Terms of Reference

Modernization of Government Services in the Republic of Moldova Project ID No. P148537

CONSULTING SERVICES FOR THE DESIGN, DEVELOPMENT, CONFIGURATION AND DEPLOYMENT OF INFORMATION SYSTEMS (e-SERVICES) AND THEIR INTEGRATION WITH BACK-OFFICE SYSTEMS OF THE PUBLIC SERVICE PROVIDERS

1. 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 2016-2020[1], 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 objectives of the Government of Moldova for inter-sectorial digitalization 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.

This year, the new Executive issued its governing National Development Plan 2023 – 2025[2] that sets modernization of administrative services and access of population to electronic public services as one if its major objectives. The recently approved Public Administration Reform Strategy 2023 – 2030[3] 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. The last, but definitely not the least, the Government Action Plan for 2023[4] through its envisaged actions counts on MGSP support to continue expanding the development of electronic services and digital transformation at various inter-sectorial level.

Therefore, 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

[1] http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=366209
[2] HG89/2023 (legis.md)
[3] HG126/2023 (legis.md)
[4] HG90/2023 (legis.md)

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 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 digitalize 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 of the core e-Governance Agency team.

Current situation in the sector

One of the key activity areas of EGA is development of electronic services for the citizens and businesses. To simplify access to public services, including electronic services provided by state agencies, in 2012, EGA developed and launched the Public Services Portal (servicii.gov.md), where visitors can find description of public services, list of required documents, opening times, costs and durations of issue, contact data and sample application forms. In 2014, the Government of the Republic of Moldova established, by GD 717/2014, the Enterprise Content Management Platform (RO: Platforma Guvernamentală de Registre și Acte Permisive – PGRAP), which aims to provide a simple solution for digitizing state registers and public services. However, currently many public service providers still do not provide their services online. Main impediments to the digitization of public services are the lack of service development capacity of service providers and the exaggerated complexity and instability of their internal processes. As result the reengineering and digitization of SP back offices takes a lot of time, often involving adjustments to the related legal framework while the consumers still have limited or no possibility to be served online.

In 2023 the ECMP has been upgraded with a framework (FOD – Front-office digitalization) which allows simple and flexible development of front-office functionalities for citizens and the business to be able to interact with Service Providers, including with the possibility to pay online and / or apply the electronic signature, as appropriate, even if Service Providers do not have their back-office information systems digitized, as necessary.

The FOD is a framework containing a collection of visual components and integration libraries that enables rapid design and development of front-office for digital government services. FOD components are designed to be oriented to user experience. The main beneficiaries of services developed based on FOD are citizens, businesses, and foreigners. FOD includes components which are used to easily configure and develop thin back-office for governmental service providers. Also, FOD could be integrated with existing service provider back-offices through API.

The FOD has been developed based on the following technology stack:

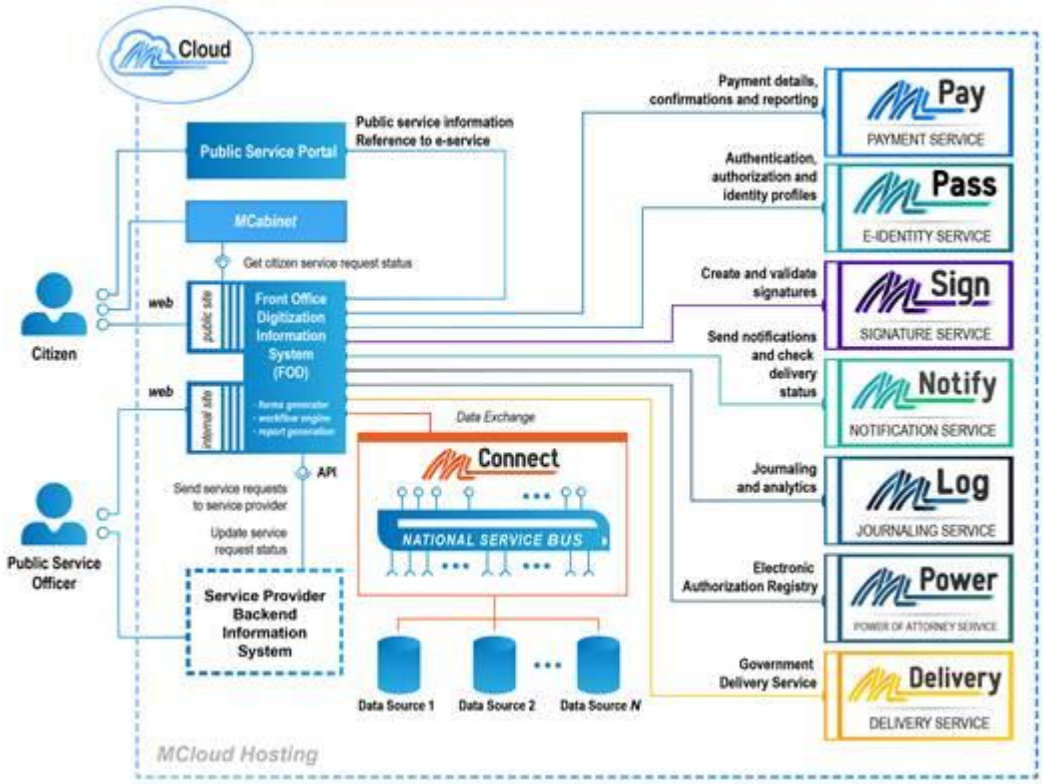
- The programming language is C#.
- ORM is Entity Framework Core.

- The 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.
- Package manager for Kubernetes is Helm.
- The monitoring system is Prometheus.
- The logging stack is Fluent Bit, Elasticsearch and Kibana

The FOD includes integration blocks with all Governmental Platform Services:

- MPass – for authentication and authorization (https://mpass.gov.md)
- MSign – for electronic signature (https://msign.gov.md)
- MPay – for electronic payments (https://mpay.gov.md)
- MNotify – for electronic notifications (https://mnotify.gov.md)
- MLog – for logging of business events
- MPower – for digital power of attorney (https://mpower.gov.md)
- MDelivery – for delivering the results of provided public services (https://mdelivery.gov.md)
- MConnect – for data exchange with third party information systems including state registers (https://mconnect.gov.md)
- MCabinet – for service application requests status monitoring and electronic documents downloading (https://mcabinet.gov.md)

The FOD components description is publicly available on (https://fod.live.egov.md). Access to the FOD component packages will be provided by EGA.



2. Objective of the Assignment

The Objective of this assignment is to digitalize a list of services using FOD framework for front-office digitalization and development of Back-office systems if necessary (indicative list of services' groups is provided in **Annex 4**).

3. Scope of work and Development approach

The scope of work of this assignment is to design, develop, configure, and deploy e-services using FOD framework as a fully functional information systems with all functionalities in place, according to the specifications iteratively defined by the Client (the indicative set of requirements applicable for each e-service is listed in **Annex 1** and **Annex 2**) and following the development approach described below.

The development of the e-services will follow agile iterative software development principles. Since there are many dialects of agile software development and to avoid misunderstandings, this section provides key principles to be used in 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 Own*er 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 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.

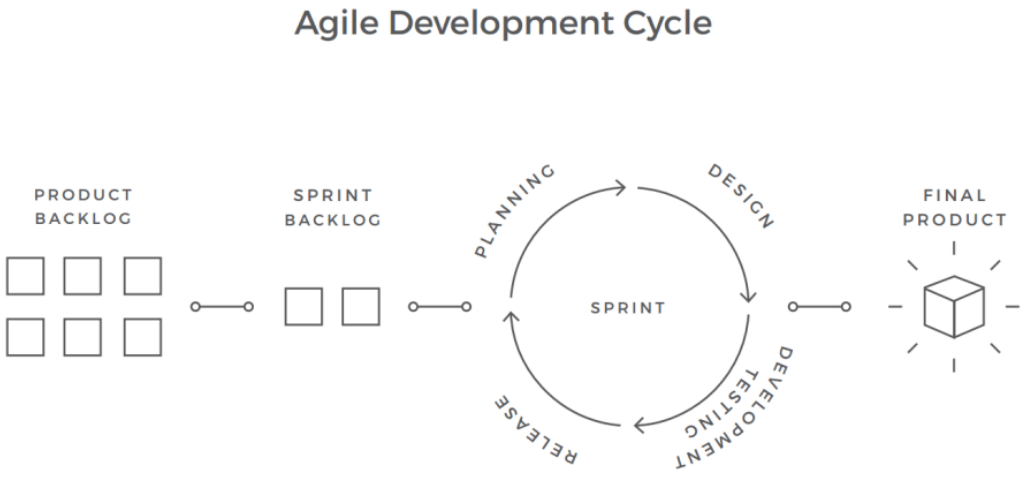


Figure 1. The indicative illustration of the Agile Development Cycle/Process

Warranty

The Consultant shall provide 3 months of warranty for the developed solutions. 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**.

Required technology stack
To preserve e-Government investments, the solution shall be developed using the latest versions of the following technology stack:

- 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.

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.

4. Expected Deliverables

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

1. **A fully functional e-services** with all functionalities developed and deployed according to the requirements defined by the Client during the assignment. The Consultant will deliver compilable and documented source code.
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 Annex 2.

5. 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;

6. 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*. The minimum estimated key experts' effort is 1450 working days.

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

7. 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 (workspace/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. All Consultant's Key Experts shall participate in the Kick-off meeting and initial Backlog discussion.

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.

8. 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:

- Key expert 1. *Team Leader / Senior software developer*
- Key expert 2, 3, 4, 5. *Software developer*
- Key expert 6. *Software Tester*

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 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:

Key expert 1. *Senior software developer, Team Leader*:
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 7 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.

Key Expert 2, 3, 4, 5. *Software developer***:**

- University degree in Computer Science or another relevant domain;
- At least 4 years' experience in software development;
- Participated in at least 2 software development projects in the last 3 years using agile approach;
- At least 2 years of experience in software development using C#, Entity Framework, ASP.NET Core and MS SQL Server;
- Experience using Blazor web framework is an asset;
- Certifications in any technology from FOD technology stack is an asset;
- Ability to communicate in Romanian or English.

Key Expert 6. *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.

Annex 1. Framework Business Requirements

This Annex describes the general functional requirements for each e-Service. The Functional Requirements are defined as User Stories. Each user story is described as a need of an identified user of e-Service.

e-Service Roles:

Anonymous Applicant – user, who can apply online for public services, receive notifications and monitor requested services processing without authentication. Anonymous Applicant will provide his/her specific data (such as IDNP, Name, Surname, Birth date, e-mail) to submit the application.

Applicant – authenticated user, who can apply online for public services, receive notifications and monitor requested services processing. The service application form will be pre-filled automatically with Applicant's specific data (such as IDNP, Name, Surname, Birth date, e-mail) which will be received from Applicant MPass profile.

Authorized Applicant – authenticated user, who acts on behalf of applicant (e.g., authorized person through MPower).

CUPS[5] **Operator** – authenticated user, who acts on behalf of applicant within a CUPS (e.g., City Hall or Consular office).

Service Provider Operator – authenticated user, responsible to process submitted applications related to a Service Provider in the framework Backoffice.

Service Provider Administrator – authenticated user, representing a Service Provider and managing Service Provider resources, including APIs and Operators.

App Developer – a Software Developer who develops and uses the framework reusable components to create/maintain applications.

Administrator – authenticated user responsible for administration of framework parameters, management, and monitoring of applications.

Anonymous Applicant

ID	Description
AP01	As an Anonymous Applicant I want to apply for a service using Captcha and providing all necessary data so that I can get a service online.
AP02	As an Anonymous Applicant I want to receive by provided e-mail a confirmation of my applications submissions and status so that I can monitor the progress of my applications.
AP03	As an Anonymous Applicant I want to cancel an application by email or phone providing application Code so that the Service Provider will stop providing the service.
AP04	As an Anonymous Applicant I want to pay for requested services using MPay so that I can pay online for services.
AP05	As an Anonymous Applicant I want to apply for a service which require authentication completing all data so that I can sign the request traditionally (handwritten) on service provider office.
AP06	As an Anonymous Applicant I want to provide feedback on using an e-service so that the user experience can be improved.
AP07	As an Anonymous Applicant I want to check validity of any document issued by the e-service platform developed using FOD so that I can check the validity of the printed documents.

Applicant

ID	Description
AP01	As an Applicant I want to authenticate in online interface using MPass so that I can apply online for a service.
AP02	As an Applicant I want to apply for a service providing only specific service data so that I can get a service online.

[5] CUPS (RO: Centru Universal de Prestare a Servicilor Publice)

AP03	As an Applicant I want to check my applications status so that I can monitor the progress of my applications' execution.
AP04	As an Applicant I want to be notified in MCabinet about my applications' execution progress so that I can monitor the execution progress of my applications.
AP05	As an Applicant I want to cancel an application so that the Service Provider will stop providing the service.
AP06	As an Applicant I want to pay for requested services using MPay so that I can pay online for services.
AP07	As an Applicant I want to provide feedback on my experience with the applications, including applications submitted through CUPS, so that the Service Providers can improve their services.
AP08	As an Applicant I want to express my consent with regards with being contacted in relation with my experience using the framework so that I can express my feedback.

Authorized Applicant

ID	Description
AP01	As an Authorized Applicant I want to apply for a service on behalf of an Applicant so that any person can apply for a service.
AP02	As an Authorized Applicant I want to confirm Applicant authorization by providing specific code (e.g., received by Applicant on phone) so that I can act on behalf of Applicant.
AP03	As an Authorized Applicant I want to search submitted applications by application code or Applicant IDNP I represent so that I can monitor the progress of submitted applications.

Service Provider Operator (SPO)

ID	Description
SPO01	As a Service Provider Operator, I want to submit applications on behalf of a Person using the same user experience as Applicants so that any person can apply for a service, I am responsible for. Note: mandatory for Service Providers who do not have their own Back-offices.
SPO02	As a Service Provider Operator, I want to access the list of applications for my services through a simple interface so that I can manage the applications.
SPO03	As a Service Provider Operator, I want to view the list of applications ordered and highlighted using color coding so that I can search and filter applications by Applicant, status, submitted date, delivery deadline and other attributes.
SPO04	As a Service Provider Operator, I want to receive configurable notifications on events regarding applications so that I can prioritize the processing of applications.
SPO05	As a Service Provider Operator, I want to configure notifications so that I can turn on/off notifications.
SPO06	As a Service Provider Operator, I want to set application processing progress so that the Applicant can monitor the progress of his/her applications processing.
SPO07	As a Service Provider Operator, I want to view reports and statistics related to applications for my service so that I can improve application processing.
SPO08	As a Service Provider Operator, I want to view the satisfaction levels of the institution I am working on based on the feedback provided by Applicants.

Service Provider Administrator (SPA)

ID	Description
SPA02	As a Service Provider Administrator, I want to view reports and statistics related to applications for my services so that I can improve application processing.
SPA03	As a Service Provider Administrator, I want to configure holiday calendar so that the service providing time will be calculated automatically.

SPA04	As a Service Provider Administrator, I want to manage (add/edit/remove) applications statuses so that the SPO can set the updated statuses.

Administrator

ID	Description
AD01	As Admin I want to manage users (CUPS Operators, Service Provider Administrators, Service Provider Operators, Authorised Applicants etc.) so that they can act according to their roles.

AD02	As Admin I want to monitor services using a dashboard which includes:
	• List of services with possibility to search/filter.
	• For each service:
	  ○ Availability
	  ○ Statistics (number of submissions)
	  ○ SLA (if there are submissions with exceeded delivery dates)
	• Feedbacks, including incidents.

AD03	As Admin I want to enable/disable a service so that the Applicant can/cannot apply online for that service.

Annex 2. Technical Requirements

1. Documentation requirements

User Documentation	The Consultant will prepare and deliver the following documentation for end-users: 1. Interactive guidance adjusted to user role (Applicant, Authorized Applicant, Service provider administrator, service provider operator, Administrator) 2. Downloadable user manuals in PDF format for Service provider administrator, Service provider operator, Administrator, etc. All end-user documentation will be provided in Romanian.
How-To video tutorials	The Consultant will prepare How-To video tutorials for main functions. The tutorials will be provided in Romanian
Technical documentation	The Consultant will prepare and deliver the following technical documentation: 3. Framework architecture documentation (including description of models in UML language, which will include a sufficient level of details of the framework architecture) 4. Test strategy document 5. Compilable and documented source code for applications, components and unit tests developed within the project. 6. Framework installation and configuration manual (including code compilation, container image build scripts, framework installation, hardware and software requirements, platform description and configuration, backup and disaster recovery procedures) All technical documentation will be provided in English.
API documentation	The Consultant will prepare and deliver: 7. API integration guide 8. Integration samples in .NET and Java 9. Human and machine-readable description in a standard description language (e.g. WSDL or Swagger). All API documentation will be provided in English.

2. Training requirements

Training sessions	The Consultant will provide on-line training sessions using developed e-learning modules based on Moodle LMS for target groups such as Administrator, Service Provider Administrators, Service Provider Operators.
Training materials	Training documentation – curricula, training courses (manuals, video tutorials, quizzes, etc.) for administrators, services providers, portal managers and end-users (individuals and businesses) developed in e-learning platform based on Moodle LMS. All training content/materials will be provided in Romanian.

3. Rights requirements

Perpetual software license	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.
Redistribution rights	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.
Full data rights	The Client keeps full rights on data created by the means of this solution.
Open data format	The solution preserves the data in an open format or includes mechanisms to extract data from the framework in an open format thus enabling the capability to transfer/migrate the data into another system.

4. Architecture requirements

Open standards	The solution architecture shall be based on relevant open standards. The solution architecture shall not use proprietary standards.
Service Oriented Architecture	The solution shall be based on a Service Oriented Architecture.
Hosting environment	The solution shall not include any hardware components and upon finalization will be deployed on governmental cloud environment (MCloud).
Running environment	Framework shall run on Docker container engine and shall not depend on specific host OS instance. Building container images shall be automated. (refer to the following link for details: https://docs.docker.com/develop) 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 framework parameters has no impact on any work in progress, such as any active sessions, requests, etc.
Multiple sites	The solution architecture shall ensure high availability including during new versions deployment and the possibility to run simultaneously on multiple sites
Browser compatibility requirements	The framework 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.
Detailed data model	Framework's detailed data model shall be described fully in a machine-readable data scheme for example using a DDL language for relational databases. The Consultant shall coordinate the detailed data model schema format with the Client in advance.

5. Framework Integration requirements

Governmental platform services integration	The MPass shall be used to authenticate users. The 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. The MNotify shall be used for all user notifications. The MDelivery shall be used for delivery of services. The MPower shall be used for authorization validations.
Feedback	The Feedback module shall be integrated using external API.
FAQ	The FAQ module shall be integrated using external API.
News	The News module shall be integrated using external API.
PSP	Redirects from public services portal shall be accepted by framework.
MCabinet	The solution shall provide API for integration with MCabinet.
Service Providers Back Office IS	The solution shall integrate Service Providers Back Offices SI through API. (Only available BO will be integrated).
Framework API	The solution shall provide the APIs for all key functions (e.g. GetApplications, GetOperators, etc)

Note: The API documentation for integration with third party components will be provided by the Client during analysis and design stages.

6. Framework Performance requirements

Asynchronous processing	Framework shall use asynchronous processing whenever possible to perform any input-output.
Concurrent users	The framework standard load and performance shall be guaranteed for 100 concurrent human users.

Response time	Response time for framework functions shall be under 3 (three) second. The Consultant shall list the exceptions, if any, and discuss/agree them with the Client at analysis and design stages.
Key performance Indicators	The framework shall meter and expose its key performance indicators. The Consultant shall propose the list of indicators and discuss/agree them with the Client.

7. User Interface requirements

Multilanguage User Interface	The framework shall support multilanguage user interface. This support includes data type specific formats (such as date, time, time spans, currencies, etc.). The framework front-end interface will be delivered with at least Romanian, Russian and English interfaces. The framework back-end shall be delivered at least in Romanian. The default language for User interface shall be the Romanian.
User Interface accessibility	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	The user interface shall automatically adapt to various display resolutions. Minimal display width is 480px.
Contextual help	User Interface components shall include Tips and Hints for user interface elements.
Client support	All pages shall include client support contacts.
Bookmarks	All service interfaces shall be bookmarkable and the User shall be able to access bookmarked pages later.
Friendly URLs	Framework shall use friendly URLs for accessing services' pages.

8. Framework maintenance requirements

Framework logs	The framework 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	The framework 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: • the type of the event • timestamp when the event took place • event level • framework 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	The framework 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	The Consultant shall supply all the source code for framework 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.
Framework deployment	The Consultant shall supply the deployment procedure and supporting tools for this. Deployment procedure shall cover all the prerequisites before proceeding to framework installation. The deployment shall be automated and include database structure initialization and seeding.

Framework upgrades	Framework 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.

9. Security requirements

Secure architecture	The framework 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/). The Consultant shall supply documentation describing this design 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	The framework'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 framework 's components required privilege level and considerations that force use of that level or access.
Secrets and addresses	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	All framework's communication with external systems or users takes place over encrypted communication channels.
No Username/Password authentication	The framework shall rely on authentication via MPass. Other forms of user authentication shall not be used.
Minimize personal information storage	The framework 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 framework shall comply with the relevant requirements related to personal data processing specified in GD 1123 from 14.12.2010 (http://lex.justice.md/md/337094/) Note that the Consultant shall coordinate with the Client the list of requirements to comply with.
Secure against OWASP Top 10 vulnerabilities	The framework 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	The framework shall expose readiness and health-check API via a HTTP GET requests. The health-check shall check the health of as many framework components as possible. In case of health check error, a human-readable error message shall be returned.
Users' roles management	The users and their roles will be managed in MPass. The framework shall retrieve the users' roles from MPass.
Session expiration	The framework 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.
Input validation	All input data shall be validated on client and server side.
User content	User content can be captured in text format only. The framework 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 framework's components.
Unauthorized access attempts	Unauthorized access attempts When the framework registers unauthorized access attempts it shall: • 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	The Consultant will ensure data integrity by providing appropriate solution for prevention of unauthorized internal activities (for ex. deletion of authorizations records directly from database). Note that chaining the signed declarations in a blockchain could be a solution.

10. Support and Warranty requirements

Support	During the warranty period the Consultant shall provide necessary technical assistance to the Client;
Warranty	During the warranty period the Consultant shall: • fix all defects reported by the Client; • solve all incidents reported by the Client according to the agreed SLAs; Note: The response and resolution time shall not exceed 60 minutes for non-critical errors and 15 minutes in case of critical errors. The incidents shall be solved within 2 working days for non-critical errors and within 4 working hours for critical errors starting from escalation time. Hourly progress report will be provided for critical errors.

Annex 3. Relevant legal acts and regulations

1. Law nr.91/2014 on electronic signature and electronic document - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=353612.
2. Law nr.71/2007 on registries - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=325732.
3. Law nr.1069/2000 on informatics - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=312902.
4. Law nr.467/2003 on informatics and state informational resources - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=313189.
5. Law nr.982/2000 on access to information - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=311759.
6. Law nr.133/2011 on personal data protection - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=340495.
7. Law nr.142/2018 on data exchange and interoperability - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=376762.
8. Government Decision nr.710/2011 on approving strategic Programme of technological modernization of government (e-Transformation) - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=340301;
9. Government Decision nr.1140/2017 on approving the Regulation of the activity of the certification service providers in the field application of the electronic signature - http://lex.justice.md/md/373494/.
10. Government Decision nr.1141/2017 on approving the Regulation on modality of application of the electronic signature on electronic documents by functionaries of legal persons governed by public law in the electronic document circulation - http://lex.justice.md/md/373495/.
11. Government Decision nr.128/2014 on Government single technological platform (MCloud) - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=351760.
12. Government Decision nr.1090/2013 on the governmental electronic service of authentication and access control (MPass) - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=351035.
13. Government Decision nr.405/2014 on the governmental electronic integrated service for digital signature (MSign) - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=353239.
14. Government Decision nr.708/2014 on the governmental electronic journaling service (MLog) - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=354589.
15. Government Decision nr.916/2007 on the concept of a Government Portal - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=324962.
16. Government Decision nr.330/28.05.2012 on development and administration of a single Service providers portal - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=343406.
    Government Decision nr.701/2014 approving the Methodology of government open data publication - http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=354534.

Annex 4. Indicative list of services' groups

1) Cadastral services' group
   a) Real estate registration – about 10 services.
2) Vehicles and drivers' documentation services' group
   a) Confirmations from Drivers State Register – 3 services
   b) Confirmations from Vehicles State Register – 5 services
   c) Vehicles registration – about 15 services
   d) Issuing vehicle registration certificate – 2 services
   e) Issuing tachographic cards – 2 service