ANNEX II + III: TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

Contract title: Supply of IT equipment and software for the establishment of a single "National centralized criminal intelligence system" (NCIS)

Publication reference: EuropeAid/139498/DH/SUP/RS

LOT 2 – Supply of IT equipment and software for implementation of: Intelligence Led Policing and Advanced Analytical Platform systems

Columns 1-2 should be completed by the Contracting Authority
Columns 3-4 should be completed by the tenderer
Column 5 is reserved for the evaluation committee

Annex III - the Contractor's technical offer

The tenderers are requested to complete the template on the next pages:

- Column 2 is completed by the Contracting Authority shows the required specifications (not to be modified by the tenderer),
- Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words “compliant” or “yes” are not sufficient)
- Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

Unless otherwise specified, the requirements in these Technical Specifications are presented as a minimum standard which the offered goods must meet in order to be compliant. Tenderers may not submit a variant solution for the items required in these Technical Specifications. The tenderer is expected to submit documentary evidence (brochures, technical data sheets etc.) of the technical compliance of his offer.

Provided documentation must be tidy organized, and all items in respective documentation must be clearly identified (highlighted and indicated by "Item Number").

The documentation's page numbers where the information could be found must be clearly stated in the "Notes, remarks, ref to documentation" column of the offer.

EU Visibility: All supplies shall comply with the visibility Manual for EU External Actions (https://ec.europa.eu/europeaid/communication-and-visibility-manual-eu-external-actions_en) as well as the EU Visibility Manual produced by the EU Delegation to Serbia.

Stickers should be placed on the supplies with a clearly visible EU flag and the phrase "Provided with the support of the EU" in the operational language of the EU programme and in the Serbian language.

A visibility event should be foreseen and financed by the contractor and organised in conjunction with the Contracting Authority.

Contents of the Technical Specification / Technical Offer

1 . General requirements

1.1 Definitions and Terms

1.1.1 Abbreviations

Whenever the following abbreviations and terms are used in the Technical Specifications or in the Technical Requirements, the intent and meaning shall be interpreted as described hereunder:

BPMN	Business Process Modelling and Notation
CA	Contracting Authority
ESB	Enterprise Service Bus
EDWH	Enterprise Data WareHouse
ELT	Extract, Load, Transform (variation of ETL)
ETL	Extract, Transfer and Load
FAT	Factory Acceptance Tests
GDPR	General Data Protection Regulation
IDA	Interchange of Data between Administrations
IDABC	Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens
ISA	Interoperability Solutions for European Public Administrations
KOS	National centralized criminal intelligence system
NCIS	National centralized criminal intelligence system
PDF	Portable Document Format
PO	Prosecutor's Office
RDBMS	Relational Database Management System
SAT	Site Acceptance Tests
UML	Universal Modelling Language
XML	Extended Markup Language

1.1.2 Standards

According to the recommendations of the "*Interoperability Solutions for European Public Administrations*" (ISA), the follow-on of "*Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens*" (IDABC) which came to an end on 31 December 2009, and *Interchange of Data between Administrations* (IDA) European Commission Programmes, enforcing the European Union decisions[1], electronic document exchange and storage in the public administrations shall rely on open document formats[2]. Such formats are to be defined in a process open to all interested parties and to be available for all interested and competent actors to implement without restrictions.

Contractor is required that all the source documents produced, internally or exported, by the systems described in this Tender Document, and all the source documents circulated in the scope of this contract shall comply with ISO/IEC 26300-1:2015, Open Document Format for Office Applications (OpenDocument)[3], or with ISO 32000-1:2008, Portable Document Format (PDF).

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[1] Decision 2004/387/EC of the European Parliament and of the Council of 21 April 2004 on the interoperable delivery of pan-European eGovernment services to public administrations, businesses and citizens (IDABC), Official Journal of the European Union L 144 of 30 April 2004

[2] http://ec.europa.eu/idabc/en/document/3428/5890.html

[3] http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=43485&scopelist=PROGRAMME

Please note that nor Microsoft *Office* proprietary formats (documents ending in .doc, .xml), and Microsoft *Office Open XML* format (also informally known as OOXML or Open XML, documents ending in .docx, .xmlx) **are not** compliant with the required standards.

1.2 Detailed Design

The Contractor will develop the system Detailed Design, which will at least include the following elements:

a) User Requirements
b) Data Dictionary
c) Business Process Model
d) Functional Specifications
e) Technical Specifications
f) Data Model
g) Software architecture

1.2.1 User Requirements

User Requirements will be an informal, natural language description of all features of the software system, written from the perspective of an end user or user of the system.

User Requirements will include a written sentence or two and, more importantly, a series of conversations about the desired feature told from the perspective of the person who desires the capability, usually a user or customer of the system. They may follow a simple template such as "As a <type of user>, I want <some goal> so that <some reason>"; it is however required that they are expressed in a natural language familiar to the end users. A good example can be User Stories approach.

User Requirements shall not require any specific knowledge nor tool to be read and understood.

User Requirements will be approved by the Beneficiary before the finalisation of the Functional Specifications.

All models should be provided in open form, i.e. in the form that will enable the, or any other entity hired by the client, to independently continue with improvement and development,

1.2.2 Functional Specifications

The Contractor shall present its approach on how to reach the functional specification requirements. The Contractor shall use optimised approach for both existing infrastructure and expected results to achieve best solution in terms of resources for Beneficiary that complies with the requirements.

UML, BPMN or other public notations for formal description of Functional Specifications are acceptable. The Contractor shall provide CA and Beneficiary appropriate tool(s) to for reading and discussing the models, if these are not publicly and freely available. Should Contractor's approach follow proprietary methodology and tool(s), the Contractor shall grant access to that to CA and Beneficiary for the whole implementation period.

1.2.3 Technical Specifications and Data Model

Technical Specifications shall include at least:

a) Business analysis report
b) Top level system design and model
c) System architecture design and model
d) Data model design
e) Detailed functional design
f) Design of identified workflows

1.2.4 Detailed Design documentation

The Contractor will draw up full design documentations at Detailed Design stage on due dates, according to the timetable submitted by the Contractor and approved by the Contracting Authority.

1.2.4.1 Detailed Design documentation

The Detailed Design documentation will include all Detailed Design elaborates, and the Developer's documentation with source code guidance It should define the methodology for development and testing with reference to standards, the quality of execution, the applicable norms and guidelines; determine responsibilities for the quality of equipment, software, installation and tests, and shall provide the supervision manner of installations operation in time.

In case the designer identifies during the implementation stage more options for the solution described in the contract, then the optimum one will be selected using a comparative analysis prepared by the designer and approved by the Contracting Authority.

1.2.4.2 "As-built" documentation

After commissioning the Contractor will draw up the as-built documentation containing all possible modifications made during the development, installation and tests, compared with the option in the initial design documentation submitted to the CA.

1.3 Third-parties commercial software licensing

The Contractor shall use third parties commercial software only if in line with licensing schema.

The Contractor shall evaluate and propose discontinuing of part or all those licenses that are not necessary. All commercial software licenses needed for the implementation of the system shall be part of this contract, and no additional purchase shall be operated by the Beneficiary at any time during the period of warranty, to secure the correct functioning of the system within the limits set in this Technical Specifications.

The Contractor is not allowed to implement at the solution licensing schema on temporary basis under third party commercial software.

1.4 Software development and testing

The Contractor shall present its approach on the intended software framework and software development process it intends to use in this contract. The Contractor shall use own tools for software development, versioning and deployment during the duration the implementation and warranty periods.

During the warranty period the contractor shall maintain source code at the beneficiary's premise updated together with the supporting documentation and manuals.

1.4.1 General Testing provisions

The Contractor shall:

- perform all the tests indicated in the Technical Specification or later agreed with the CA and the Beneficiary necessary to demonstrate the functional guarantees of the equipment delivered and of the system as a whole.
- present a testing approach, describing the steps and approach followed during FAT and SAT, the associated documentation produced before and after the tests, and the Contractor's personnel in charge of performing the tests.

Whether any of the tests performed during a test session fails, the appropriate corrections shall be applied, which may require the replacement of the failing equipment, and the test(s) repeated in the next testing session.

1.4.2 Factory Acceptance Tests (FAT)

FAT will be carried out only in the presence of the Beneficiary's specialists. Each delivery stage will be preceded by a FAT stage.

Software FAT shall include testing sample data, at least static and dynamic testing, white-box, black-box tests, unit testing, integration testing, component testing, system testing, operational acceptance testing, to assure functionality, performance and usability of the product.

The Contractor simulates testing conditions that generate expected working environment and workload to prove the system. The testing process shall assure that system responds correctly of any kind of user inputs. The testing shall assure that solution can handle all specified users simultaneously without degradation of performance.

FAT tests will be carried out using testing data provided by the Beneficiary, as well as testing data prepared by the Contractor.

1.4.3 Site Acceptance Tests (SAT)

Provisional acceptance tests will be carried out at the installation place (SAT) to all new installations.

Before site tests the Contractor will transmit the test schedule and the test list (globally referred as Test Plan) to CA and Beneficiary, specifying the tests to be performed for the equipment and software delivered.

The Contractor has to provide test cases, test data, expected results. The CA and Beneficiary shall use these test scenarios and shall implement own test assessment of the system together with the Contractor.

The Contractor shall set-up a separate testing environment (equipment, software, and data) for software testing, hosted in the data centres of the Beneficiary where supplies are delivered, and appropriate to verify the proper functioning of supplies. Such testing environment shall be made available at the time of verifications described in SC Article 24, and shall remain operational during the whole duration of the supply contract including any warranty period.

Such testing environment (hardware and software) shall:

a) Be provided at no cost for Contracting Authority or Beneficiary

b) Remain property of the contractor

c) Remain available for the whole duration of the warranty period

d) Be hosted in the premises of the Beneficiary during whole duration of any testing period, required to achieve results foreseen in this supply contract and its ancillary services

The Contracting Authority may designate other person(s) to perform the quality verification of supplies. The testing of the Supplies will be realised in accordance with the provided Test Plan, which shall detail how the tests will be organised and implemented and will include, as a minimum, the following:

1. The phases of the tests, namely:
    a) the Pre-Commissioning and Preliminary Tests, the objectives of which are to ensure successful system inter-operation, and
    b) the Acceptance Tests which comprise:
        i. tests to ensure that the system meets the requirements;
        ii. Integration tests to ensure that the system fits into the existing IT system;
        iii. Load tests; to test the system behaviour under normal as well as excessive load.
2. The Context of the performed Tests that will be performed, such as:
    a) The objectives of the test;
    b) Reference of data or lot of data to be used for the test;
    c) Expected functionality of the system;
    d) Measurement and recording procedures as well as procedures for reporting of test results;
    e) Precise description of the procedure to be set up with reference to the commands and parameters to be set;
    f) Tools and means to use for the tests;
    g) Expected results;

h) Expected state of the final system.

3. The minimum requirements for the successful implementation of the tests, which are:
   a) the tests are based upon measurable metrics agreed by the Contractor and the Project Manager or his/her designated representative(s);
   b) the tests are logged and repeatable;
4. the Contractor shall provide automatic testing tools for the logging and replay of the non- regression tests;
5. the Contractor shall provide tools for automatic analysis of the tests.

The Contractor shall prepare the testing environment in a clean and efficient manner and must ensure that all prerequisites for the successful realisation of the tests are met. The Contractor shall provide any necessary assistance in the implementation of all tests under the supervision of experts from the development support team and other authorised representatives of the Contracting Authority.

1.4.4 Testing documentation

After every testing session, the Contractor shall prepare FAT and SAT documentation, containing the Test Plan, the result (pass / fail) of all tests performed, and any CA or Beneficiary observation.

The Contractor shall draw up all interface documents between the new equipment and/or systems and the equipment and/or systems existing within Beneficiary and/or third parties.

The results of the tests will be reported in the Testing and Acceptance Report where, for each test, the following information shall be provided:

1. Reference to the test;
2. Results;
3. Description of encountered anomalies;
4. Name and signature of the Contractor's and the Project Manager or his/her designated representative(s).

1.5 Data Migration

The Contractor shall ensure the migration of structured and unstructured data from the existing system, transforming the existing data and documents into the new database and document storage without losing data and without compromising the data quality. Migration of both data should be established on four eyes control principle with verification and validation. Validation has to be completed by the owner of the data. Only after that the data can be considered as migrated. Unstructured data after verification and validation have to be linked to already validated structured data or/and other validated metadata.

The Contractor shall prepare a Data Migration methodology, describing the Data Migration process, and the Contractor's personnel in charge of performing the tests of migration.

Before performing the actual Data Migration, the Contractor will prepare and submit to Contracting Authority and Beneficiary a Data Migration Plan for their approval. The Data Migration Plan describes the data transformations process, the details of data structures affected, the quality checks, and any applicable automated recovery measure.

Should the data quality cannot be verified for certain data, that data will not be automatically migrated. The Contractor shall identify and quarantine unreliable data, stored for successive analysis. The Contractor shall provide the Beneficiary with appropriate tools for editing, verifying and approving of quarantined data before that is moved into the system.

Data quality check includes, but is not limited to: duplicated records, classification errors.

Data failed to pass quality check during migration shall be stored in an established buffer of quarantined data within the new system. This buffer shall be used for search and extraction of these unreliable data during daily work for further edition before to store them into the structured records of the system.

The final migration of data is to be performed by the Contractor on the live system after completion of all SAT tests.

1.6 Training

The Beneficiary's personnel will be trained in the use of the system, and the operation and maintenance of all the equipment that will be delivered under this contract.

The training on software will provide the Beneficiary personnel with required skills to use all the system features foreseen for their respective role, and to set the parameters of terminal equipment (personal computers and peripherals), to configure system communications and reports.

The training on hardware will qualify the Beneficiary personnel to use the equipment, make the diagnosis tests to equipment, locate and repair faults.

Trainees should be able to operate and maintain by themselves the equipment and the system, as well as its components, at the end of the training period.

Training sessions will include practical issues and theoretical knowledge as required so that the trained employees can provide all the operation, maintenance and intervention work.

Training courses will be delivered by experienced trainers at all the Beneficiary's premises where equipment is delivered.

The Contractor will provide trainees with own training equipment, such training laptops, a training server per class (if required), a dedicated network for the class, sample data in the solution database and for data entry during the training period, similar to real data, for the duration of the courses. The training equipment remains property of the Contractor.

The quantity of training equipment shall be sufficient to support trainees of different user profiles acting at the same time. Sharing of the same training equipment among trainees shall be limited and shall not impact on learners' experience.

The Contractor will provide all the materials needed for training courses. Each trainee will receive individual copies of the technical books and documents used during courses. These will be transmitted to the Beneficiary at least two weeks before the beginning of respective sessions.

The Contractor will provide online training courses and training materials to be used within Intranet of the Beneficiary. The Beneficiary will be allowed to make video recordings of the courses.

Training materials, including the documents submitted before beginning the courses will become the Beneficiary property. This one will commit to multiply them only for internal uses.

The training plan will be compatible with the contract schedule so as to allow the CA and the Beneficiary to assume responsibility in due time.

1.7 Deployment of the system

1.7.1 Source code handover

The contractor shall provide documented source code for the system.

Libraries, in this context defined as "a collection of implementations of behaviour, written in terms of a language that has a well-defined interface by which the behaviour is invoked" can be provided by the Contractor and/or third parties.

If libraries are provided by the Contractor, source code together with the description and scripts for generating of the executables/builds shall also be provided.

If libraries are provided by third parties, the Contractor shall prove its rights to provide such libraries as part of its solution.

1.7.2 Delivery of equipment and materials

The Contractor commits to deliver the equipment into the place indicated in the assigning documentation.

Equipment must conform and/or be compatible with any standards, currently in force, including ISO, IEC or other relevant standards that may apply to each specific category of equipment. The Tenderer must deliver a certificate of conformity (issued by a quality control independent regulatory agency of recognized competence) for each equipment item or group of items.

Equipment must conform to the relevant CE regulation; all equipment must be CE compliant and fully authorised for use in Europe.

The Contractor is responsible for the packaging, dispatch, transportation and site unloading of delivered equipment (in the storage place).

The Contractor will get in due time all authorisations required for transportation on site, with confirmed possibilities of access and site lifting and unloading outfits made available.

The Contractor answers for the deterioration of materials and equipment during transport and unloading. He will bear all the costs of remedies or replacements owed to possible equipment deterioration.

Each equipment container will be marked with the contract number, destination, transporter's name and content.

The Contracting Authority can request the Contractor to postpone product delivery up to 12 months in special cases. Such request shall be issued at least 2 months in advance of the provided supply date.

All containers will allow their inspection and check-up on site.

The delivered products will be accompanied by the producer's statements of conformity and guarantee certificates. The products from regulated domains will provide EC type statements of conformity, while products will bear the EC marking.

1.7.3 Installation of equipment

The Contractor must deliver and install the Supplies in an orderly and tidy manner. Power cords and data cables, including patch cords for all networked devices, shall be run cleanly and efficiently between the equipment and power sockets and shall not cause undue obstruction or in any way create a safety risk or health hazard. Under no circumstances should cables run over the front edge of a desk/bench into a walkway. Where excess cable cannot be removed, the appliance must not be used with the excess cable coiled.

The Contractor is responsible to install, tune and optimise the delivered equipment with the selected software, operating systems and supporting licenses, including the most recent relevant device drivers.

Equipment allowing capacity upgrading must be provided in a way that upgrades can be performed by installing additional capacity, without discarding the already installed capacities.

1.7.4 Project Implementation Schedule

The execution of this contracted works shall not exceed 18 months from the date of the issuance of the commencement order issued by the Contracting Authority. The warranty period shall be 12 months.

The delivery of equipment shall be planned as late as possible, compatibly with the usability of the system, in order to minimise its obsolescence.

Equipment specifications shall be updated according to market conditions existing at the time of delivery, if better than the offered ones.

Implementation periods of the main contract stages shall comply with the following:

- Milestone 1: "Detailed System Design" shall be completed within 3 (three) months after contract signature
- Milestone 2: "System developed ready for FAT, and testing environment established" shall be completed not later than 9 (nine) months after Milestone 1
- Milestone 3: "System passed FAT" shall be completed not later than 1 (one) month after Milestone 2

- Milestone 4: equipment delivery shall start not before Milestone 2, and end not later than Milestone 6
- Milestone 5: “Training ready for start” shall be completed not later than1 (one) month after Milestone 3
- Milestone 6: “System passed SAT” and “Training completed” shall be completed not later than 3 (three) months after Milestone 3
- Milestone 7 (go-live): “Data Migration completed” shall be completed not later than 2 (two) months after Milestone 6. Upon Data Migration completed the system will “go-live”, and the users access to old system disabled.

1.8 Operations and warranty support

1.8.1 General O&M provisions

The Contractor shall submit to the CA the Operation and warranty support approach, which covers the warranty period of the contract. The Warranty Period can commence after CA approval of the Operation and Warranty support approach.

The ordinary warranty support of equipment shall be conducted by the Beneficiary staff under the supervision of the Contractor personnel. To this end the Contractor shall provide that adequate training and supervision of the Beneficiary staff in conducting the operation and warranty support of the equipment and installations delivered under this contract.

The supervision assistance shall be limited to the duration of the warranty period.

1.8.2 Manuals

The Contractor shall provide in Serbian dedicated manuals. The package should include at least:

- User’s manuals. User’s manuals have to cover all roles of end-users except System Administrators.
- Administrator’s manuals. Includes operation and trouble-shooting of the system, third party DMS, database, operating system, other packages, and equipment.
- Installation, configuration and optimisation manuals. Includes all used packages and system

1.8.3 Warranties

During the warranty period the Contractor shall promptly correct, repair, redesign or/and replace any defective software, equipment, materials or parts upon receipt of a written notice of defect from the Contracting Authority or the Beneficiary.

If during the contract implementation a systematic defect occurs, the Contractor shall check, redesign, replace or repair, on its own expense, the respective element at all delivered software, equipment and installations.

The Contractor shall store all notices of defect received in a dedicated database “Ticketing System”, recording at least: date of request, requester, date of solution, solution applied, references to prior defects (if any).

The Ticketing System shall provide appropriate policies for the prioritisation of defects resolution.

Beneficiary's specialists shall be granted access to the ticketing system, and shall be trained on its operation.

The Contractor will produce a report on a bi-weekly basis, listing all defects received and their details stored in the ticketing system, and the action plan for the defects reported and not yet resolved.

During the warranty period the Contractor shall also offer help-desk level 3 support, i.e. hot-line accessible by the Beneficiary help-desk level 2 staff, including specifications and procedures for implementation of system support, as well as specifications and procedures for implementation to react in emergencies that threaten the normal operation of the system

1.9 Contractor's responsibilities

The Contractor is responsible for performing all the contract requirements described at the paragraphs "Scope of the contract" for the respective Lot. In doing so, the Contractor has the full responsibility for contract implementation under safe operational condition and in full compliance with the laws of the country and other obligation as lay down in the contract.

All proposed personnel that are working under this contract shall have the adequate professional qualifications and hold required licenses needed for performance of their specific duties under the contract.

The Contractor shall have the obligation to send to the CA for its prior approval the list of all the staff and their qualifications indicating their specific duties/task/job/ assignments in the implementation of the contract.

The Contractor will propose a contract implementation plan for the execution of tasks, supply of equipment, and provision of ancillary services, which shall be aligned to the proposed "Contract Implementation Schedule" as presented in the respective Lot. The contract implementation plan will include the execution terms, tasks assumed, as well as highlight of any deviation from previous plans. The contract implementation plan will be also elaborated in electronic form, in a habitual format for contract management, agreed by both parties.

The Contractor is free to size the resources used under the contract.

The Contractor is responsible for auxiliary, additional and/or collateral services, equipment, installations and services that are part of the contract concluded with the CA but are necessary to complete and the good functioning of the system.

Activities performed by the Contractor will not disrupt the proper functioning of equipment / systems and existing installations. In particular, integrity and technical characteristics of equipment, systems and existing installations should not be affected during the execution of:

- services to be provided and activities to be performed;
- new products, systems and installations.

The CA and Beneficiary will take over the system after provisional acceptance has been signed (in accordance with commercial provisions). Final acceptance will be made after warranty period expiration (in accordance with commercial provisions).

During contract execution the Contractor is obliged to comply with the Serbian applicable norms with respect to labour safety, guard, fire prevention & extinguishing, and environmental protection.

The Contractor is responsible for integrating the supplied equipment/systems into the equipment/systems existing in Beneficiary and/or third parties.

The Contractor shall be fully responsible for the organisation of its site, shall be borne by costs associated with it is the Contractor's obligation and accountability which are stipulated in the contract. Any partial acceptance or modification of the scope and terms and conditions of contract that has been approved by the Contracting Authority shall not relief the Contractor of its obligation under the contract to ensure complete and the good functioning of the system as defined in the contract or as later modified.

The Contractor will ensure the confidentiality of any data and information provided by the Contracting Authority or produced under this contract, especially of that whose disclosure can lead to an increasing vulnerability of the installations.

Only adequately qualified and trained staff shall be allowed to be present on contract site and work under this contract.

2 . Full analysis, design, implementation and deployment of EDWH with BI as part of Advanced Analytical Platform System

2.1 Preamble

2.1.1 Background

Analysis of the Advanced Analytical Platform (AAP) system and the current data base model has to include an identification, design and developing of the functionality of the system with improved functions comparing to existing one, its optimisation, creation of all analytical reports and tools into the reporting module oriented to the end-users that allows to create ad hoc reports and to use predefined reports. The analytical reporting module has to include full analytical reporting capabilities for both the local office needs, for management and operational purposes. A set of rules has to be developed for these reports and to be implemented into the reporting tools.

The required licenses for implementation have to be delivered and the rights to use have to be transferred to the Beneficiary. The licenses have to include all existing currently and future users and the licences with no time limits.

The existing system was created more than 5 years ago. It is based on IBM Cognos ver. 8 licenses for BI and statistical analysis and ESRI ArcGIS 10 for GIS visualisation. IBM Cognos version is obsolete, and it is not maintained. The number of licenses is limited to 20, but it is enough for design and publishing of requested analyses. The reporting applications were created in-house. ESRI ArcGIS licenses are quite new and do not need to be revised and changed. They have to be updated and maintained in the future. ESRI package is based on one server application available within the network with unlimited number of users (web based), one desktop application for creating requesting features and their later publishing on the server. Important data are delivered from various sources, including cadastre for map layers.

Currently the required by the legislation statistical data outputs and reports are standardised and made public, but not implemented on the existing platform.

The existing system does not cover all requirements of future AAP and therefore needs complete redesign and redevelopment. Collected data are important and need to be migrated.

The MoI has defined the structure of new necessary reports and analyses. They are published. Part of them refers to criminal investigation. The expected work includes also supply new and modern software for BI capable to allow definition and design of both local and common reports, migration of part of the data, link with existing GIS package and training of users. Training should cover everything to make possible MoI users to work autonomously – starting with definition of n-way cube, validation and design of reports (based on examples of public reports for criminal investigation subset), and ending with link to other packages and visualisation via GIS.

The number of licensees depends on the package and vendor policy, but the solution has to cover the required profile of MoI users currently involved in design and analysis. There are in two directorates of MoI. No other restrictions are envisaged

The design of the system has to incorporate the policy for implementation of active-passive disaster recovery. A policy example for automated backup of the production environment of AAP application to the disaster recovery location could be configured and proposed. The Contractor shall implement the disaster recovery schema locally in the premise of HQ of MoI to demonstrate the system disaster recovery has been completed.

2.1.2 Current hardware hosting AAP system

The existing environment for current AAP used now by the Beneficiary for that system is obsolete and the tender aims to upgrade or to deliver new one for replacement.

2.1.3 Current third-parties commercial software licenses

2.1.3.1 BI software

Currently the Beneficiary is using IBM Cognos ver. 8 licenses for BI and statistical analysis. The number of licenses is 20. These licenses are enough for work done and there is no plan to increase them in near future. The Contractor may decide to reuse in its proposal these licenses; adoption of that particular software is however not compulsory. If the reuse of existing licenses is included in the offer, note that the software was not maintained and it has to be upgraded to its most recent version, and licenses upgraded accordingly.

In case that proposed solution is based on different licenses, the contractor shall deliver licenses for these 20 users.

2.1.3.2 GIS Software

The Beneficiary owns all licenses required and used by AAP only for creation of analyses but results are used by all authorised users within the network;

1. ESRI ArcGIS server ver. 10.3 (unlimited clients, web based)
2. ESRI ArcEditor ver. 10.3 (1 desktop license)

The completed list of all licenses can be provided upon request.

The Contractor may decide to reuse in its proposal these licenses; adoption of that particular software is however not compulsory. If the reuse of existing licenses is included in the offer, the software shall be upgraded to its most recent version, and licenses upgraded accordingly.

In case that proposed solution is based on different licenses, the contractor shall deliver licenses for all users.

2.1.3.3 RDBMS Software

The Beneficiary owns all server licenses that might be required by AAP, and could be used by new redesigned AAP. The completed list of all licenses is provided in section ***8 Annexes Table 1 List of software licenses at the Beneficiary's premise***

. These licenses are not compulsory. If the Bidder plans to use different ones then The Bidder shall deliver these licenses.

2.1.3.4 Virtualisation software

The Beneficiary owns the following virtualisation software bundled with the delivered hardware:

1. VMWare vSphere 5 Enterprise Plus

2.2 Scope under this contract

The objective is to establish comprehensive, complete, extensible and efficient Advanced Analytical Platform that is consisted of following components:

- An efficient, technology independent, unified, consolidated and extendable Enterprise Data Warehouse
- Efficient and extendable system for extractions, transformation and loading of data to and from EDWH,
- Corresponding Business Intelligence/reporting system
- System for descriptive and predictive analysis
- Data quality governance system
- AAP management system and
- Integrated modelling environment

Implementation of these components will contribute to a better and more efficient realization of the activities and functions of Ministry of Interior/and its related organizational units.

The contractor has to evaluate status of the existing AAP system, identification of data model, workflows, revision of the licenses and customised software tools and to optimise the existing functionality and licensing schema within the new AAP system with EDWH, BI tools, predictive analysis and statistics, developed for identified Crime subject area.

Analysis of the system and the current data base model has to include an identification, delivery of new analytical and reporting tools to end-users that allows to create ad hoc reports and to use predefined reports. Fixed templates that have to be delivered shall be provided by the Beneficiary to the Contractor during performance. A set of rules for accessing and use of these reports have to be delivered and implemented. The tools have to include full analytical reporting capabilities for both the local office needs for management and operational purposes. A full-scale central statistics module at any level of the Beneficiary with access rights to data has to be delivered. The module also has to be able to implement operations as data extract-transfer-load (ETL) for current data base model and further using of OLAP business intelligence. The cube has to be created as statistical reporting BI tool with implemented all required periodical reports. It shall include the identification of data, data definition into new model, data transformation, design of the statistics and reporting data base model. The external workflow has to be implemented accordingly. A separate task has to cover bidirectional compliance of the system with established interoperability infrastructure at MoI and especially with ArcGIS server package according to applied standards.

A complete EDWH for defined subject area has to be established. Automated ETL/ELT procedures with automatic validation have to be defined for data extraction from operational databases in real-time mode with time periods. It has to contain and point both structured and unstructured data in various formats. Data quality has to be implemented within the EDWH and the system.

A detailed reporting module with statistics and predictive analysis from EDWH has to be established. The module has to allow various logical operations over the identified datasets (both structured and unstructured) as analysis, consolidation, grouping etc.

The Contractor has to deliver all required equipment and licenses, developing, training and documenting allowing completing tasks of the departments of the Beneficiary as they are specified below

The required licenses for implementation have to be delivered and the rights to use have to be transferred to the Beneficiary. The licenses have to include all existing currently, future users, and the licences with no time limits.

As summary scope of the contract for the AAP system is the following:

1. Prepare detailed design of the AAP system including user requirements, workflows, functional requirements, data model, hardware architecture, etc., including the additional functionalities not currently included in the pilot system.
2. Develop the necessary custom software necessary to implement the AAP system.
3. Review the database model and migrate – where applicable – the existing data into the new model without data loss and with improvement of data quality.
4. Review and redesign the existing hardware and supply the necessary equipment needed for the implementation of the AAP system.
5. Install, commission, and test the AAP system.
6. Assure required performance of the whole system as it is stated in section 2.4.3.
7. Train the Beneficiary staff in use, maintenance and operation of the AAP system, according to their respective role.
8. Perform all other contractual obligations during the warranty period.

The AAP system shall support MoI users, according to the following user roles:

1. 20 existing AAP editors
2. 1 GIS editor
3. 1 GIS administrator
4. All MoI users as readers of analyses

2.3 Architecture of AAP system

2.3.1 General architecture provisions

The AAP system shall:

1. Be centralised, web-based custom application, that satisfies technical requirements defined in chapters 2.3.1 and 2.3.2 for all users at MoI offices. Outline of the proposed system architecture has to be attached to the bid.
2. Allow dealing with at least 80 000unique products per year
3. Designs and delivers identified workflows in terms of BPMN. Provides tools for maintenance of the changes in implemented workflows.

The list of architecture related requirements is as follows:

1. The proposed solution must provide at least the following components:
    a) The Data Loading ETL/ELT component, that will extract data from the mapped sources, based on the source2target mapping, and using the predefined extraction condition, either for an initial loading or incremental daily loading,
    b) The Data Loading ETL/ELT component that will transform the previously extracted data sets into the form required by the targeted schema, using the transformation rules specified by the corresponding source2target mapping,
    c) The Data Loading ETL/ELT component that will load the transformed data sets into the EDWH storage and the targeted schema that is devised, designed and implemented previously, based on the source-to-target mapping,
    d) The Data Quality Automation component that will automatically check if particular data item is valid, according to the predefined set of validation rules, and mark a particular data item as invalid on the corresponding level, that will further enable the filtering, as well as data quality management,
    e) The Data Quality Management component that will be used to recognize, understand and propose the correction actions for the data items previously marked as invalid,
    f) The Data Serving component (RDBMS) that will be able to serve data to various users and consumers, filtering out the data with an unacceptable level of quality,
    g) The Data Delivery ETL/ELT component that will extract data from the EDWH, transform and load it into the targeted data mart or repository based on the source2target mapping, either for initialization, incremental synchronization or at a user request, and
    h) Reports, dashboards, KPIs, and alarms, all of which will be using a particular BI data mart/repository as the source
2. The solution provider have to design, implement, deploy and hand over all previously listed components,
3. The solution provider shall identify and design the corresponding data models related to all sources used to load data from,
4. The solution provider shall devise, design and specify a data model that corresponds to the targeted schema, either EDWH or any of the BI data marts or repositories,
5. The number of sources, as well as the BI data marts/repositories, must not be limited by the architecture,
6. The proposed architecture must provide the means to easily and efficiently extend an extraction schema with the new entities or new and/or modified source2target mapping, in already implemented Loading and Delivery ETL/ELT components,
7. The proposed architecture must provide the means to easily and efficiently add a new data source or a new BI data mart/repository,

8. The EDWH schema shall be relational, while the BI data mart schema may be either relational or multidimensional, which is determined by its purpose and usage,
9. The solution provider have to implement all devised and designed data schemas to the corresponding databases and repositories automatically from the modelling environment,
10. The solution shall enable a management of history of changes for the referential entities, which will be transparently available to consumers and used by reports,
11. The solution shall provide the means for a data delivery, both incremental and full, outside of the EDWH and not only for standard multidimensional data marts but also for any kind of repository which may be used for various purposes, including the KPI calculation, dashboards, and standard or proprietary predictive analysis,
12. The proposed architecture must provide the means to load, process, validate, store, and serve unstructured data

2.3.2 Third-parties commercial software licenses

The use of specific commercial software is not compulsory, but it is recommended to be reused by the proposed solution. If the use of existing licenses in is included in the offer, they have to be upgraded to their most recent version.

1. The Contractor equips the central location, that complies with the proposed software architecture for the proposed and existing hardware described in section 2.1.2 and supplies under this contract for all users of the system within the scope, specified in section 2.2, according to their roles. The Contractor includes the customised application and licenses for any necessary third-party commercial software.
2. The Contractor shall deliver, update and use the latest stable release of all necessary third-party commercial software, maintained by the vendor, available at the moment of deployment of AAP system including, but not limited to:
   a) Operating system
   b) RDBMS
   c) Application Server
   d) Middleware (EDWH, BI, GIS systems)
3. The Contractor shall revise and optimise the licensing schema according to current specifications.

2.4 Functionalities of AAP system

The AAP system shall provide the following functionalities:

2.4.1 Functional requirements

2.4.1.1 All functionalities provided by the current AAP

The Contractor has to keep the achieved functionality at the existing implementation. It is expecting to improve and optimise the work process, to improve searching capabilities for updating of data for existing analyses, improve data quality during migration, optimise licensing schema, where it is applicable.

2.4.1.2 Functional requirements of new AAP

The contractor has to evaluate status of the existing AAP system, identification of data model, workflows, revision of the licenses and customised software tools and to optimise the existing functionality and licensing schema within the new AAP system with EDWH, BI tools, predictive analysis and statistics, developed for identified Crime subject area.

Analysis of the system and the current data base model has to include an identification, delivery of new analytical and reporting tools to end-users that allows to create ad hoc reports and to use predefined reports. Fixed templates that have to be delivered shall be specified in TS. A set of rules for accessing and use of these reports have to be delivered and implemented. The tools have to include full analytical reporting

capabilities for both the local office needs for management and operational purposes. A full-scale central statistics module at any level of the Beneficiary with access rights to data has to be delivered. The module also has to be able to implement operations as data ETL for current data base model and further using of OLAP business intelligence. The cube has to be created as statistical reporting BI tool with implemented all required periodical reports. It shall include the identification of data, data definition into new model, data transformation, design of the statistics and reporting data base model. The external workflow has to be implemented accordingly. A separate task has to cover bidirectional compliance of the system with established interoperability infrastructure at MoI and especially with ArcGIS server package according to applied standards.

A complete EDWH for defined subject area has to be established. Automated ETL/ELT procedures with automatic validation have to be defined for data extraction from operational databases in real-time mode with time periods. It has to contain and point both structured and unstructured data in various formats. Data quality has to be implemented within the EDWH and the system.

A detailed reporting module with statistics and predictive analysis from EDWH has to be established. The module has to allow various logical operations over the identified datasets (both structured and unstructured) as analysis, consolidation, grouping etc.

The Contractor has to deliver all required equipment and licenses, developing, training and documenting allowing completing tasks of the departments of the Beneficiary as they are specified below

The required licenses for implementation have to be delivered and the rights to use have to be transferred to the Beneficiary. The licenses have to include all existing currently, future users, and the licences with no time limits.

2.4.1.3 General functional specifications requirements

1. The system has to provide automatic extraction of a predefined set of data from the data warehouse in a predefined multidimensional space related to selected domain and its topics
2. The system has to provide clear labelling of events and other activities related to selected domain and its topics
3. The system has to provide a display of aggregated data at the organisational level of the MoI, at least at the level of the police station, police departments and the entire ministry
4. The system has to provide a display of aggregated data in requested period of time and in any other period of time
5. The system has to provide a display of aggregated data for all the important characteristics of the entities in selected domain
6. The system has to provide a simple and efficient way to drill down from aggregated views, into any detailed views, giving a direct insight into the specific events at the lowest level of detail
7. The system has to support the integration with the institutions with which the MoI has agreements on business and technical cooperation
8. The system hast to provide a dynamic introduction of additional concept classifications as well as all important characteristics of relevant concepts
9. The system has to provide automatic validation of loaded date together with multilevel marking of it
10. The system has to provide automatic consolidation of all relevant and valid data (structured and unstructured) into a data warehouse

2.4.1.4 Data model functional specifications requirements

The data model has to be created and provided. It has to allow reporting all specified fixed reports – both analytical and statistics. It has to allow creating ad-hoc reports, based on the model. It has to allow extension by the trained users of the Beneficiary. The data model update shall be automated / on-demand, incremental / initial, controlled within the central data warehouse from identified sources.

The Contractor has to evaluate current model, the existing data bases, the required outputs, the quality of data and to implement ETL procedures for creating of new EDWH, assuring quality of data in the new cube.

2.4.1.5 Requirements to system for reporting and descriptive and predictive analytics

Specific objectives related to the establishment of a system for reporting and descriptive and predictive analytics are:

1. Identifying, recording, analysis, consolidation and grouping together business issues into a single topic for analysis,
2. Creating a relational and/or multidimensional scheme of the corresponding data extract (subset of the central data warehouse), which suits the needs of the selected topic, and extension of the scheme with the appropriate key performance indicators (KPI) in the selected domain,
3. Establishing an appropriate multidimensional, relational, hybrid or other data scheme suitable for reports, and descriptive and predictive analysis that are related to the selected topic,
4. Consolidation of structured and unstructured data with the central data warehouse,
5. Establishing an efficient and scalable infrastructure to support a large amount of structured and unstructured data
6. Analysis and preparation of the input data set, selection and implementation of descriptive and/or predictive analysis model, analysis implementation, models verification and further improvement of the implemented models and
7. Recording the results of the analysis and KPI for later distribution to the users.

2.4.1.6 Extended predictive reports

The reporting tools, currently implemented in the pilot need optimisation and extension of implemented functionalities with searching and filtering functions, ad hoc reporting and analytics and data visualisation.

The implemented searching capabilities must not degrade overall performance of the system.

The existing current reports should be migrated to new reporting tool.

Ad hoc searching within operational database has to be reduced.

The predictive reporting has to provide enough functions for filtering and managing existing data by the end user. The list and content of predefined reports will be designed during the business analysis. The Contractor shall create predefined reports, not presented in current version of application. The total number of reports is 5.

Examples of possible reports include:

- Generate pattern in the execution of certain criminal acts in the given territory and in the given period;
- Determine the likelihood of a particular crime being re-executed on a particular street at a specified time;
- Profiling a possible offender of a particular criminal offense in a specific territory in a given period.

2.4.1.7 Statistical analytical reporting

The Contractor has to ensure that only clean data will present into the base for statistics data. An ETL procedure for these data shall be provided from the existing databases into new data model to assure the quality of data entry and future statistics. The decision on matching the records shall be taken by the authorised person of the Beneficiary owning the disputable data.

The system has to cover all required reports, including reports for general statistics and consolidated reports for prosecution. The data for past periods, included into report in these reports has to be error-free.

The expected number of statistical reports is 20. Examples of possible reports:

- The number of criminal offenses within a given period by district police administrations;
- Number of crimes committed by one the same offender in a given period;
- The number of offenders of a particular criminal offense who have committed the same or another criminal act in the previous period;

- The number of crimes that happened in a given previous period, and were solved in another set period (union and parallel, unique view of the period)
- User must have the ability to export data from given set of reports in a form readable for external existing analytic applications of MoI (such as (.txt, .csv, .xls, XML). Format of exported data must be specified by MoI.
- Export of data from reports must be specified as a specific role (or set of roles) in a system so that only authorized users can use this functionality and system have to be integrated with MoI existing tracking log system in a way that every export is logged with data about which user used this functionality, when and what data has been exported

The Contractor shall identify needs and design a statistical reporting tool; shall deliver required for it licenses for the expected number of users with their roles; shall design the data placeholder (EDWH for example), capable to accommodate data for the production of both internal and public statistics; shall design and produce predefined statistical and analytical reports; shall train users and allow end users to create their own reports.

The Contractor shall perform the following activities:

1. Creates a placeholder for collecting, storing, analysing and hierarchical publishing of non-transactional statistical data.
2. Data placeholder must support upgrade to distributed architecture, running in active-active cluster where multiple instances of same database will run in parallel achieving greater availability and workload distribution among instances. Each instance must be able to access all data in placeholder.
3. Data placeholder must be able:
    1. to manage its own storage volumes supporting automatic data rebalancing after adding or removing disks without disruption in data availability. It must support 2 way or 3 way mirroring of data. It must support presenting parts of storage space that is managing to operating system.
    2. to divide tables in partitions in order to improve speed of access and managing of data.
4. Allows placeholder independently to store, maintain and query data history
5. Fills the placeholder with the selected transactional data of the application, assuring quality, integrity and consistence of the collected data
6. Data placeholder must be able to divide tables in partitions in order to improve speed of access and managing of data.
7. Provides procedures for querying, extracting and transferring of selected data from placeholder to serve other external authorities.
8. Opens the placeholder to maintain structured (minimum .xls, .csv types) data.
9. Data integration tool shall be implemented in order to provide querying ETL (Extract Transform and Load) and ELT (Extract, Load to placeholder, Transform) functionalities of selected data from/to placeholder to serve Beneficiary's services and other external authorities.
10. Data integration tool together with the placeholder shall be able to run Transformation in target data placeholder system, without need of separate staging systems.
11. Data Integration tool must support parallel data processing.
12. Both data placeholder and reporting tool must support equipment, running on MS Windows, Linux and Unix[4] like (HP-UX, AIX and Solaris) operating systems.
13. Creates and delivers predefined statistical reports, based on required public statistics
14. Provides capability for ad hoc statistics reports
15. Provides tool for:
    1. viewing and publishing and exporting of text and graphics statistics reports

[4] See https://en.wikipedia.org/wiki/Unix

2. defining and visual tracking and presenting end users at own personalise-able dashboard of important parameters, deadlines, thresholds, KPI.

16. For purposes of administration and end users operations like querying, filtering, selecting, searching, sorting in both directions, dragging, reordering
17. Reporting tool must be used via web interface and must support all major internet browsers: Microsoft Internet Explorer, Google Chrome and Mozilla Firefox.
18. Users of reporting tool must be able to see and use logical business model even when data source is highly complex.
19. Reporting tool must have service oriented architecture, a common semantic business model and integrated meta-data management.
20. Reporting tool must support:
    1. blending of data from one data source with data from another data source, different placeholder, server or service.
    2. write-back feature from reports, where users of reporting tool have the ability to modify the data source in the placeholder that they see in a table.
    3. drill-down and drill-up functionalities.
    4. different hierarchy for different logical sources.
    5. the usage tracking statistics at the detailed query level.
21. Reporting platform must be able to execute code in parallel.
22. Reporting tool must be able:
    1. to connect to different data sources like XML files, RDBMS: DB2, MySQL, MS SQL, Oracle Database, PostGre, Excel xls and ASCII files, ODBC data sources, and Big Data sources like Hive and Cloudera Impala.
    2. to integrate with external application via web services.
23. Reporting tool must allow integration with R statistical language in order to utilize it for extending analytical functions.
24. Reporting tool must have personalized dashboards for end users.
25. Reporting tool must support integration with existing MoI portals and be compliant with JSR-168.
26. Reporting tool must support that users can use web browser to filter, search and sort the data.
27. Reporting tool must support multiple filters active and the same time with ability for end user to reorder them by simple click and drag operation.
28. Reporting tool but support sorting dimensions both in ascending and descending order.
29. Reporting tool must support adding link to customized help pages in reports
30. Reporting tool must support later upgrade to active-active cluster architecture where multiple applications servers can run in parallel hosting different modules of reporting tool system in order to achieve greater availability.

2.4.1.8 Established EDWH

The Contractor has to:

1. Establish single, unified, integrated and complete relational scheme of structured data that includes all concepts that are of interest to the descriptive and predictive analysis
2. Establish single, unified and integrated scheme of unstructured data, including data in various formats (Word, Excel, PDF, bmp, gif, tiff, email, web pages, etc.)
3. Keep complete records of the change history for specific concepts
4. Integrate with internal data sources in MoI, manual records and additional records which are produced by Directorate for Analytics

5. Integrate with external sources of partner institutions in RS such as the Ministry of Justice, Ministry of Finance, and etc.
6. Consolidate the structured data from these sources, along with data validation and data marking if it isn't with an unacceptable level of quality
7. Consolidate the unstructured data together with their text extraction and appropriate processing
8. Establish efficient and scalable infrastructure to support a large amount of structured and unstructured data

2.4.1.9 Ensure data quality

The Contractor has to pay attention to data quality system and in particular:

1. The solution has to ensure that the information is correct, complete and accurate and that the mechanism for data quality management is implemented,
2. The solution has to ensure that the data can be trusted as well as the responsibility of the user and the data source for the quality of available data,
3. The solution has to design and implement data validation rules for input data and analysis of data quality by applying these validation rules
4. The solution has to label and to record identified irregularities in the input data, and to send request for correction and conducting correction of the data in the data source
5. The solution has to improve of the existing operational records in order to improve data quality at the data source
6. The solution has to establish standards for data quality management including evaluation, use, promotion, monitoring, maintenance of data quality and data protection
7. The solution has to implement tools for modelling, mapping, use, profiling, cleansing, ownership, data monitoring

2.4.1.10 External workflow management through a dedicated engine.

The Contractor has to identify and design all business processes as workflows currently existing at the sector. Any identified workflow should include and unify all variations between offices with pilot application and offices not yet automated. The workflow parameters should be editable and accessible by the end user for maintenance. The system shall allow to design and use work flow and the exchange workflows. It shall supports many standardised contemporary modelling notations, including BPMN, Data Flow, WS-BPEL, UML, IDEF1X, E/R-Merise, CODASYL, and Barker

The workflow definitions shall be exportable in BPMN.

The Contractor shall:

1. Identify users' Business Processes
2. Design workflows for the identified Business Processes
3. Use Business Process Modelling Notation (BPMN) for the identified workflows
4. Implement workflows into the application
5. Provide applications' control and management tools of the implemented workflows

2.4.2 Security requirements

The Contractor shall perform the all security measures required by the legislation and internal regulations

2.4.3 Non-functional requirements

The Contractor shall assure following requirements:

1. The response time for daily standard fixed analytical tasks should not exceed 1 min. It is not related to the on-the-fly reporting/massive searching functions
2. The system shall be able to register, handle and report for at least 80 000 unique products per year, with at least 1000 concurrent users

3. AAP users authentication and authorisation has to be integrated with existing Identity Management System , with user roles based on the functionality, data and location
4. AAP System has to be integrated with existing tracking log system

5. The list of browsers include last stable versions of Mozilla Firefox, Chrome, IE/Edge
6. The system shall keep internally change logs with time stamp of the operation, the identification of performed operation and user identification
7. All needed system software (also server and storage system software) must be included in order that are certified for existing maintained licenses and working with solution without additional software.
8. If solution requires licensing of Storage servers for database, it is mandatory to provide adequate number database licenses (for total 30 cores).
9. The system shall allow searching capabilities for identification and filtering of entered data during the identification, positioning or editing of entered data. Sample of extended searching includes search by person, type of crime, address, time slot, source, police office, etc.
10. The system shall establish and performed during the whole life cycle of the session a secured connection between user and data; the system environment must be safe and to minimise the risk of intentional damage done by unauthorised users; the system must protect personal data; the design of the system shall be done according to the requirements of Law for Information security in Serbia, referred to security and protection of governmental IT systems, according to ISO 27001:2005 or other equivalent standard
11. The system shall be open for accessing and it shall support the approved standards for interoperability at MoI, ArcGIS in particular. The system shall be able to provide data to other department according to access rights of the users.
12. The system shall monitor APP components and resources utilization and informing the responsible persons if and when a problem is detected or availability of a resource is threatened
13. The main DBMS that will be proposed to manage the EDWH and BI data should have the ACID characteristics (Atomicity, Consistency, Isolation, and Durability)
14. The main DBMS should be an RDBMS, i.e. relational DBMS
15. The RDBMS must support the standard access modes, such as JDBC ODBC and OLE DB
16. The RDBMS must support the use of the standard query language SQL DML and DDL
17. The RDBMS must allow the simultaneous use of all kinds of supported report types and data refresh through an ETL process, i.e. uninterrupted operation during the refreshing of an EDWH and BI content, in other words, live and continuous loading
18. The RDBMS must be highly performative and it must be column oriented
19. The RDBMS must have the compression features which can be administered and are transparent to end users
20. The RDBMS and overall solution must provide an efficient scalability that will not impose an interruption to the running system once a new processing node is added
21. RDBMS must have ability to run in-memory, which means that all operational data is stored in the memory (RAM)
22. RDBMS must be columnar store, for both option in-memory and classic RDBMS that optimizes the benefits of multicore processing and the single-instruction, multiple-data instruction set and etc.
23. The RDBMS must provide the full/text search capabilities
24. The RDBMS must provide a support for unstructured data
25. The RDBMS must provide OLAP functions
26. The RDBMS must provide high performance bulk loads

27. All components designed and created by the solution provider will be delivered to the client in open form, i.e. in the form that will enable the client, or any other entity hired by the client, to independently continue with improvement and development
28. All designed and used database schemas must be documented with corresponding models by using ERD notation
29. Overall architecture provided by project must be documented by using corresponding EA models
30. All source2target mappings must be documented using corresponding data models
31. The solution shall provide efficient and simple ways for extended number of concurrent users, requiring only administrative actions and without effects to or requirements for changes in the solution architecture, except for performance improvement
32. The solution shall provide the means to disseminate read-only reports to an unlimited number of users
33. The solution shall allow automated / on-demand, incremental / initial, informed and controlled update/refresh of the central data warehouse in accordance with changes in the sources from which it is integrated
34. The solution shall allow expanding the set of integrated data sources, changes to the structure already integrated data sources or expand the reach of already integrated data sources
35. The solution shall allow expansion or modification of the data warehouse schema with new concepts and / or new features
36. The solution shall allow constant analysing, establishing and improving data quality, the ability to govern data quality in the central data warehouse
37. The solution shall allow creating unlimited number of permanent and / or temporary extracts of data warehouse structure and content that meets the needs of reporting, descriptive and / or predictive analysis
38. The solution shall allow analysis and structure and data content adjustment in the extract according to the needs of a specific model of analysis and reporting
39. The solution shall allow creation of unlimited number of key performance indicators (indicators) KPI and alarms. The solution shall allow capturing calculated values in the extract and the ability of storing and distributing calculated indicators to other users and computer systems (internal / external)
40. The solution shall allow expanding the set of supported types of analytical, descriptive and predictive models and the corresponding parameters.

2.5 Reconfiguration of system hardware platform

The contractor shall re-design the existing virtual servers' architecture at the existing hardware, and/or supply different/additional equipment to meet the required performance.

In case re-design of servers' architecture and/or additional equipment is offered, the respective cost shall be included in the price of the solution at the tendering phase with justification on it.

The proposed AAP architecture shall be compliant with the Beneficiary disaster recovery centre as active-passive system.

The Contractor has to design also environments for development, test and production. Use of virtual machines is required.

2.6 Initial training of AAP users

The Contractor has to organise training courses on site in such a way to proceed with at least two groups per type whereas training course needs 5 full days training. The Contractor shall perform the following activities:

1. Develop and provide training plan with logistics and schedule for approval

2. Train users of the system, separated into following groups:
    a) Train all, both current and new users of the system to use the applications
3. New users – on site, at least 5 days, in groups with no more than 20 trainees.
    a) For design, creation and use of statistical reporting – 80 users
    b) For design, creation and use of predictive reporting – 20 users
    c) For publishers – 20 users
    d) For designers of EDWH – 20 users
4. Current users – on site, at least 3 days, in groups, with no more than 20 trainees.
    a) Train 10 selected users as trainers - at the premise of Beneficiary, at least 5 days, in group with no more than 10 trainees
    b) Train 10 users as level 1 help desk employees – at the premise of the Beneficiary, at least 2 days, in groups, with no more than 10 trainees
    c) Train 3 administrators as level 2 help desk employees and for maintenance of delivered hardware - at least 3 days
    d) Performs tests before and after completion of training courses and provides results
5. Advanced users – on site, at last 30 days (several turns, not necessary all at once)
    a) For advance design, creation and use of statistical reporting – 10 users
    b) For advance design, creation and use of predictive reporting – 5 users
    c) For advance designers of EDWH – 5 users

6. Provides training equipment and training plan for the organised training groups on site according to the schedule
7. Provides training materials on paper, where it is applicable
8. Provides electronic training materials in Serbian
9. Publish on the web based system, situated and accessible within the internal network of the Beneficiary
    a) Loads regularly prepared electronic materials and user's manuals to distance learning system
    b) Maintains FAQ (collected by help desk team) updated regularly from the user's feedback and questions, on most typical cases and know-how
    c) Serves as electronic help, separated from the application itself and open for users
    d) Updates electronic materials in line with the changes of applications during warranty period
10. Provides printed user's manual, administrator's, configuration and installations manuals in Serbian

3 . Full analysis, design, implementation and deployment of Intelligence Led Policing System (ILP)

3.1 Preamble

3.1.1 Background

The Intelligence Led Policing System (ILP) is new system for MoI that follows practical standards set in police daily routine and aims to improve police work and bring the results in combating crime and other security threats to a higher level, and to allow police work to be compatible, in regards to standards, structure, quality and terminology, with police forces in developed countries in Europe. Therefore the goal is to adopt internationally recognised Intelligence-led Policing model.

As summary, the expected system is an integrated system for data and event driven generation for all structures of MoI. It should serve all MoI officers, managing created documents/events for reporting and analysis. Closest definition to this system is content management system or document management system. The system is large with expecting around 300 concurrent users

The Bidder must implement an IT system with functions, business processes and document types written in **Intelligence led policing Handbook (English version)** at the following address http://www.mup.gov.rs/wps/wcm/connect/1533908c-a2c9-404b-9592-1e5ed9ed1071/POM+ENGLESKI+za+sajt.pdf?MOD=AJPERES&CVID=lP9FEAw

, published at the site of the Ministry of Interior.

The developed system must allow registering of events (business process digitalisation, documenting for every stated function) at criminal intelligence process within ILP via 12 basic functions[5] as follows:

a. Strategic and operational planning;
b. Request;
c. Planning the criminal intelligence work
d. Collecting;
e. Processing;
f. Analysis;
g. Submitting the product;
h. Decision-making;
i. Planning the operational police work;
j. Execution;
k. Follow-up;
l. Evaluation and quality management

3.2 Scope under this contract

The objective is to establish comprehensive, complete, extensible and efficient automated software application platform for MoI for incorporation of Intelligence led policing model that, in practice, is implemented through a criminal intelligence process described in ILP Handbook. This process represents a set of three connected and mutually conditioned sub-processes:

a. Leading and steering (tasking and coordination);
b. Criminal intelligence work;
c. Planned operational police work

[5]For more details please read page 9-10 of the Handbook

3.3 Architecture of ILP system

3.3.1 General architecture provisions

In order to enable the organisation to innovate, respond to the user demands and increase quality, monitoring and evaluation became very important. This is especially with information technology, different organisational methods, and by creating or modifying of a working environment for better productivity. Another important element is the growing attention towards accountability.

Content management techniques register business processes and track all case events at MoI department, enhance record keeping, reduce delays and case backlogs and provide information to support strategic allocation of time and resources - all of which encourage generally better services. They also improve the predictability of events, which can ensure accountability, increase public trust, reduce opportunities for corruption and enhance the transparency of administration.

While the case management principles vary depending on their needs and the local skills and needs, some have evolved into a set of core principles. The case management system relies on these common grounds usually fixed in internal regulations.

The general requirements for the ILP system are as follows:

a. Be centralised, web-based custom application that satisfies technical requirements defined in chapter 3 for at least 300 concurrent users at MoI offices in the country. Outline of the proposed system architecture has to be attached to the bid.

b. Allow dealing with at least 80 000 unique products per year

c. Designs and delivers identified workflows in terms of BPMN. Provides tools for maintenance of the changes in implemented workflows.

3.3.2 Third-parties commercial software licenses

The use of specific commercial software is not compulsory, but it is recommended to be reused by the proposed solution. If the use of existing licenses in is included in the offer, they have to be upgraded to their most recent version. The Bidder can refer to existing licenses at premise of the Beneficiary at table 1 in the annex.

1. The Contractor equips the central location that complies with the proposed software architecture for the proposed hardware at supplies under this contract for all users of the system within the scope, specified in section 3.2, according to their roles. The Contractor includes the customised application and licenses for any necessary third-party commercial software.
2. The Contractor shall deliver, update and use the latest stable release of all necessary third-party commercial software, maintained by the vendor, available at the moment of deployment of ILP system including, but not limited to:
    a) Operating system
    b) RDBMS
    c) Application Server
    d) Middleware (management systems)
3. The Contractor shall revise and optimise the licensing schema according to current specifications.

3.4 Functionalities of ILP system

The ILP system shall provide the following functionalities:

3.4.1 Functional requirements

a. All functionalities, processes and workflows required in ILP Handbook[6] and in addition

[6]See at http://www.mup.gov.rs/wps/wcm/connect/1533908c-a2c9-404b-9592-1e5ed9ed1071/POM+ENGLESKI+za+sajt.pdf?MOD=AJPERES&CVID=lP9FEAw

b. Document and case management: The system must be able to track, manage and to store documents, cases and meta data, linked to the documents. Documents are plans, reports and strategies at different levels. Parts of the documents are defined queries as metadata, and their results/snapshots.

c. Visualisation: Graphically represent objects within the system (such as people, documents, cases, resources etc.) and establish relations between them based on defined workflows, containers/cases

d. Record management: The system must allow identifying, classifying, storing, versioning, securing, retrieving, tracking and destroying or permanently preserving case records. It has to cover the basic requirements of ISO 15489-1:2016 standard.

a. Workflow management: The system must allow to set-up, perform and monitor of a defined sequence of tasks, arranged as a workflow by the advanced dedicated user. The system must allow the user to define different workflows for different types of jobs or processes. The system must adopt standard input and output of defined workflows like BPMN 2.0, XPDL, BPEL. The system must enable users to create modify and manage workflows, tasks through graphical interfaces

e. Metadata/Indexing: The process including the linked documents and other data entities are classified with metadata, i.e. the "data about data". The system must support and use all distinct types of metadata such as structural metadata for identification, sorting, comparing of the case elements, descriptive metadata that allow to attach text description to the cases and their building blocks into the system, predefined and defined-on-the-fly queries and finally administrative metadata that help to identify and manage system resources and objects. The system shall follow the international standard requirements about the identified metadata

f. Management of registration book: The system must establish a case tracking system to provide information for tracking of the status and location of a case from filing through disposition. The process collects data in registry of actions that provide information regarding case status, documents received, case events, and case summary.

g. Management of calendars: The system must include tools to initiate a case, to facilitate calendar and scheduling functions for case events, including to control deadlines, sending out notices to relevant parties, ensuring efficient use of time of all parties involved.

h. Management of work plans, tasks, resources and teams: The system must allow establishing of work plans, design of tasks and resources, use of resources and their assignment to the tasks. The system must allow registered changes and reasoning for these changes. The system must allow standard outputs and analytical reports.

i. Case archiving: The system must provide record control and storing final records of the case. The system also must ensure that the case history is entered at the conclusion of a case, and that it is archived as a closed case

j. System summary statistics: The system shall provide automated and on demand reports statistics reports according to required outputs, the periodical and the annual reporting production, and use by request of custom statistical reports by users performed at the department. The performance of the requested result is to be completed as single site task

k. Management and monitoring of progress: The system shall allow access to case status, ability to manage, track and monitor progress with options, performance roadmap, from initiating to completing the case

l. Generate required documents: The system must allow relational searches to support indexing and document creation via text templates and text search functions, for further ease the work and to potentially reduce error and enhance the quality of results.

m. Management of electronic signature: The system must allow signing, storing, and transferring selected electronic documents within the corresponding case, using qualified electronic certificate using qualified electronic certificates and smart cards of MoI.

n. Management of case templates: The system must allow defining, creating, designing and maintaining a list of templates that shall be used by the users of the system in their everyday life for generating specific content, including documents for further use.

o. Editing / searching / filtering / selecting of entered data: The system must allow editing an open case metadata with tracking of changes per use per case per action per date with graphical user interface.

It also will allow tools for searching and/or filtering of the data within the cases and events to identify and pick the right case and to improve user's editing technique during the data entry.

p. Management of classification: The system shall allow to categorise the elements defined outside the system and to manage these categorisations. The system shall not allow changing of categorisation when it is defined once except to convert to metadata.

q. Access control: The system must protect personal data and it must ensure that the data will not be made public before the decision (if any) of publication

r. Querying MoI databases and data through KOS/NCIS: System must have the ability to enable query of MoI databases to retrieve data in document or case management creation phase, such as personal data, employee data, statistics analyses, etc. through connectors or interfaces which will be provided by beneficiary.

s. Early Warning System: System must have ability to register and analyse events and to provide early warning system module that allows improving reaction to crises or emergency

3.4.2 Security requirements

The Contractor shall perform the all security measures required by the legislation and internal regulations.

Design and functionalities of the system must comply with laws in Serbia such as Law on information security, Law on personal data protection, Law on secret data, Police Law, Law on records and data processing in the field of internal affairs, Law of electronic identification, electronic document and trust services, according to ISO 27001:2013 or other national and international legislation and equivalent standard, etc.

3.4.3 Non-functional requirements

a. Response time: The response time for daily editing task should not exceed 2 s

b. Capacity: The system shall be able to register, handle and report for at least 50000 cases per year, average size of 100 sheets each, with not less than 300 concurrent users

c. Supported browser: The list of browsers include last stable versions of Mozilla Firefox, Chrome, IE/Edge

d. Access control: Data Security Authorisation: System must enable user and role management so that only authorized user can access specific data in system. ILP users authentication and authorisation has to be integrated with existing Identity and Access Management System, with user roles based on the functionality, data and location. It will grant access to resources (both functionality and data) related to specific profile combining the role and the user; the system must protect personal data and it must ensure that the data will not be made public before the decision (if any) of publication. System access must implement strong authentication method for users using smart cards of MOI and electronic certificates of MOI (MOI CA).

e. Journaling: ILP System has to be integrated within existing journaling system. Data Security Logs: System must log every user activity on the system (including authentication, search, data access, data audit, search results etc.) and administrator activity (system audit, etc.)

f. User interfaces: The system modules must enable users to work with graphical user interfaces.

g. PKI management: The system shall support approved in Serbia PKI implementation at MoI namely qualified electronic signatures for identification of the parties and for electronic services and use of smart cards of MoI

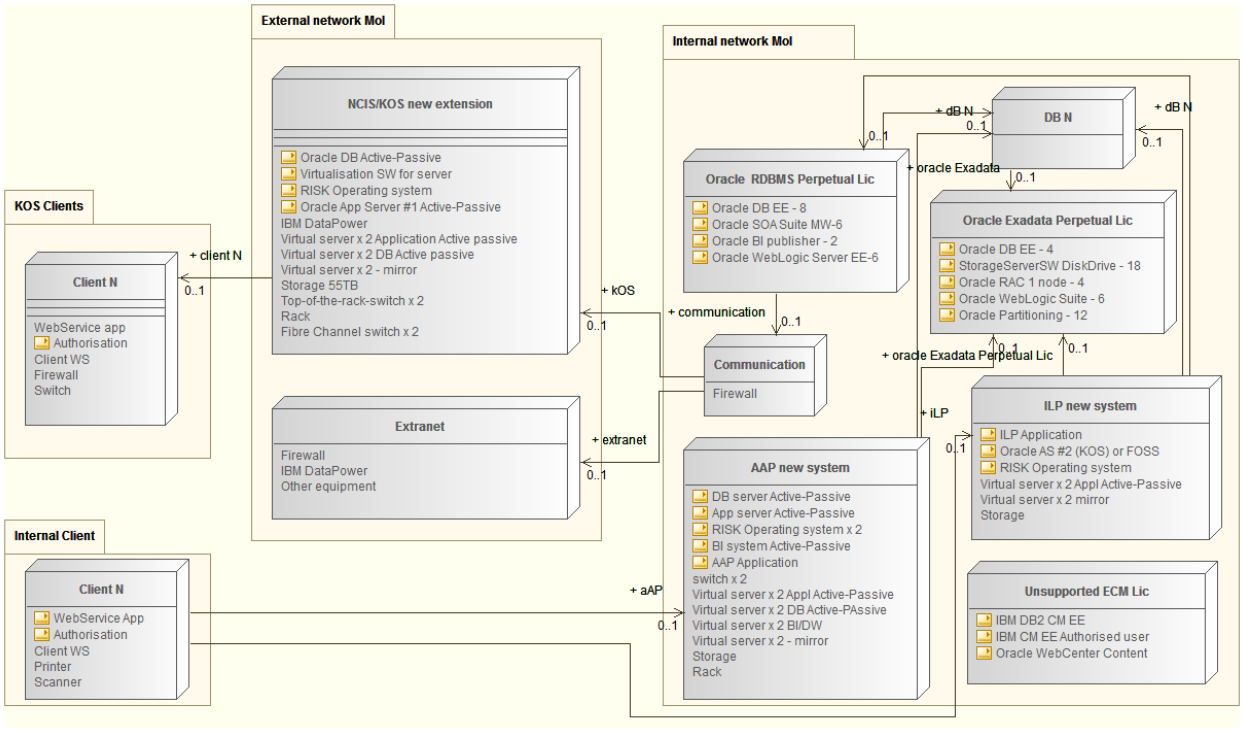
h. Data Security Encryption: System must enable encryption of data to protect access to confidential data (if needed) and encryption of communication from user to the system

i. Data Security Integrity and Non repudiation: System must enable a use of digital signature using MOI electronic certificates and MOI smart cards in order to achieve Integrity and non-repudiation of data and documents in the system.

j. Number of users: Expected number of concurrent ILP system users shall be minimum 300.

3.5 *General design, users and workflows of the system*

The system has to work together with other systems at the Ministry and to exchange data with AAP system. For more details see the model at figure below:



3.6 *Initial training of ILP users*

The Contractor has to organise training courses on site in such a way to proceed with at least two groups per type whereas training course needs 5 full days training. The Contractor shall perform the following activities:

1. Develop and provide training plan with logistics and schedule for approval
2. Train users separated in groups on site, in groups with no more than 10 trainees.
   a) Train 10 selected users as trainers - at the premise of Beneficiary, at least 5 days, in group with no more than 10 trainees
   b) Train 70 users as level 1 help desk employees – at the premise of the Beneficiary, at least 2 days, in groups, with no more than 10 trainees
   c) Train 10 administrators as level 2 help desk employees and for maintenance of delivered hardware - at least 5 days
   d) Performs tests before and after completion of training courses and provides results
3. Provides training equipment, methodology and training plan for the organised training groups on site according to the schedule
4. Provides training materials electronic and on paper, where it is applicable
5. Provides electronic training materials in Serbian
6. Publish on the web based system t situated and accessible within the internal network of the Beneficiary
   a) Loads regularly prepared electronic materials and user's manuals to distance learning system

b) Maintains FAQ (collected by help desk team) updated regularly from the user's feedback and questions, on most typical cases and know-how
c) Serves as electronic help, separated from the application itself and open for users
d) Updates electronic materials in line with the changes of applications during warranty period

7. Provides printed user's manual, administrator's, configuration and installations manuals in Serbian

4 . Content of the bid

The following table summarises the component of the bid. Each component has to be clearly marked with its reference and will be part of the evaluation process:

Ref	Bid components	Notes, remarks, ref. to documentation	Evaluation Committee's Notes
1	Outline of the proposed AAP system architecture (based on the requirements specified in section **2.3 "Architecture of AAP system"**)		
2	Outline of the proposed ILP system architecture (based on the requirements specified in section **3.3 "Architecture of ILP system"**		
3	Project Implementation Schedule (based on the requirements specified in section **1.7.4 "Project Implementation Schedule")**		
4	Outline of Testing approach (based on the requirements specified in section **1.4"Software development and testing"** and Special Conditions Article 25)		
5	Outline of Data Migration approach (based on the requirements specified in section **1.5"Data Migration"**) for AAP system		
6	Outline of Training approach (based on the requirements specified in sections **1.6 "Training"** , **2.6 "Initial training of AAP users"**) and **3.6** "**Initial training of ILP users" "** **Initial training of ILP** users**"**		
7	Operation & warranty support plan covering the warranty period (based on the requirements specified in section **1.8 "Operations and warranty support "**)		
8	Detailed description of how after-sales service will be delivered for the three year following the warranty period (Special Conditions Article 33)		
9	A commercial offer concerning corrective and evolutive warranty support for the solution as a whole. The corrective warranty support should include all the supporting tasks (mainly bug fixing) that may need to be implemented related to any possible future software and/or hardware malfunction. The evolutive warranty support shall include also predefined amount of services (expressed in minimum 10 person/day per month within warranty support period) for future amendments of the software in terms of functionality additions or changes.		

Delivery summary

Lot 2: Supply of IT equipment and software for implementation of: Intelligence Led

Policing and Advanced Analytical Platform systems		
No.	**Item(s)**	**Quantity**
1.	Turnkey AAP system	1
2.	Bundle middleware licenses for AAP system	1
3.	Bundle of other licenses for AAP system	1
4.	Turnkey ILP system	1
5.	Bundle middleware licenses for ILP system	1
6.	Bundle of other licenses for ILP system	1
7.	Rack server type I	3
8.	Rack server type III	2
9.	Data storage type I	1
10.	High performance internal switch devices	2
11.	Network management switch	2
12.	L3 switch	2
13.	Rack cabinet	2
14.	Data storage type II	1
15.	Fibre channel switch devices	2
16.	Ancillary services “Data migration”	1
17.	Ancillary services “Initial user training”	1

5 . Items to be delivered

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
1.	**Turn-key customised centralised AAP as described in sections 2.1 – 2.6** 1. System scope: compliant with requirements specified in section **2.2 "Scope under this contract"** 2. System architecture: compliant with requirements specified in section **2.3 "Architecture of AAP system"** 3. Detailed Design: compliant with requirements in sections **2.3 "Architecture of AAP system", 2.4 "Functionalities of AAP system" and 2.5 "Reconfiguration of system hardware platform"** 4. System functionalities: compliant with requirements specified in section **2.4 "Functionalities of AAP system"** 5. Software development: compliant with requirements specified in section**1.4 "Software development and testing"** 6. System testing: compliant with requirements specified in sect**ion 1.4 "Software development and testing"** and Special Conditions Article 25 7. System deployment: compliant with requirements specified in sectio**n 1.7 "Deployment of the system"**			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
2.	**Bundle of AAP middleware licenses** 1. Enterprise-grade EDWH with BI system, featuring requested functionality, specified in Item #1 2. Allowing at least 20 users to create and publish outputs with the solution specified in Item #1 3. Licensing model: compliant with requirements in sections **1.3 "Third-parties commercial software licensing",** and**2.3.2 "Third-parties commercial software licenses"**			
3.	**Bundle of software licenses (commercial or commercially supported Open Source)** such as Application Server, RDBMS, Operating System if required by the proposed solution, specified in Item #1 Existing Oracle licenses specified in the **Table 1 List of software licenses at the Beneficiary's premise** from section**. 8. Annexes**, if foreseen by the proposed architecture, will be provided by the Beneficiary and do not need to be included in this bundle.			
4.	**Turn-key customised centralised ILP as described in sections 3.1 – 3.6** 1. System scope: compliant with requirements specified in section **3.2 "Scope under this contract"** 2. System architecture: compliant with requirements specified in section			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	3.3Architecture of ILP system" 3. Detailed Design: compliant with requirements specified in sections **3.3 "Architecture of ILP system", 3.4 "Functionalities of ILP system" and 3.5 "General design, users and workflows of the system"** 4. System functionalities: compliant with requirements specified in section **3.4 "Functionalities of ILP system"** 5. Software development: compliant with requirements specified in section**1.4 "Software development and testing"** 6. System testing: compliant with requirements specified in sect**ion 1.4 "Software development and testing"** and Special Conditions Article 25 7. System deployment: compliant with requirements specified in sectio**n 1.7 "Deployment of the system"**			
5.	**Bundle of middleware licenses** 1. Enterprise-grade middleware management system, featuring: a) process management (workflow engine) that can execute business processes described in BPMN b) search features including instant search suggestions and simple search filtering c) multimedia content storage			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	d) seamless access from other applications e) information governance: Access Controls and Audit Tools 2. Allowing all 300 concurrent users to use the solution 3. Licensing model: compliant with requirements specified in sections **1.3 "Third-parties commercial software licensing",** and **3.3.2 "Third-parties commercial software licenses"**				
6.	**Bundle of software licenses (commercial or commercially supported Open Source) such as Application Server, RDBMS, Operating System:** 1. As required by the solution specified in Item #4 2. Additional to the commercial software licenses currently dedicated to the pilot system, according to the proposed solution *Existing Oracle licenses specified in the* ***Section 8 Table 1 List of software licenses at the Beneficiary's premise*** *if foreseen by the proposed architecture, will be provided by the Beneficiary and do not need to be included in this bundle.*				
7.	**Rack Server Type I**	**Quantity: 3**			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	Manufacturer's name:			
	Product type, model:			
7.0.	Application and BI tools server with RISC architecture 64bit CPU and UNIX like operating system that supports creating virtual machines without Hypervisor and allow assignment of hardware IO components to virtual machines, no less than 128 Virtual machines to be created.			
7.1.	Server need to have minimum of 16 CPU cores with RISC architecture with no less than 4.2GHz frequency per core.			
7.2.	Server need to have minimum 512 GB of RAM			
7.3.	Server need to have at least 8 x 1.2TB SAS HDD			
7.4.	4x16 Gbps port FC network adapters (dual or single port adapters) with optical connectors (LC);			
7.5.	8x1 Gbps ports of Ethernet network adapters (quad port adapters) with copper connectors (RJ45) infrastructure; 4x10 Gbps ports of Ethernet network adapters (minimum two dual port adapters) with optical ports (SFP+) for 10Gbps			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
7.6.	Server need to have redundant power supply				
7.7.	Server, operating system and virtualization need to have 24x7 Support offered for period of one year.				
7.8.	UNIX like operating system and Virtualization need to be offered with full feature enabled (enterprise edition) for full server capacity (no capacity license).				
7.9.	Offer need to include central management software (monitoring, administration and can manage multiple hosts) for hardware components, virtualization platform and virtual machines and operating systems. Solution need to support for Service Request automatic creation.				
8.	**Rack Server Type III**	**Quantity: 2**			
	Manufacturer's name:				
	Product type, model:				
8.1.	Processor architecture implemented in 64-bit technology				

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
8.2.	Processor: minimum of 2 (two) physical processor and with minimum of 24 (twenty-four) cores on min 2.0 GHz			
8.3.	Operational memory: minimum 384 GB of RAM with minimum frequency of memory card on 1600MHz DDR4.			
8.4.	Each server must have at least 4 (four) SAS (Serial Attached SCSI) internal disks with at least 600 GB for the operating system, and have to be configured for redundant operation.			
8.5.	Internal disk adapter (HBA - Host Bus Adapter) must have at least 2GB Battery Backed Write Cache (or equivalent technology) and must support RAID 1 protection level.			
8.6.	Internal drives must be replaceable without stopping system operation (Hot Swap).			
8.7.	Server must have at least 2 (two) 1/10Gb Ethernet ports.			
8.8.	Server must have at least 2 (two) 10/25 Gb Ethernet ports.			
8.9.	Server must allow at least 40 Gbit/sec redundant connection (2 x 40 Gbit/sec in full capacity) to the			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	storage system using high performance switch.				
8.10.	Server must have at least 1 (one) dedicated 1GbE Base-T Ethernet port to support remote control and monitoring of database server.				
8.11.	Server must have its own redundant power supplies interchangeable without affecting server operation (hot swap PSUs).				
8.12.	Server must have its own redundant cooling units interchangeable without affecting server operation (hot swap cooling fans).				
8.13.	Server must be shipped with preinstalled, configured and licensed 64-bit Enterprise Class Linux or UNIX like operating system with included technical support for at least one year.				
8.14.	Each database server must be certified for Oracle Database 12c Enterprise Edition and Oracle Real Application Clusters installation.				
9.	**Data Storage Type I**	**Quantity: 1**			
	Manufacturer's name:				
	Product type, model:				

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
9.1.	At least 3 (three) identical and physically independent storage servers to support the protection of individual server failure, high availability and redundancy.			
9.2.	Total Capacity (gross) of storage system must be at least 360 TB of raw disk space implemented using hard disk drives.			
9.3.	Requested capacity of storage system must be implemented using a system of identical SAS (Serial Attached SCSI) hard disk drives of at least 36 (thirty-six) units in order to ensure system performance.			
9.4.	Hard disk drives must be Hot Swap replaceable.			
9.5.	Each storage server must have its own redundant power supplies interchangeable without affecting server operation (Hot Swap PSUs).			
9.6.	Storage system cache must have a capacity of at least 75TB of NVMe flash cache or with equivalent performance Solid State Disk (SSD) technology.			
9.7.	Complete Storage system must allow a minimum of 120 Gbit/sec redundant connections (240 Gbit/sec in full capacity) to database servers using high performance switch.			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
9.8.	Storage system must have at least one (1) dedicated 1GbE Base-T Ethernet port per storage server to support remote control and monitoring of storage servers.			
9.9.	Each storage server must have 192GB of RAM and 20 cores on min 2.0GHz.			
9.10.	The system should have the I/O bandwidth and database performance confirmed by manufacturer (brochures, specifications, benchmark results, etc.).			
9.11.	Performance should be reported using the standard metric such as TB/hour for data load rate, and IOPS (number of I/O operations per second) for disk and flash cache performance. • Disk System IOPS should be at least with bandwidth of 5,4GB/s, 7,800 IOPS • Flash Cache Read operations should be at least, with bandwidth of 75GB/s, 1,000,000 IOPS for SQL operations • Flash Cache Write operations should be at least with bandwidth of 75GB/s, 1,000,000 IOPS for SQL operations • Disk System Data Load Rate should be at least 7TB/h for SQL operations.			
9.12.	The complete system need to have at least 60 processor cores available for SQL offload.			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
10.	**High performance internal switch devices**	**Quantity: 2**			
	Manufacturer's name:				
	Product type, model:				
10.1.	Platform must have at least 2 (two) high performance switch devices to support the protection of individual switch failure, platform high availability and redundancy at infrastructure level.				
10.2.	Switch devices must have fully non-blocking architecture.				
10.3.	Each switch device must have at least 36 (thirty six) 40 Gbit/sec ports for connection between database servers and storage servers or equivalent in terms of performance.				
10.4.	Total throughput per individual switch device must be at least 1440 Gbit/sec.				
10.5.	Each switch device must have a management module.				
10.6.	Each switch should have its own redundant power supplies interchangeable without affecting the switch device operation (Hot Swap PSUs).				

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
10.7.	Each switch device must support logical network isolation.				
10.8.	Each switch device must be supplied with all necessary fittings and cables to connect the database servers with the storage system.				
11.	**Network management switch**	**Quantity: 2**			
	Manufacturer's name:				
	Product type, model:				
11.1.	Type: Rackmount				
11.2.	Platform must have at least 1 (one) switch with 48 (forty-eight) 10/100/1000 BASE-T ports to manage the system.				
11.3.	Management: Web based management interface				
11.4.	Network management switch should be min layer 2 switch.				
12.	**L3 switch**	**Quantity: 2**			
	Manufacturer's name:				

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	Product type, model:			
12.1.	Maximum rack size needs to be 1Rack Unit with appropriate tools for mounting to 19" industry rack.			
12.2.	The device must be equipped with redundant AC power.			
12.3.	At least 24 x 10/100/1000 Gigabit Ethernet interface.			
12.4.	At least 8x TenGigabit Ethernet (10GE) SFP + ports.			
12.5.	The ability to stack (create one logical device) of two or more devices of this type using dedicated ports and / or using the Ethernet ports interface.			
12.6.	Support for forwarding Jumbo Ethernet frames.			
12.7.	Support for OSPF, ISIS and BGP routing protocols.			
12.8.	Support for multicast routing through protocols: Internet Group Management Protocol Version 2 and 3 (IGMPv2 and IGMPv3), Protocol Independent Multicast Sparse Mode (PIM SM), PIM Source-Specific Multicast (SSM).			

1. Item Number	2. Specifications Required		3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
12.9.	Support for L2 protocols (STP, MSTP, 802.1Q).				
12.10.	TenGigabit Ethernet active optical twinax cable with embedded SFP + transceiver, 8 pieces per each L3 switch.				
12.11.	Gigabit Ethernet optical SFP transceiver for multimode fibre, 2 pieces per each L3 switch.				
13.	**Rack Cabinet**	**Quantity: 2**			
	Manufacturer's name:				
	Product type, model:				
13.1.	Standard equipment: minimum Rack casters kit, rack levelling feet, side panels, front door, adjustable vertical mounting rails, roof, keys, split perforated rear door.				
13.2.	Rack cabinet should have the form factor of at least 42U.				
13.3.	Features: Adjustable depth, integrated cable management.				
14.	**Data Storage Type II**	**Quantity: 1**			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	Manufacturer's name:			
	Product type, model:			
14.1.	The data storage system must have at least two controllers in the active-active configuration.			
14.2.	The operating system of the controller must be located on the controller itself, on redundant internal disks or on separate medium			
14.3.	Minimum 256 GB DRAM cache per offered system.			
14.4.	Minimum 32 CPU cores per offered system.			
14.5.	Must have a minimum of 4 x 10GBps T-Base port for connection to clients per offered system.			
14.6.	Must have a minimum of 8x 16 GBps ports with associated SFP + short-range optical modules with an LC connector to connect to the SAN infrastructure of the user per offered system.			
14.7.	Must support the following at least levels of data protection in technology Double-parity.			
14.8.	Must include Thin Provisioning.			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
14.9.	Must include the following File level protocols: NFS v4, SMB 2.1.			
14.10.	Must include the following Block-Level protocols: iSCSI, Fibre Channel.			
14.11.	Must include deduplication and compression.			
14.12.	Must include the option to create a copy of copies.			
14.13.	Must support the following functionalities: remote replication, clones, encryption.			
14.14.	Remote control via the intuitive browser user interface (BUI) or command-line interface (CLI)			
14.15.	"Call home" functionality for automatic opening of cases with the manufacturer			
14.16.	NDMP interface for serverless backup software.			
14.17.	Minimum number of disks: • 24 x 3.8TB SSD (flash based drives) • 48 x 8TB SATA			
14.18.	To be expandable to a minimum of 16 disk shelves that can contain no less than 24 disks.			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
14.19.	Power cords: 2 x minimum lengths 1.2m with connectors C13 on one side and C14 on the other side of the controller.			
14.20.	Licenses with supported system features must be offered up to the maximum system extensions.			
14.21.	Must support the following operating systems (and multi-path functionality): RHEL / Enterprise Linux, IBM AIX, Microsoft Windows Server, Oracle Solaris.			
14.22.	System needs to have 24x7 Support offered for period of one year.			
15.	**Fibre Channel Switch 24 port** **Quantity: 2**			
	Manufacturer's name:			
	Product type, model:			
15.1.	Minimum 24 ports with supported speeds 4, 8, 16 Gbps.			
15.2.	Minimum 12 ports need to be enabled for use and configured with SFP+ adapters with LC connectors Short range.			
15.3.	Maximum rack size needs to be 1Rack Unit with			

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
	appropriate tools for mounting to 19" industry rack.			
15.4.	Possibility to aggregate 24 ports for achieving 384 Gbps full-duplex bandwidth.			
15.5.	Switch need to support following port modes: E, F, M, D.			
15.6.	Switch need to support Access Gateway mode: F_Port and NPIV-enabled N_Port.			
15.7.	Switch need to have minimum one 10/100 Mb/sec RJ45 Ethernet port for remote management, one serial port for console access and one USB port for firmware upload.			
15.8.	Power cables need to be minimum 2 meters with C13 C14 connectors.			
15.9.	For remote management switch need to support SSH, HTTP, SNMP v1/v3 protocols.			
15.10.	FC cables need to be offered to connect all SAN clients to network.			
15.11.	Hardware support included need to be at least 1 year from manufacture vendor.			

6 . Ancillary Services

1. Item Number	2. Specifications Required	3. Specifications Offered	4. Notes, remarks, ref to documentation	5. Evaluation Committee's notes
16	**Data migration** Compliant with requirements specified in section **1.5 "Data Migration" for AAP system**			
17	**Initial user training** Compliant with requirements specified in section **1.6 "Training"**, **2.6 "Initial training of AAP users"** and **3.6 "Initial training of ILP users"**			

7 . Distribution Schedule

No.	Location	Address	All items
1	Ministry of Interior	Kneza Miloša 101, 11000 Beograd	X

Delivery Locations

No.	Location	Address	Contact person	Contact e-mail	Contact phone
1	Ministry of Interior	Kneza Miloša 101, 11000 Beograd			

8 . Annexes

Table 1 List of software licenses at the Beneficiary's premise

#	Short description	Q-ty	Notes
1	Oracle DB EE perpetual	4	Maintained annually
2	Oracle Exadata Storage Server SW Disk Drive perpetual	18	Maintained annually
3	Oracle RAC 1 Node perpetual	4	Maintained annually
4	Oracle WebLogic Suite perpetual	6	Maintained annually
5	Oracle Partitioning perpetual	12	Maintained annually
6	Oracle DB EE perpetual	8	Maintained annually
7	Oracle SOA Suite for Oracle Middleware perpetual	6	Maintained annually
8	Oracle BI Publisher perpetual	2	Maintained annually
9	Oracle WebLogic Server EE perpetual	6	Maintained annually
10	IBM Cognos 8	20	Not maintained
11	ESRI ArcGIS Server 10.3, unlimited clients, web based	1	Maintained annually
12	ESRI ArcGIS Editor 10.3 Desktop	1	Maintained annually
13	IBM DataPower Gateway with HSM Card Appliance - D1AT1LL	1	Maintained annually
14	IBM DataPower Operations Dashboard Single Gateway Application Instance - D1NAWLL	1	Maintained annually