

Technical Specifications

1. Products and services that are subject of procurement

a) SOFTWARE FOR THE DIGITIZATION OF FOREST AREAS (NFC TECHNOLOGY)

The terms of reference aim is to define implementation of a complete software and hardware solution (hereinafter: platform) for entering, processing and maintaing various sets of data and activities of trees in forests of 5 parks of National Parks of Montenegro

Activities of this TOR are a part of a Pilot project that will be implemented in NP Prokletije.

The resulting platform will essentially represent a new solution for monitoring, identification and management of trees, which will enable monitoring and maintenance of tree inventory while preventing and detecting illegal tree cutting.

Vision is that all trees in National Parks of Montenegro get a physical RFID tag where each tree will get a unique ID. All trees/unique IDs will be stored in a database.

The software part of platform must be developed as a web-oriented solution (web application), and the data to be collected in this system must be stored in a centralized database based on a relational model. It is necessary to develop a user authorization system based on user accounts, and a module that enables the creation and administration of users and their rights. All activities of web application users must be automatically recorded through transaction logs in the database.

Web based software platform will allow authorized users to enter and maintain data using desktop computers/laptops and mobile/handheld devices, that will be saved in to establish a modern database management system through a user-friendly application module.

Some of main data for each item/tree are:

1. unique ID
2. type/category of tree
3. status (ex. exiting or cut)
4. age
5. location (GPS coordinates)
6. image
7. owner of tree
8. other specific content and information related to the item.

The platform must be ready to manage millions of unique IDs in a simple way and must allow integration with third-party information sharing software.

Especially important is that platform ensures reliable data access and manipulation for a technician working in the forest using a handheld device.

Main processes that platform has to cover:

1. Mark trees by RFID and read it into platform to form a unique item record
2. For each ID, enter all main data or updates of existing data and save it
3. Automated alerts: For certain data manipulation events, platform should send a message to NP representatives and owner of the
4. Enable fast and detailed search of all items/trees by status, type, location, etc
5. Enable reliable reporting of all items with various filters/parameters to show and follow the life cycle of each tree
6. Ability to export data and reports from platform as XLS
7. Automated monitoring of selected items – NP user should have ability to select specific trees or areas of forest to be alerted for changes of data for those items.

Basically, implemented platform should integrate the following solutions:

- Unique ID management system
- Tree inventory
- Inventory tracking and geolocation
- Content creation
- Email module
- Analytics

Some of the technical characteristics that the software should support are:

1. Simplicity
2. Business continuity
3. Compliance with business requirements – development and improvement based on requirements and business needs in accordance with the law
4. Compliance with best practice standards
5. Development of functions and services - the possibility of multiple use of business functions and services
6. Reliability
7. Availability
8. Security
9. Interoperability
10. The software must have functionalities to detect potential errors in its operation.
11. The software must be capable of reporting errors that occur during its operation.
12. Even with reduced performance, the software must remain operational after identifying the error.
13. The software must remain operational during regular maintenance, repair removal, new version installation, etc.
14. The software must be adaptable and support the possibility of increasing the number of users and functionality without compromising the solution's performance.

The platform must have a content management module to create dynamic landing pages and associate them with one or more IDs. It must also contain a file storage module for uploading multimedia content.

The content associated with the ID is displayed every time someone reads the tag with a reader. Landing pages must allow access to information from a third-party platform or software.

Database requirements

Physical data to be located in a relational central database (RDBMS) that supports concurrent access. For data persistence, database management systems based on the relational model should be used and support the concepts of transactions and ACID properties (Atomicity, Consistency, Isolation, Durability).

Application layer

Application programming interfaces (APIs) that implement business logic and expose functionality to internal and external subsystems should be implemented using REST full web services. This layer should be realized through programming languages and tools such as: Java, Spring environment, .NET platform or equivalent and supporting languages and tools. Equivalent also means a tool or environment through which it is possible to create RESTful web services.

User interface

The user interface of the application should be accessed via a web browser from a computer and mobile/handheld devices, so responsive design approach is important. The user interface should be implemented using modern tools and environments from this field.

Security requirements:

The web application must have integrated security protection that enables resistance to various types of hacker attacks. It is necessary to take into account all aspects of risk that can lead to the danger of misuse and endangering the integrity of data placed through the web application. During development, it is necessary to take into account the recommendations and standards regarding the security policy of Web content (Content Security Policy), such as, for example, the recommendations of the W3C (World Wide Web Consortium). The web app must satisfy the "OWASP Top 10" from 2021. After the creation of the web app, an external verification of the recommendations from the mentioned standard (A1-A10) as well as a basic "pen test" will be done. All observed deficiencies in this sense will be submitted to the contractor in writing in order to eliminate them.

Data exchange with other institutions:

For the purpose of data accuracy and process automation, the Web application must contain components (web services, API, etc.) that will enable integration with the web services of the Real Estate Administration and other public administration bodies that will be able to exchange data.

User Administration module:

It is necessary to enable the creation and administration of user accounts with different levels of privileges: super administrator, administrator, user 1 with the right to enter data, user 2 with only reading rights, and various system modules/functions.

The Bidder should provide a detailed description of the methodology that will be used and a work plan for the execution of the project with a plan of activities (jobs) with descriptions of the associated phases and individual activities, which includes all participants, time schedule, etc. Certain functionalities may have to be adapted to the new, electronic way of doing business, meaning they may deviate from the specification.

b) HARDWARE PORTION OF PLATFORM

RFID nail tags

RFID nail tags for tagging trees. Nail tags should be secure for installation and easily driven into place. The nail tag should be rust-resistant in wet and chemical environments as well as water and dustproof.

Example: <https://www.rfidconnectus.com/rfid-asset-tag/rfid-nail-tag.html>

RFID Nail Tag specifications:

Material: Special ABS material or customized

Size: 36*6mm, 40*10mm, 41*28mm (or can be customized)

Frequency: 860-960MHz

Weight: 1.25-1.50g

Color: black

Reading range: 0-50cm

Working environment: -25° C to +85° C

Feature: Waterproof, rust-resistant, shockproof, long using life

Handheld reader with tray – RFID reader

Handheld android RFID reader which is easy to use and provides good performances in UHF reading of RFID nail tags.

Handheld device must have protection from “Tag collision” (reads only one Tag at the time)

RFID reader specifications:

Must work with tags with frequency: 860-960MHz

System: At least Android 11

Memory: at least 32GB

Working environment: at least -20° C to +50° C

Communication: Bluetooth, WI-FI, NFC

Battery: At least 5000 mAh

1. Expected Outputs and Deliverable

Implementation of the system in accordance with this specification shall be **150 days** from the date of signing the contract and includes:

- **Methodology and Activity Plan with implementation dynamics** (software implementation /development plan, Detailed plan of integration of software and hardware, Testing plan, Training Plan, Support and Maintenance Plan, Backup and disaster recovery plans, ect);

The Bidder should provide a detailed description of the methodology that will be used and a work plan for the execution of the project with a plan of activities (jobs) with descriptions of the associated phases and individual activities, which includes all participants, time schedule, etc. Certain functionalities may have to be adapted to the new, electronic way of doing business, meaning they may deviate from the specification.

- **Developed Information System in accordance with requirements** (source code for applications with comments, technical documentation, analysis reports, architectural specifications, ect.);
- **Procurement and delivery of specified hardware**
- **Integration with web-based software and database**
- **Implementation and setup of the software in the Client's environment** (all the system components must be compatible and installed on existing hardware/infrastructure platform; initially online hosting with possibility for migration on local server once the infrastructure is set up by end user)
- **Delivery of final technical documentation**
- **Trainings for the staff responsible for system operation;**
- **Warranty period and maintenance during the warranty period.**

Upon the completion of the delivery, the Client shall verify and accept the obtained results, which is a prerequisite for the final completion of the work. This phase's duration shall be a maximum of 5 days, after which Minutes of the handover of the software solution will be prepared to be signed by the representatives of the Client and the Contractor.

The executor undertakes to provide maintenance services for a period of one year from the date of signing the minutes on the handover of the software solution.

All communication with the vendor shall be conducted in Montenegrin language, including the delivered materials.

Documentation:

The documentation to be submitted by the contractor must include at least:

- Documentation on the implemented functionalities with a detailed specification of the solution architecture, hardware/software requirements, development code (source code), installation version, procedures for system maintenance, making backups, recovery, downtime procedures, etc.;
- User instructions for all user groups.

Training and installation of the system

Installation of the software/system on-site and at least three-day training for users with covering main points:

- Starting a new system,
- Creating content and uploading data to the platform,
- Integration with third-party data and testing and validations to adjust the software according to user requirements.

Warranty period and maintenance during the warranty period

The warranty period must be **one year** from the date of system production release or from signing the handover protocol for the delivered functionalities. The warranty must include the elimination of all errors observed when using the system.

During the warranty period, it is necessary to take care of regular software updates, improvements within existing functionalities in accordance with user experience, and technological adjustments.

Maintenance includes detecting and resolving possible errors and problems in the regular operation of the system, where the cause is analyzed in detail and activities are undertaken to eliminate it, whether it implies changes in the code, a new installation of the system, and the like.

The maintenance of the software solution includes all activities and interventions aimed at the smooth functioning of the system from the aspect of the software solution.

HARDWARE PORTION OF THE PLATFORM

The following equipment which is compatible with the developed software should be delivered:

- **RFID nail tags, 20.000 pieces**
- **Handheld reader with tray – RFID reader, 5 pieces**

2. Implementation team

Minimum requirements:

- **Team Leader/Project manager – 1 person**
 - Minimum general working experience of 7 years
 - Minimum specific working experience of 3 years on same and similar jobs (inventory systems, IoT, etc)
 - Experience working with Government/Public sectors clients is an asset
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset
- **Software/Devops engineer– 1 person**
 - Minimum general working experience of 7 years
 - Minimum specific working experience of 3 years on same and similar jobs
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset
- **Programmer/developer – 3 persons**
 - Minimum general working experience of 3 years
 - Minimum specific working experience of 3 years on same and similar jobs
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset

- **Business analyst – 1 person**
 - Minimum general working experience of 5 years
 - Minimum specific working experience of 3 years on same and similar jobs
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset

- **UI/UX designer - 1 person**
 - Minimum general working experience of 5 years
 - Minimum specific working experience of 3 years on same and similar jobs
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset

- **System Architect**
 - Minimum general working experience of 7 years
 - Minimum specific working experience of 3 years on same and similar jobs
 - Experience working with Government/Public portals/web based software is an asset
 - Regional and international experience is an asset
 - Fluency in English language is mandatory, while the proficiency in the local language will be considered as an asset