use this type of auction doubled. The newest platforms are not only graphically improved in line of latest technical achievements but are also easier and more intuitive to use. In some states, e-auction is the mandatory form of sale of foreclosed assets; in others, it is a facultative form as an alternative to direct sale or public oral auction in attendance.

Actually, 21 MSs are currently using e-auctions (Austria, Belgium, Bulgaria, Czech Republic, Croatia, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxemburg, Netherlands (The), Poland, Portugal, Slovenia, Spain, Sweden), and of these,

²⁷ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=SWD:2020:540:FIN>



18 MSs have only one national platform. In Romania, the traditional judicial auctions are advertised on a national website but not carried out through it.

One of the main challenges in implementing e-auction platforms lies in making them interoperable with each other. Actually, judicial e-auction systems are fragmented at national level with a potential impact on the competition among potential buyers, on the sales values and on the time to conclude the sales.

The only case of connection between national systems is that of Austria and Germany. These countries are using the same platform for judicial e-auctions of movable assets. The German platform was launched first and since 2015 it has been adapted by dividing the auction of these two countries.

3.1.3. Legal Issues Affecting Sustainability of the LEILA Project

The platforms dedicated to judicial auctions allow both the search for assets for sale and also the possibility to register, submit the bid and participate in the auction.

The aim of LEILA Project is, at this stage, to create a multilingual search engine connected to the various national platforms through which only it will then be possible to lend the bid.

The rules of law that currently govern the platforms of the MSs allow, in almost all states, the free search for assets without the obligation of prior registration and digitally identification, which instead is always required to participate in the auctions.

In addition, compliance with the Regulation (EU) 2018/302 on addressing unjustified geo-blocking and other forms of discrimination based on customers' nationality, place of residence or place of establishment within the internal market²⁸, ensures that LEILA solution(s) will interact with national platforms. According to this Regulation, indeed, discrimination between EU customers to segment markets along national borders and to increase profits to the detriment of foreign customers – as prevention of the use of a national platform to users connected from abroad – is considered as unjustified and not legal geo-blocking.

In conclusion, no legal issues of the MSs rule of law effecting sustainability of LEILA Project were found.

²⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32018R0302>



3.1.4. Control Practices for Development of the e-Auction Strategy

The control practices usable for a sustainable project management for development of e-auctions must have as object the adoption of specific measures (legislative, governance- and IT-related) necessary or useful for the adoption or the development of the e-auction strategy.

They can be divided in three thematic areas:

- **Governance and development:** they concern the strategic and regulatory aspects to be adopted for the development of judicial e-auctions.
- **Operative aspects of the Platform:** they concern the structure and functioning of the e-auction platform.
- **Organisational aspects of e-auctions:** they concern rules and procedures for the management of bid submissions and tenders.

These measures could be considered regarding three possible degrees of significance:

- ‘Must-have’: such measures are imperative for the successful implementation of e-auctions.
- ‘Should-have’: these measures are important but not necessary for e-auction delivery. While ‘should have’ measures can be as important as ‘must have’, they are often not as time-critical or there may be another way to satisfy the requirements they are related to so that they can be held back until a future delivery.
- ‘Could-have’: the ‘could have’ measures are desirable but not necessary and could improve the user experience or satisfaction for a little cost. These are typically included if time and resources allow it.



3.2. Technical Sustainability Framework

3.2.1. Architecture and Its Evolution (e-CODEX Dependencies)

In this section, the architectural solution's overview as developed under the LEILA Project is provided. It is focused on providing a pilot multilingual platform for judicial auctions taking place in more than one EU Member State (being the European Platform for Judicial Auctions).

Following this overview, we provide some potential paths of architectural evolution related to the e-CODEX dependencies therein.

In LEILA, we have defined an architecture for digital accessibility to judicial auctions of EU Member States developed around a Central Portal that should adapt to the variety of regulations and implementations of Member States' judicial auction systems.

A skeleton of such architecture and a first implementation have been realized in the LEILA Project, having in mind two main objectives:

- to realize a shared transcoding data model that is able to fit to such a wide ecosystem of regulations and implementations; and
- to realize a pilot running implementation of an EU judicial auctions platform integrated with six national portals (in particular, the ones of the Czech Republic, Croatia, Italy, Latvia, Lithuania, and Portugal).

This experience provides hints for a sustainable architectural evolution of the LEILA solution – the European Platform for Judicial Auctions, in the context of a common Digital Europe vision.

e-CODEX

The European Platform for Judicial Auctions and Member States' national portals are e-CODEX participants, using the cross-border interconnection of national judicial systems for citizens, business and legal professionals in the Member States provided by the e-CODEX system.

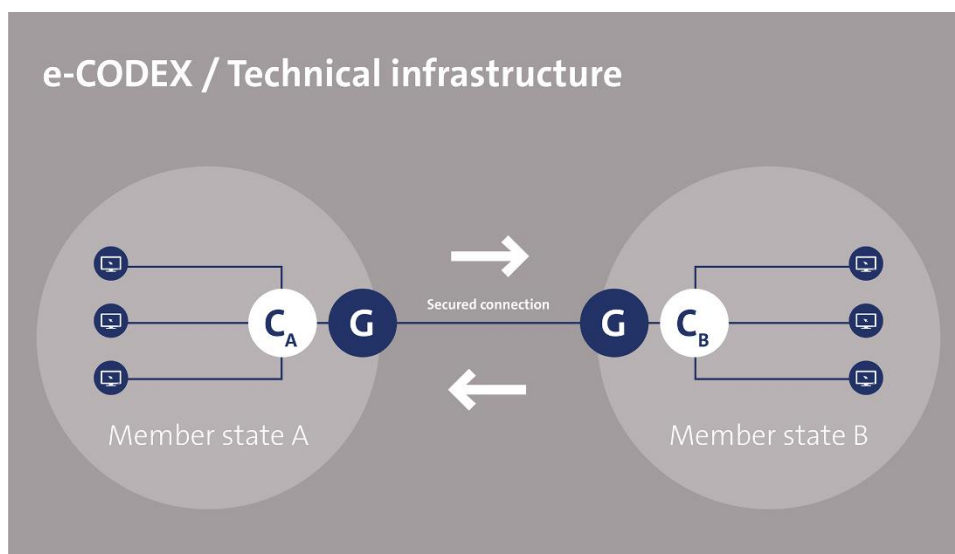


Figure 1. e-CODEX Technical Infrastructure

Current LEILA implementation has Domibus Gateway as its key component.

Domibus

Domibus 5.x versions support the following database back-ends: MYSQL 8.0.13 and above, Oracle 12c R2 and Oracle 19c. When Domibus is used as a mean for exchanging payloads bigger than 30MB, it's possible to rely upon the file system to store messages.

Domibus uses a Plugin architecture to communicate with the back-end. It is provided by default with three plugins: a WebService Plugin (WS), a Java Messaging Service plugin (JMS) and a File System plugin.

Currently there aren't publicly available performance reports for Domibus.

According to available guides, "starting with 5.0, Domibus can reliably handle a throughput of more than 1,000 messages/s* and, with added support for table partitioning, ensures this high level of performance even as the size of the database increases. These results were measured during a 2-hour period with Domibus working in single-tenancy mode, deployed in a 4-node cluster, using Oracle WebLogic Server and Oracle Database, with a message size of 5 kB, configured to receive 500 messages/s and send 1,000 messages/s. The performance results are dependent on several variables, such as message size, data base disk speed, RAM, etc."



LEILA Solution Architecture Overview

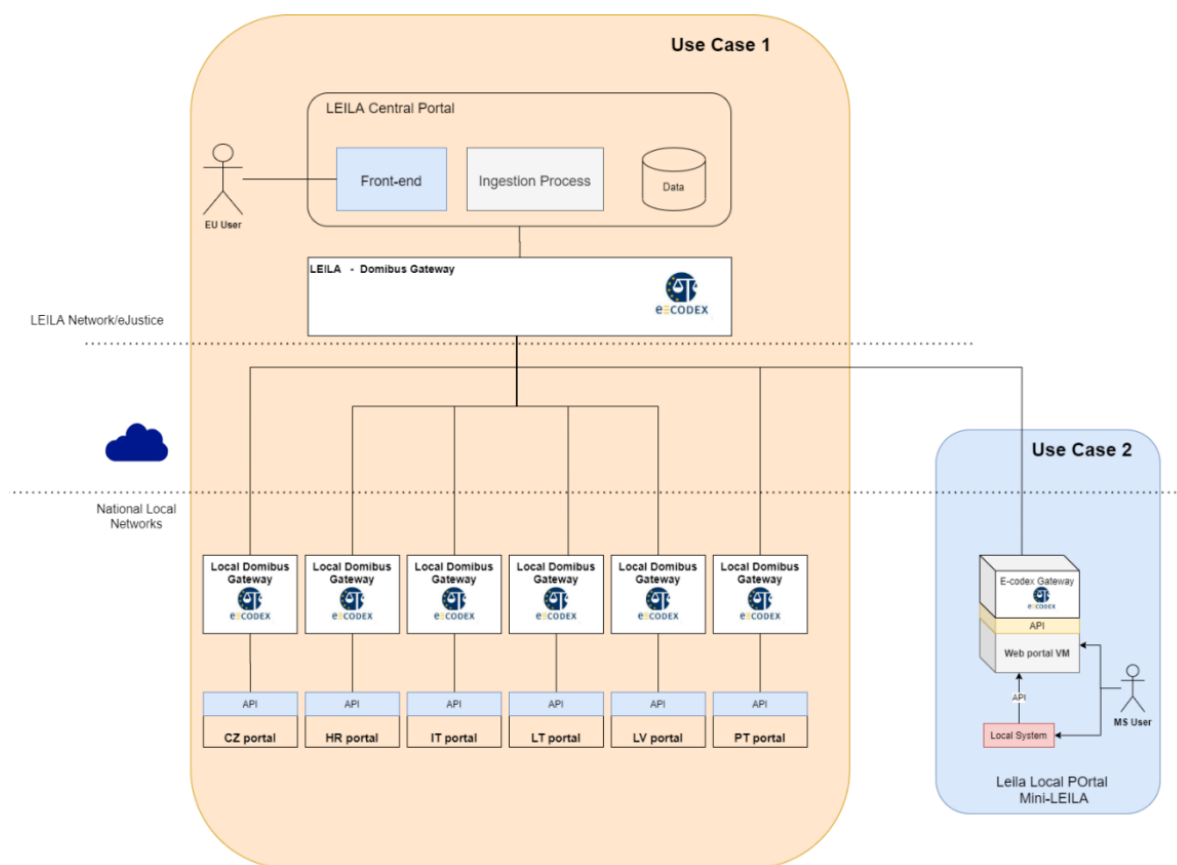


Figure 2. LEILA Solution Architecture Overview

The architecture consists of the following components:

- LEILA Central Portal: the Portal is developed using a web and content management platform based on the product Liferay. The latter is developed by Java and manages the user interface, the business logic and all content of the Portal. Inside the architecture of Liferay, there is an indexing engine based of Elasticsearch in order to manage all types of searches, included free text-search, with high performance.

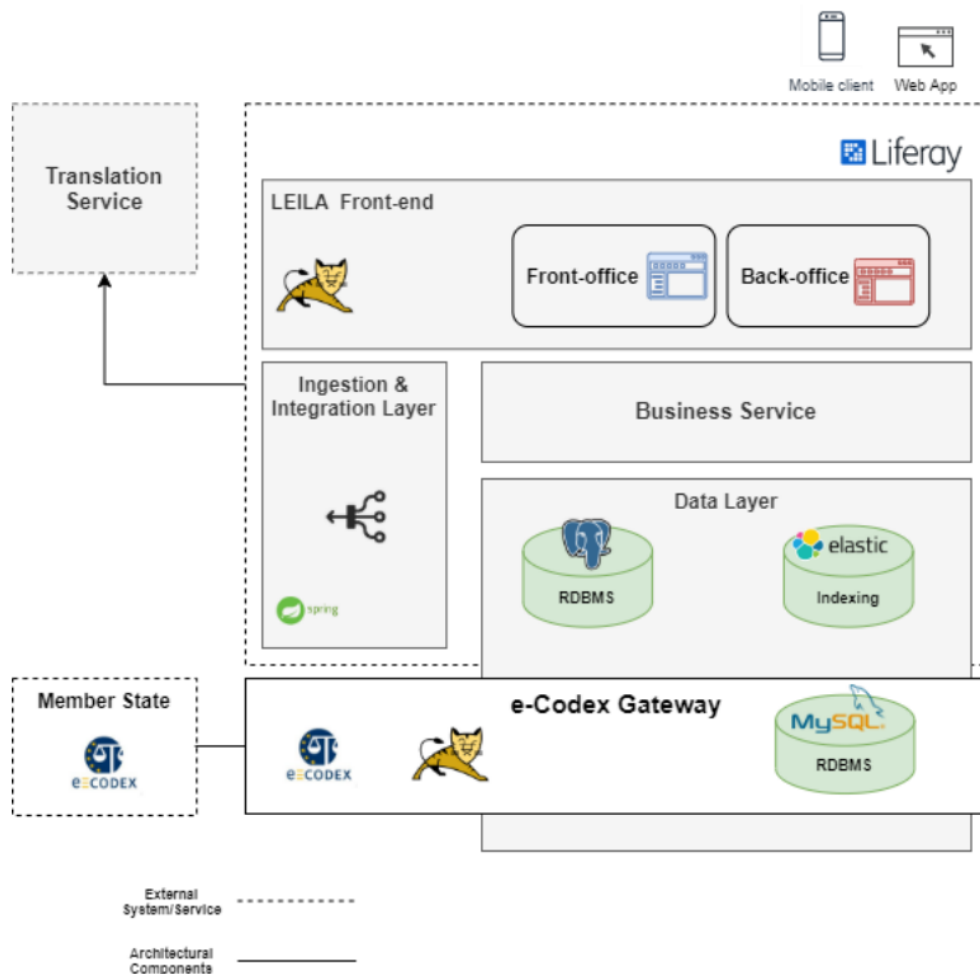


Figure 3. Central Platform Components

- LEILA Database: it contains information on the Portal’s configuration and judicial auction data. The latter are obtained through data ingestion process. The data ingestion process is implemented by a batch procedure developed in Java with Spring framework; the batch is scheduled by a crontab configured inside a custom panel in an administrative area of Liferay.
- LEILA Domibus Gateway: it is deployed on Tomcat and its database is based on MySQL. The Domibus Gateway is directly connected with all Member States by messages exchange and the communication security is implemented by a certificate installed inside the Domibus trust store.
- Member States’ Local Domibus Gateways: they are used to connect the European Platform for Judicial Auctions with all Member States’ national portals for the purpose of message exchanging.



- Member States' Local Virtual Machines: local web portals developed using a web and content management platform based on the product Liferay. This component is used only by Member States that do not have an online judicial auctions portal.

The LEILA Domibus Gateway is directly connected with all Member States' Local Domibus Gateways.

The architecture is designed to fulfil two use case scenarios for the integration of the LEILA solution:

- USE CASE #1: The Member State has all the possibilities to provide a set of APIs to retrieve the data from its national judicial auction portal/database;
- USE CASE #2: The Member State is not able to provide the APIs due to financial, resource, technical or other reasons.

USE CASE #1 Overview

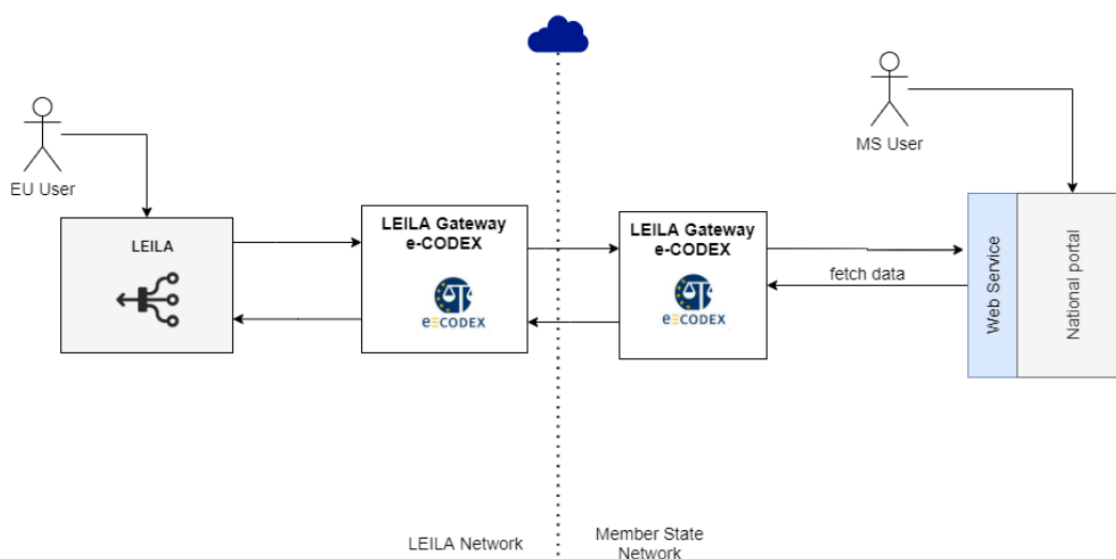


Figure 4. Use Case #1 Overview

LEILA solution relates to a Member State through the e-CODEX Gateways. To exchange data, the Local Domibus Gateway on the Member State side communicates with the Member State's API. All data is stored and managed in the national portal of the Member State.



USE CASE #2 Overview

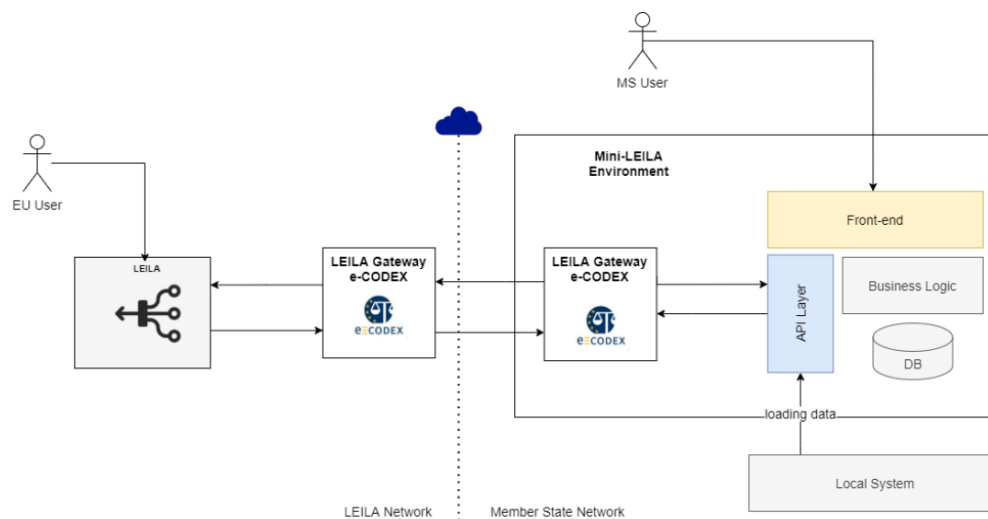


Figure 5. Use Case #2 Overview

The LEILA solution is connected to a Member State through the e-CODEX Gateways. All data can be stored and managed in the local integration portal or transferred using the API. The database suggested for the local integration portal is MySQL.

This solution is known as Mini-LEILA.

Data Retention Period

Currently, the retention period for data obtained through the ingestion process is 24 hours. This duration has an impact on several fronts including network communications and computing resources.

Some advantages of a possible extension of this retention period are proposed below:

- **Enhanced Analytics and Insights:** By retaining data for more than just one day, deeper and more meaningful analyses could be carried out. This would provide richer insights into the dynamics of judicial auctions across the EU, helping policymakers, auctioneers, and bidders alike.
- **Reliability and Redundancy:** Extended data retention can offer a buffer against data loss or corruption. In case of any system failures or mishaps, data from previous days can act as a fallback, ensuring seamless operations and minimal downtime.



- **Support for Research and Academia:** Scholars, researchers, and students studying the dynamics of judicial auctions or related fields would immensely benefit from having access to a more extensive dataset.
- **Cost Efficiency:** While it might seem counterintuitive, extended retention might save computational costs in the long run. The system currently expends resources on a daily basis to delete and reinsert data, which can be optimized with extended retention.

In addition to the advantages that the extension of data retention can offer, the following aspects must also be considered:

- **Data Storage and Management:** Retaining data beyond the current duration will inevitably demand more storage space. This not only means increased infrastructure costs but also mandates effective data management to ensure data integrity and accessibility.
- **Potential Data Staleness:** With extended retention, there's a risk of old and outdated data being mistakenly considered in decision-making processes.
- **GDPR Concerns:** Longer data retention periods can pose challenges in terms of GDPR²⁹ compliance. It's essential to ensure that all data held for extended periods still respects the privacy rights of individuals and businesses.

While the advantages of extending the data retention period are clear, it's imperative to weigh them against potential risks, especially concerning data security and GDPR compliance.

It's crucial to consult with GDPR experts and conduct a thorough risk assessment before implementing any changes. Moreover, clear communication with all stakeholders, ensuring they understand the implications and benefits of extended data retention, will be essential for successful implementation.

In conclusion, the decision to extend the data retention period should be a calculated one, factoring in both the potential benefits and risks.

The extension of data retention may lead to consider the following scenario, which could allow to have **up-to-date judicial auctions**.

Indeed, the LEILA Central Portal, leveraging the capabilities of e-CODEX, currently showcases the judicial auctions from the preceding day, sourced from distinct Member

²⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 4.5.2016, p. 1–88



States' portals using a PULL mechanism. This approach mandates the LEILA Central Portal to proactively source auction information daily. Intricately tied to a one-day retention policy, all judicial auctions are pulled anew every day from each Member State's national portal. However, this modus operandi raises sustainability concerns, both computationally and ecologically. The repetitive deletion and re-insertion of data, especially when the auctions remain active, undermines efficiency. The real-time publication of judicial auctions on both the European Platform for Judicial Auctions and Member States' portals opens the door to conceptualizing the LEILA solution not just as a European search engine for judicial auctions but as a one-stop-shop. A wider LEILA solution's adoption can be expedited through regulatory steps, making the Platform's use legally binding while respecting distinct Member State legislations and portals' functionalities and features. This paves the way for a unified European judicial auctions' market framework.

Since Domibus is used for data exchange, which can be considered a message broker solution, it supports both event-driven and message-driven data exchange. This enables the collection of all active action data into the LEILA Database and facilitates the exchange of actions on both sides. The message-driven data exchange principle can be leveraged to ensure that all necessary information is sent to the LEILA Database. Usually, several variants can be used.

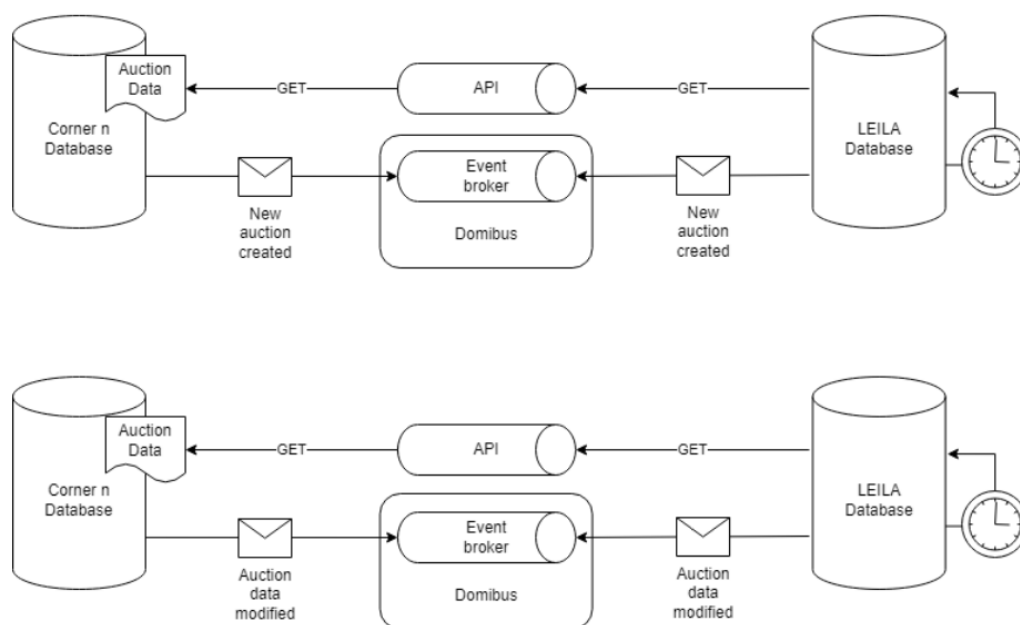


Figure 6. The Event-driven and API Principle Mix

A Member State (Corner) sends information about new auctions and auction data changes to the LEILA Central Portal using Domibus. The LEILA Central Portal receives notifications



about the auction changes and uses these to initiate an asynchronous call to the API for more information.

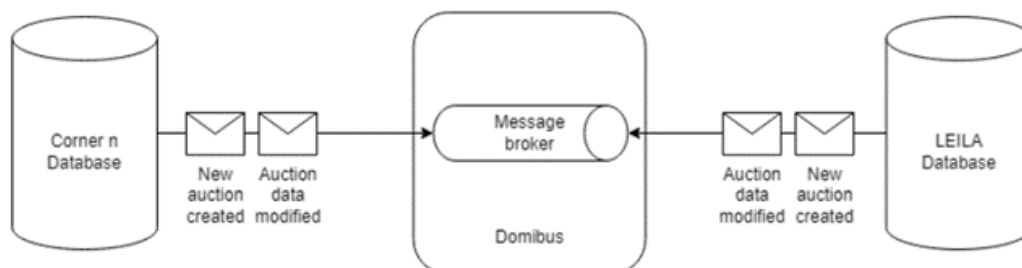


Figure 7. The Message-driven Principle

The Member State sends asynchronous messages containing all the necessary information about new auctions and any changes to the LEILA Central Portal. This ensures that the LEILA Central Portal has access to up-to-date information about the auctions.

A transition to such mechanisms is advocated. This model would entail that any new judicial auction listed on a Member State’s national portal should be visible on the LEILA Central Portal. Central to this proposition is adherence to a shared European format³⁰ for every auction, which can be finetuned to acknowledge diverse legislative nuances, championing inclusivity and robust representation.

Further development of a multilingual platform can be facilitated by the extension of the data retention period.

Currently, LEILA’s multilingual process is mirrored in its user interface, tailored in an array of languages, and the fact that judicial auctions are presented in their inherent language specific to each Member State.

Although the Platform’s multilingual attributes are commendable, there’s potential for augmentation. The integration of an on-the-fly translation mechanism can considerably elevate user engagement, promoting a harmonized comprehension of auction intricacies across Member States. Presently, auctions are depicted in their native languages, devoid of an automated translation tool. Incorporating such a service would empower users to instantly discern auction specifics in their language of choice, predominantly for the description field. Nonetheless, the augmentation’s viability hinges on its sustainability, particularly the capability to process extensive data while maintaining accuracy and agility.

³⁰ Currently the shared schema is based on XSD format.



An in-depth exploration of this translation service's sustainability facets is elaborated in Section 3.4.2 of this document.

Further Development of Mini-LEILA Solution of USE CASE #2

As presented above, Mini-LEILA aims to assist EU Member States that don't have a national portal to transfer judicial auctions data by electronic means. This functionality allows Member States without a dedicated portal to publish their judicial auctions directly on the Mini-LEILA, which subsequently transfers this data to the LEILA Central Portal via e-CODEX. Presently, this solution employs the PUSH mechanism, with the central component communicating directly with the Domibus Gateway, treating it akin to a standard portal.

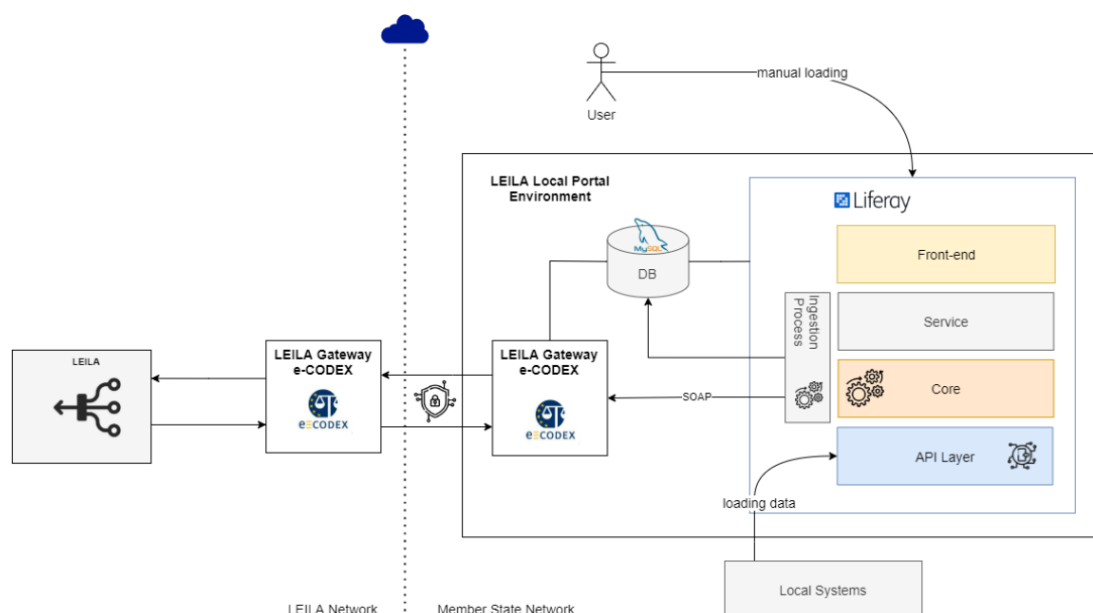


Figure 8. Mini-LEILA current Architecture

Mini-LEILA could be improved and made more sustainable by considering the following suggestions:

- **User-Friendly Interface:** The Mini-LEILA solution can be refined further for a more intuitive user experience. Streamlining the process of publishing judicial auctions can boost participation and efficiency.
- **Integrated Access Management:** An integrated access management system can be developed to merge seamlessly with any pre-existing systems in the Member



State. Leveraging technologies like LDAP (Lightweight Directory Access Protocol) could ensure controlled access and security, making the system more resilient.

- **Advanced Portal Component:** Currently, the Mini-LEILA solution offers a basic structure. Envisioning it with advanced portal capabilities, especially regarding the input of judicial auctions, can make it more adaptive to user needs and future expansions.
- **One-Stop-Shop on LEILA:** For Member States without a national portal, the LEILA solution can step up to serve as a one-stop-shop for all judicial auctions under its jurisdiction. This not only ensures consistency across the EU but also amplifies the reach and effectiveness of the LEILA Project.
- **Miscellaneous Enhancements:** There's always room for improvement, and future iterations can explore and incorporate feedback from users, integrate cutting-edge technologies, and adapt to evolving requirements to ensure this part of the European Platform for Judicial Auctions remains contemporary and efficient.

By focusing on these areas of enhancement, the Mini-LEILA solution can become more robust, sustainable, and user-centric, fostering a collaborative environment for all EU Member States.

Exposure of APIs to Third Parties

The idea behind this objective is to harness the potential of the vast pool of data the LEILA solution collects on European judicial auctions. Leveraging this data can pave the way for innovative services, functionalities, and insights that could benefit multiple stakeholders across Europe.

An API (Application Programming Interface) can be envisioned to allow third-party interaction with the LEILA Central Portal's data through e-CODEX. This could facilitate a broad spectrum of stakeholders, extending beyond individual Member States, to engage with LEILA solution's data, especially if the retention limitation of one day is reconsidered. Such a move can act as a catalyst, fostering the creation of an ecosystem around European judicial auctions data.

The exposure of APIs to third parties may have the following advantages and implications:

- **Open API Ecosystem:** By creating an open API, the LEILA Project can invite innovation from different players across Europe. This could lead to the development of new services and features, all feeding off and contributing to the central data on European judicial auctions.



- **Extended Data Retention:** A prolonged data retention period, beyond the current one-day limit, could make the system more versatile. This would allow developers and businesses to utilize the data for more prolonged analyses, leading to richer insights and more comprehensive services.
- **GDPR and Data Privacy:** Making judicial auction data available through APIs implies greater attention to GDPR and security concerns.

By realizing this objective, LEILA has the potential to become more than just a search engine and a centralized repository for European Judicial Auctions. It could serve as a hub for innovation, fostering a collaborative environment, contributing to drive Europe's digital economy, and ensuring that data privacy and protection remain paramount.

3.2.2. High Availability for the LEILA Solution

High Availability (HA) refers to the uninterrupted operational performance of a system over a given period. The quality of HA is determined by system uptime, recovery time after failures, and the inclusion of both scheduled and unscheduled maintenance. Service level agreements (SLAs) typically express HA as a percentage of uptime.

Domibus Gateways serve as primary engines for data exchange. Therefore, ensuring their HA is paramount. Currently, the decentralized system utilizes the AS4 protocol, providing opportunities for HA data exchange. However, HA varies as each Member State individually handles infrastructure operations.

Both the LEILA Domibus Gateway and MSs' Local Domibus Gateways should be designed and implemented following HA best practices. The priority should be on enhancing the LEILA Central Portal's HA, with subsequent improvements extended to Member States based on successful implementations.

Domibus High Availability Implementation

The official Domibus architecture documentation delineates an infrastructure setup. All Member States must utilize load balancers designed with HA principles.

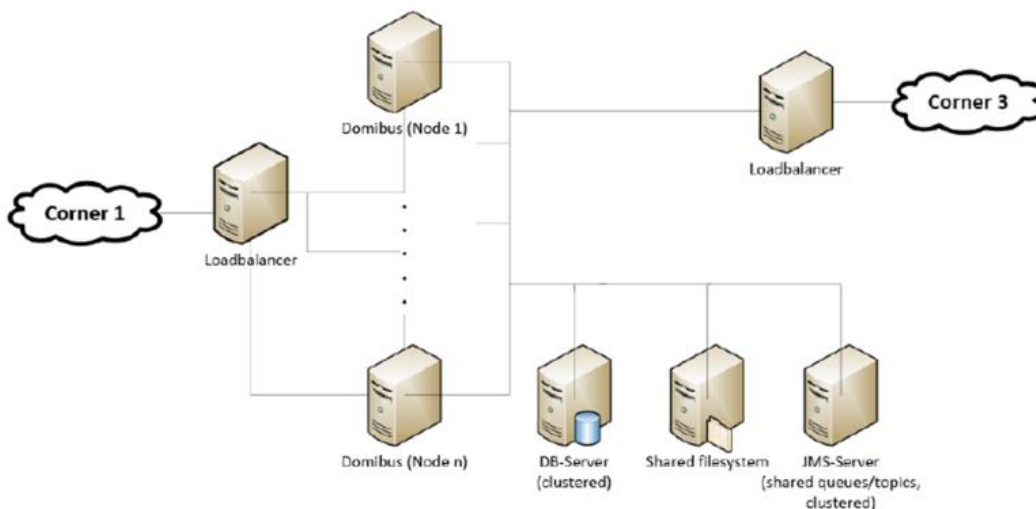


Figure 9. Domibus HA Implementation

Optimal HA is achieved when at least two servers of load balancers, configured identically in an active/passive mode, utilize keep alive technology. The active load balancer, operating in round-robin mode, directs traffic to each Domibus node. In case of failures or maintenance, the passive load balancer takes over.

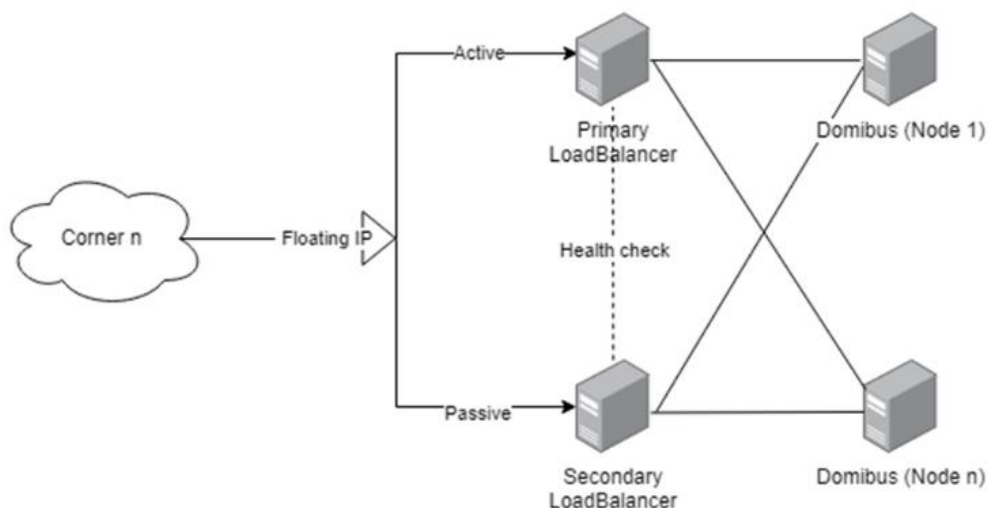


Figure 10. Load Balancing

At least two Domibus nodes are recommended for current loads to ensure HA during maintenance periods. Increasing nodes enhances HA tolerance and performance. When multiple nodes exist, a shared file system is essential. A persistent storage solution,



enabling file sharing across all Domibus nodes, is recommended. This system, especially in block mode, could also optimize disk space usage.

Implementing a database cluster improves data availability, scalability, and performance. With Domibus using MySQL, a Main and Replicated node approach is suggested to direct operations between the primary and databases replica.

High Availability for the LEILA Central Portal

The LEILA Central Portal, which employs Liferay, requires a review of the manufacturer's HA recommendations. Clustering, being one of these recommendations, should be prioritized. Depending on the load, the Liferay needs appropriate scaling.

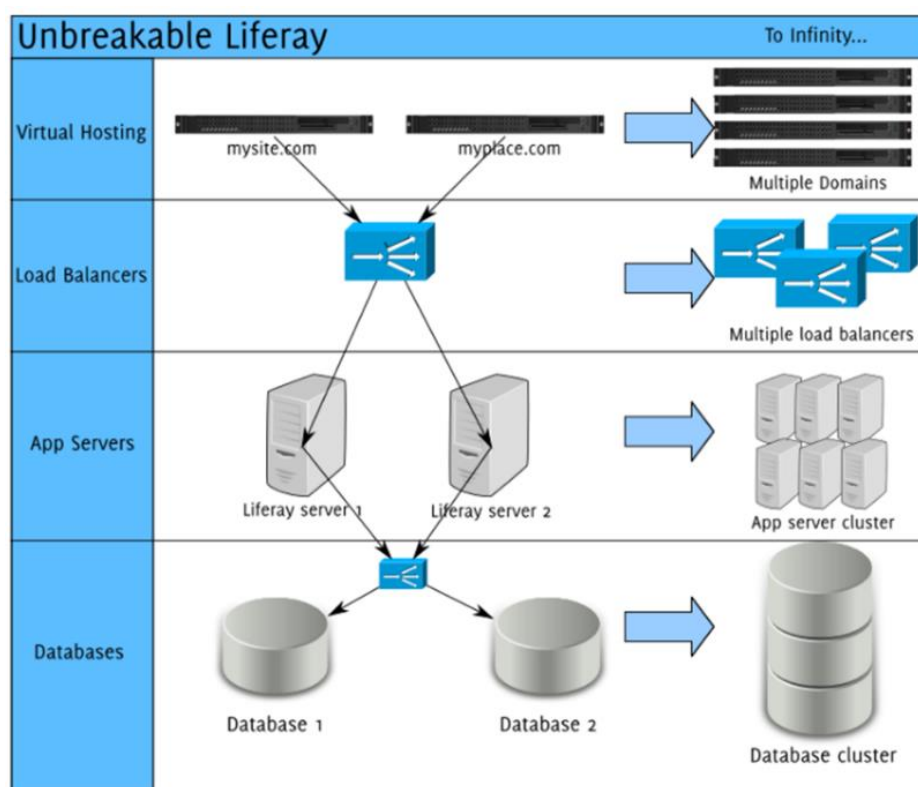


Figure 11. Unbreakable Liferay

At least the 'Unbreakable Liferay' recommendations should be implemented to ensure continuous availability and minimize downtime. Key recommendations include implementing load balancers, having two Liferay nodes, and pointing all nodes to a database cluster using PostgreSQL in Multi-master mode.



3.3. Functional Sustainability Framework

The functional sustainability of the European Platform for Judicial Auctions revolves around many factors. In particular, in this section we will cover the following topics:

- Accessibility for challenged users; and
- Service support.

3.3.1. Accessibility for Challenged Users

Accessibility for challenged users is a cornerstone of inclusive design, ensuring that everyone, including those with disabilities and the elderly, can effectively perceive, understand, navigate, and interact with digital platforms like the European Platform for Judicial Auctions, developed under the LEILA Project. This commitment to accessibility is crucial for avoiding the risk of exclusion from the increasingly digital world of judicial e-auctions.

The LEILA Project, via its solutions, aims to embody this ethos of accessibility by adhering to fundamental principles:

- **Perceivability:** This principle dictates that all information and user interface components must be presentable in ways that are discernible to users. This doesn't merely mean that information must be visible; it also must be perceivable through other senses for those with visual impairments. For example, providing text alternatives for non-text content or captions for videos can make a substantial difference.
- **Operability:** Every user must be able to operate the interface. This principle ensures that the digital environment developed under the LEILA Project is navigable and usable by individuals with a range of physical abilities. For instance, ensuring keyboard navigability for those who cannot use a mouse, or providing sufficient time for all users to read and use content.
- **Understandability:** Information and the operation of the user interface must be intelligible. In practice, this could mean consistent navigation and predictable interactions, as well as simple language and explanation of complex issues. For the LEILA Project, this could involve using plain language summaries for legal terms or complex auction procedures.



- **Robustness:** The content must be robust enough to be interpreted reliably by a wide variety of user agents, including assistive technologies. Ensuring compatibility with current and future user tools is key. For the LEILA Project, this means coding in ways that assistive technologies can interpret.

Digital accessibility is an important aspect of the European Commission’s commitment to inclusion, diversity, and creating a ‘Union of equality’. Public services and information, which used to be only available in physical offices or printed format, are being replaced or complemented by online equivalents. Ensuring that these online services are accessible to all persons, irrespective of abilities, is essential for an inclusive society.

EU-wide digital accessibility legislation was adopted in 2016. Directive (EU) 2016/2102 of the European Parliament and of the Council of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies³¹, also known as the Web Accessibility Directive (WAD)³², establishes accessibility requirements for the websites and mobile applications of public sector bodies, requiring compliance with accessibility principles, which the LEILA Project respects. However, LEILA’s challenge is not merely to comply with legislation but to lead by example in the development of specific applications that transcend traditional barriers. These applications might include:

- **Video Sign Language:** Providing sign language interpretation for video content to aid users with hearing impairments.
- **Adaptive Contrast:** Enabling users to adjust the contrast colour of pages to improve readability and reduce eye strain.
- **Text Resizing:** Allowing for the text to be resized without loss of content or functionality to accommodate those with visual impairments.
- **Monochrome Themes:** Offering versions of the site in grey scale or darker tones to cater to users with specific colour vision deficiencies.
- **Text-Only View:** Creating an option to view pages without images or additional visual content that may distract or hinder users with cognitive disabilities.
- **Enhanced Focus Indicators:** Implementing clear and discernible focus indicators for users who navigate with keyboards, making it easier to keep track of where they are on the page.

In the realm of digital accessibility, compliance is not merely a regulatory requirement; it represents a commitment to inclusivity and user-centric design. As the LEILA Project

³¹ <https://digital-strategy.ec.europa.eu/en/policies/web-accessibility-directive-standards-and-harmonisation>

³² <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016L2102>



strives to meet the benchmarks set by the Web Accessibility Directive (WAD), choosing the right platform for implementation is crucial. Liferay, a widely recognized enterprise web platform, offers a robust foundation for creating accessible web applications and could serve as an effective tool in LEILA Project's efforts to achieve its accessibility goals.

Liferay is known for its flexibility and a strong focus on user experience, which is evident in its compatibility with accessibility standards. With its inherent support for creating accessible web content and applications, Liferay provides the following features:

- **Standards-Conformant Themes:** Liferay's themes are designed to be accessible out-of-the-box, adhering to international standards such as the Web Content Accessibility Guidelines (WCAG) 2.1.³³ This compliance ensures that the visual presentation will be perceivable and operable for all users.
- **Accessible Site Navigation:** The European Platform for Judicial Auctions supports keyboard navigation and screen readers, essential for users with visual and motor impairments, making it possible the navigation to all individuals, regardless of their physical abilities.
- **Customizable Portlets:** Liferay's portlets can be customized to ensure that they are accessible, providing the flexibility to create content that is both robust and understandable. This means that the information within the European Platform for Judicial Auctions could be tailored to meet the diverse needs of its users.
- **WAI-ARIA Support:** Liferay has built-in support for WAI-ARIA (Web Accessibility Initiative – Accessible Rich Internet Applications) standards³⁴, which means that dynamic content and advanced user interface controls could be further developed for the European Platform for Judicial Auctions to be accessible to people with all disabilities.
- **Accessible Forms:** Forms are a critical component of a portal, especially in the context of e-auctions. Liferay facilitates the creation of forms that are compliant with accessibility standards, ensuring that form inputs, labels, and error messages are accessible to everyone.

In conclusion, the current graphic and textual design of the European Platform for Judicial Auctions and its suitability to be further developed to promote an even more effective interaction with disabled people, will contribute to the improvement of the daily life of all those people who are limited in their personal autonomy by making them feel integrated

³³ <https://www.w3.org/TR/WCAG21/>

³⁴ <https://statics.teams.cdn.office.net/evergreen-assets/safelinks/1/atp-safelinks.html>



and will help to spread the culture of digital accessibility among the States participating in the project.

3.3.2. Support Service and Business Continuity

In this section, we will deal with the European Platform for Judicial Auctions' support service concerning the user interface with which users would interface for searches, through the Platform. The support service may address minor issues related to viewing, as well as be a symptom of other problems within the infrastructure. As regards the infrastructure, two main types of problems could be encountered, those that may be problems in communication between the e-CODEX nodes, therefore the e-CODEX infrastructure at the point-to-point communication level and those that are problems experienced at Member State level related to the communication between the portal and the e-CODEX node. Infrastructure issues may also concern the evolution of the system and in this sense could lead to system updates.

In the second part of the section, the focus shifts to the business continuity of the Platform, detailing the essential steps to ensure ongoing operations in the face of potential disruptions.

Support Service

With regards to the above, the support service may concern:

- Customer Support
- Change Management
- Incident Management
- Service Level Management.



Figure 12. LEILA Support Service

Customer Support

Initially, the Customer Support Service could be carried via email support. Web forms could be used on the European Platform for Judicial Auctions. The web form may contain designated fields that need to be filled by customers to get the necessary support.

- **First Level Support:** Service Desk employees could receive customer inquiries and forward them to appropriate channels of second level support.
- **Second Level Support:** It should include expert engineers responsible for specific areas, whose task is to solve the inquiries. Second Level Support engineers don't have to be only employees that support only the LEILA Central Portal but also partners' employees that provide data for the European Platform for Judicial Auctions itself.

Customer Support Service represents an essential service to ensure a positive user experience and the proper functioning of a complex digital platform like the European Platform for Judicial Auctions.

the European Platform for Judicial Auctions' Customer Support Service should provide differentiated assistance for:



- **Users of the European Platform for Judicial Auctions:** multi-channel support (chat, email, ticketing system) to respond to information requests; queries about using the Platform and resolve any issues; presence of FAQs, guides, and webinars for user on-boarding and continuous training; constant monitoring of user satisfaction.
- **e-CODEX Technological Infrastructure:** dedicated technical support service, available via ticketing or preferential channels, to handle malfunction reports from national nodes and quickly identify solutions to infrastructure-related issues, in accordance with eu-LISA guidelines
- **Interfaces with National Portals:** preferential contact point and dedicated SLA for national authorities, in order to facilitate the resolution of issues related to the interaction between their respective IT systems and the e-CODEX node.

Continuous monitoring of volumes and times for handling requests, along with targeted training activities, should also allow maintaining a quality service that meets the needs of the heterogeneous pool of users involved in the LEILA Project. Therefore, Customer Support Service represents a key element for the long-term sustainability of the Platform.

Change Management

Change management stands for the process of dealing with not only changes to the infrastructure but also application patch management.

Changes may include the introduction and implementation of new application functionalities, dealing with application bugs by deploying new versions and updates, all changes to IT infrastructure components and implementations of new version of system software.

All changes may be done according to LEILA Change Management Process which could include planning, approval, deployment and release.

Changes can be classified as urgent due to the need to urgently normalize system functioning, but also planned in case of need of implementing new business functionalities or changes in the IT infrastructure or at regulatory level.

The different types of changes would require different levels of testing and approval before being deployed. For example, urgent bug fixes may go through a faster approval process than major new features.

The change management process ensures that any changes to the system do not disrupt operations or create security issues. It is an important part of maintaining a stable and



sustainable platform over the long term as technical and business requirements continue to evolve. The customer support team would need to work closely with development and operations teams to smoothly manage all changes according to the defined change management process.

Clearly documented policies and procedures for change requests, testing, approvals, and deployment are key to effective change management. This is important for overseeing any updates or modifications to the European Platform for Judicial Auctions in a controlled and coordinated manner.

Incident Management

Incident management is a critical process for any technical platform and should be a well-defined procedure for the European Platform for Judicial Auctions as well. Incident management deals with potential incidents that could cause disruption to normal business operations and negative impact. Incidents can originate from various sources. Incident information may be gathered not only from LEILA customers reporting issues via the customer support channels, but also through continuous monitoring of the underlying systems and infrastructure. Dedicated incident monitoring tools should be implemented for the European Platform for Judicial Auctions to provide early detection of any anomalies or problems. These tools could provide 3 types of information:

- **Information alerts:** These indicate normal system functioning and don't require immediate action but help with benchmarking and historical trend analysis.
- **Warning alerts:** Events flagged under this type have not caused an actual system breakdown but point to emerging issues that need to be addressed to prevent future disruption. They require examination and may need root cause analysis to identify potential vulnerabilities.
- **Critical alerts:** Critical alerts are triggered when events cause actual disruption in normal business operations. They need to be prioritized and addressed on an urgent basis by assigning responsible employees to resolve the issue before further deterioration in functioning occurs.

Standard procedures would need to be defined for escalating the different alert types to the appropriate internal teams through defined communication channels. SLAs would determine the expected response and resolution times. For critical incidents causing outages, automated response playbooks come into effect to immediately activate the specified procedures for resolving the issue. Post-incident reviews are also important for implementing preventive measures. Overall, an effective incident management workflow



encompassing monitoring, detection, communication, and resolution is vital for ensuring continued sustainability and reliability of the European Platform for Judicial Auctions.

Service Level Management

Service Level Management is a document that contains normal business operations schedules, Support Service response times and incident management deadlines.

Normal business operations could be 24/7. However, Customer Support Service could be available on workdays only, meaning Mon to Fri from 08 AM to 04 PM CET.

During normal customer support availability, the standard response time could be 4 hours.

Response time stands for the time starting from initially receiving customer inquiry until the time the inquiry is considered accepted by Service Desk employees.

There could be 3 types of inquiries:

1. Service not functioning
2. Parts of service not functioning properly
3. Information.

Standard deadline for handling Type 1 'Service not functioning' inquiry is 24 hours from Service Desk inquiry acceptance. Same could apply to Type 2 'Parts of service not functioning properly' inquiry. The latter is calculated depending on the nature and the impact of the inquiry.

The responsible employees could guarantee to undertake and perform the services at an appropriate scientific and professional level in accordance with modern achievements of theory and practice and undertake to perform all services according to the rules of the profession.

They could also make sure to take all reasonable measures to ensure the security of the system and data in the Platform.

The elimination of downtime could be carried out in such a way that every repair and maintenance action could be carried out or attended by a technically educated person.

Business Continuity

In order to provide the business continuity, it is suggested to take yearly the steps as follows.



First and foremost, it is suggested to create a risk assessment in order to define the scope of the business continuity process. The key task here is to recognize the events and the possible impact and the probability of the events and define the measures to mitigate potential threats.

The next step is creating the Business Impact Analysis (BIA) document that describes individual processes and functionalities that have to be taken into consideration in terms of business continuity. Key IT components and resources needs to be assessed in the BIA as well as individual activities have to be covered for various disaster scenarios.

The final and the most important BIA goal could be defining the RTO (Recovery Time Objective) and RPO (Recovery Point Objective) as well as other important parameters.

Following the successful BIA creation, additional Communication Plan, IT Recovery Plan and especially the Business Continuity Plan could be created.

- Communication Plan could describe the groups and activities that need to be carried out after the disaster scenario is materialized.
- IT Recover Plan describes the IT procedures and action that must be carried out to achieve the designated RTO and RPO.
- The Business Continuity Plan should be the key document that gives detailed description of the steps that are done to ensure normal business operations after the disaster.

Hosting third-party contents, the LEILA Project could implement in future developments of the Platform, process in place to assist with the notification by users of suspect illegal content published on the national platforms connected with it. This process must be easy to access, user-friendly, and allow for the submission of notices exclusively by electronic means.

The notice should include the following elements:

- An explanation from the rapporteur of the reasons why she/he considers the information to be illegal content.
- A clear indication of the electronic location of that information.
- The name and e-mail address of the rapporteur.

Reporting forms, which prompt the rapporteur to provide all the necessary information, should help to ease the process for all parties and allow the Platform's providers to act expeditiously. In an intellectual property context, the Platform might receive reports



relating to copyright infringement, trademark infringement, or even counterfeit goods for sale by judicial auctions.

Platform's providers must follow up with the rapporteur without delay once a decision in respect of the notice has been reached. They should also provide a clear and specific statement of reasons for removal/disablement to the impacted party, notifying both the party that reported the infringement, as well as the national platform providers that shared the infringing content.

The Platform should also provide an appeals process, for a period, against the decisions for removals. It could set up an infrastructure similar to that for notification, which allows affected parties to appeal a takedown decision and have that decision reviewed by a human.

In conclusion, the LEILA Project should not be obligated to monitor information nor engage in proactive fact-finding concerning illegal activity but could take measures to set up notification and appeal mechanisms.

3.4. LEILA Possible Future Extensions

In this section, some possible future extensions of the LEILA Project are presented.

On the one hand, analysing blockchain technologies to suggest what possible uses of this technology could be done to improve the LEILA Project solution with a view to sustainability and development of the Platform, from a simple search portal to a one-stop-shop also considering the possibility of carrying out transactions through the Platform. Therefore, through blockchain, one could consider this platform as a way not only to search for auctions but to carry them out, in particular using smart contracts to deal with the different legislations and procedures by offering a single European access point to the auctions.

On the other hand, the possibility of offering a single access point to the auctions would imply the inclusion of a translation service since the auctions at European level concern multiple states with different languages. Language should not represent a barrier in the future, and the European Platform for Judicial Auctions, in this sense, is a multilingual platform that has implemented user interface localization. The following paragraphs also analyse the possibility of translating part of the contents of judicial auctions.



3.4.1. Blockchain-Driven Sustainability

This section considered blockchain technology as a digital enabler for sustainability solutions. After describing the main innovative technologies related to blockchain and its peculiarities, four use cases were developed to consider its application in the context of different aspects of the judicial auction life cycle.

Blockchain represents itself sustainable technology because four elements characterise the intersection between the technological innovation it brings and the design of institutional arrangements:

- The management of the entire on-chain governance.
- The mitigation of centralized power.
- The direct encouragement of user good conduct; and
- The use of effective and innovative systems to reward virtuous behaviour.

Moreover, blockchain technology offers new opportunities to enhance sustainability by improving the traceability and verification of information. Its main features like immutability, accountability, and transparency enable tracking of events, making companies, organizations, and stakeholders in every sector accountable for their sustainability claims. Furthermore, using smart contracts, companies can automate tracking, information can be made public, while the cryptographic nature of the data ensures that it cannot be falsified or manipulated. Another way blockchain can contribute to sustainability is through tokenization and digital distribution of assets.

Blockchain Background

At the technological level, blockchain consists of a mix of computing solutions and techniques ranging from peer-to-peer file sharing to cryptography, particularly ‘public and private key’ and hash encryption. It involves algorithms, economic models, and mathematics. A blockchain solution is defined by an ever-growing list of records called blocks, linked, and protected by cryptography. Each block typically contains a cryptographic hash of the previous block, a timestamp, and transaction data. The blocks are linked together, and each block references the previous block in the chain where each block in turn is also a repository for all transactions and the entire history of each of them. Once written to the blockchain, the information is immutable. Thus, the mechanism of storing data in validated transaction blocks with a time marker (timestamp) makes it possible to verify that a transaction has been completed.



The use of hashes allows to maintain the integrity along the immutable chain of transactions without a central authority, as any change in the data would result in a different hash, invalidating successive blocks of the blockchain. The ordered and shared structure consents the validation of a transaction, as each piece of information is verified not by a central entity but by the interaction of all nodes, in a peer-to-peer mode, which ensures replicated and immutable persistence.

Furthermore, blockchain technology guarantees a high level of reliability because if one of the nodes suffers an attack or an attempt to tamper with data, all other nodes remain operational thus saving the chain without loss of information. As highlighted by the European Parliament, Distributed Ledger Technology can be used to increase data sharing, transparency, and trust not only between government and citizens but also between public or private sector operators and users.

The European Parliament itself encourages public bodies to experiment with Blockchain and DLT-based systems in order to improve citizen service delivery and digital administration solutions while complying with data protection regulations. For this reason, the introduction of blockchain in the conduct of judicial auctions corresponds to an important high-value choice.

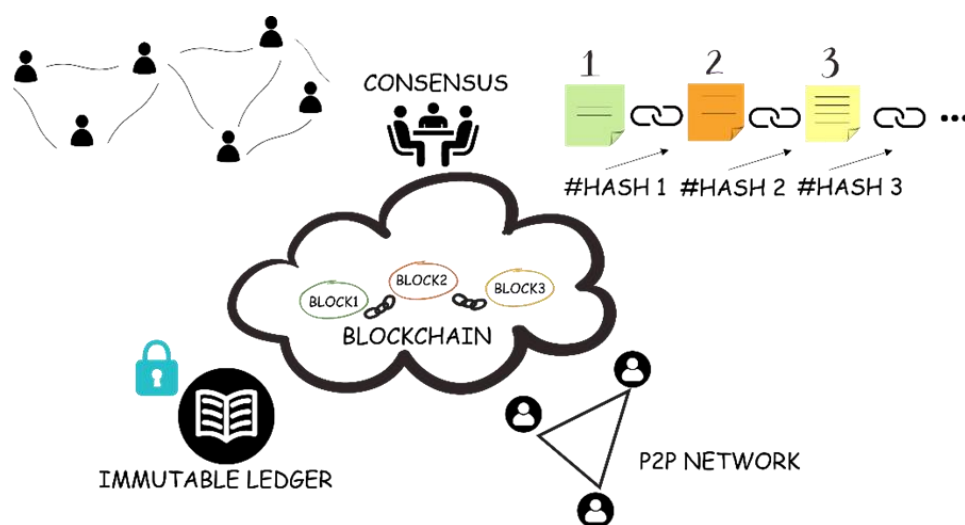


Figure 13. Key Elements of Blockchain

The main difference between blockchain and traditional data architectures is centralisation. It characterises traditional databases where all records are centralised, whereas it gives way to decentralisation in the Blockchain where each participant has a copy of the records, and each user verifies the provenance of the data.

Traditional databases are based on a client-server network architecture where the user can easily modify the data stored on the centralised server. An administrator maintains



complete control over the database by authenticating the credentials of each client before allowing access to the database. Any breach of security can result in the alteration or even deletion of data.

To make any additions in the blockchain, the majority of nodes must reach a consensus to protect the network and make it difficult to tamper with.

Blockchain offers a new level of trust between network participants. Participants can be organisations or companies in a consortium or supply chain partners that use blockchain to record shared data and information. This enables the formation of secure ecosystems that can be used by groups of entities or companies wishing to exchange information.

There are two main types of blockchain network to operate on: 'permissionless' and 'permissioned'. These two modes concern access to the blockchain network and participation in the agreement (consent) procedure responsible for maintaining the state of a blockchain system. In general, when permissions are present, the system can restrict only write rights, or both read (access) and write rights. In the first case, the ledger is publicly readable, but any modification of the transaction ledger is restricted to a selected set of nodes, whereas in the second case, the restriction is on both operations. Often blockchain solutions are also described as public and private with exclusive reference to network access: when access is open, anyone can access the network and observe (read) the data ledger; if access is authorised, only white-listed participants have the right to access the network. Authorised blockchain solutions are often used by public or private sector consortia and generally by public organisations that have sufficient resources to provide significant requirements in terms of computation, storage, and bandwidth. In these cases, decisions on which blocks to add can be made on the basis of a voting protocol.

Both types of blockchain can be used individually or together for different use cases.

Judicial Auctions using Blockchain Technology

The application of blockchain technology in auctions is one of the most popular aspects of financial markets and commerce. Blockchain promises to be influential on any kind of industry so the interest generated by research on this technology is extremely important and can be recognized the growing number of European grants and investments in tech start-ups. Most of today's auctions, whether digital or not, have one thing in common and that is that they are centralized and dependent on a third party, the system suffers from problems such as increased costs due to high fees, inefficiency, and lack of flexibility. Announcing an online auction means providing the opportunity for a wide and



international audience to participate while guaranteeing anonymity and avoiding possible disruption. For this reason, the introduction of blockchain in auction management could play a central role, generating significant advantages:

- Decentralization: every blockchain user is provided with a copy of the transaction ledger. In a decentralized environment, the network operates on a peer-to-peer basis.
- Transparency, for processes and actors involved, with guaranteed access to all data: (i) verifiable by all participants and in the clear way for what must be exposed in the public domain, or (ii) based on permissions, always transparent, for data that require confidentiality.
- Inclusiveness and accessibility, so that, for the services offered, the adoption is simple, and the interfacing can be oriented towards interoperability.
- Implementation of a layer for the anonymization and assurance of data and data sources through cryptographic solutions and decentralized technologies.
- Non-repudiation of communications, interactions and documents through immutability and certain attribution, giving guarantees on actors, processes, data, and enacted standards.
- Security, through technologies that guarantee, by definition, the identifiability and accessibility of the actors operating, the confidentiality of information, the consistency of data and their timestamps.
- Event-driven approach, with stakeholders being notified in real-time of everything that affects them, without the intermediary guaranteeing the correctness of communications, data, and processes by designated responsibility: through the inclusive platform and its technology based on trust less protocols highly optimized for all those use cases where confidentiality and verification of data are needed.
- Communications resilience: because of the blockchain's ability to generate, protect and share data in a secure and impenetrable manner. These characteristics ensure the reliability of verified data transmission around the world, despite malicious attacks against communication paths, nodes, or the blockchain itself.



Blockchain: Overcoming the Energy Issue

Blockchain networks face unique challenges, and one of the most significant is energy consumption. In fact, in recent years, the term ‘blockchain’ has often been used as a synonym for inefficiency and disproportionate energy consumption. Today, nations around the world are striving to achieve and maintain environmental sustainability, so the electricity consumption of blockchain and cryptocurrency mining is under great scrutiny. Unfortunately, in addressing the energy issue, reference is made to a single component of the technology: the consensus mechanism. Each blockchain offers unique functionality, but all blockchain network architectures require the so-called consensus mechanism to operationalize transactions and data confirmation in a decentralized infrastructure. Blockchain technology, however, is by no means homogeneous; the amount of power consumed by different consensus mechanisms varies by several units, and power consumption does not necessarily increase with the number of transactions executed. In the case of Bitcoin, network validators, known as miners, participate in a Proof-of-Work (PoW) mechanism. Under that mechanism, miners must compete to solve complex mathematical problems that require significant computing power. To overcome the energetic issue, some blockchain projects are adopting Proof-of-Stake (PoS) models, and many Bitcoin miners have switched to renewable energy sources. PoS relies on a much less energy-intensive network of collateral to guarantee the operation of the network (users must prove ownership of a certain amount of cryptocurrency); in contrast, PoW requires an energy-intensive system of networked computer hardware nodes around the world. Finally, private and consortium blockchains are only partially decentralized (semi-decentralization), which makes the use of proof-of-work schemes less necessary.

Quantum-resistance in Blockchain Networks

Recent advances in the field of quantum computing have raised the possibility of a threat to blockchain protocols and networks, as they use cryptographic algorithms that are not quantum-robust. In particular, it is feared that when quantum computers become sufficiently robust, the asymmetric algorithms most commonly used for digital signatures and message encryption will no longer be secure because quantum computers will be able to decrypt them in a short time.

At the moment, this problem is made surmountable by following different approaches: native quantum-resistant blockchains are proposed as alternatives; another possibility is to replace traditional cryptography with post-quantum cryptography; basing approaches directly on quantum computer networks. It still takes a long time for quantum computing to pose a real danger to the blockchain, and blockchain technology will certainly evolve to



address the quantum security problem so as to be ready when quantum computers become more widely deployed.

Evidentiary Value of Smart Contracts at the European Level

Smart contracts, which can be defined as computer programmes that, upon the occurrence of pre-defined conditions, run automatically, execute pre-defined actions, and leverage a Distributed Ledger Technology (e.g. blockchain). Smart contracts may or may not be intended to represent terms in a contract in law, have been gaining traction in various industries due to their potential to increase efficiency, transparency, and trust among parties, especially in the context of self-executing agreements with the terms directly written into code.

At EU level, the evidentiary value of smart contracts is still an evolving area of law and regulation. While there is no specific EU-wide legislation addressing smart contracts, the EU has acknowledged their potential in the context of digital innovation.

The European Commission, aiming at making Europe a global leader in the data-agile economy has proposed the Data Act³⁵ as a Regulation to harmonise rules on fair access to and use of data.

While the legislative process relating to the Data Act proposal is almost completed, it is worth underlining that smart contracts have been proposed as an efficient mean to execute data sharing agreements and to ensure that conditions for sharing data are respected.

Currently, at the European level, the legal admissibility in legal proceedings of any evidence resulting from smart contracts still relies on analogical reasoning and extensive interpretation of the principles stemming from the ‘old’ eIDAS Regulation³⁶ in the context of electronic documents and signatures.

A smart contract can fit in the definition of ‘electronic document’ provided for by Art. 3 (35) of the eIDAS Regulation, which means that it is admissible in court following Art. 46 therein on the legal effects of electronic documents.

Furthermore, any transaction and ‘operation’ done by the parties (i.e., the owner or any other authorised subject) on a smart contract works by the same principles of asymmetric

³⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A68%3AFIN>

³⁶ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC, OJ L 257, 28.8.2014, p. 73–114



cryptography, thus meaning that every operation will qualify as an electronic signature within the meaning of the eIDAS Regulation.

From eIDAS 1.0 to eIDAS 2.0: a Continuously Up-to-date Approach

The transition from eIDAS 1.0 to eIDAS 2.0³⁷ represents a significant step forward in the EU efforts to create a secure and interoperable digital environment. Currently, as anticipated, the eIDAS Regulation represents a regulatory framework that establishes standards for electronic transactions, identification, and trust services across the EU. The evolution to eIDAS 2.0 aims to address the emerging needs of blockchain technology and smart contracts, which have the potential to revolutionize various industries by automating processes, reducing costs, and increasing transparency. By incorporating these innovative technologies into the eIDAS framework, the EU is demonstrating its commitment to staying up-to-date with the latest digital advancements. eIDAS 2.0 will likely provide clearer guidelines and legal certainty for the use of blockchain, fostering innovation and adoption across the region. This updated approach will not only enhance the security and trustworthiness of electronic transactions but also contribute to the development of a more cohesive and competitive Digital Single Market in the EU.

In particular, European Digital Identity Wallets (in short, EUDI Wallets; see *infra* UC.2) will represent the cutting-edge solution to shift the paradigm of Digital Identity within the European area from a mostly centralized approach to one where the user retains control of the keys for its identity and blockchain could be one of the key enabling technologies underlying the new EUDI Wallets.

Furthermore, another distinct feature used within blockchain networks – Zero-Knowledge Proofs, has been appointed as a core technology underpinning the EUDI Wallet in the latest revision of the Proposal for the new Regulation, amending the previous eIDAS framework. The latter aims to establish core rules for the EUDI Wallets; for example, every Wallet shall provide common protocols and interfaces users or relying parties, when available, to perform a Zero-Knowledge Proof inferred from person identification data or electronic attestation of attributes.

To this extent, the continuous monitoring of the state of the art within the European legislative process which will establish a new regulatory framework for digital identification and electronic transactions, with a *focus* on the legislators' attempts in including new and innovative technologies in the legislative landscape of the Digital Single

³⁷ <https://www.europarl.europa.eu/legislative-train/spotlight-JD22/file-eid>



Market, enables the design and implementation of blockchain technology in a sustainable and trustworthy manner in heavily regulated subject matters, such as judicial auctions.

In the following paragraphs, 4 use cases are considered with different facets of the integrations between judicial auctions and blockchain being analysed. This is followed by a sub-chapter in which reflections on possible developments on the integration of the Platform with blockchain technologies are presented, with potentially relevant aspects in the complex ecosystem of European judicial auctions being considered.

USE CASE #1. Judicial Auctions On-chain: Workflow Managing and Certification

The traceability of all steps and information along the workflow plays a key role especially when multiple parties are involved and strict criteria must be met to lead to a successful outcome, meanwhile the certification ensures the status of a process and the relative accountability of an actor responsible for it.

The Platform could track the workflow through blockchain considering a multitude of operations including notarization of:

- description of the asset with the date, time and location of the auction
- base price
- minimum bid
- deadline for submission of bids
- terms of auction
- appraisal report security deposit →
- adjudication
- payment of the balance
- publication of the outcome.

The notarization process assures that the document is authentic and reliable (communication documents between different actors). It is proof of the authenticity of documents. The system generates a receipt that by itself proves that data existed at a specific time, on a specific date, and with a certain attribution of authors and owners. The operation ensures the accuracy of the documents and communications exchanged; usually the management of the notarization activity on public blockchain involves the management of the purchase and use of Ether (the cryptocurrency needed to perform



transactions on Ethereum, the chosen blockchain network), as well as the private keys needed to move Ether. In this regard, it is proposed the use of a service that allows to relieve of this burden. The European Platform for Judicial Auctions or an institutional data provider can generate, for example, a certificate stating that someone (or the institutional data provider itself) uploaded data at a certain time and on a certain day. In effect, a receipt is created to prove that this information belongs to a specific organization. This concept is also called ‘proof of existence’; the data owner can always prove actions taken at a certain time.

In on-chain auction management, smart contracts automatically govern all steps of the procedure. Smart contracts are computer programs stored inside the Ethereum blockchain and associated with a particular blockchain address that references the smart contracts software code. Ethereum smart contracts are mainly written in Solidity, a programming language derived from Javascript, Python, and C++, which allows running programs on the blockchain infrastructure as decentralized applications. The smart contracts code is compiled, and the corresponding bytecode is recorded into the blockchain and run by the Ethereum Virtual Machine (EVM). Smart contracts are written in a programming language in such a way as to determine, automatically, the execution of contract terms when certain conditions included in the contract occur. A smart contract is self-executing, meaning that once the instructions have been written to blockchain, the transaction will occur automatically when the appropriate conditions are detected. The LEILA Project can use smart contracts also to automate processes such as, for example, the automatic return of the security deposit in case of no award.

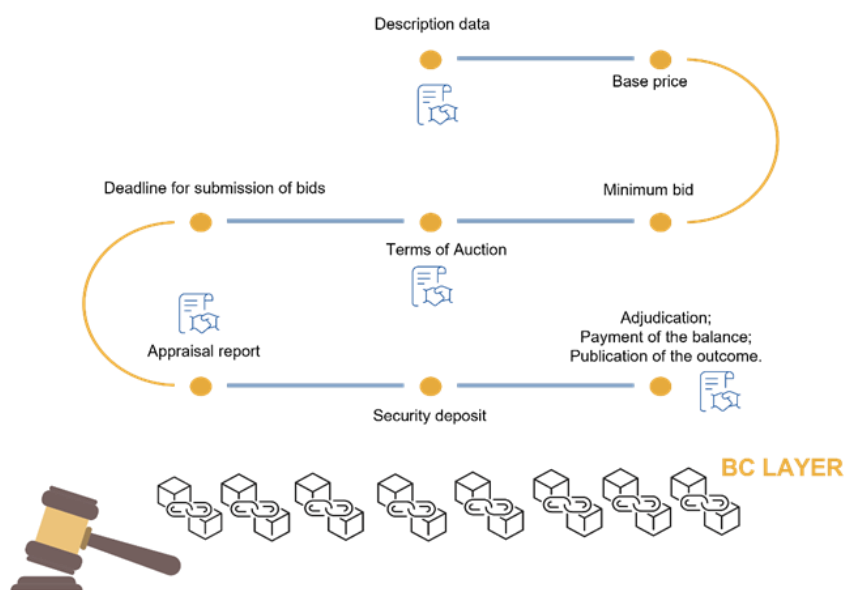


Figure 14. Judicial Auctions Chain Management and Certification



USE CASE #2. Decentralized Identity for Interoperable Access, Signature, and Recognition

Decentralized Public Key Infrastructure, or DPKI, is an alternative approach to designing better PKI systems. Decentralized Identity allows individuals to manage their identity-related information because the user owns his or her keys.

Public Key Infrastructure (PKI) is a standard certificate-based technology that combines authentication and protection, ensuring the security and integrity of remote connections and communications.

Traditional centralized PKIs (such as the certificate authority-based system) have problems and limitations because they rely on a central trusted party. In a centralized PKI system, the user cannot choose his or her online identity; it is defined by trusted third parties, the CAs (Certificate Authorities).

This puts security at risk because it leaves the door open for cybercriminals to conduct attacks; in fact, attackers can trick the CA into thinking they are someone else, or they can go so far as to compromise the CA into issuing an illegal certificate.

The point of decentralized digital identity is to transform physical identity credentials held in our physical wallets into verifiable digital credentials stored in digital wallets. The public key identifies the account holder, while private keys can sign and decrypt messages for this account.

The DPKI provides the evidence needed to authenticate entities and prevent identity theft and the use of false identities by using cryptographic signatures to verify requests. In a DPKI, there is no central system that can be attacked to steal user data and make unauthorized accesses. Identity is based on European interoperability standards (ESSIF) that allow identity porting between different systems through the user's wallet.

The decentralized identity can be used to sign a breadth of transactions, in this case for example, the transaction of successful bailment and payment of the balance following the auction adjudication.

The proposed solution allows an individual to generate his own credentials (key pair) that can be associated with a certain identity thanks to a porting system connected to an eIDAS (electronic identification, authentication and trust services) compliant identification system (e.g., CIE/SPID). The association procedure can attribute material and temporal certainty to this association for the purpose of avoiding future disavowal thanks to multifactor authentication and notarization techniques via blockchain.



Blockchain digital signatures affixed with the appropriate signature application possess full formal and evidentiary value at the legal level, specifically, the legal validity is comparable to that of the advanced digital signature according to eIDAS standards. The procedures for the creation of blockchain credentials and the association with one's own identity are simple and require few interactions from the user.

Every document, signature, or acceptance is certified in the blockchain and has the same validity as a procedure carried out in the presence of a notary. This process guarantees its integrity, immutability, and the ability to irrevocably prove the date of upload of the document or information entered, ensuring its official status in full compliance with security. The document thus becomes unique and unrepeatable, making any attempt at manipulation or modification impossible. The use of blockchain improves transparency and the possibility of verification by the individual user, without changing the user experience, reduces timelines, and provides maximum transparency and protection.

The proposal becomes very interesting when coupled with the European Digital Identity Wallet project, a digital wallet that will be available to any EU citizen, resident, or business wishing to use it, could be used to identify or prove certain personal information to access public and private digital services throughout the EU. In 2021, the European Commission presented a proposal for a Regulation on the creation of a framework for a European Digital Identity: the new proposal would amend the existing eIDAS Regulation by, among other things, introducing an IT system for the unified collection of information and documents that EU citizens and residents can use to authenticate themselves when using public and private digital services. In early February 2023, the Commission published the first version of a toolbox to implement this project, and later the European Parliament published its position on the review for a major acceleration. The Commission's program has the ambitious goal of giving users the ability to choose for themselves which aspects of their identity, data, and certificates to share with third parties, also keeping track of all interactions. The progress of work on the European ID wallet will be monitored to make the solution compatible and compliant with the new framework.

USE CASE #3. Privacy-preserving ZKP Credentials and Selective Disclosures

Zero-Knowledge Proof (ZKP) is a protocol that allows one party to prove an assertion to another party by revealing only that the assertion is true and not leaking other information. Selective disclosure is instead defined as 'the ability of an individual to granularly decide what information to share.' The advantage of using ZKP credentials is the ability to derive zero-knowledge evidence from the signature, in which the party generating the evidence can choose to partially disclose statements in the original



message. If enabled, this feature allows issuers to create a credential that effectively enforces minimal data disclosure. ZKP-enabled credentials can be stored in one's wallet along with all other credentials. ZKP has been recently designed among emerging Privacy Enhancing Technologies (PETs) by the OECD in March 2023 Issue of the Digital Economic Papers (“[...] ZKP could thus help shift the paradigm from requiring users to reveal their sensitive information as part of a transaction to instead allow others to verify the claims”).

Moreover, they have been appointed as one of the key technologies underpinning the future European Digital Identity Wallets within the broader revision of the eIDAS Regulation mentioned in the preceding paragraph.

The advantages of using ZKP to preserve privacy in the context of judicial auctions are:

- Identity verification: proving the authenticity of a bidder's identity without revealing his or her personal information. This ensures that only verified bidders can participate in the auction while maintaining their privacy which is the essential element for sealed envelope auctions when, typically, only the procedure number is listed on the outside of the envelope.
- Privacy of bidders and bids: demonstrating that a bid has been submitted without revealing the amount of the bid, while ensuring that it is higher than the minimum bid required, allowing for the fairness and competitiveness of the auction, as other bidders cannot see the bids submitted and change their bids accordingly.
- Financial solvency: demonstrating (bidders) have sufficient funds to participate in the auction without revealing the exact amount of funds they hold.

USE CASE #4. Decentralized Registry of Auctioned Assets based on Blockchain Technology

Traditional telematic auction management platforms, to date centralized, use a register of sales activities that is manipulatable and subject to forgery without any guarantee of the authenticity of the data it contains.

Blockchain has been relevant in the document management process, by making use of a decentralized registry, the data goes through the notarization process, which transmits to the Blockchain every single event that occurred at the auction, eliminating the possibility of changes to the registry during the different phases of the bidding process. Therefore, the Implementation of a decentralized Blockchain-based registry to manage information on auctioned assets, legal documentation, and auction details is proposed. The registry, accessible to all stakeholders, ensures transparency and accuracy of information.



Expected benefits are:

- immutability: information cannot be modified; integrity of asset data is guaranteed.
- transparency: all stakeholders can verify the information stored in blockchain, promoting trust in the auction process.
- security: resistant to data tampering.

Reflections on the Possible Future Integration of the Platform with blockchain

The integration of the European Platform for Judicial Auctions with blockchain can consider more aspects. In particular, would be of interest the exploration of the potential integration of the Platform and its e-CODEX-based architecture with the blockchain technology, focusing on smart contracts and the structuring of blockchain nodes.

Here, we sketch such two aspects that could be part of further developments of the Platform.

For the first aspect, smart contracts, the integration with e-CODEX could be highly beneficial. Smart contracts are self-executing contracts with the terms of the agreement directly written into lines of code. They could serve as the backbone for automating legal processes and ensuring compliance with the diverse legal systems across EU member states in the context of judicial auctions. By incorporating smart contracts in the Platform, as a one-stop-shop, each Member State could digitize their unique legal procedures on judicial auctions, creating a more seamless and automated system for cross-border legal transactions.

For example, an Italian smart contract could contain rules such as:

- Minimum auction price
- Auction duration
- Terms for depositing collateral
- Award criteria
- Payment terms.

A German smart contract could instead provide different rules based on its own national legislation.



By consulting the correct smart contract based on the jurisdiction of the auction, users and validator nodes would obtain all the necessary information to participate/manage the auction in a legally compliant manner.

Smart contracts, thanks to their decentralized and transparent nature, would ensure that all auctions are carried out according to the provisions of the applicable specific regulation, overcoming cross-border legal barriers in a harmonious way.

This is just one example, but the flexibility of smart contracts could really facilitate the integration of the Platform in the various national realities.

In this sketched system, the blockchain would store smart contracts that represent the various legal procedures and legislation of each EU member state in the context of judicial auctions. The e-IDAS framework, which provides technical and legal tools for electronic identification and trust services of electronic transactions, could support the legal validity and enforceability of these smart contracts.

The use cases that we have presented herein could be integrated to leverage the benefits of blockchain and the Platform. Use Case #1 could utilize smart contracts to automate the various steps of judicial auctions while ensuring compliance with different regulations across EU countries. Use Case #2 would allow actors to identify themselves securely via digital wallets as per e-IDAS framework. Use Case #3 could help preserve privacy during auctions, e.g. for identity and solvency verifications. Use Case #4 could implement the asset registry as a distributed ledger on blockchain, with authorized nodes that guarantee immutability of data.

The second aspect relates to the configuration of the blockchain nodes. In a blockchain, nodes are the individual computers that together form the network. They validate and store transactions and are critical to the maintenance and security of the blockchain.

In an authoritative node setup within the e-CODEX system, certain nodes would have special permissions or roles. These nodes could be operated by trusted entities, such as governmental bodies or legal institutions, which would interface directly with the e-CODEX system. This suggests a permissioned blockchain structure, where access is restricted, and only certain nodes can validate transactions. At least there should be some nodes that act as validators, like in Ripple network, with higher permissions on the network. This could ensure a higher level of security and trust within the network, as only few authoritative participants would manage the legal smart contracts and processes.

At the same time, it is necessary to allow that anyone can join and participate in the network, offering in this way a greater decentralization. This could present challenges in terms of security and legal validity; for the sensitive nature of judicial transactions e-IDAS



framework could be a mean to ensure that only authorized and identified entities, like public auctioneers, bidders, and other stakeholders can participate to judicial auctions through the smart contracts that are deployed on the sketched network.

Considering the possibility of a blockchain network with different levels of authorization and different levels of data visibility could allow to takeover and manage all the complexities of judicial auctions at MS level, while a common ledger for different smart contracts, related to different procedures and jurisdictions, could allow the integration of a complex ecosystem maintaining diversity while realizing a single EU judicial auctions one-stop-shop.

Overall, integrating blockchain technology with e-CODEX presents a promising avenue for modernizing the EU's judicial auctions system. Regarding future developments, it is proposed to investigate the above sketched possibilities of integrating the blockchain infrastructure with the Platform, allowing connectivity between national judicial systems in a secure manner.

3.4.2. Translation Service and Its Sustainability

Automated translation, being the act of using digital tools and algorithms to translate content from one language to another, has been the cornerstone of ensuring content accessibility in multi-lingual environments. The demand for real-time, accurate translations has surged with the growth of international e-commerce and digital communication. As organizations look to expand their digital reach across different linguistic audiences, automated translation becomes a crucial component. However, the large-scale application of automated translation can have significant implications for both environmental and technological sustainability. We suppose the possibility to rely upon the eTranslation Service³⁸ provided by EC. This hypothesis has to be further investigated for integration details.

In the following paragraphs, we consider three use cases:

- Use Case #1. Full-text Search Translation
- Use Case #2. Judicial Auction Description Field Translation
- Use Case #3. Bulk Translation of Judicial Auctions Description Field.

³⁸ https://commission.europa.eu/resources-partners/etranslation_en



USE CASE #1. Full-text Search Translation

Description: Whenever a term is inputted into a full-text search in a particular language on the European Platform for Judicial Auctions' description field, the Platform not only conducts a search based on that specific string but also, instantaneously, translates that string across available languages, thus broadening the scope of search results. Such translation occurs on server side and rely on an external service like the above cited eTranslation Service.

Implications: This approach should ensure wide access to all available auctions, enhancing user experience. However, the recurrent, dynamic translation processes require constant server activity, increasing energy consumption. Actual retention period of data on the Platform is 24 hours for privacy concerns that are, so far, part of the Platform requirements. Caching translations terms should not be affected by such retention policy on data. This solution should be further investigated to enable on demand multi-lingual full text search of European judicial auctions.

USE CASE #2. Judicial Auction Description Field's Translation

Description: Following a search, any judicial auction description in a foreign language is translated to the user's native tongue. Translation occurs on server side and rely on an external service like the above cited eTranslation Service.

Implications: This function heightens user comprehension and inclusivity. Yet, this real-time service also demands considerable computational resources. The possibility of caching translations could be a solution that can be further investigated to enable multi-lingual view of European judicial auctions.

USE CASE #3. Bulk Translation of Judicial Auctions Description Field

Description: In a more resource-intensive scenario, every descriptive field of every record on each portal undergoes translation across all available languages daily, due to daily retention policy.

Implications: Such an exhaustive translation process would exponentially increase energy consumption. With a potential of up to millions of translations daily, this scenario can strain both energy resources and computational infrastructure.



We make some considerations in terms of sustainability on such use cases:

- **Use Case #1 and Use Case 2:** When relying upon translations caching, these use cases are sustainable both for energy resources consumption and computational infrastructure.
- **Use Case #3:** We propose an incremental translation approach. Proposing an incremental strategy can reduce the resource footprint. By translating only newly added records (e.g., an estimated 1% daily addition), substantial energy savings and reduced server load can be achieved. This approach not only conserves resources but can also reduce the need for high-availability solutions for external eTranslation Services on which the Platform could rely upon.

The promise of automated translation in ensuring content accessibility across languages on the Platform is undeniable. Yet, its implementation, especially on a vast scale, needs careful consideration from a sustainability perspective. Balancing the need for comprehensive translation with the environmental and resource implications requires strategic planning, advanced infrastructure, and constant innovation. As the digital landscape becomes more linguistically inclusive, we must prioritize the sustainable implementation of an automated translation solution which is essential to fulfil the vision embodied by the Platform.

3.5. Stakeholders' Engagement

In this section, the critical role that various stakeholders play in the success of the LEILA Project is explicitly highlighted. It outlines the importance of engaging stakeholders of the judicial e-auction domain and could be beneficiaries of the Platform. The text details a phased approach to engagement, starting with experts who have contributed to the initial phases, and expanding to include providers of national e-auction platforms, judicial bodies, and eventually, governmental authorities.

The chapter proposes a list of stakeholders related to the first three phases:

- 1) Experts in project management, e-CODEX, legal and judicial matters members
- 2) e-Auction platform providers in EU MSs
- 3) Courts, bailiffs, and other enforcement agents.



Finally, some considerations on the potential benefits for the LEILA stakeholders are explored.

3.5.1. Key Stakeholders for LEILA Project

The involvement of stakeholders was, is, and will be essential for the LEILA Project.

They are experts in the field of judicial e-auctions and/or potential beneficiaries of the main project outcome (the Platform). They can provide valuable inputs depending on their expertise, area of activities, and participation in different policy learning activities.

Key stakeholders already helped during project workshops, and should do it also in the future, bringing different ideas to the table, identifying common needs, mitigating conflicts and building a sustainable collaboration during project duration and beyond.

To achieve LEILA Project's sustainability, it is necessary to involve all relevant groups of stakeholders, governmental stakeholders (e.g., national and subnational governments, ministries, embassies, governmental departments, public agencies, etc.), organized civil society (e.g., national and transnational NGOs, pressure groups, civil associations, unions, local communities, activist groups, etc.), intergovernmental and supranational stakeholders (e.g., multilateral international organizations and related institutions in global governance, regulatory authorities, etc.), research and academic sector (e.g., research councils, universities, research centres, large research infrastructures, national academies, learned societies, funding agencies, individual committed scientists, etc.), business stakeholders and private sector (e.g. suppliers, partners, distributors, customers, advisers, financial intermediaries, competitors, media, multinationals, SMEs with international projection, etc.). Already existing EU institutional resources (channels and platforms) could also give rise to a path of sustainability to empower the digitalisation of justice in the EU.

The involvement of stakeholders will have to take place gradually, proceeding in individual steps, starting from those that will be able to contribute to the functioning and maintenance of the platform and then move on to those who can guarantee its technical and legal operation in each MS.

Therefore, this involvement started from the experts who, as stakeholders, have already given their contribution by participating in the workshops of the first phase of the LEILA Project (first step).



It will then be necessary to extend the involvement to the national platforms' providers existing in the MSs, if not already partners of the LEILA Project (second step) and to the judicial bodies responsible in the various countries for the sale procedures through auctions (third step).

Finally, they will have to involve the respective ministries of justice and other competent authorities controlling national e-auction systems (fourth step).

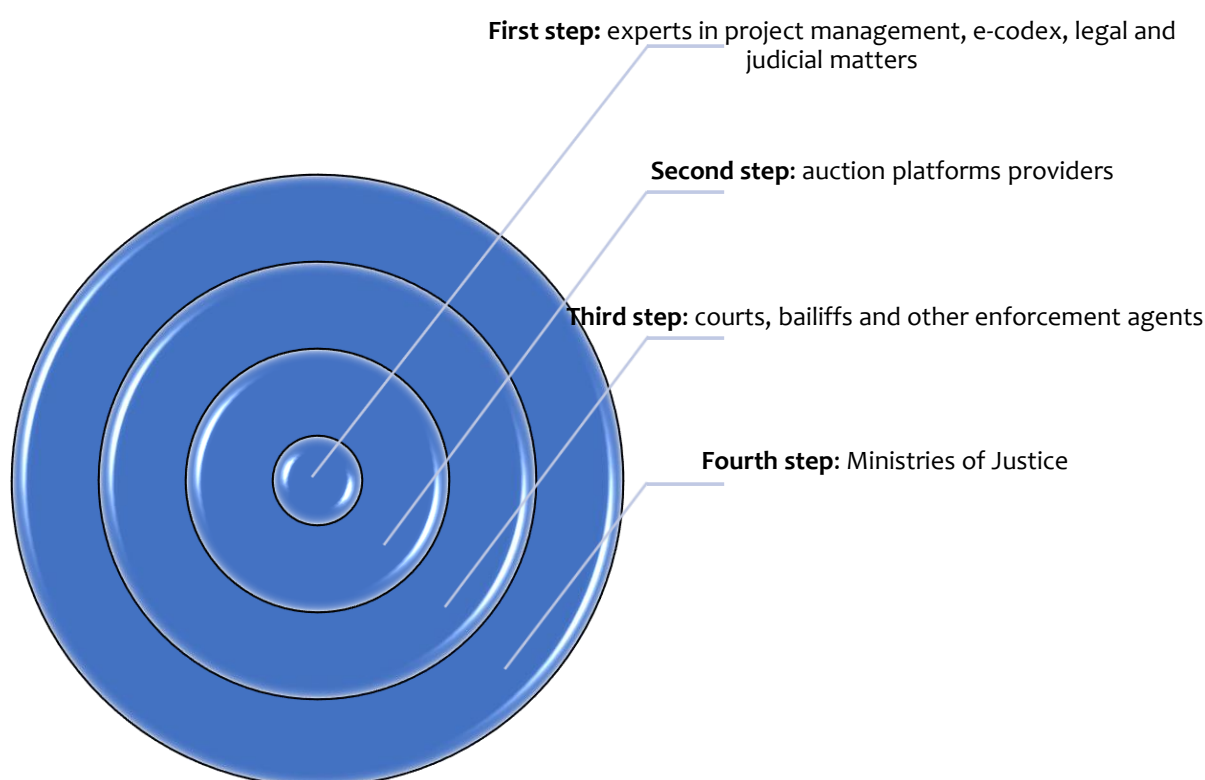


Figure 15. Phased Approach to Engagement

The process of identifying the stakeholders is important to understand how they can be useful to support the sustainability of the Platform in future. A non-exhaustive list of stakeholders, related to the first three steps above, that can be integrated during the development of the Project, can be summarized as follows:

1. Experts in project management, e-CODEX, legal and judicial matters members of:
 - The European Commission for the Efficiency of Justice (CEPEJ) of the Council of Europe and its working groups and network.
 - CONNEXX – European Collection and Enforcement Network.
 - e-CODEX Community, based on an agreement on a Circle of Trust.



- EBRD – the European Bank for Reconstruction and Development.
- European universities and research centres;
- UEHJ – the European Union of Judicial Officers.
- UNIDROIT – the International Institute for Unification of Private Law and its Best Practices for Effective Enforcement (BBEE) working group.
- the World Bank.

2. e-Auction platforms' providers in EU MSs:

- Austria: <http://www.justiz-auktion.de>, Ministry of Justice of the State of North Rhine-Westphalia, Germany;
- Belgium: for mobile assets: <https://www.huissiersdejustice.be/auctionline>, National Chamber of Judicial officers; for real estate <https://www.biddit.be/de/landing>, Royal Federation of Belgian Notaries;
- Bulgaria: <https://zapor.mjs.bg>, Bulgarian Ministry of Justice;
- Czech Republic: <http://www.portaldrazeb.cz>, Bailiffs' Chamber of the Czech Republic;
- Croatia: <https://www.fina.hr/>, Financial Agency (FINA), public company;
- Estonia: <https://www.oksjonikeskus.ee/>, Chamber of Bailiffs and Trustees in Bankruptcy;
- Finland: <https://huutokaupat.com/>, "Mezzoforte Oy" based on Porkkalankatu 5, Helsinki;
- France: <https://www.interencheres.com>, "Commissaires Priseurs Multimedia public limited company" with registered office at 37, rue de Châteaudun, Paris; <https://uk.drouot.com>, "Drouot Digital" with registered office at 9 rue Drouot, Paris;
- Germany: <http://www.justiz-auktion.de>, Ministry of Justice of the State of North Rhine-Westphalia, Germany;
- Greece: <https://www.eauction.gr/>, "Notary Association of Athens Piraeus Aegean and Dodecanese Islands" as well as the IT services provider "NEWSPHONE HELLAS S.A";
- Hungary: <https://arveres.mbvk.hu/arverezok/>, Hungarian Bailiff's Association;
- Italy: <https://pvp.giustizia.it/pvp/>, Italian Ministry of Justice;



- Latvia: <https://izsoles.ta.gov.lv>, Court Administration, State JSC “Tiesu namu aģentūra”;
 - Lithuania: <https://evarzytynes.lt>, Ministry of Justice of Republic of Lithuania, Chamber of Judicial Officers of Lithuania and the State Enterprise Centre of Register;
 - Luxemburg: <https://ventes.huissiers.lu>, Etude d’Huissiers de Justice BIEL & GALLÉ, 1, rue Nicolas Simmer, L-2538, Luxembourg
 - Netherlands (The): <https://www.openbareverkoop.nl> and www.veilingbiljet.nl, “Open Koop Makelaardij B.V.”, with its registered offices in Baarn, (Chamber of Commerce number 23088145);
 - Poland: <https://e-licytacje.komornik.pl>, National Council of Bailiff;
 - Portugal: <https://www.e-leiloes.pt/>, Ordem dos Solicitadores and Enforcement Agents National Association – OSAE;
 - Slovenia: <https://sodnedrazbe.si/>, Supreme Court of the Republic of Slovenia;
 - Spain: <https://subastas.boe.es/>, Official State Gazette Agency;
 - Sweden: <https://auktionstorget.kronofogden.se/auktionstorget>, Swedish Enforcement Authority (Kronofogdemyndigheten).
3. Courts, bailiffs, and other enforcement agents:
- Members of the European courts.
 - International Associations of Judges (as: UIA – International Association of Judges; EAJ – European Association of Judges);
 - National Associations of bailiffs and other enforcement agents of EU MSs;
 - Companies, professionals and public authorities, responsible as judicial bodies in the various countries for the sale procedures through auctions.

3.5.2. Potential Benefits for Stakeholders

The collaboration of stakeholders during the implementation phase of the project and in the subsequent phase of its application has allowed and will allow them to achieve various benefits that will vary depending on their nature (public or private) and the type of relationship with the judicial e-auction sector.



The acquisition of information on the Platform and its operating methods, the comparison between experts, the exchange of ideas and common needs, allows to better understand and evaluate all the benefits that will be achieved by the European Platform for Judicial Auctions. The improvement of the efficiency of enforcement procedures will be beneficially appreciated by the stakeholders who are public authorities or public bodies. The improvement of the advertising of assets on sale and the increase of the proceeds will be an undoubted benefit for the companies and professionals who manage the auctions or involved in them.

Furthermore, by participating as stakeholders, public authorities and public bodies will be able to immediately evaluate the opportunity to become partners and to initiate the law reforms and IT adaptations necessary for joining the Platform.

3.6. Impact and Long-term Outcomes

3.6.1. KPI Achievements

This section describes the expected impact of the LEILA project outcomes after the end of the project, and the methodology which can be used to measure it via Key Performance Indicators (KPIs), expanding and refining the work carried out under Task 2.5 ‘Defining assessment criteria’, validated with the stakeholders (see D2.3. ‘Stakeholders Feedback Loops’, pages 30-31 and 40-45). The basic theory of change which underpins the LEILA Project can be schematically depicted as in the following figure:

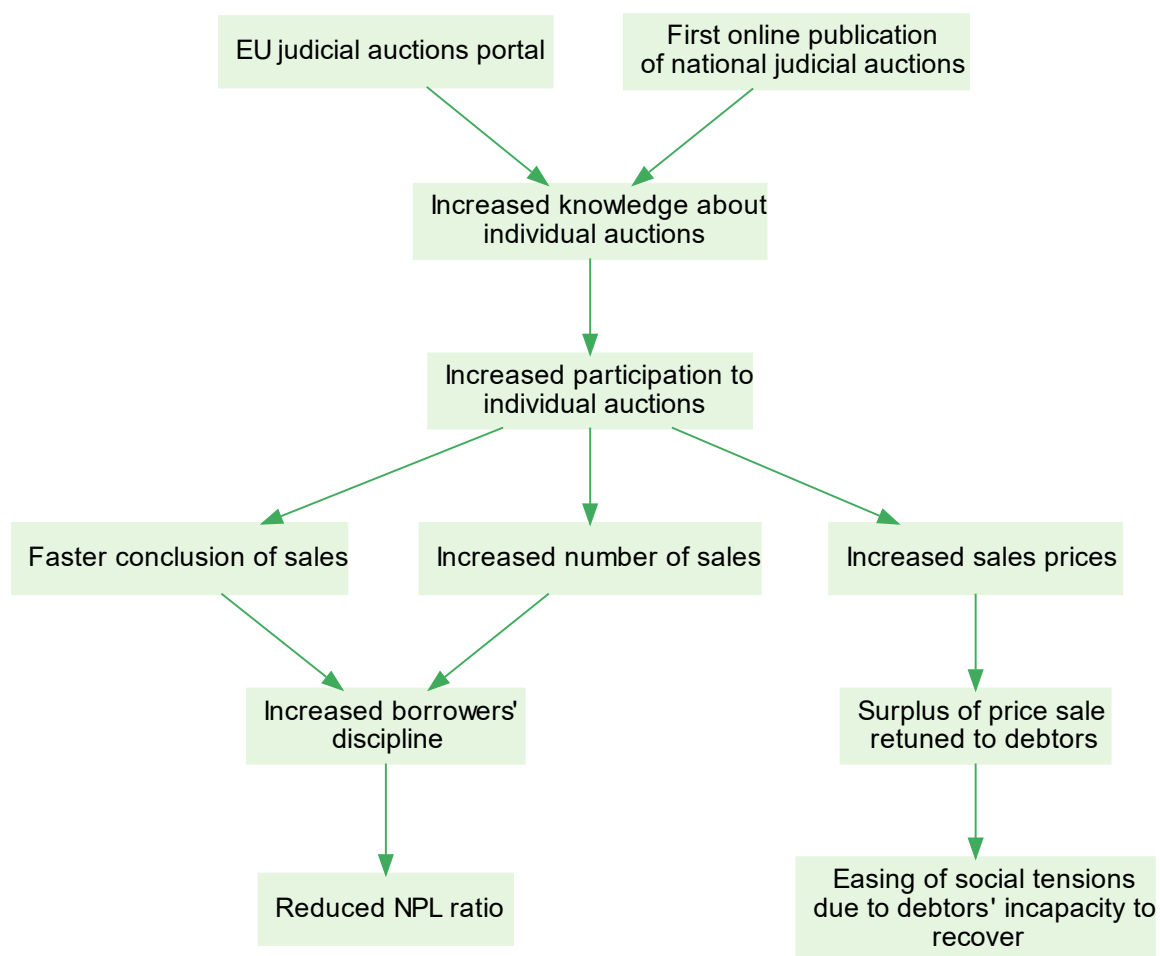


Figure 16. Theory of Change for the LEILA Project

The European Platform for Judicial Auctions will put any citizen or private company in condition to access reliable and uniform information on goods to be sold in judicial auctions across Europe. In addition, the Member States currently lacking on-line national systems for judicial auctions, such as France, will be provided with easy-to-use tools for on-line publication of information on goods to be sold in judicial auctions on national level.

The availability of such information is aimed at increasing the number of cross-border participants to judicial auctions. A higher visibility of judicial auctions could contribute also to an increase in the number of national participants, which should certainly be recorded in MS where such information would be published online for the first time thanks to the project's virtual machine.

The actual increase in the number of cross-border participants should discount for the current obstacles to the participation of foreign citizens to national auctions which have been already identified by the project in the analysis phase, in particular for electronic



auctions due to the different requirements for the participation (national digital certificates subject to a local tax number, certified email, etc.). A large discrepancy between the increase of cross-border visitors to national judicial auctions portals and the increase of participants to the auctions, together with a growing number of inquiries in concrete cases may lead national authorities to streamline the access to auctions for participants from other MS, which would be *per se* an important policy outcome (see Section 3.5.2 below).

Increase of sales may lead to an increased borrowers' discipline. Knowing that their assets could be seized and sold through a judicial auction may motivate borrowers to be more disciplined in their debt repayment, which could lead to a reduction in the number of non-performing loans (NPLs). Measuring such effect is, as discussed below, very difficult — if possible, at all — but the direction of change is not.

Higher recovery rates on NPLs contribute to improve the overall health of the banking sector, contributing to economic stability and ideally lead to a decrease of interest rates which would go to benefit of future borrowers.

Current debtors would also benefit if their assets were sold at a higher price, possibly even worth more than the outstanding debt, so that they could retain the surplus and avoid of becoming social cases.

In the next three sub-sections, KPIs are hence proposed for each of the following three levels:

1. The information offered by the platform, which is a precondition for its use
2. The use of the platform, which is a precondition for its impact
3. The (long term) impact of the use of the platform.

The latter will also include the enhancement of users' awareness of informative content presented by the EU.

The use of KPIs would not be appropriate to measure possible impacts on policy, economic and social environment due to an attribution problem — there are so many important factors affecting, for example, the loans repayment rate such as global inflation, economic crisis, instable political environment.

The three sections which conclude this chapter elaborate briefly on possible ways to elicit information on the possible impact of the project under these three dimensions. For the first five indicators baseline, values before and at the end of the project are also provided.



3.6.2. Policy, Economic, and Social Impact

Key Performance Indicators (KPIs) are instrumental to measure the impact of a project against its declared goals that, in turn, should be SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). The source of information should be specified, and their definition must be accompanied by the timely collection of benchmark data necessary to measure progress. They should also be limited in number to simplify their monitoring.

KPIs for the Offer by the Platform

The following seven indicators are proposed to measure the performance of the Platform in providing adequate information on judicial sales. The relevant data must be provided by the entity in charge of the maintenance of the portal and (except for the last one) updating them does not require any particular effort.

KPo1. Number of MS with a public national portals for judicial sales connected to the Platform

Short explanation and discussion: The number of contributing MS is generally an important indicator for any EU project. Assuming that MS with connected portals will engage in public information campaign about the European Platform for Judicial Auctions, this may lead to an increase of the number of visitors to the portal. This number should include also any MS put in condition to advertise their sales on a single online portal (KPo3), once the virtual machine is connected to the Platform.

- *Baseline before the project: 0*
- *Baseline at the end of the project: 4**

() as already justified into Technical report, the OSAE has been still facing technical issues of connection, while MoJ-IT has successfully integrated the National Portal test environment to the central Platform, but it is yet temporary ongoing the activity to integrate the National Portal production environment too, due to security constraints aimed at migrating the Portal to the Cloud.*

KPo2. Number of public national portals for judicial sales connected to the Platform

Short explanation and discussion: Given that there may be more national portals for judicial sales in one and the same MS (as, for example, in Belgium or Spain), the value of this indicator, at variance with the previous one, will increase when a new portal



joins from a MS where another portal was already connected, and it will reflect the increased offer.

- Baseline before the project: 0
- Baseline at the end of the project: 4*

(*) as already justified into Technical report, the OSAE has been still facing technical issues of connection, while MoJ-IT has successfully integrated the National Portal test environment to the central Platform, but it is yet temporary ongoing the activity to integrate the National Portal production environment too, due to security constraints aimed at migrating the Portal to the Cloud.

KPo3. Number of MS put in condition to advertise their sales on a single online portal

Short explanation and discussion: This is the number of installations of the virtual machine for the collection of information on judicial sales.

- Baseline before the project: 0
- Baseline at the end of the project: 1

KPo4. Average number of sales published per month (by category of assets)

Short explanation and discussion: Since the Platform has no ‘memory’ of previous publications, it is not possible to measure the number of distinct sales which are published. The average of the number of sales published in each day of the month is easy to collect and it will provide a useful indication.

This indicator can be useful to compare the number of participants to sales with the number of available sales. It is useful to distinguish by category of assets (movable, immovable, rights and other) to be able to perform different analyses for each, as the interest in sales may be very different. For NPL (and for the economic impact of the project), it is real properties and rights (which include company shares) that are more relevant.

- Baseline before the project: 0
- Baseline at the end of the project: 8000

KPo5. National portals’ coverage: % on the total number of national portals for judicial sales across MSs

Short explanation and discussion: According to the information collected by the LEILA Project, there were 18 national portals for judicial sales across the EU MSs in 2022 (as listed in Deliverable D2.3, page 18). This number is bound to increase (as for example Belgium is developing one), and the target is to eventually have all of



them contributing to the the Platform (100%). Virtual machine installations even if connected should not be counted here.

- *Baseline before the project: 0*
- *Baseline at the end of the project: 33% = 6 over 18*

Useful KPIs for the Offer by the Platform

In this short section, more useful KPIs have been identified but it has not been possible to quantify them.

KPo6. Sales' Coverage: Approximate % of judicial sales potentially covered by the connected national portals, in MS in which at least one of the national portals for judicial sales are connected to the Platform

Short explanation and discussion: This is an estimation of the portion of all judicial sales whose publication is not covered by the national portal(s) connected to the Platform in MS already contributing to the LEILA Project. In some MS, the mechanism of publication is limited to a certain category of sales (e.g. only immovable properties or only sales carried out by a certain category of seller, such as notaries, etc.). This indicator is aimed at estimating the size of this “missing part” of sales which cannot be published, which may be addressed by an installation of the LEILA virtual machine (ref. the Mini-LEILA solution).

It is calculated dividing the total estimated number of sales in the given reference period in the MS counted by KPo1 by the total approximate number of sales in the same MS which cannot be covered by the contributing portals, subtracting the result from 1 and multiplying by 100.

This indicator is not concerned by the fact that the mechanism of publication in the national portal may well not be used for all sales they could potentially advertise (e.g. judges do not consider useful or necessary to send the information to the portal).

KPo7. Average rating of the Platform by the users (from 1 to 5 stars)

Short explanation and discussion: The relevance of the Platform should not only be assessed looking at the quantity of information made available, but also by its user-friendliness and its capacity to satisfy the needs of the users in finding what they are looking for. The best measure of this could a rating performed by the users of the portal, i.e. via a simple online survey which would be accessible from a link in the Platform itself.



Other KPIs for the Use of the Platform

These are KPIs that should be collected by the entity in charge of maintaining the Platform, making use of Google Analytics or similar tools (not currently available).

KPu1. Number of monthly visitors (by provenience)

Short explanation and discussion: This indicator count the number of distinct visitors, determined on the basis of their IP addresses. The total number should be broken down by country; non-MS countries with less than 10 hits will be aggregated in the corresponding M49 geographical region defined by UN Stats (e.g. Northern Africa, Sub-Saharan African, etc. – [UNSD Methodology](#)). These data may be skewed using VPN; where the identification of the main VPN IP addresses may help to screen out such accesses, which can be all put under a separate ‘VPN’ category instead of the corresponding geographical area.

KPu2. Number of new monthly visitors (by provenience)

Short explanation and discussion: As per above, but only for first-time visitors.

KPu3. Number of searches (by category and type of assets)

Short explanation and discussion: This indicator may help understanding which are the most frequent use cases for the Platform.

KPu4. Number of searches (by selected national portals)

Short explanation and discussion: This indicator may help understanding which are the most frequent use cases for the Platform.

KPu5. Number of clicks on links to pages with information on judicial sales in the European e-Justice Portal

Short explanation and discussion: This indicator can provide an estimation of the impact on enhanced users’ awareness of informative content presented by the EU.

Other KPIs for the Impact on Sales

These are other KPIs that could be used to monitor the Platform’s impact on sales.

The first three KPIs in this group, which rely on the availability of this information, are kept as an indication of the importance of collecting data on the provenience of buyers. These could be used to measure the main direct expected impact of the LEILA Project (increase of cross-border participation in judicial auctions), but also – as it emerged during the



discussions with stakeholders – as a mean of implementing anti-money laundering controls, in particular for non-MS buyers.

The collection of similar data for on-site auctions would also be useful, as the Platform will also advertise this type of sales. However, if these data are not collected, it would be necessary to set up new reporting mechanism in each MS, an effort which cannot be justified only by this project.

KPs1. Number of cross-border participants to e-auctions (by provenience)

Short explanation and discussion: Such data can realistically be collected only for participants to electronic auctions and provided the identification obstacles are removed. For the provenience, the same rules used for KPu1 should be used. Even if a registered user participates to more auctions, they will be counted every time as a different participant.

KPs2. Number of offers in e-auctions, by provenience of the offering participant

Short explanation and discussion: This indicator concern activities within e-auctions. Each offer contributes to raise the final sale price.

KPs3. Number of sales in e-auctions, by provenience of the buyer

Short explanation and discussion: This indicator will measure activities within e-auctions.

KPs4. Average sales price in e-auctions (per category and type of assets)

Short explanation and discussion: This indicator, whenever it is possible to measure it, can provide useful information on trends when looking.

KPs5. Average ratio of sales price in e-auctions (per category and type of assets)

Short explanation and discussion: This indicator, whenever it is possible to measure it, can provide useful information on trends when looking.

KPu6. Total length of sales procedure in e-auctions (days)

Short explanation and discussion: The duration in days of e-auction can provide useful information on the process from the first sale to the real conclusion of the procedure.



4. Intellectual Property Rights Management Strategy

4.1. Objectives

The LEILA Consortium should place great emphasis in managing innovation and intellectual property rights (IPRs) in the framework of the Project with a view to effectively paving the way for the smooth sustainability of its results. For this purpose, the setup of the IPR Management Strategy is needed for ensuring that innovative results which stemmed during the project were thoroughly examined and assessed for potential sustainability, while at the same time all background and foreground IP of the Project is appropriately managed and identified.

The main objectives of LEILA's IPR Management Strategy are the following:

- **Protection of Project Innovations:** It refers to protecting the intellectual property developed during the project. This includes innovations, inventions, and other valuable intellectual assets that arise from the Project's research or activities. The strategy aims to define the appropriate methods for safeguarding these intellectual properties through patents, copyrights, trademarks, or other legal means.
- **Maximizing Value and Impact:** The IPR Management Strategy seeks to maximize the value and impact of the Project's intellectual assets. This involves identifying opportunities for commercialization, technology transfer, or other forms of exploitation that can lead to economic or societal benefits. It may also involve licensing or collaboration with industry partners to bring the innovations to market.
- **Ensuring Legal Compliance:** The strategy aims to ensure that the Project complies with all relevant European and national laws and regulations related to intellectual property rights. This includes adhering to patent and copyright laws, data protection regulations, and other legal requirements.
- **Fostering Sharing Knowledge and IP:** The strategy aims to promote collaboration among project partners. It may include mechanisms for sharing knowledge and intellectual property among consortium members to enhance research and development activities, especially in the case of jointly developed project results.



- **Long-term Sustainability:** Ensuring the long-term sustainability of the LEILA Project’s intellectual property is essential. This includes developing a roadmap for the post-project period to continue protecting, managing, and exploiting the main asset generated during the project.
- **Define a Methodology:** Raising awareness among project partners about terms and issues relevant to IP and its protection such as background (BG) IP and Foreground (FG) IP along with access rights and joint ownership as well as confidentiality, is key.
- **Provide a Framework** for:
 - Positioning consortium partners as a unique provider of LEILA Project’s outcomes and innovation through enforceable rights
 - Avoiding IP infringement and potential IP disputes with consortium partners and beyond
 - Making decisions on the IP protection of each foreground and the main asset identified in the LEILA Project.

4.2. Methodology

This section should **present the methodology applied for the IPR Management strategy** in the context of the LEILA Project, **providing an overview of the process applied for defining the strategy and to deal with the project’s main IPR issues:**

- Step 1: Identifying **Foreground IP** and ownership
- Step 2: Identifying main **LEILA Key Exploitable Result (KER)** to be handed over
- Step 3: **Technological minimum viable costs** of LEILA Key Exploitable Results

4.2.1. Identification of Foreground IP

A second step consisted of identifying the **Foreground IP**. It means, *‘the tangible and intangible results which are generated within a given project, including pieces of information, materials and knowledge and whether they can be protected. It includes intellectual property*



rights (e.g. copyrights, industrial designs, patents, plant variety rights), similar forms of protection (e.g. rights for databases) and unprotected know-how (e.g. confidential material). Results generated outside a project are not foreground³⁹.

As regards specific indications on the use of Foreground IP from a contractual point of view, reference must be made to what is reported in the Consortium Agreement under Chapter 8 ‘Foreground’, in particular regarding the following sections:

- 8.1 ‘Joint Ownership’
- 8.2 ‘Transfer of Foreground’
- 8.3 ‘Publication’.

Foreground (FG)	Partner IPRs Sharing
Central LEILA Infrastructure	MoJ IT (100%)
Use Case #1. National Portal Interoperability with e-CODEX	SECR-LT (25%) EKCR-CZ (25%) FINA-HR (25%) CA-LV (25%),
Use Case #2. Mini-LEILA (France)	CNCJ-FR (100%)
LEILA Source Code	MoJ IT (100%)
Test Infrastructure	AUTH (100%)
Test Scenarios	AUTH (100%)
LEILA Central Portal Documentation: <ol style="list-style-type: none"> 1. Editor User Guide 2. Installation Guide 3. Installation User Guide 4. Member State Integration User Guide 5. Profile Editor User Guide 6. Public User Manual 	MoJ IT (100%)
Mini-LEILA Documentation: <ol style="list-style-type: none"> 1. Installation Guide 	MoJ IT (100%)

³⁹ https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/european-ip-helpdesk/europe-glossary/glossary-f_en



2. REST API Auctions Guide	
3. User Manual	
LEILA Data Model and the corresponding XML Schema	MoJ IT (100%)
Blockchain Study	MoJ IT (100%)
Partnership Agreement Proposal	MoJ IT (100%)

Table 1. LEILA Foreground IP

A detailed list of the Foreground IP is presented below:

- **LEILA Infrastructure:** This includes the LEILA Central Portal developed using Liferay as a web and content management platform. Liferay includes an indexing engine based on Elasticsearch for search functions.
 - The LEILA Database contains the portal configurations and judicial auctions data obtained.
 - The LEILA Domibus Gateway manages the exchange of messages with the Member States.
- **Use Case #1 – National Portal Interoperability with e-CODEX:** Local Domibus Gateways in the Member States enable connectivity with LEILA Domibus Gateway (on central level). The data flow foresees that the Member States provide auction information via APIs to their local Domibus Gateway, which sends it to the LEILA Domibus Gateway and so to the central LEILA Database, making it available on the Platform. This allows for federated integration by retrieving data in an automated way from the national systems of the Member States through APIs and Domibus Gateways.
- **Use Case #2 – Mini-LEILA (France):** A local integration portal, called Mini-LEILA and deployed on a Virtual Machine and using Liferay, acts as a basic solution for Member States without an online judicial auction’s portal. This allows them to publish their judicial auction data directly on Mini-LEILA, to advertise their sales directly on the Platform via e-CODEX gateways, etc. This provides an inclusive solution for all Member States.
- **LEILA Source Code:** It provides the software code developed to realize the key components of the European Platform for Judicial Auctions. The LEILA Central Portal, developed using the Liferay web and content management platform, has its own code base that integrates all the solution for the presentation of the data to the user and for the batches querying Member States’ national portals on a



daily basis. The Mini-LEILA solution for Member States without a national portal, also developed using Liferay, has its own code base that relates not only for the Liferay interface for judicial operators entering judicial auctions but even for the messaging of such auctions through the e-CODEX system. It contains also the code relating to the integration logic with the Domibus Gateways for data exchanges between the LEILA Central Portal and the national portals of the Member States. Any other software components developed within the LEILA Project and necessary for the full functioning of the Platform is also included herein.

- **Test Infrastructure:** The test infrastructure provided by AUTH (Aristotle University of Thessaloniki, Greece) is considered as part of the LEILA Project's foreground IP. As one of the project partners, AUTH has made available a technological testing infrastructure within its research laboratories to conduct tests on the Platform. Specifically, this infrastructure includes testing servers to run various test cases and simulate production-level workload loads, and monitoring collection systems through the Central Testing Platform (CTP), linked to e-CODEX. CTP is an automated testing infrastructure, being the middleware/database configurations to replicate the production environment. This infrastructure has been utilized by AUTH researchers to perform functional, integration, loading and regression testing on the different LEILA components.
- **Test Scenarios:** They consist of a set of test cases developed to validate the technical and functional requirements of the LEILA infrastructure components and end-user interface. The infrastructure components would include elements like the LEILA Central Portal, the Mini-LEILA solution, integrations with Domibus Gateways, etc. The end-user interface aspects tested relate to features like search functionality, user workflows, language support/translations, accessibility, etc. The test cases aim to simulate real-world usage scenarios and ensure the system performs as specified across different configurations/conditions.
- **LEILA Central Portal Documentation:**
 - **Installation Guide:** The LEILA Installation User Guide provides instructions for installing and configuring the LEILA Central Portal and associated components. The key elements covered include:
 - Installing the LEILA bundle, which includes the central Liferay-based portal.
 - Configuring the required Domibus Gateway for secure data exchange with national systems.



- Setting up certificates and trust stores for authentication between the Platform and Member states.
- Importing base configuration data into the Platform using Liferay features.
- Configuring the integration with e-CODEX and Local Domibus Gateways.
- Customizing search features and asset taxonomy configurations.
- Managing periodic server maintenance tasks like cache cleaning.
- Providing guidance on features like the Mini-LEILA solution for non-integrated countries.
- **Editor User Guide:** It is a comprehensive manual for users with the Editor role on the Platform. It provides detailed instructions on how to modify and manage web content and portal pages, including creating, editing, and deleting various types of content like news, tutorials, FAQs, and regulations. The guide also covers the use of vocabularies and categories for organizing content, managing documents and media, creating new portal pages, and handling expired web content. Additionally, it includes information on other operations such as tagging, user role management, and utilizing the recycle bin.
- **Installation User Guide:** It provides comprehensive instructions for installing and configuring the Platform. This platform, developed for the EU judicial system, facilitates the visualization and search of judicial auctions across EU countries. It also enables Editor users to post, edit, or remove various types of content like news, FAQs, tutorials, and regulations. The guide details system prerequisites, installation steps, and configuration settings, ensuring technical operators can effectively deploy and manage the Platform.
- **Member State Integration User Guide:** It provides detailed instructions on integrating MS national portals with the LEILA Central Portal using Domibus. It covers the installation and configuration of Domibus, setting up gateways in each MS, and describes the steps for secure data transfer between the LEILA Central Portal and MS national portals. Additionally, the guide includes information on testing, support tools, and internal system requirements for successful integration.
- **Profile Editor User Guide:** It is a comprehensive manual for users with the Editor role, detailing how to modify and manage content on the Platform. It covers a wide range of functionalities, including creating and editing web content, managing vocabularies and categories, handling documents and



media, and constructing new portal pages. The guide also discusses various features such as tags, user roles, and the use of the recycle bin, providing step-by-step instructions and tips for efficient portal management.

- **Public User Manual:** It provides comprehensive guidance on navigating and using the Platform. The manual details various components and functionalities, including searching for auctions, accessing news, understanding regulations, FAQs, and tutorials. It emphasizes the Platform's user-friendly features, such as filters for refining auction searches, detailed views of judicial auction details, news sections, and helpful resources like regulations and FAQs, making it an essential guide for users interacting with the LEILA Central Portal.

– **Mini-LEILA Documentation:**

- **Installation Guide:** It is a comprehensive manual for installing and configuring the Mini-LEILA solution and is designed primarily for system technicians. This guide details the steps for setting up the Mini-LEILA given to Member States that do not have a national portal. Mini-LEILA is a portal used to create, modify, and remove auctions, and configuring its various components, including the Domibus Gateway for secure communication. It provides instructions for prerequisites, system bundle installation, basic configuration, and additional features. The guide emphasizes the importance of correct setup for the smooth connection to the LEILA Central Portal.
- **REST API Auctions Guide:** It is a comprehensive manual that explains how to use a REST service for creating, modifying, deleting, detailing, and listing auctions. It includes instructions on accessing the service, which is protected via OAuth 2 authentication, and details the fields, methods, and requirements for successful API integration, including the use of JSON for data handling. The guide is structured to assist users in understanding and implementing API calls effectively for auction-related operations.
- **User Manual:** It is a comprehensive manual detailing the usage of the Mini-LEILA, specifically designed for operators managing auctions. It provides instructions on how to add, update, and delete auctions within the Mini-LEILA solution. The guide covers various aspects of the portal, including auction creation, management, and archiving, as well as detailed instructions on how to use the Platform's features effectively.

- **LEILA Data Model and the corresponding XML Schema:** These include the LEILA Data Model agreed amongst the current group of platforms and the



corresponding XML schema and procedures to be used by the platforms to export information in the LEILA format.

- **Blockchain Study:** This document, located in Section 3.4.1 of the current deliverable, elaborates on blockchain technology, its potential applications in e-auctions, and the associated impacts from political, economic, and social perspectives.
- **Partnership Agreement Proposal:** This document depicts the scenarios of a potential collaboration among the current project Partners and potential new parties, regarding the opportunities to implement improvements and all the necessary activities of governance, organization, and management of the LEILA Platform after the end of the project.

4.2.2. Identification of the Main LEILA Key Exploitable Results

A concrete step regarding LEILA Sustainability Plan is the identification of the Key Exploitable Result (KER) of the project, intended as the main result and being selected and prioritized due to its high potential to be ‘exploited’ – meaning to make use and derive benefits – downstream the value chain of a product, process or solution, or act as an important input to policy, further research, or education⁴⁰.

The **Platform** is a centralized web portal that aggregates information on judicial asset auctions taking place across the European Union. Its main goal is to provide a single multilingual access point for information on judicial sales, overcoming barriers related to language and national platforms’ fragmentation.

The Platform connects to existing national e-auction databases and portals in EU Member States through an API integration layer. It pulls auction data like asset descriptions, prices, deadlines, and other relevant details from these sources daily. The information is standardized and stored in a centralized database to be displayed on the Platform.

On the front-end, the Platform presents auction listings to users through an intuitive graphical interface. Searches can be performed across all connected national databases for a unified European view of upcoming judicial sales.

⁴⁰ [HEU Results platform.pdf \(europa.eu\)](#)



For Member States that currently do not have an online e-auctions platform, the LEILA Project provides a minimum viable portal implementation known as Mini-LEILA. This virtual machine allows such MS to publish their auction listings directly on the Platform.

Key features of the Platform include multilanguage search capabilities, standardized data fields for listings, integration with e-CODEX for secure cross-border data exchange, and a user-friendly interface optimized for both public users and judicial administrators.

The overarching goal of the Platform is to increase transparency, participation and returns from judicial asset auctions across Europe by aggregating once-fragmented national information sources into a centralized access point. This is expected to streamline enforcement procedures, support online judicial cooperation, and ultimately benefit creditors, debtors as well as national economies.

Given the experience gained with the LEILA Project, we aim that there will be a **LEILA plus Project** in order to explore the steps to develop the current LEILA solution into a fully-fledged European Platform for Judicial Auctions.

We think that some key things *LEILA plus* should include are:

- Ensuring long-term sustainability and development of the Platform beyond the initial LEILA project lifespan, which ends in 2023.
- Facilitating easier integration of additional EU Member States who are interested to join the Platform in the future.
- Potentially opening the Platform up to different types of auctions, not just judicial ones.
- Further enriching the Platform functionality with more complex features over time
- Establishing partnership agreements and governance structures between stakeholders to support the Platform's continued operation and evolution after the original project funding ends.
- Proposing the platform as a one-stop-shop for online auction services at a pan-European level.

In summary, *LEILA plus* aims to build upon the initial Platform, developed under the LEILA Project, by developing it further into a broader, fully sustainable, and inclusive system for e-auctions across Europe into the long-term future.



We propose to further explore the idea of a multilingual one-stop-shop for EU judicial auctions in a **LEILA 2 Project** that should integrate in one place a multilingual search portal with a multilingual e-auctions system across all Member States.

LEILA 2 should provide full integration with e-CODEX, leveraging all its latest updates and upgrades. The portals would be seamlessly linked to support interoperability across different legal systems.

Blockchain technology would be integrated in *LEILA 2* to create a true one-stop-shop; in particular, smart contracts could electronically represent and automate execution of diverse national procedures and legislations, addressing cross-border judicial auctions processes. This would improve efficiency while maintaining separate legal frameworks.

The architecture of *LEILA 2* would be designed according to the highest availability standards in the e-CODEX context to support larger user volumes. A resilient and scalable infrastructure would ensure continuity of service.

A centralized support system would provide constant assistance, linked to other European bodies like eu-LISA to facilitate user requests and pan-European cooperation around the Platform between the different judicial bodies that operate in Europe. Multiple channels like live chat and remote sessions would offer user-centric support.

In addition to multilingual user interfaces, on-demand content translation would allow full access to information across languages on *LEILA 2*. Machine translation technologies would be leveraged for scalability.

Exposing APIs would enable an ecosystem of services and applications to be built around *LEILA 2*'s data assets and capabilities. This would promote data sharing and drive efficiencies for stakeholders in the European judicial auction sector.

In summary, *LEILA 2* would harness cutting-edge technologies through an evolutionarily integrated approach. It aims to establish the platform as a future-proofed, pan-European one-stop-shop supporting all process needs in a transparent manner.

4.2.3. Technological Minimum Viable Costs of LEILA Key Exploitable Results

In this section the consortium partners identified **the operational costs associated to the maintenance of the Platform**. The estimate provided herein takes in consideration the



actual production infrastructure deployed in the Italian Ministry of Justice' Palermo Data Centre.

Scenario 1: Actual Infrastructure Costs Estimate – Italian Ministry of Justice's Environment

The actual infrastructure is composed of 5 virtual machines as described below:

	Number of Nodes	CPU core	Memory	OS	Dati - Storage
Database	2	8	16	150	250
Domibus	1	8	16	150	N/A
File System Shared	1	4	8	150	150
Message Broker	1	8	16	100	100

Costs are estimated considering the main applicable procurement frameworks in Italy, in relation to the types of activities, services and equipment needed. Hardware costs are not included in this scenario because the actual infrastructure is deployed over existing equipment in the data centre. Moreover, software costs are included only in the next year costs because the first installation has been covered by the LEILA Project funds for development. All costs are indicated VAT excluded.

Services/ equipment	First year costs	Next years' costs
Operation maintenance	330 €/d * 35 dd= 30.000,00 €	330 €/d * 35 dd= 30.000,00 €
Software		
OS		5 * 865 € = 4.325,00 € ⁴¹
DBMS		2 * 31.535,75 € = 63.071,00 €
Virtualization Software		36 * 266,97€ = 9.610,92 € ⁴²
Total	30.000,00 €	107.006,92 €

Table 2. LEILA Platform Infrastructure - Costs estimate – Italian Ministry of Justice's environment.

⁴¹ Red Hat Enterprise Linux Server with Smart Management, Premium (Physical or Virtual Nodes) – Annual subscription

⁴² VMware vSphere 8 Enterprise Plus with Tanzu Standard Runtime - 3-Year Prepaid Commit Subscription - Per Core (36 months guarantee). Costs are estimated for 5 hosts with 36 CPU cores



Scenario 2: Cloud Infrastructure Costs Estimate

This cost estimate considers the migration to the Italian PSN (Strategic national pole) cloud environment of the complete infrastructure. All costs are indicated VAT excluded.

Services/ equipment	First year costs	Next years' costs
Migration services	71.240,00 €	
Hosting services (networking, compute, DB, storage, VPN, monitoring) services	91.605,00 €	91.605,00 €
Operation maintenance	330,00 €/d * 35 dd= 30.000,00 €	330,00 €/d * 35 dd= 30.000,00 €
Total	192.845,00 €	121.605,00 €

Table 3. LEILA Platform – Costs estimate – Cloud infrastructure.



5. LEILA Sustainability Considerations and Conclusions

The aim of this chapter is to outline the framework for the Sustainability Action Plan of the European Platform for Judicial Auction, as detailed in Deliverable D4.2. This plan builds on the discussions with members of the European Commission on October 5th, 2023, and focuses on enhancing the Platform's long-term viability and impact. Potential extensions of LEILA should follow two veins.

The first vein is a three-year EC-funded partnership among current and new project partners for a three-year period to address issues (both occurred and envisaged) under three main categories: 1) technical issues and eco-sustainability, 2) maintenance and support activities, 3) governance and legal aspects.

Regarding technical issues and eco-sustainability, it is necessary to deeply address the dimensioning of e-CODEX bandwidth and the High Availability of the Platform, consider the use of multi-tenancy e-CODEX access points, translate judicial auctions content with the European translation service, evaluate the extension of the current data retention policy, migrate the Platform to the Cloud, and rely on the latest containerization technologies.

Regarding maintenance and support activities, what is most important and needs to be addressed deeply is the management of the infrastructure up and running, management of ITSM aspects (Incident, Problem, Change, Service Request), and the support to new member states to join the Platform.

Regarding governance and legal aspects, what is most needed is to align the LEILA ecosystem with the regulatory framework, defining and monitoring KPIs, and creating a management board liaising with the EC.

The second extension vein is about the possible development of a 'LEILA 2' Platform. We consider the opportunity to initiate a new project to create a one-stop-shop platform for end-to-end judicial auctions management that is not limited to judicial auction searches only. We propose to leverage the latest technologies and in particular:

- the blockchain for reliability, tamper-proof systems, its tracking of actions/steps, zero-knowledge proof for anonymization, e-IDAS compliant authentication, and smart legal contracts to manage different regulatory frameworks and procedures among EU Member States.



- Artificial intelligence for semantic search of goods.
- Incorporation of a harmonized regulatory EU framework about judicial auctions.

In conclusion, the proposed extensions and enhancements to the Platform are aimed at establishing a robust, sustainable, and technically advanced system. The latter is intended to effectively manage judicial auctions across the EU, leveraging cutting-edge technologies and aligning with legal and governance frameworks. The partnership, combined with the development of a new 'LEILA 2' Platform, will provide a comprehensive and unified approach to judicial auctions, enhancing accessibility, efficiency, and reliability.