

Modernization of Government Services in the Republic of Moldova

Project ID No. P148537

Terms of Reference

Consulting services for the design, development, configuration and deployment of Information Systems e-APL Core

I. Background

The Government of Moldova is determined to fundamentally change the way how public services are provided in Moldova through a variety of interventions for modernization of service delivery, which combat corruption, foster a customer care culture, enhance access, as well as increases efficiency in the Moldovan public administration.

From 2006 to 2013, Moldova modernized its civil service legislation and administrative processes under the Central Public Administration Reform (CPAR), supported by the World Bank's administered CPAR Multi-Donor Trust Fund.

In July 2016, the Government of Moldova approved the Public Administration Reform Strategy for 2016-2020¹, that kept the modernization of public services delivery process among its main objectives.

To achieve the stated objectives, the Government requested the World Bank's assistance for a PAR operation, that became effective in June 2018, called Modernization of Government Services Project (hereafter *MGSP* or *the Project*).

The design of the project takes into account the Government of Moldova's vision, stated in the Public Administration Reform Strategy 2016-2020 and makes extensive use of institutional and technological achievements of Governance e-Transformation Project (GeT) implemented by the Government of Moldova and World Bank in the period between November 2011- December 2016.

In 2021, the new Executive issued its governing Programme "Establishing Good Times for Moldova"² and set modernization of at least 100 administrative services and access of 100% of active population to electronic public services as some of its objectives. The Government Action Plan 2021 – 2022³ through its envisaged actions reconfirms the determination of the Government to modernize the administrative service delivery system by improving access to public services through various channels, their efficiency, reduction of unnecessary administrative burdens and cost of services for both beneficiaries and service providers, ensuring a stable level of quality of administrative services.

MGSP continues to play a very important role in achieving the high-level objectives set up by the Government. The project aims to improve access, efficiency and quality of delivery of selected administrative services through the following components:

1. Administrative Service Modernization

The key activities under this component focus on re-engineering a group of government to citizen and government to business administrative services; piloting of one-stop-shops for public service delivery in selected locations and rolling out at national level; increasing

¹ <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=366209>

² https://www.gov.md/sites/default/files/document/attachments/programul_de_activitate_al_guvernului_moldova_vremurilor_bune.pdf

³ https://www.gov.md/sites/default/files/document/attachments/pag_2021-2022_ro.pdf

public awareness on and advocacy for administrative services, with a particular highlight on e-services.

2. Digital Platform and Services

The main objective of this component is to digitize selected re-engineered government services; complete and strengthen a common infrastructure and mechanisms for rapid deployment of ICT-enabled public services; introduce government wide IT Management and Cyber Security standards and procedures. The component finances the procurement of additional shared computing infrastructure elements, digitization of services needed to deliver Government services electronically, as well as the development of a learning management system to mainstream the new digital infrastructure and the modernized services within the government.

3. Service Delivery Model Implementation

The objective of this component is to ensure that the institutional capabilities of key government agencies are aligned with and support the new model of public services delivery.

4. Project Management

This component supports the Project Implementation Unit (PIU), based in the e-Governance Agency (eGA) and ensures the activity the core e-Governance Agency team.

Current situation:

Currently many public service providers still require a plethora of paperwork for each individual Local Public Authority (LPA) to access their services, even electronic services. Main impediments to LPA access to public services are the lack of LPA capacity to coordinate their needs with numerous service providers and the exaggerated complexity and peculiarity of their internal processes. As a consequence, digitization at LPA level takes a lot of time, often involving adjustments to the related legal framework while they still have limited or no possibility to be served online.

To simplify access of LPA to public services and resources, including electronic services provided by state agencies, EGA conceptualized and the Government approved a Republic of Moldova Local Public Administration Portal – e-APL⁴. Considering the above the EGA with the procurement of these software development services is implementing a single platform which would allow simple and flexible access of LPA representatives to services and resources already provided by Service Providers in digital form, including with the possibility to pay online and / or apply the electronic signature, as appropriate.

Conceptually, the e-APL is hosted on the Mcloud government platform and integrated with government platform services (MPass, Msign, Mpay, Mnotify, Mlog, Mpower, Mcabinet, Public Services Portal). All data exchange will be done exclusively through MConnect. The solution will have a minimal workflow engine that will allow development and configuration of the external services and resources exposed by Public Authorities and facilitate LPA prerogatives to consult, list, create, update or remove informational objects in their jurisdiction. On the other side the solution allows Public Authorities to extend their offering and enable e-APL administrator to connect e-APL to those resources as they become available. Also, the solution offers reports regarding usage, services availability,

⁴ Translation of original "Conceptul Portalului Administrației Publice Locale din Republica Moldova (e-APL)"

number of actions or events and other key performance indicators (KPIs) of the service providers which provide services using the solution.

It is important to note that even for services that APL representatives can already use they need to have contractual agreements with each of them. E-APL by its nature will improve on this by allowing APL representatives:

- self service within their environment thus removing the requirement of the first formal agreement
- all other agreements will be accounted for by e-APL possessor – EGA

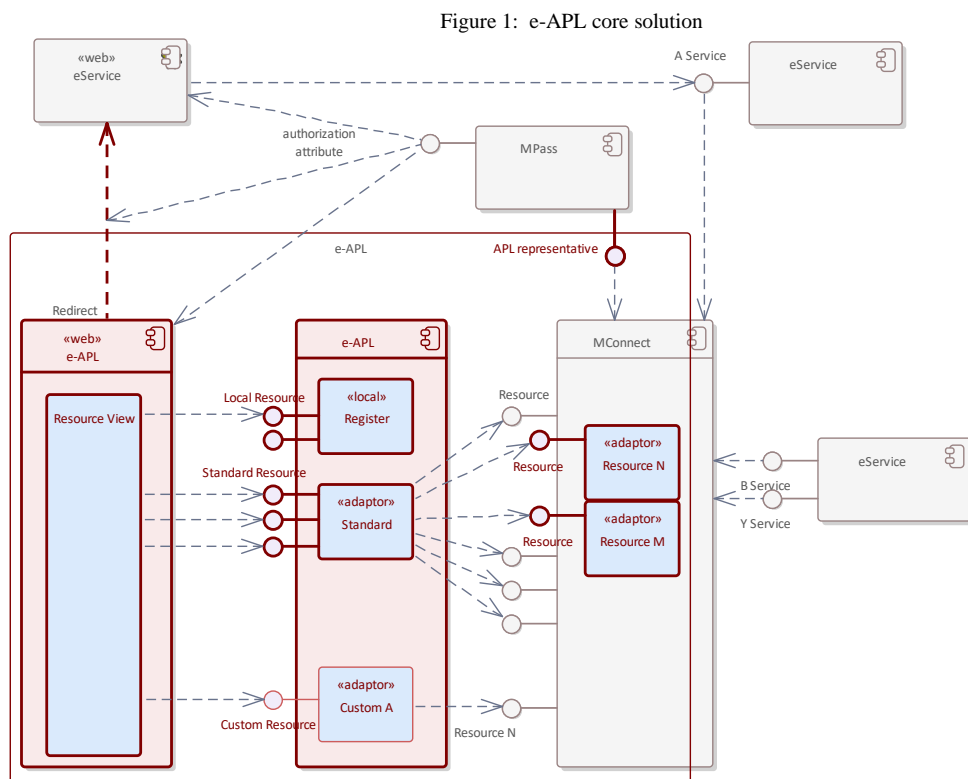
e-APL core is:

- a multi-tenant solution where each APL can setup and maintain their own isolated view of the data and configuration
- extendable system where in the future new systems and services can be plugged in and extend the capabilities APLs can use.

e-APL core solution

e-APL integrates a series of already existing services. The diagram below highlights how e-APL achieves that.

Note that the area of changes to support e-APL implementation extends to MPass, MConnect and eventually to external eServices that at the moment are not compliant with this approach.



The dark red area depicts the area of changes:

- MPass with APL representative provided service

- MConnect with a series of adaptors designed to finetune the already integrated eService resources via e-APL standard service/resource adaptor
- Redirect mechanism that allows e-APL redirect its end users to extended capabilities offered by eServices via their own web UI. The redirect capability is probably not supported As Is by most eServices and will require adjustments on their authorization/authentication side in order to grant access to APL representatives to APL owned resources.

Overall, e-APL integrates

- services in the form of resources that are
- exposed for consumption via MConnect

e-APL "web"

e-APL <<web>> is the component of e-APL concerned with the User Interface. One of its main responsibilities is to uniformly generate Resource Views. These views are informed by e-APL configuration and depend on the capabilities of integrated/offered services such as:

- list, detail read/write and spreadsheet views for Local registers
- list, detail read or read/write and redirect for external resources
- list or detail read or redirect for custom resources

Resource Viewer is directed by user action and interconnects accordingly with the subscribed services within e-APL.

eService

Any of the existing automated systems using SOA as their architectural principle.

Note that many eService resources are intended to be integrated but all of them shall provide the services and access to them in a standard manner. Each eService shall publish their offered services via MConnect.

eService "web page"

Individual eServices can include advanced functionality that cannot be implemented by e-APL, for example:

- GIS systems working with maps
- building permit systems working with building schematics
- workflow systems etc.

In order to offer these advanced capabilities APL representatives will be redirected to the <<web>> eService UI. The redirect will pass the required authorization attributes in order to grant APL representatives the required access.

MPass

MPass as usual serves as an Identity Provider and its identity attributes are used for authorization purposes.

Additionally, MPass is extended to depict the APL/eService required authorization attributes and provides them as a service (via MConnect) to eAPL in order to allow APL administrators to manage APL representatives.

Objective of the Assignment

This automated system main goals are:

- to focus on local public authority personnel functionality
- to proxy existing central public authority electronic services in order to facilitate their easy use within local public authorities
- to enable local public authorities create and manage their own inventories of resources (based on external resources) that will allow them to pursue various business outcomes

Scope of work and Development approach

The scope of work of this assignment is to design, develop, configure, and deploy an automated system as a fully functional product with all functionalities in place, according to the specifications iteratively defined by the Client (the indicative set of requirements is listed in **Annex 1** and **Annex 2**) and following the development approach described below.

The development of the solution will follow agile software development. Since there are many dialects of agile software development and to avoid misunderstandings, this section provides key principles to be used in the development of the solution.

Iterative development

In contrast to waterfall software development approach, the solution shall be developed in iterations named sprints. This means that the implementation of different functionalities will take place in phases with some modules being in production while others still being in development. The priorities of functionalities included in a sprint will be determined by the Client. Sprint duration will be determined by the Client together with the Consultant.

Agile development

The development shall follow agile principles by allowing change and flexibility in implementation. Client will maintain the master list of generic requirements for the solution – *product backlog*, which consists of ordered business and technical requirements as seen by the Client. Items in product backlog are ordered by the Client by their priorities. Client is free to manage the product backlog by adding new items to it, removing items and reordering them as he/she desires. At the beginning of each sprint, the topmost N items that fit into a sprint are taken, and a *sprint backlog* is built out of them. Items in sprint backlog are further detailed and distributed to developers. Sprint backlog is not changed during the sprint.

Working product in each iteration

Each sprint ends up in a working product which is presented to the Client for acceptance in the last day(s) of sprint. The working product shall meet the agreed criteria – Definition of Ready (e.g. it must be fully functional, fully tested, accompanied with relevant unit tests, accompanied with relevant documentation where necessary, complete commented source code supplied etc.). Payments will be made upon successful delivery of working packages (one or more working products) deployed on Client's environment. In case the deliverables contain defects for reasons not imputable to the Client, the Consultant shall fix them without impacting the time schedule and at no additional costs, including possible visits to Client site. Working products from different sprints can be combined into a release deployed in production at Client's discretion. Any incidents reported by the Client after the release, shall be solved by the Consultant according to the agreed Service Level Agreements (SLAs) as defined in Annex 2, p.10 Support and Warranty requirements.

To ensure that the development team is in position to deliver on time working products, a Client representative – typically named *the Product Owner* in agile methodologies – is permanently available to the team for answering eventual questions, thus not slowing down the implementation pace.

The Consultant will appoint a Scrum Master from the team of key or non-key experts for the entire duration of the project.

The Scrum Master will be responsible for the day-to-day liaison with the Client; s/he must ensure the internal coordination and guidance of the project experts and the project coordination with external counterparts.

The Scrum Master must also ensure the availability of suitable experts in accordance with the project planning documentation.

Client involvement

In contrast with commonly used waterfall model for procurement and implementation of information systems for the government, the Client designated person – Product Owner – will be heavily involved in the development process. The Product Owner will have three core responsibilities:

1. Maintenance of product backlog – the owner will maintain the product backlog up to date, so it reflects prioritized list of desired functionalities.
2. Answering to questions coming from developers – the owner will be at all time available to the development team for answering their eventual clarification questions, thus avoiding complex and formal communication within the project. This is essential to ensure the team has all the information on time to deliver a working product at the end of the sprint.
3. Acceptance of working packages – delivered working packages are presented to the Client for acceptance at the end of each sprint. The Client shall accept the working package or notify the Consultant of any defects during the following sprint.

Although it is not strictly necessary, the Product Owner may participate in team stand up meetings listening for progress and eventual blockers for an immediate reaction.

Product Owner also decides on product releases, as per release plan.

Also, as per the principles of Agile project management methodology, the Client will define the Product Vision Statement and Product Roadmap in order to track progress and to ensure the appropriate product development.

Agile Development Cycle

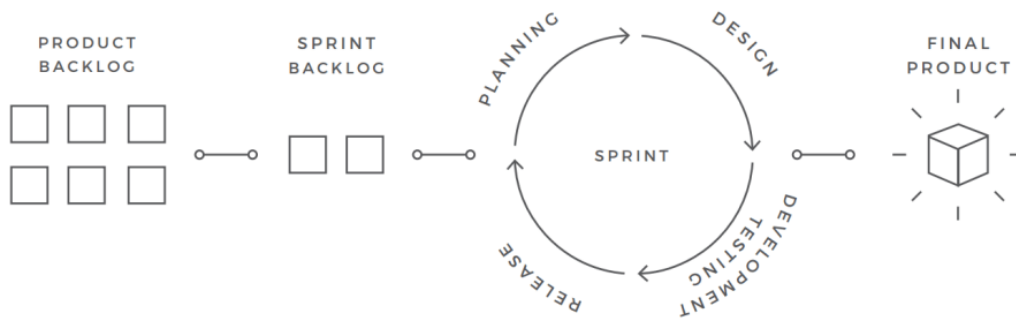


Figure 1. The indicative illustration of the Agile Development Cycle/Process

Warranty

The Consultant shall provide 3 months of warranty for the developed solution. The warranty period starts after final release. During the development and warranty period the Consultant shall fix any identified defects.

The development and operations must be in compliance with the legal and regulatory documents listed in **Annex 3**.

1. Expected Deliverables

The following deliverables will be provided by the Consultant during the current assignment:

1. **A fully functional framework** with all functionalities developed and deployed according to the requirements defined by the Client during the assignment. The Consultant will deliver compliant and documented source code (including third-party tools and libraries, licenses, where applicable and automation scripts).
2. **Technical and End-user documentation** developed according to the Client's documentation requirements defined in the Annex 2.
3. **Training sessions and training materials** developed according to the Client's training requirements defined in the Annex 2.

2. Reporting Requirements

The following reports will be provided during the assignment:

- a) Sprint Report, including release notes, breakdown and duration of tasks implemented during the sprint, velocity, issues and outstanding problems, proposed actions to be taken;
- b) Next Sprint Backlog, including breakdown and estimated duration of tasks proposed to be implemented during the next sprint, resources that the Consultant expects to be provided by the Client and/or actions to be taken by the Client;
- c) Training reports, submitted after each training session, including:
 - Participants list;
 - Training session agenda;

- Training materials (presentations, labs etc.);
- Trainees' test results;

3. Timing

The tasks under the current contract are estimated to be performed in 18 months – 15 months for development and 3 months of warranty period.

Subject to satisfactory performance, the contract can be extended based on the same fee rates.

4. Institutional arrangements

The **Client** is responsible for all administrative and procedural aspects, contract and financial management, including acceptance and payment of deliverables/reports expected under the Contract, general project responsibilities and efficient coordination with stakeholders.

A Product Owner will be appointed by the Client, who will coordinate and decide on all issues related to the technical elements of the Contract. The Product Owner will issue the administrative notice on the start date of the implementation of the contract and other duties.

The Client will provide the following:

- infrastructure resources for testing and production environments;
- code repository, issue tracking system, CI/CD environment, task management system via the Client's subscription in Azure DevOps. The Consultant shall not include Azure DevOps subscription in its financial proposal.
- Training facilities.

The **Consultant** will ensure that adequate working conditions (work space/office premises for the experts, office equipment, computers, communication facilities, etc.) and services are provided to the Consultant's staff during the lifetime of the project.

The Consultant will be responsible for day-to-day management of the project team and availability of all necessary resources.

The Consultant will organize the Kick-off meeting and initial Backlog discussion at its premises or in an agreed upon location in Chisinau, Republic of Moldova. All Consultant's Key Experts shall participate in the Kick-off meeting and initial Backlog discussion. The costs associated with the Client's presence at the Kick-off meeting will be covered by the Client and shall not be included in the Consultant's financial proposal.

The Consultant will ensure visits to the Client site to provide training to end users.

In case the deliverables contain defects and/or there are delays for reasons not imputable to the Client that may impact project outcome, the Consultant may be requested to visits to Client's site in order to solve the project issues.

The communication language will be Romanian or English.

The Consultant shall work under the supervision of the appointed Product Owner and report to the Client's Chief Digital Officer.

5. Qualification Requirements

Consultant qualifications requirements

The Consultant shall furnish documentary evidence (including information about the completed contracts and contact information of clients from whom the references could be

taken or whom the Client may, when necessary, visit to familiarize themselves with the systems put into operation by the Consultant) to demonstrate that it meets the following experience requirements:

1. Have been in operation for at least five (5) years with main part of its business being the development of information systems.
2. Experience in conducting projects similar size and complexity developing web applications proven by at least two (2) contracts with the development phase finalized in the last three (3) years. For ongoing projects, copies of acceptance documents of the entire software solution shall be provided.
3. Experience in software development using agile software development principles (as described in the scope of work and development approach section of the ToR) would be an asset. This shall be demonstrated by presenting the project methodology describing the role of the client.
4. Demonstrated experience using required technology stack would be an asset.

Staff qualifications requirements

The Consultant shall provide a team of the following key experts:

- *Senior software developer/technical lead - 1 staff*
- *Software developer - 3 staff*
- *Software analyst - 1 staff*
- *Software tester - 1 staff*
- *Trainer - 1 staff*
- *Project manager - 1 staff*

Each key expert must meet at least one the following requirements:

- Proven experience in web UI design and development using responsive frameworks
- Proven experience in database design, development and optimization
- Experience in systems' integration, API design and development using SOAP/REST
- Experience with unit testing
- Experience in DevOps practices
- Experience in project management
- Experience in system analysis.

Per total the entire team of the proposed key experts must meet all the above requirements. Offers which will not demonstrate that the team covers the above requirements may be subject of disqualification.

For proposed key experts the CVs need to be submitted, demonstrating the minimum qualifications requirements, as detailed below:

Senior software developer/technical lead:

The senior software developer shall oversee that all reporting obligations are fulfilled in a timely manner to a high-quality standard.

- University degree in Computer Science or another relevant domain
- At least 5 years of experience in software development
- Participated in at least 2 software development projects in the last 3 years using agile approach
- At least 3 years of experience in software development using C#, Entity Framework, ASP.NET MVC, SQL Server and a dependency injection framework
- Certifications in any technology from the required technology stack is an asset

- Ability to communicate in Romanian or English

Software developer:

- University degree in Computer Science or another relevant domain
- At least 3 years' experience in software development
- Participated in at least 2 software development projects in the last 3 years using agile approach
- At least 3 years of experience in software development using C#, Entity Framework, ASP.NET MVC, SQL Server and a dependency injection framework
- Certifications in any technology from the required technology stack is an asset
- Ability to communicate in Romanian or English

Software analyst:

- University degree in Public Administration, Computer Science or another relevant domain
- At least 5 years' experience in software analysis or software development
- Participated in at least 2 software development projects in the last 3 years using agile approach
- Experience in public administration or software projects for public administration is an asset
- Certifications in any technology from the required technology stack is an asset
- Ability to communicate in Romanian.

Software tester:

- University degree in Computer Science or another relevant domain
- At least 3 years' experience in software testing in projects of similar complexity
- Proven experience in software testing analysis and design
- Proven experience in automated testing
- Proven experience in performance (load and stress) testing
- Proven experience in security testing
- Certification in testing or any technology from the required technology stack is an asset
- Ability to communicate in Romanian or English

Trainer:

- University degree in Computer Science or another relevant domain
- Proven experience in conducting training sessions for end-users and IT specialists in at least 2 similar projects
- Proven experience in writing technical and end-user documentation
- Experience in on-line training development using Moodle e-learning system is an asset
- Ability to communicate in Romanian
- Knowledge of English is an asset

Project manager:

- University degree in a relevant domain
- At least 5 years' experience in project management of software projects
- Participated in at least 2 software development projects in the last 3 years using agile approach
- Experience in project management for public authorities is an asset
- Ability to communicate in Romanian and English

Annexes

Annex 1. e-APL Core Business Requirements

This Annex describes the Business Requirements for the system. Business requirements identify what the system does, they define a specific goal of a user that sets what the system is supposed to accomplish.

The Business Requirements are defined as User Stories. Each user story is described as a need of an identified user.

e-APL Roles

ID	Description
APL	The organization entity that depicts an APL identified by an IDNO and administered by a Mayor (elected official). The full list of APLs is maintained in MPass and only organizations from this list will be authorized to get accounts in e-APL.
APL elected official	APL elected official is the true administrator of the APL, including its e-APL account. APL elected official can delegate administrative tasks of e-APL account to another APL representative - an APL administrator.
APL representative	Any person listed as an APL Representative (in e-APL or MPass).
e-APL administrator	e-APL administrator is either the mayor (administrator of the APL in MPass) or any listed APL representatives with assigned e-APL Administrator role.
CEC representative	A representative appointed by Central Electoral Commission with the responsibility to keep up to date the list of elected APL officials: - Mayors and - Pretors
System administrator	The designated person or team who ensures e-APL operations including by extending the list of resources available to APLs.
e-APL integrator	The developer and integrator of e-APL system. They use all the software development tools at their disposal to facilitate e-APL functionality and capabilities such as exact generic (pass-through) adaptor or individual eService custom adaptors where needed.
e-APL	This system
date.gov.md	Open data portal of Moldova.
e-Service	A generic name given to any of the automated state registers or information systems that provide services and resources to e-APL. It is important to highlight the fact that integration with e-Services is intermediated only through MConnect and as such only those e-Services that already use MConnect will be possible to be exposed in e-APL. If additional capabilities are required on e-Service part to better serve e-APL, those changes lay outside the scope of this assignment.
MPass	MPass is the governmental authentication and authorization electronic service. For the purpose for e-APL MPass will be extended to: allow CEC via its representatives or by integration with SAISE maintain APL, APL jurisdictions and APL elected officials

ID	Description
	<p>allow e-APL administrators manage APL representatives and their roles integrate a mapping of authorization attributes required by eServices in order to enable APL representative access to resources within APL jurisdiction facilitate the redirect of authenticated APL representatives to the advanced facilities offered by resource owner eServices</p> <p>Of note is that MPass shall rely on SOA at least for the top two enhancements above and assure their integration with e-APL and SAISE over MConnect.</p>
MConnect	The interoperability bus of the Government of Moldova that facilitates interoperability of electronic services and other state digital resources.
MLog	Moldova's electronic journaling service.
MNotify	Moldova's electronic notification service.
MPay	Moldova's electronic payments service.
MSign	Moldova's electronic signature service.
RSAL	State registry of local acts
SAISE	<p>State Automated Information System Elections (SAISE) operated by Central Electoral Commission (CEC). CEC oversees elections in APLs and maintains the lists of APLs and their currently elected officials.</p> <p>At the moment this resource is not available for automated consumption. The API structure has to be coordinated with CEC, during analysis and design stages.</p>

APL functionality

This section depicts user stories where APL representatives use e-APL in order to achieve their day-to-day objectives and perform their work.

ID	Description
Manage APL items US101	<p>As an APL representative I want to manage items in the Resources within APL jurisdiction in order to provide services or fulfil APL functions.</p> <p>Note that resources managed by external eServices are submitted to their owners/administrators to be persisted.</p> <p>Local resources managed by APLs are persisted and exposed for further use by e-APL in the form of APL registers.</p>
Reference APL decision US102	<p>As an APL representative I want to reference an APL decision that has been submitted to RSAL in order to support the changes made to an item.</p> <p>Main actions</p> <ol style="list-style-type: none"> 1: User provides the reference to RSAL documents in the form of a textual URL 2: System before persisting the reference validates that the URL is valid, links to RSAL, is secure and for example does not include possible XSS markup or does not exceed a maximum length that reduces the possibility of compromise

ID	Description
	<p><i>3: System displays the reference using a uniform marker (icon, button etc) which links to RSAL</i></p>
<p>Review item details US103</p>	<p>As and APL representative I want to read and review the detailed information regarding a specific item based on its ID in order to verify that the correct item is being considered.</p> <p>APL representatives are authorized to retrieve item's details for review based on their:</p> <ul style="list-style-type: none"> • APL representative status • APL representative role • APL jurisdiction over the item <p>Main actions</p> <p><i>1: User navigates to an item in the listed inventory of items or provides the Key Attribute of the item manually</i></p> <p><i>2: System validates that the Key Attribute is valid according to Key Attribute validation rules</i></p> <p><i>3: System checks if the local storage contains the details of the item</i></p> <p><i>4: System for external resources validates that the local data is missing or outdated and retrieves the data from the eService owner of the resource (as configured) while persisting the data in its local cache</i></p> <p><i>5: User has the option to request a fresh representation of the external resource items when a cached version of the data is being displayed</i></p>
<p>Redirect to owner system US104</p>	<p>As an APL representative I want to manage a resource within APL jurisdiction directly in the external service UI in order to be able to perform advanced functions on the object. This is achieved by including MPass authentication and authorization attributes.</p> <p>Main actions</p> <p><i>1: User from within the display of an information item follows a link to the eService where they get advanced functionality</i></p> <p><i>2: System offers the option to navigate to the eService only where the external resources have this capability configured</i></p> <p><i>3: System facilitates user's direct access (without additional login) by means of user's identity and authorization attributes established by MPass and the fact that the item user wishes to work on is within APL jurisdiction</i></p> <p><i>4: System counts the success or failure of user's action as part of its KPI counters/statistics</i></p>
<p>Inventory APL items US105</p>	<p>As and APL representative I want to list all the resource items within APL jurisdiction in order to inventory them and plan subsequent actions.</p> <p>A feature of eAPL is to maintain 'inventories' of items. In the form of an inventory APL representatives can in a standard manner locate the items of interest.</p> <p>Main actions</p> <p><i>1: User lists the informational items within their jurisdiction</i></p>

ID	Description
	<p>2: System offers pagination, filtering and sorting facilities that users can specify how to better display the items, especially the large sets of items</p> <p>3: System caches a local inventory of items based on previously identified items for external resources. This cache is used in case the eService does not provide a resource listing capability.</p> <p>4: System retrieves the items to display either from eServices for external resources or from its local storage for local resources</p> <p>5: System includes option to add new items to inventories based on the Key Attribute of the resource and the set of Key Attribute values within APL jurisdiction</p>
<p>Update/Delete item US106</p>	<p>As an APL representative I want to update or remove information regarding a specific item based on its ID.</p> <p>APL representatives are authorized to update/delete item based on their:</p> <ul style="list-style-type: none"> • APL representative status • APL representative role • APL jurisdiction over the item <p>Main actions</p> <p>1: System activates functionality to create, update, delete resources based on resource types a) all for local resources, b) as configured for external resources</p> <p>2: User initiates any of the available functions and provides the attributes of the informational item per resource definition</p> <p>3: System validates and highlights required/erroneous data</p> <p>4: System persists submitted and confirmed user changes locally for local resources or with the resource owner eService for external resources</p> <p>5: System journals user actions with MLog</p> <p>6: System informs user of the results</p>
<p>View/edit resource items as spreadsheet US107</p>	<p>As an APL representative I want to view and edit (where edit is allowed) resource items in the form of a spreadsheet since I'm familiar with spreadsheets and how they work. Column names inherit the names of the configured resources to be displayed.</p> <p>The spreadsheet functionality of e-APL is limited but ensures:</p> <ul style="list-style-type: none"> • write protection of key attributes • addition of new columns to local resources by giving the column a name that does not already exist within the resource • sets data type of a column to text, number, money, year, date, datetime, attachment if the column does not have any values • sets a column as mandatory if there are no items in the local resource without values • rejects values in a cell that do not match the type of the column • allows creating a new local resource based on the spreadsheet with the option to include only some of the columns in the original • allows sorting by any of the columns preserving items values on the same

ID	Description
	<p>row</p> <p>Main actions</p> <p><i>1: System protects items and data attributes that cannot be modified such as identifiers, change date/time, author</i></p> <p><i>2: System highlights items with pending changes</i></p> <p><i>3: System notifies user when they wish to leave the page where there are pending changes.</i></p> <p><i>4: System highlights cells with required or erroneous data</i></p>
<p>Harvest APL items of interest</p> <p>US108</p>	<p>As MConnect I want to harvest items that might belong to APL jurisdiction based on identifiers used.</p> <p>e-APL facilitates harvesting of identifiers of various external resources. The identifiers can be subsequently queried and reviewed with their owner eServices in order to establish when indeed some items might be within a specific APL jurisdiction.</p> <p>Harvesting is done by means of observing attributes such as:</p> <ul style="list-style-type: none"> • address details (locality, street etc <p>If these point to within APL jurisdiction the identifier is matched within APL in the form of a pair:</p> <ul style="list-style-type: none"> • IDNO of the APL within whose jurisdiction the address is matched • IDNP or IDNO or Cadastral Code or Fiscal Code or Vehicle identifier (etc). <p>e-APL persists harvested pairs like above only once.</p> <p>Harvesting can be switched off and the corresponding harvesting capabilities can be removed from MConnect at this stage.</p>
<p>Claim item within APL jurisdiction</p> <p>US109</p>	<p>As an APL representative I want to be able to add new items as being part of the APL jurisdiction in order to fill the gaps in APL inventories or to supplement the inventories with newly created items.</p> <p>e-APL operates under the assumption that eServices designated items under APL jurisdiction and thus APL representatives can inventory these and undertake any of the required actions.</p> <p>At times some of the items will either naturally move across APL jurisdictions or might be incorrectly mapped from the start. Moreover, some items might have presence within multiple jurisdictions - for example somebody owning property in multiple locations, i.e. within different APL jurisdiction. This use case introduces the concept of APL representatives initiating the procedures where the item is assigned to APL jurisdiction. The jurisdiction where the item was listed originally will be notified of this as well as the eService (owner) itself.</p> <p>Important! When eServices do not maintain their own Jurisdiction data the jurisdiction attributes can be intermediated by MPass for authorization/access control.</p> <p>Main actions</p> <p><i>1: User navigates to claiming item within APL jurisdiction</i></p> <p><i>2: System prompts user to select the key attribute used to identify the claimed</i></p>

ID	Description
	<p>item and to provide its value</p> <p>3: User provides the identifier of the item and submits</p> <p>4: System retrieves additional details regarding the item and prompts user to review and confirm claim</p> <p>5: User reviews that item details match their item and confirms claim</p> <p>6: System prepares a PDF claim form based on the template and initiates its signature by the user via MSign</p> <p>7: User signs the claim form</p> <p>8: System retrieves signed PDF claim form and persist the item identifier within APL jurisdiction and attaches the signed claim form to the record</p> <p>9: System journals action with MLog</p> <p>10: System informs user of result</p>

Services configuration

This section lists user stories for the setup and configuration of an APL account.

ID	Description
<p>Define key attributes</p> <p>US201</p>	<p>As a system administrator I want to specify what resource data fields are Key Attributes.</p> <p>Key attributes are subsequently used to:</p> <ul style="list-style-type: none"> validate local resources that re-use the Key Attributes within review object details from its source when APL representatives request such details. <p>Note! Key attributes might be IDNO, IDNP, IDNx, vehicle registration, cadastral code, fiscal code, CUATM etc. Their validation within e-APL can be implemented as e-APL functionality and if so e-APL integrator shall carry out some of the work too.</p> <p>Main actions</p> <p>1: User provides a well known name of the Key Attribute, validation rules for example in the form of a regular expression, and the owner of the identifier in the form of a web resource/service where details regarding the object identified by the Key Attribute can be retrieved and consulted.</p> <p>2: System ensures that the provided user data is accurate (no duplicate of Key Attribute name, correct regular expression for validation and correct URL for the web resource</p> <p>3: System includes option to test a valid Key Attribute value to conform both to regular expression and to retrieve data from the source of the identifier</p> <p>4: System includes the required attributes of the request in order to ensure the request is accepted by the owner system and a valid response will be issued back</p>
<p>Configure e-Service resource</p> <p>US202</p>	<p>As a System administrator I want to supplement e-APL external resources once new eServices start offering them in order to expand the possibilities of e-APL and support APL representative work.</p> <p>This can be achieved either via configuration files or via a setup interface.</p>

ID	Description
	<p>A test facility is included in e-APL to allow validation of the resource definition.</p> <p>Important! Configuration of external resources covers these aspects of e-APL integration:</p> <ul style="list-style-type: none"> • Get item details (mandatory) • List items within APL jurisdiction (optional) • Create new item within APL jurisdiction (optional) • Update item within APL jurisdiction (optional) • Delete item within APL jurisdiction (or update item with Deleted status) (optional) • Redirect APL representative to resource host system (optional) <p>Main actions</p> <p><i>1: User assigns a clear, unambiguous name to the resource and provides a short description</i></p> <p><i>2: User provides the additional attributes of the request to MConnect to ensure the requests submitted later are valid for example by referencing e-APL system as a source of the request</i></p> <p><i>3: User provides where the external resource details can be obtained (Get)</i></p> <p><i>4: User provides the optional service endpoints to create new items, to list APL items, to update and to delete items</i></p> <p><i>5: System validates the above service endpoints all point to MConnect resources</i></p> <p><i>6: User provides the Redirect service endpoint where advanced functionality will be offered by the eService Web UI</i></p>
<p>Combine APL (local) resource US203</p>	<p>As a System administrator I want to combine existing (external resources) into new semantic combinations in order to enhance e-APL capabilities and the activity of APL representatives.</p> <p>For example:</p> <p>- task assignment resource can combine FOD requests with APL representatives and an assignment (set of) attribute(s). This resource can be used by APL to assign requests to different representatives and track execution status.</p> <p>System administrators perform this task in order to ensure that all APL are using similar resources. Alternatively, APL administrators can be allowed to do the same and combine internal resources.</p> <p>Main actions</p> <p><i>1: User provides clear and unambiguous names and descriptions to local resources</i></p> <p><i>2: User lists the data fields of the resource and their data types</i></p> <p><i>3: System allows some data fields of a local resource to contain a set of Key Attributes (separated by coma/space combo)</i></p> <p><i>4: System ensures duplicate resources are not allowed in the system</i></p>

ID	Description
<p>Maintain local resource US206</p>	<p>As an e-APL administrator I want to define new resources within my APL jurisdiction (not visible to other APLs).</p> <p>Such resources allow loading batches of items from a CSV spreadsheet and subsequent manual entry by APL representatives.</p> <p>Main actions</p> <p><i>1: User names unambiguously the local resource when creating it and specifies the data fields and their types</i></p> <p><i>2: User adds items to the resource manually or by uploading a spreadsheet for example in the form of a CSV file</i></p> <p><i>3: System validates that the required data fields are provided and the values are of the correct type, especially for values representing Key Attributes</i></p> <p><i>4: System validates that the columns in the spreadsheet match those in the resource definition (except for the protected columns such as identifier, change date/time, author)</i></p>
<p>Review/Navigate APL resources US207</p>	<p>As an APL representative I want to use various ways to organize (large) number of APL resources in order to easily spot and work with those resources</p> <p>. Facilities used for this include:</p> <ul style="list-style-type: none"> • New resources - allowing users to spot when new resources have been defined by themselves or their colleagues. • Favorite - allowing users to specifically mark some of the resources for easy access in a designated section of the UI but also by highlighting them accordingly in larger lists. • Bookmark - allowing users to save resources • Most active today/weekly - listing resources with most activity by all APL representatives in the last 1/7 days. • Archived - allowing users to hide resources that are no longer used on a daily basis <p>More options might be available here - tags, APL favorites, important...</p> <p>The system uses the above to shortlist and highlight resources that are relevant within APL or user's context.</p>
<p>Self-register APL account US204</p>	<p>As an e-APL administrator I want to use e-APL self-registration facilities to initialize my APL's account. Initialization of APL account takes place only during the adoption of e-APL. Later on, APL accounts persist across election cycles when other elected officials take administrative roles. Subsequent changes to APL representatives lists will ensure access to the account. e-APL system itself ensures continuity of an APL's data.</p> <p>Mayors of an APL is assumed to be listed as the Administrator of the organization with a specific IDNO.</p> <p>When the APL is not yet an e-APL participant its Mayor:</p> <ul style="list-style-type: none"> - login with MPass in e-APL - e-APL will notice that Mayor IDNP response includes IDNO where they are administrators

ID	Description
	<p>- if an account for this IDNO does not exist - we prompt them to create one following a declaration by the user that they indeed are the Mayor of an APL and that abuse will be investigated accordingly.</p> <p>Main actions</p> <ul style="list-style-type: none"> 1: User navigates to e-APL account page 2: System identifies user and detects that they are an elected official of an APL without e-APL account 3: System offers user to register an APL account 4: User confirms their intent to register APLs account 5: System prompts user to confirm their acceptance of the e-APL terms and conditions 6: User accepts the terms and conditions 7: System journals event with MLog 8: System prompts user to provide further APL account details including for example their contact details where MNotify will forward notifications addressed to the APL, bank/treasury account(s) where MPay will debit/credit the payments, their postal addresses where MDelivery will collect or deliver packages etc. 9: User provides the available data and continues 10: System creates APL account and persists the provided data 11: System displays and prompts user to review/adjust the jurisdiction data of the APL they represent i 12: User reviews and makes adjustments as appropriate 13: System persists user changes 14: System journals event with MLog 15: System displays and prompts user to subscribe to available e-APL resources 16: System displays and prompts user to appoint APL representatives
<p>Subscribe resource US205</p>	<p>As an e-APL administrator I want to subscribe to resources available in e-APL in order to allow my APL to use them too. Once subscribed they are available to authorized APL representatives to capture data and information as needed.</p> <p>Main actions</p> <ul style="list-style-type: none"> 1: User reviews full list of e-APL resources 2: User marks some of the resources the APL does not yet subscribe and subscribes them 3: System highlights subscribed resources and does not allow further changes to these 4: System allows pagination, filtering and sorting of the resource list 5: Once a new resource is subscribed it is added to the APL subscribed resources and at this stage APL representatives are able to work with items within their jurisdiction

MPass capabilities

To enable e-APL functionality a series of capabilities regarding APLs and APL representatives management are carried out within both e-APL (user interface) and MPass.

ID	Description
<p>Setup APLs and their elected officials US301</p>	<p>As a CEC representative I want to maintain the list of APLs and their elected officials.</p> <p>Note: Initially e-APL is configured with a current list of APLs and their elected officials by means of a bulk data import.</p> <p>Subsequently CEC representative make adjustments as required. It should be noted that again a bulk import facility can be used except it will include a shorter list of items to load and store.</p> <p>It should be pointed out that this covers:</p> <ul style="list-style-type: none"> • APL from an organizational perspective • elected officials • APL jurisdiction in the form of territorial codes but also sets of people, organizations, buildings, terrains and other objects. The jurisdiction is represented by a set of key attributes. <p>Main actions</p> <p><i>1: User navigates to MPass (or e-APL) APL maintenance</i></p> <p><i>2: System validates user is authorized to access the resource</i></p> <p><i>3: System displays the list of existing APLs according to filter and sorting criteria</i></p> <p><i>4: User navigates to a particular APL in the list and updates as needed its attributes such as Name and parent, the identifier of the elected official or jurisdiction sets. User submits changes.</i></p> <p><i>5: System validates changes and persists them.</i></p> <p><i>6: System journals action above with MLog</i></p> <p><i>7: System notifies APL (or its administrator) regarding changes via MNotify</i></p>
<p>Sync APLs and their elected officials US302</p>	<p>As a CEC representative I want to manage records regarding administrative units and their elected officials using CEC operated SAISE systems without the need to manually reflect this information in MPass or e-APL.</p> <p>Note: The list of APLs and their elected officials is maintained by Central Electoral Commission which operates SAISE. This system can provide the information regarding the current list of APLs and their elected officials.</p> <p>Main actions</p> <p><i>1: CEC/SAISE provides the APL/APL elected official resources via MConnect</i></p> <p><i>2: MPass on a daily basis (configurable) syncs its APL/APL elected official data via MConnect</i></p> <p><i>3: Sync results are logged with MLog</i></p> <p><i>4: System administrator is notified via MNotify if a sync job failed</i></p>
<p>Setup APL identity attributes US303</p>	<p>As an e-APL integrator I want to designate and coordinate with MPass a series of APL specific identity attributes. These will be subsequently assigned within e-APL to APL representatives by APL administrators. The identity attributes are used</p>

ID	Description
	<ul style="list-style-type: none"> • within e-APL to make access and authorization decisions • by MPass to intermediate access of APL representatives to external services • by external resource suppliers to make access and authorization decisions
<p>Manage APL representatives US304</p>	<p>As an e-APL administrator I want to designate the authorized personnel of the APL including their roles. It is preferable that I use e-APL UI directly even though the records are managed by MPass.</p> <p>Main actions</p> <p><i>1: User navigates to APL representatives administration</i></p> <p><i>2: System validates user is authorized to access the resource and the APL they represent</i></p> <p><i>3: System lists the APL representatives of the identified APL according to filtering and sorting criteria</i></p> <p><i>4: User adds APL representative by providing their IDNP and submits. Alternatively User enables/disables/removes existing APL representatives.</i></p> <p><i>5: System loads Name and Surname of the provided IDNP, displays it to user and prompts to confirm request</i></p> <p><i>6: User confirms submission</i></p> <p><i>7: System persists the APL representative changes</i></p> <p><i>8: System journals action with MLog</i></p> <p><i>9: System notifies APL representative regarding the change with MNotify</i></p>
<p>Assign APL roles US305</p>	<p>As an e-APL administrator I want to set what roles each of the APL representatives holds within e-APL.</p> <p>Main actions</p> <p><i>1: User navigates to APL representatives management</i></p> <p><i>2: System validates that user has e-APL administrator privileges/role</i></p> <p><i>3: System provides the paginated, sortable and filterable list of APL representatives for the APL the e-APL administrator represents during this session</i></p> <p><i>4: User sets the roles of APL representatives within their APL</i></p> <p><i>5: System does not allow changing the Elected Official role/privilege</i></p> <p><i>6: System persists user changes to APL representatives roles/privileges</i></p> <p><i>7: System logs each APL representative role changes with MLog</i></p> <p><i>8: System notifies APL elected official regarding role/privilege changes of APL representatives</i></p>
<p>Authenticate/auth orize users US306</p>	<p>As and APL representatives I want to login with MPass and be subsequently recognized as:</p> <ul style="list-style-type: none"> • mayor by the fact that they are the administrator of the APL IDNO • other representatives - since they are listed as an APL representatives. <p>When a person fits multiple such criteria they are required to choose which of the roles they will take during the session. They need to logout in order to be prompted again this option.</p>

ID	Description
	<p>Main actions</p> <p><i>1: MPass validates user identity and includes the required identity attributes in user's token</i></p> <p><i>2: User navigates to e-APL and is recognized as an APL representative with their assigned roles</i></p> <p><i>3: System denies access to users that have not been authenticated by MPass or do not have any APL permissions</i></p> <p><i>4: System does not require authentication on its public pages</i></p>
<p>Facilitate redirect to eService US307</p>	<p>As an APL representative I want to transparently be granted access within external services where those objects lay within my APL jurisdiction.</p> <p>The redirect capability of e-APL to navigate to source eServices of the resources they maintain.</p> <p>The redirect capability relies on the following working together:</p> <ul style="list-style-type: none"> • e-APL web interface and user's web browser • MPass redirect token authenticity • MPass additional identity attributes for the resource/host eService • eService web interface and user's web browser to capture and automatically validate/authorize the redirected APL representative.

Value added services

This section lists capabilities of e-APL that are exposed to end users or applied automatically in order to help APL representative carry out their work.

ID	Description
<p>Review e-APL terms and conditions US501</p>	<p>As an APL representative I want to review e-APL</p> <ul style="list-style-type: none"> • terms and conditions and also • quick help materials in order to understand what the system can offer. <p>Terms and conditions can be reviewed by all APL representative for their information. It must be pointed out that terms and conditions might change in the future and when such changes happen besides APL representatives being notified regarding the change they will be allowed to review the full text again.</p> <p>Quick help materials are also listed on publicly accessible pages of e-APL. Note that for example video materials can be hosted on video streaming platforms and are only linked/embedded in e-APL.</p> <p>Main actions</p> <p><i>1: System maintains a series of publicly accessible informative pages that can be consulted by all, including pages with terms and conditions or training materials.</i></p>
<p>Review adoption by APLs US502</p>	<p>As an APL representative I want to review publicly facing pages of e-APL that includes up to date statistics regarding e-APL adoption by other APLs in the country.</p> <p>The data includes values like:</p> <ul style="list-style-type: none"> • number of APL accounts in the system

ID	Description
	<ul style="list-style-type: none"> • number of total possible accounts in the system • number of active accounts. Active are the accounts for which at least on APL representative accessed any information via e-APL during the last 10 days • number of APL representatives total and distributed by APL • number of active APL representatives - total and distributed by APL. Active are the users who accessed e-APL in the last 5 days • number of external/local/total resources subscribed/maintained by APL grouped by APL <p>Full list of possible stats like these will be agreed upon during development. The stats is presented in table form with pagination and sortable by column. At the end of the day these stats are published on date.gov.md to enable historical data analysis.</p> <p>Main actions</p> <p><i>1: System keeps a series of statistical indicators regarding e-APL adoption and use by all APLs in the country</i></p> <p><i>2: User navigates to adoption statistics and reviews both current values but also past values for reference</i></p> <p><i>3: System provides the periodical statistics regarding e-APL adoption to date.gov.md for further reference by researchers or the public</i></p>
<p>Review resource availability for APLs</p> <p>US503</p>	<p>As an APL representative I want to review publicly facing pages of e-APL that include up to date statistics regarding resources integrated in e-APL and available for APLs.</p> <p>The data includes values like:</p> <ul style="list-style-type: none"> • number of external/local/total resources • distribution of resources based on their main e-APL requirements - inventory, read, create, update, redirect to source <p>Full list of possible stats like these will be agreed upon during development. The stats is presented in table form with pagination and sortable by column. At the end of the day these stats are published on date.gov.md to enable historical data analysis.</p> <p>Main actions</p> <p><i>1: System keeps a series of counters regarding resources and the level of their availability within e-APL. The stats include counters regarding individual resource use</i></p> <p><i>2: User reviews latest and historical values on e-APL public pages</i></p> <p><i>3: System periodically adds these stats to date.gov.md for further reference</i></p>
<p>Sign excerpt of resource item</p> <p>US504</p>	<p>As an APL representative I want to easily produce and electronically sign with MSign an excerpt of an informational item based on:</p> <ul style="list-style-type: none"> • APL name and IDNO • current date • resource name

ID	Description
	<ul style="list-style-type: none"> • all item key attributes • a choice of item non-key attributes • a free text part provided by the user <p>The excerpt is presented in the form of a PDF with the option to sign it with MSign.</p> <p>The signed PDF excerpt is attached to the item and end users are able to download and pass the signed document to other systems or to persons who need it.</p> <p>The attachment is available to be included in the notifications sent for this resource/item.</p>
<p>Notify on APL topics US505</p>	<p>As an APL representative I want to easily notify via MNotify the contacts of the informational items I chose in order to facilitate and trace APL communication with its constituency.</p> <p>It should be noted that this facility can target a single notification but also notifications across a range of selections. APL representatives can select a full page, a full list of items and notify all of them at the same time.</p> <p>Further capabilities offered by MNotify are exposed to APL representatives in order to allow them to customize better their communication.</p>
<p>Generate payment order US506</p>	<p>As an APL representative I want to easily create payment orders and assign them identifiers as accepted by MPay in order for the actual payments to be made in designated APL bank/treasury accounts.</p> <p>These identifiers will be used to trace back the payments to APLs who issued the payment order with the following repercussions:</p> <ul style="list-style-type: none"> • payment orders are identified as part of local resources and matched to payments thus allowing APL representatives to track the status of the items. • payments are made into the designated APL bank/treasury accounts
<p>Accept payment US507</p>	<p>As and APL representative I want to see what payment orders issued via MPay have been paid or at least have the option to manually reference such a payment in order to trace progress of payments made by our constituency.</p> <p>e-APL integrates with MPay and payments that target APL bank/treasury accounts or payments that match previously issued APL payment orders are automatically updated to reflect the changes.</p> <p>Of note is that APLs will continue to receive payments outside e-APL system (traditionally) and there will be an ability for APL representatives to manually update the records regarding payment orders and payments made.</p>
<p>Journal business actions with MLog US508</p>	<p>As MLog I want to trace all business relevant events made within e-APL.</p> <p>MLog journals APL representative actions and changes with MLog.</p> <p>Journal events include details about</p> <ul style="list-style-type: none"> • date/time of the event • APL representative

ID	Description
	<ul style="list-style-type: none"> • the fact that the action/change was intermediated by e-APL system • the nature of the action/change carried out
<p>Set key attribute of local resource</p> <p>US509</p>	<p>As an APL representative I want to convert some of APL local data to reference Key Attributes and avoid maintaining redundant data locally.</p> <p>Note that local resources are created without country-wide identifiers such as IDNO, IDNP, Fiscal code, CUATM, Cadastral code, Vehicle number etc.</p> <p>Still, local resources can potentially refer such identifiers since the local records refer in some way to country-wide resources, persons or other types of objects.</p> <p>APL representatives can pinpoint a specific attribute of the local resource as representing one of the country-wide identifiers. This is allowed when all the values within that local resource do comply with key attribute value format and actually represent a known resource.</p>
<p>Display item details on mouse over key attribute</p> <p>US510</p>	<p>As an APL representative I want to see details regarding the informational object identified by a Key attribute value, for example:</p> <ul style="list-style-type: none"> • for IDNP a person's name, surname and date of birth is shown • for IDNO an organizations shortname and headquarters address is shown • for a vehicle registration its make, year and colour is shown <p>The details are retrieved from key attribute owners at the moment of request. The request is triggered for example on prolonged mouse over event or by clicking a "lookup" icon.</p>

Annex 2. Technical Requirements

Technology stack

ID	Description
<p>Required technology stack</p> <p>NFR001</p>	<p>To preserve e-Government investments, the solution shall be developed using the latest versions of the following technology stack:</p> <ul style="list-style-type: none"> • Programming language is C#. • ORM is Entity Framework Core. • Web framework is ASP.NET MVC Core. • UI framework is Bootstrap. • UI component framework is Blazor. • Package manager for components is NuGet. • RDBMS is SQL Server. • Container orchestrator is Kubernetes. • Caching server and session store is SQL Server or Redis. <p>During the development process the Consultant or the Client may propose use of additional components required for the development and proper functionality of the solution in production. Upon the Client’s approval of such components, the costs for these shall be added through amendments to the contract.</p>

Architecture requirements

ID	Description
<p>Open standards</p> <p>NFR010</p>	<p>The solution architecture shall be based on relevant open standards. The solution architecture shall not use proprietary standards.</p>
<p>Service Oriented Architecture</p> <p>NFR011</p>	<p>The solution shall be based on a Service Oriented Architecture.</p>
<p>Hosting environment</p> <p>NFR012</p>	<p>The solution shall not include any hardware components and will be deployed on governmental cloud environment (MCloud).</p>
<p>Running environment</p> <p>NFR013</p>	<p>System shall run as container instances and shall not depend on specific host OS instance. Building container images shall be automated.</p> <p>Running in a container-based environment, the application must be elastic, including when adding/removing application container instances (above minimum required instances for HA), changing of configurations and system parameters has no impact on any work in progress, such as any active sessions, requests, etc.</p>
<p>Multiple sites</p> <p>NFR014</p>	<p>The solution architecture shall ensure high availability including during new versions deployment and the possibility to run simultaneously on multiple sites</p>

ID	Description
Browser compatibility requirements NFR015	The system shall be compatible with latest two major versions (to be considered at the time of system acceptance) of following web browsers: Chrome, Safari, FireFox and Edge.
API for integration with governmental platform services and third-party systems NFR016	<p>The system shall expose API for core functionality to be consumed by governmental platform services (at least for MPass, MConnect, MCabinet and MAccess) and by third party systems.</p> <p>The full list of logically applicable APIs and their format will be detailed during analysis and design stages.</p>
Detailed data model NFR017	<p>System's detailed data model shall be described fully in a machine-readable data scheme for example using a DDL language for relational databases.</p> <p>The Consultant shall coordinate the detailed data model schema format with the Client in advance.</p>

Documentation and Training

ID	Description
User Documentation NFR020	<p>The Consultant will prepare and deliver the following documentation for end-users:</p> <ul style="list-style-type: none"> • Interactive guidance included in user interface adjusted to user role • Downloadable user manuals in PDF format by user role • Downloadable user manual for system Administrators in PDF format <p>All end-user documentation will be provided in Romanian.</p>
How-To tutorials NFR021	<p>The Consultant will prepare How-To tutorials for system's main functions.</p>
Technical documentation NFR022	<p>The Consultant will prepare and deliver the following technical documentation:</p> <ul style="list-style-type: none"> • System architecture documentation (including description of models in UML language, which will include a sufficient level of details of the system architecture) • Test strategy • Compilable and documented source code for applications, components and unit tests developed within the project • System installation and configuration manual (including code compilation, container image build scripts, system installation, hardware and software requirements, platform description and configuration, backup and disaster recovery procedures) <p>All technical documentation will be provided in English.</p>
API documentation	<p>The Consultant will prepare and deliver:</p> <ul style="list-style-type: none"> • API integration guide

ID	Description
NFR023	<ul style="list-style-type: none"> • Integration samples in .NET and Java • Human and machine-readable description in a standard description language (e.g. WSDL or Swagger).
Training sessions NFR026	<p>The Consultant will provide on-line training sessions using developed e-learning modules for the following target groups:</p> <ul style="list-style-type: none"> • System Administrators from eGA and STISC. • 2 groups of 7-12 APL representatives.
Training materials NFR027	<p>Training documentation – curricula, training courses (manuals, video tutorials, quizzes, etc.) for administrators, services providers and end-users (individuals and businesses) developed in e-learning platform based on Moodle.</p> <p>All training content/materials will be provided in Romanian.</p>

Licensing and rights

ID	Description
Perpetual software license NFR030	<p>The Consultant grants to the Client the rights to run and use entire solution with all included software components with no constraints on time, location and offered functionality.</p>
Redistribution rights NFR031	<p>The Consultant shall grant to the Client the right to re-distribute the solution. While the Client does not intend to re-distribute at a massive scale it still envisions the need to transfer the software solution to another state agency due for example to potential reorganization. Also, the Client might get the opportunity to re-deploy the entire e-Government platform elsewhere.</p>
Full data rights NFR032	<p>The Client keeps full rights on data created by the means of this solution.</p>
Open data format NFR033	<p>The solution preserves the data in an open format or includes mechanisms to extract data from the system in an open format thus enabling the capability to transfer/migrate the data into another system.</p>

System integration

ID	Description
Governmental platform services integration NFR040	<ul style="list-style-type: none"> • MPass shall be used to authenticate users. • MSign shall be used to sign and verify electronic signatures. • MLog shall be used to journal business critical events. The events that are business critical will be defined at analysis and design stages and must be configurable. • MNotify shall be used for notifications. • MPay is used to request and accept payments.
Third party systems	<p>e-APL Core will be integrated with state e-Services and third-party information systems.</p>

ID	Description
integration NFR041	The integration with any registry or external information system will be implemented through MConnect.
Open data integration NFR042	The system shall publish agreed sets of data to Open Data portal located at date.gov.md using its API.

System maintenance

ID	Description
System logs NFR050	The system shall log its various actions and events in a structured manner. Logging shall be configurable and based on extensible logging framework (such as log4net, nlog, etc.). Logging framework shall minimally support JSON format and the following targets: console, rolling files, UDP and HTTP POST.
Log levels and event log records NFR051	The system shall differentiate events and actions it logs into at least following levels: Critical, Error, Warning, Info, Debug Critical and Error level events shall be logged only for non-recoverable error that require human intervention. Event log records will include at least: <ul style="list-style-type: none"> • the type of the event • timestamp when the event took place • event level • system component that produced the event • user/user agent, IP that triggered the event • information object identifier affected • textual details about the produced event
Graceful shutdown NFR052	The system shall implement graceful shutdown, i.e. shutting down an application container instance at any time shall not impact any work in progress, such as any active sessions, requests, event logs, etc.
Source code NFR053	The Consultant shall supply all the source code for system components that are not available as COTS from third parties. The source code shall use package managers for dependencies to 3rd party libraries. All prerequisite software must be part of container image definition and based on public container repository
System deployment NFR054	The Consultant shall supply the deployment procedure and supporting tools for this. Deployment procedure shall cover all the prerequisites before proceeding to system installation. The deployment shall be automated and include database structure initialization and seeding.
System upgrades NFR055	System upgrades shall be automated, including database upgrade/downgrade scripts or code. To enable rolling upgrades in production environment, the recommended practice is to perform database breaking changes in incremental changes.

System performance

ID	Description
Asynchronous processing NFR060	System shall use asynchronous processing whenever possible to perform any input-output.
Background uploads NFR061	The system often uploads/accepts very large archival packages. These should be performed in background without blocking subsequent user interaction with the system.
Concurrent users NFR062	The system standard load and performance shall be guaranteed for 250 concurrent human users.
Concurrent system requests NFR063	The system shall be designed to respond (via API requests) to at least 100 concurrent external system requests.
Response time NFR064	Response time for system functions shall be under 3 (three) seconds. The Consultant shall list the exceptions, if any, and discuss/agree them with the Client at analysis and design stages. One notable exception is uploading large archival packages (which is serviced in the background).
Daily transactions NFR065	The system shall be designed to process at least 10000 transactions per day.
Key performance Indicators NFR066	The system shall meter and expose its key performance indicators. The Consultant shall propose the list of indicators and discuss/agree them with the Client.

User Interface requirements

ID	Description
Multilanguage User Interface NFR070	The system shall support multilanguage user interface. This support includes data type specific formats (such as date, time, time spans, currencies, etc.). The system will be delivered with at least Romanian and English interfaces. The default language shall be the Romanian.
User Interface accessibility NFR071	User interface shall conform at least to Level A of Web Content Accessibility Guidelines 2.0. https://www.w3.org/TR/WCAG20/
Responsive/Adaptive design NFR072	The system user interface shall automatically adapt to various display resolutions. Minimal display width is 480px. The system's UI shall be implemented using progressive web application (PWA) technologies and shall be functional on mobile devices.

ID	Description
Contextual help NFR073	User Interface elements shall include Tips and Hints for user interface elements.
Client support NFR074	All pages shall include client support contacts.
Bookmarks NFR075	All major pages shall be bookmarkable and the User shall be able to access bookmarked pages later. The bookmarkable pages will be defined at analyzing stage.
Friendly URLs NFR076	The system shall use friendly URLs for accessing its pages.

Information Security requirements

ID	Description
Secure by design NFR080	The system shall be secure by design and comply with the relevant requirements specified in GD 201 from 28.03.2017 (http://lex.justice.md/md/369772/).
Security design documentation NFR081	The Consultant shall supply documentation describing design of security features and supporting evidences that such a design is secure. Note that the Consultant will coordinate with the Client the format of the documentation, supporting evidence and list of requirements to comply with.
Least privilege principle enforcement NFR082	The system's components shall rely on the least privilege principle and run under such a limited privilege account under the OS rights model. The documentation shall highlight each of the system's components required privilege level and considerations that force use of that level or access.
Secrets and addresses NFR083	Secrets (passwords, private keys and certificates, connection strings) and addresses of external services shall be clearly delineated in configuration documentation and easily modifiable via automated scripts.
Secure communication channels NFR084	All system's communication with external systems or users takes place over encrypted communication channels.
No Username/Password authentication NFR085	The system shall rely on authentication via MPass. Other forms of user authentication shall not be used.
Minimize personal information storage NFR086	The system shall minimize the amount of personally identifiable information stored. For example, there is no need to store a user's First and Second names since this will be provided after authentication by MPass. The system shall comply with the relevant requirements related to personal data

ID	Description
	processing specified in GD 1123 from 14.12.2010 (http://lex.justice.md/md/337094/) Note that the Consultant shall coordinate with the Purchaser the list of requirements to comply with.
Secure against OWASP Top 10 vulnerabilities NFR087	The system shall include security controls for all its components for at least OWASP Top 10 vulnerabilities. Refer https://www.owasp.org/index.php/Category:OWASP_Top_Ten_Project
Health-check API NFR088	The system shall expose readiness and health-check API via a HTTP GET requests. The health-check shall check the health of as many system components as possible. In case of health check error, a human-readable error message shall be returned.
Users' roles management NFR089	The users and their roles will be managed in MPass. The system shall retrieve the users' roles from MPass.
Session expiration NFR090	The system shall include a session expiration mechanism when after a specific period of inactivity, the user is required to authenticate again. The period of inactivity shall be configurable and by default it is 15 mins.
Authorized access to personal content NFR091	Users are granted access to content designated as belonging to them. Content belongs to a user if it has been assigned/addressed to their personal IDNP.
Input validation NFR092	All input data shall be validated on client and server side.
User content NFR093	User content can be captured in text format only. The system shall forbid entry of special characters used for formatting and markup of special Web content. Otherwise all UNICODE characters shall be possible to enter/view by system's components.
Unauthorized access attempts NFR094	When the system registers unauthorized access attempts it shall: <ul style="list-style-type: none"> • log such attempts with at least ERROR level • provide users with a warning message that access is not authorized and that abuse will be investigated
Data integrity NFR095	The Consultant will ensure data integrity by providing appropriate solution for prevention of unauthorized internal activities (for ex. deletion of records directly from database).

Warranty and support

ID	Description
Support	During the warranty period the Consultant shall provide necessary technical

ID	Description
NFR100	assistance to the Client
Warranty fixes NFR101	<p>During the warranty period the Consultant shall:</p> <ul style="list-style-type: none"> • fix all defects reported by the Client; • solve all incidents reported by the Client according to the agreed SLAs; <p>Note: The response and resolution time shall not exceed 8 hours for non-critical defects and 1 hour in case of critical defects.</p> <p>The incidents shall be solved within 2 working days for non-critical incidents and within 4 working hours for critical incidents starting from escalation time. Hourly progress report will be provided for critical items.</p>

Annex 3. Legal and regulatory framework

The legal and normative context governing e-APL design and operation shall conform with:

1. Law 982/2000 regarding access to information;
2. Law 435/2006 regarding administrative decentralization;
3. Law 436/2006 regarding local public administration;
4. Law 71/2007 regarding registers;
5. Law 239/2008 regarding decisional processes transparency;
6. Law 133/2011 regarding personal data protection;
7. Law 91/2014 regarding electronic signature and electronic document;
8. Law 100/2017 regarding normative acts;
9. Law 151/2017 regarding addresses system;
10. Law 142/2018 regarding data exchange and interoperability;
11. GD 710/2011 regarding Strategic program of technological modernization of governance (e-Transformation);
12. GD 656/2012 regarding Interoperability framework program;
13. GD 1090/2013 regarding governmental electronic service of authentication and access control (MPass);
14. GD 128/2014 regarding the governmental shared technological platform (MCloud);
15. GD 405/2014 regarding integrated governmental electronic service of electronic signature (MSign);
16. GD 701/2014 regarding the methodology for publication of governmental open data;
17. GD 708/2014 regarding governmental electronic service for logging (MLog);
18. GD 201/2017 regarding minimal mandatory requirements of cybernetics security;
19. GD 1141/2017 regarding Regulations for application of electronic signatures on electronic documents by personnel of public sector organizations within their electronic flows;
20. GD 414/2018 regarding measures for data center consolidation in the public sector and for rationalization of state information system administration;
21. GD 211/2019 regarding interoperability platform (MConnect);
22. GD 376/2020 regarding concept of governmental electronic notification service (MNotify);
23. GD 1123/2010 regarding approval of requirements for securing personal data during their processing by informational systems

Annex 4. Terms and abbreviations

Term or abbreviation	Details
API	Application Programming Interface
APL	Abbreviation of Romanian "Administratia Publica Locala" - Local Public Administration.
CEC	Central Electoral Commission
COTS	Commercial off-the-shelf
CSV	Comma Separated Value
GD	Government decision
HA	High Availability
HTML	HyperText Markup Language
HTTP	HyperText Transfer Protocol
HTTPS	Secure HTTP
IDNO	National organization identification number
IDNP	National personal identification number
IS	Information System
ITISS	Information Technology and Information Security Service of Moldova, stisc.gov.md
JSON	JavaScript Object Notation
eGA	Moldova eGovernance Agency, egov.md
KPI	Key Performance Indicator
LPA	Local Public Administration. (see also APL).
NCPDP	National Center for Personal Data Protection of Moldova

ORM	Object-Relational Mapping
OS	Operating System
OWASP	Open Web Application Security Project®, owasp.org
PDF	Portable Document Format
PWA	Progressive web application
RDBMS	Relational Database Management System
SAISE	State Automated Information System "Elections"
SDLC	Software Development Lifecycle
SLA	Service Level Agreement
SQL	Structured Query Language
TOR	Terms of Reference
UDP	User Datagram Protocol
UI	User Interface, mostly the Web based User Interface
UML	Unified Modelling Language
URL	Unified Resource Locator
US	User Story
XSS	Cross Site Scripting