

GREEN SPACES

designed by R3GIS

EFFICIENT AND RESPONSIBLE MANAGEMENT OF URBAN GREEN AREAS FOR PUBLIC ADMINISTRATIONS

The software that initially started as R3 TREES evolved over the years, driven by the need to manage all assets of green areas, and, in 2020, the updated version R3 TREES 5 was renamed in GreenSpaces.

GreenSpaces is an integrated and geo-referenced platform for all stakeholders involved in the management, maintenance and documentation of green areas. The Web technology, the simplicity of use, the usability in the field, the ease of activation of new users with different roles and privileges, makes it the ideal tool to coordinate and document all the work related to green areas.

This document reports the main features of GreenSpaces, with particular attention to the needs of public administrations. Further information is available online at: www.r3-trees.com.

GreenSpaces is based on web and mobile technology: all users access a single database according to their roles with a simple web browser or in-field using a tablet or an app on a smartphone.



Fig. 1: GreenSpaces can be used on a fixed location and in-field on a tablet or mobile app.

The main advantages of the software are listed below:

- All information related to sites and assets are managed in a single database, which can be consulted directly in the field or from the workplace through a web browser by all stakeholders involved in green management.
- Management of all elements of green areas, from trees to green surfaces, street furniture, play equipment, flooring, etc.

- Possibility to manage for each plant over time one or many visual tree assessments (VTA) and instrumental measurements and have a precise monitoring of its health and stability.
- Ability to schedule maintenance jobs and inspections based on the outcome of past inspections.
- Representation on map of all elements with query, search and configuration functions of the visible layers.
- Possibility of giving access to the application to an unlimited number of users with roles differentiated according to their tasks (contractors, collaborators, external professionals, etc.).
- Possibility to give access to the application to different users with visualization-only profiles, to view the activities completed in the areas of their competence, without being able to modify the data.
- Extensive browsing and search functionalities, both from map and tables, map editing, querying, measuring, printing, importing and exporting data in various formats.
- Mobile app to update information in the field, also without data connection.

The available features vary depending on the version of the software, as described at the end of this document.

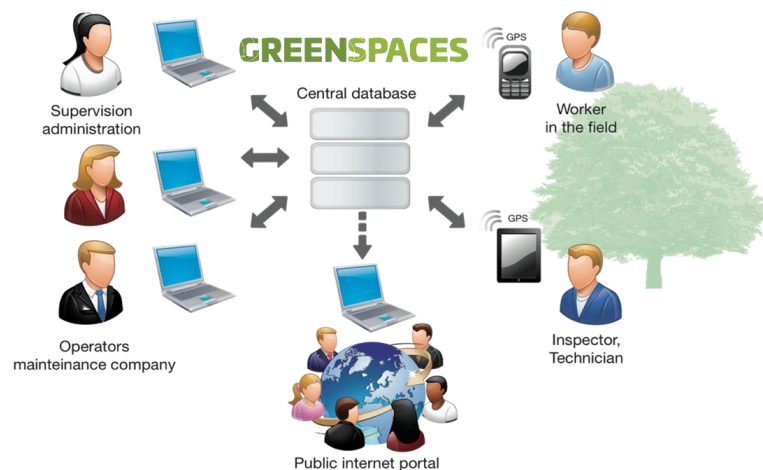


Fig. 2: GreenSpaces is a platform to coordinate, manage and document the maintenance of green areas

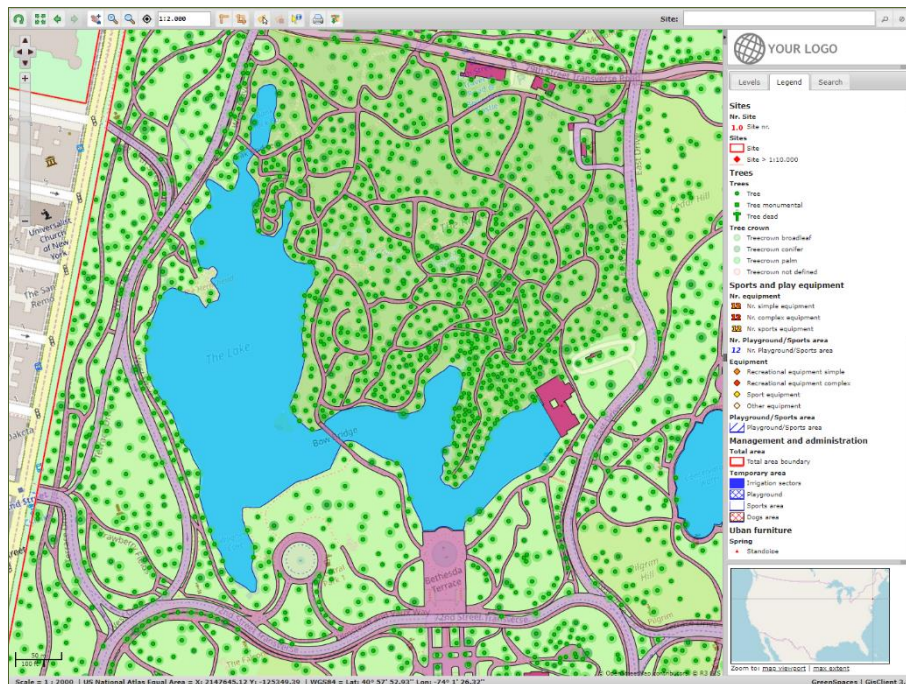


Fig. 3: All data can be viewed on the map.

Management of trees and VTAs

GreenSpaces manages all information related to trees, including the position and dendrometric characteristics of each plant. The tree form contains data about the species, growth site, vital condition, and photos. Some of the parameters entered may be configured for the customer, such as the tree tagging system, height (class or precise), canopy diameter (class or precise), stem diameter with option of multiple stems.

The application allows to program and carry out visual tree assessments (VTA). In the VTA form are reported the defects that can have an effect on the stability of the plant, a fundamental aspect for public green areas. The form may be configured for each customer in order to customize the defects checked, as well as the presence and categories of the targets. GreenSpaces allows to assign to each VTA various instrumental analysis performed with, for example, the resistograph or the sonic tomograph.

GreenSpaces can be used to program and manage maintenance jobs on trees, as well as felling and planting activities. The 'Empty spaces' module allows you to manage the planting of replacement trees.

The history of maintenance, visual tree assessments, change of status are stored in the application database and can be consulted at any time.

Fig. 4: A tree data form containing details of the plant, images and geographical position, maintenance jobs, VTAs and related documents.

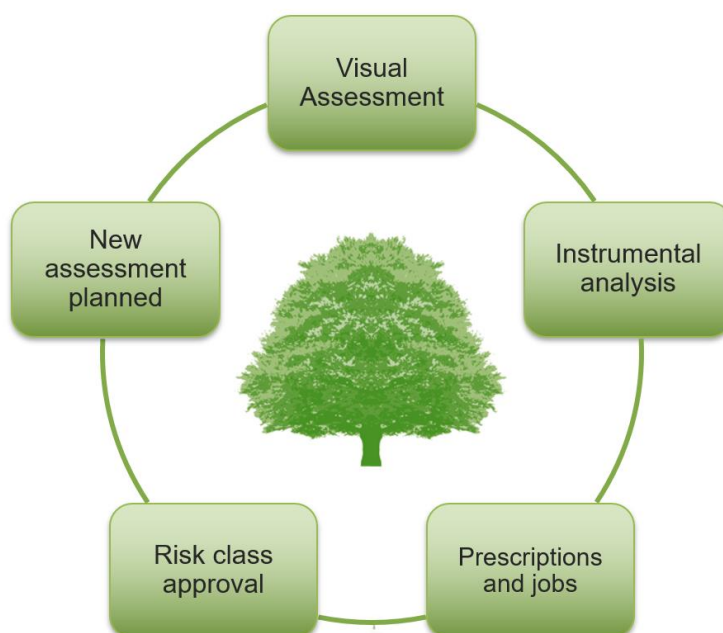


Fig. 5: GreenSpaces manages all the phases of survey, inspection, monitoring of a tree, guaranteeing a complete documentation.

| # Job | # Type | Kind of job | Scheduled start date | Scheduled end date | Company | Actions |
|-------|--------------------------------------|--|----------------------|--------------------|------------|--------------------------|
| 57 | VTA - Tree Risk-Assessment checklist | SYS-CONTROL-VTA - Monitoring TRA check | 2021-11-30 | 2021-12-30 | R3 GIS srl | [Search] [Edit] [Delete] |

Fig. 6: The VTA form allows to register all the information on the visual assessment of the plant and to document and associate instrumental checks.

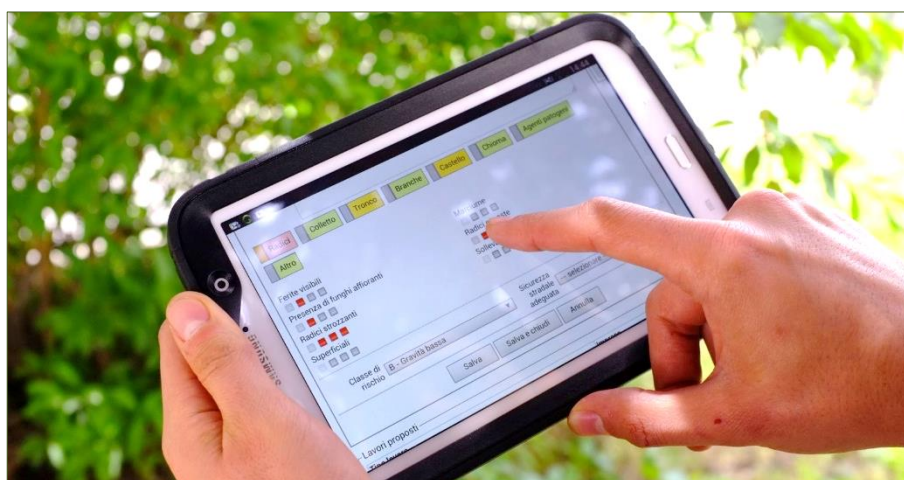


Fig. 7: Compiling the VTA form in the field using a tablet.

Playground management

GreenSpaces manages all information related to children's playgrounds, including the location and the main features of each equipment. The software highlights the safety aspect, the management of maintenance operations and periodic inspections with the possibility for the administrator user to program a work schedule.

The attributes that can be associated with the equipment items are: type, material, manufacturer, production date, maintenance schedule, age group, drop height, flooring, installation date, age, new value and current depreciation value, photos and related documents.

The historical database also lists decommissioned equipment and related information, such as inspections and maintenance work carried out.

Equipment - Modification

Localization

Site: 1.010 - Central Park

Playground/Sport area: 001 - West 110th Street Playground

Coordinates: 2148306.16 / -122112.5

Product information

Equipment category: Simple

Equipment type: Climbing game

Producer: Richter Spielgeräte GmbH

Production: 2018

Age group (from): 6 years

Age group (to): 16.00 years

Material (en): Wood, Rope, Galvanized metal

Fall height: not measured

Surfacing:

Quantity:

Maintenance information

Installer:

Status equipment:

Installation: 3/20/2018

Removal:

New value: 12,000,000 \$

Amortization: 10 years

Left value: 10,800,000 \$

Notes:

Added: Administrator 07/26/2016 17:40:29 - Last change: Administrator 12/31/2019 16:53:13

Inspection Jobs Documents Images Equipment documentation

| Date | Inspection Type | Detector | Actions |
|------------|-----------------|---------------|---------|
| 12/19/2019 | Ordinary | Administrator | 🔍 📄 📷 |

Fig. 8: An example of an equipment form with details of inspections, maintenance jobs and any related documents.

In order to improve the traceability of inspections, NFC tags can be used to identify the equipment. The operator can read the tag with GreenSpaces Mobile and keep track of the inspections and maintenance activities. This can help to reduce liability in case of accidents on playgrounds.



Fig. 9: Registration of inspections of play equipment using NFC tags.

Planning and financial accounting

GreenSpaces allows you to schedule the maintenance jobs for each site and to share the programming between the various operators and the administrative entity as a detailed job list or a Gantt chart. All the jobs carried out are recorded and linked to the element (tree, lawn, hedge, etc.) being maintained, as well as to the site. For each job it is possible to verify the times and methods of execution.

The list of maintenance jobs for a particular site can also be viewed as a Gantt chart. The figure shows an example of a work calendar, with job types and periods when the activities are planned. The colour of each activity can be individually set by the administrator. The red vertical line indicates the current date.

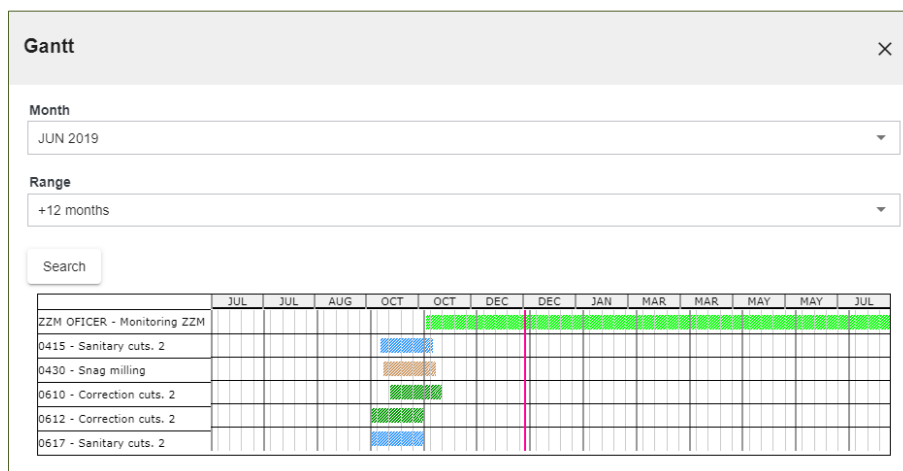


Fig. 10: Gantt chart of maintenance jobs

| Company | Job category | Temporarily visible | Actions |
|-----------------|-------------------|---------------------|---------|
| Green Grass Ltd | Green maintenance | ✓ | |
| R3 GIS srl | All categories | | |

Fig. 11: Site form with all related information

GreenSpaces allows you to manage all stages of reporting, from the closure of a job, and its validation by the commissioner, to the creation of an interim report with the list of jobs performed in a given period, to the final registration of the payment.

The financial reporting of the maintenance jobs is carried out through the definition of a price list linked to the individual operations. When a job is programmed the cost is calculated based on the areas it affects and the geometries of the objects concerned. For example, if you insert a task to mow the lawn on a sports field, the cost will be calculated by multiplying the price per square meter of the mowing by the actual square meters of lawn on the sports field defined by the lawn polygon. The job created, once completed, will be added to the list of jobs to be accounted for and will be available for the compilation of the activity report.

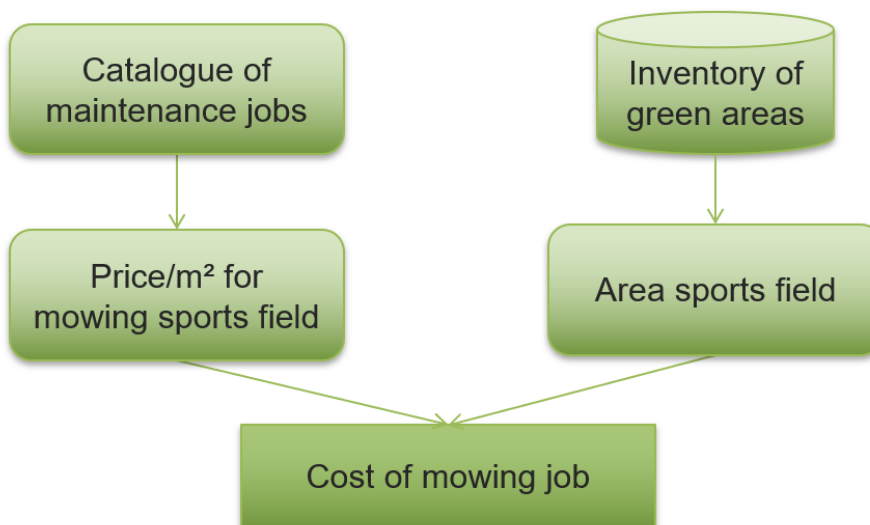


Fig. 11: Job configuration diagram

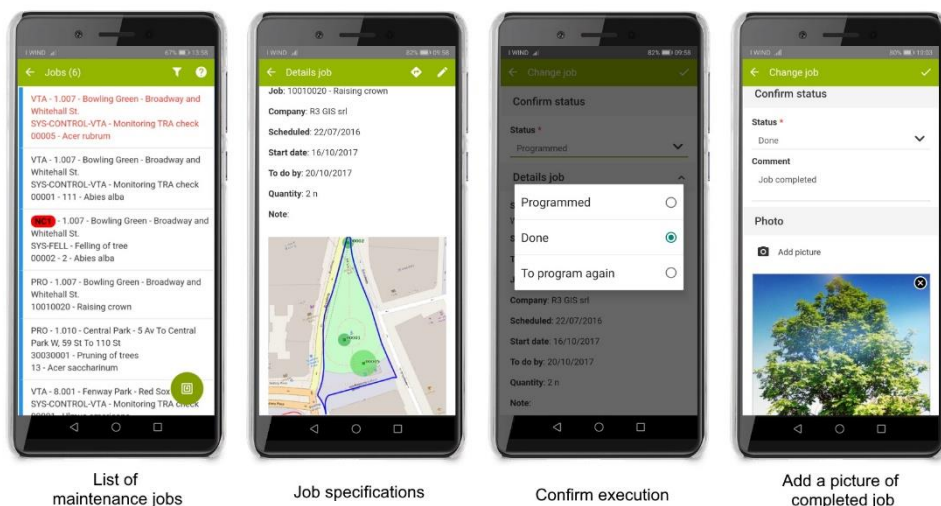
This way all phases of the job, from initial programming, to progress monitoring, to final payment, are manageable in GreenSpaces.

GreenSpaces Mobile

Green management takes place in the field: being able to collect and record information at the time and place where it happens saves time and avoids errors.

GreenSpaces Mobile, an app for Android devices, allows you to manage operations related to urban green maintenance directly in the field. The app is an extension of the GreenSpaces application, simple and intuitive and can be used both on tablets and smartphones, even when there is no mobile network available (offline).

The operator enters reports directly in the field, carries out VTA inspections, performs a tree census, confirms the execution or reprograms the maintenance jobs planned for that day.



List of
maintenance jobs

Job specifications

Confirm execution

Add a picture of
completed job

Fig. 12: Field-work management with the application GreenSpaces mobile. The jobs can be filtered manually, by the location detected by the device's GPS, or by reading the NFC tag attached to a site

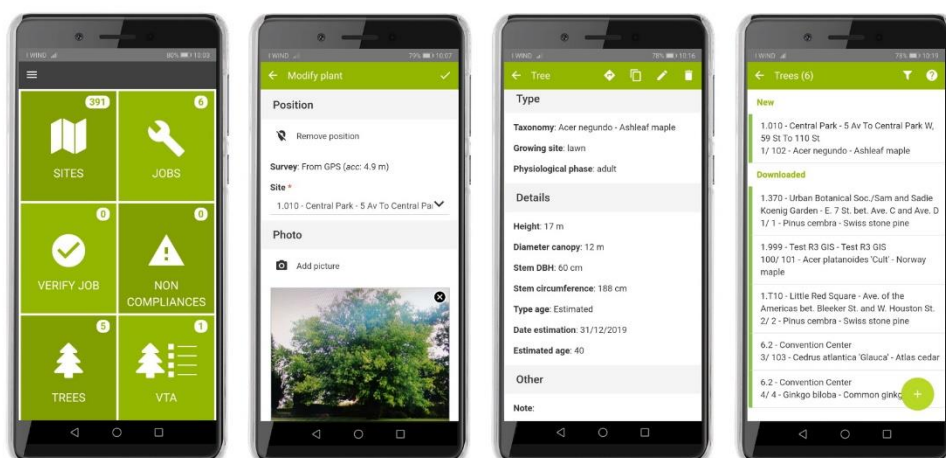


Fig. 13: Entering a new plant through the mobile application

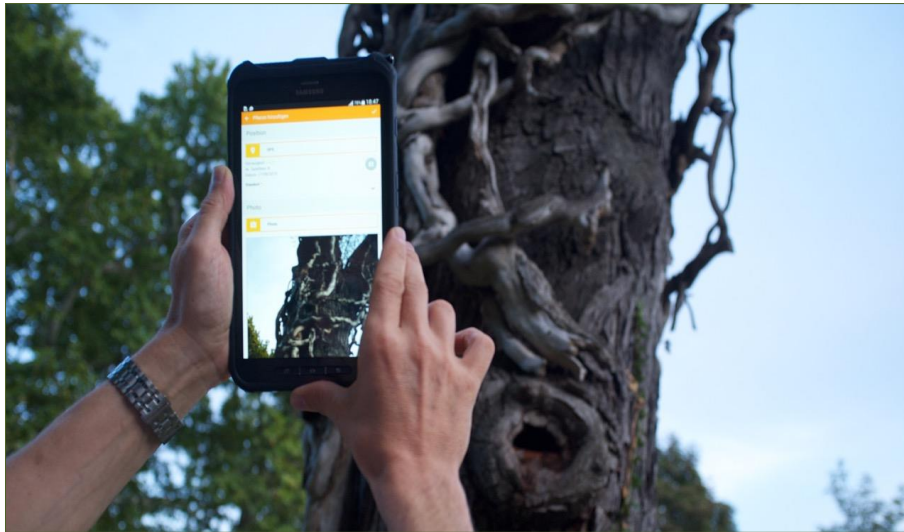


Fig. 14: For each plant surveyed, you can add a photograph taken directly with your mobile device.

Hosting or server installation

In order to ensure the usability of the application by the client, and by third-party operators involved in the maintenance of greenery and play equipment, it is necessary that the server on which the application is installed is visible on the Internet. We therefore offer hosting services on a suitable machine, including adequate internet bandwidth, security systems, daily data back-up and other activities necessary to ensure trouble-free operation of the service.

Alternatively, GreenSpaces can be installed on the customer's server or virtual machine. In this case R3GIS takes care of the configuration of the complete machine, starting from the operating system, to the basic open source software, to the application itself.

Configuration

The configuration of the software is included in the cost of the license and will be done together with the customer to determine, according to the type of license, which types of objects will be managed, which validation procedures and which groups of users should be activated.

Import of data

If a tree census or green areas census already exists, it is possible to import such data.

R3GIS can take care of the conversion and upload the data. In that case we request a sample of data in order to estimate the work required.

Training and support

The introduction of new methodologies for the use of information, combined with the use of new technologies, requires an adaptation of procedures for various stakeholders involved in green management (owner, manager, contractor, technicians). This evolution entails the need for training on how to access the services and a consequent need for requalification of staff in order for the service to be provided correctly.

The training includes the following topics related to the use of the GreenSpaces application:

- user profiling and creation of new users
- map interface with search, query and print functionality
- site form: consultation, updating, printing
- tree form: consultation, updating, printing

- equipment form and playgrounds/sports areas: consultation, update, printing
- management of visual and instrumental tree stability assessments
- management of inspections of play equipment
- maintenance job scheduling: configuration, validation, printing the Gantt chart, financial accounting, reporting
- information management in field with GreenSpaces Mobile

Versions of the software

There are three versions of GreenSpaces. The features described so far apply to GreenSpaces FULL. Below is a brief description and a table that distinguishes the functions present in TREES, PLAY and FULL versions of the software.

- A) **GreenSpaces TREES** is installed and customized for the client. The basemap is the one provided by the customer (orthophoto, technical map, topographic database) or Openstreetmap, and can also be installed on the customer's server. In addition to the tree census, the software manages the VTA inspections, the scheduling of tree-related jobs, has the possibility to activate multiple users with different roles, at the customer's choice. With the Mobile app it is possible to manage trees, VTA and tree-related jobs directly in the field, even without data connection.
- B) **GreenSpaces PLAY** is installed and customized for the client. The basemap is the one provided by the customer (orthophoto, technical map, topographic database) or Openstreetmap, and can also be installed on the customer's server. In addition to the equipment census, the software manages the inspections, the scheduling of maintenance jobs related to sports and play equipment, has the possibility to activate multiple users with different roles, at the customer's choice. With the Mobile app it is possible to manage equipment, inspections and related jobs directly in the field, even without data connection.
- C) **GreenSpaces FULL** manages in addition to trees and sites all the other elements of the greenery (urban furniture, green areas, flowerbeds, hedges, play equipment, etc.). It has a map based on customer's data, several types of users according to their functions, sophisticated work management tool which includes programming, validation, execution and reporting, management of play equipment inspections and non-compliances. With the Mobile app it can manage trees, VTA, play equipment, inspections, maintenance jobs and alerts directly in the field, even in the absence of data connection.

Below is a table with the differences between the versions:

| Functions | GreenSpaces TREES | GreenSpaces PLAY | GreenSpaces FULL |
|---|----------------------|---------------------|---------------------|
| Any number of users with different roles | X | X | X |
| User groups with differentiated roles | X | X | X |
| Site form with automatic areas, documents, pictures | X | X | X |
| Site statistics | X | X | X |
| Print in PDF format | X | X | X |
| Export as XLS, SHP | X | X | X |
| Openstreetmap as basemap | X | X | X |
| Map interface with customer's basemap | X | X | X |
| Standard cartography tools | X | X | X |
| Installation on customer's server or hosting | X | X | X |
| Field use with interface optimized for mobile tablets | X | X | X |
| Field work management using GreenSpaces Mobile | X | X | X |
| Tree form with documents and pictures | X | | X |
| VTA inspections | X | | X |
| Instrumental tree analysis | X | | X |
| Tree statistics | X | | X |
| Management of tree-related jobs | X | | X |
| Tree census and VTA using GreenSpaces Mobile | X | | X |
| Management of playgrounds and play equipment | | X | X |
| Equipment form with documents and pictures | | X | X |
| Play equipment inspections | | X | X |
| Maintenance jobs related to play and sports equipment | | X | X |
| Equipment census and inspections using GreenSpaces Mobile | | X | X |
| Management of all elements of green areas | | | X |
| Urban furniture management | | | X |
| Maintenance jobs for all types of elements | | | X |
| Cost calculation and reporting | | | X |
| Statistics on all types of objects of green areas | | | X |
| Photos and documents for all types of objects | | | X |
| Data import from SHP format | | | X |
| Management of issues and non-compliances | | | X |

More information is available on the website www.r3-trees.com.