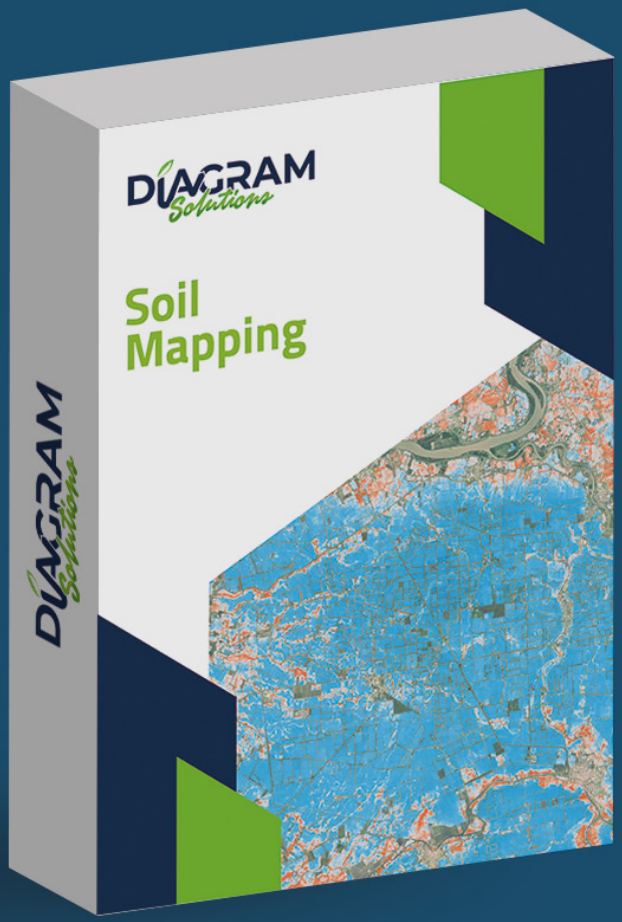
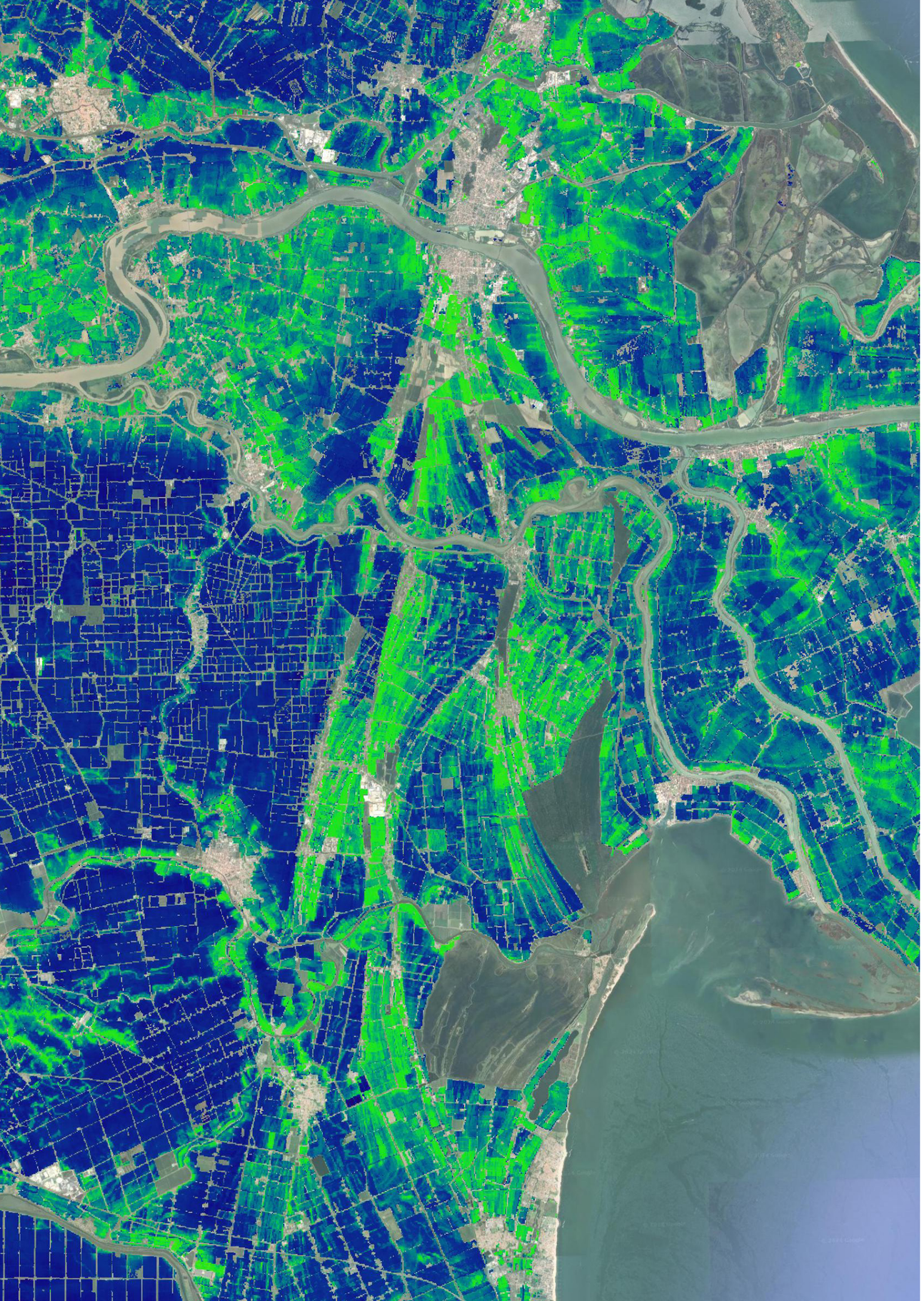
DIAGRAM Solutions

Soil Mapping





Summary

The Group

Diagram was established in 2024 through the transformation of the IBF Servizi SpA Group and the acquisitions of Agronica Srl, Abaco SpA, Agriconsulting SpA and Netsens Srl.

It is a leading Italian and European company in the digitalisation of services dedicated to the agri food sector, in the development of farm management software and in the management of processes for delivering, monitoring and controlling environmental and agricultural support programs.

As a partner to major Governments across Europe, it supports Public Administrations, farms, banks and insurance institutions and the agri food industry with the goal of promoting social, economic, and environmental sustainability.

Today, the company is owned 41.6% by CDP Equity, 41.6% by Trilantic Europe and 15% by BF International.

Challenges

Soil is the strategic resource underpinning agricultural production, climate balance and food security. Yet, according to the United Nations, approximately 75% of the world's soils are already degraded and, in the absence of structural intervention, this figure could rise to 90% by 2050, with direct consequences for the environmental and economic resilience of regions.

In Europe, growing regulatory attention confirms the strategic importance of this resource. The new European Directive on soil monitoring and resilience, the Soil Monitoring Law, together with the objectives of the Green Deal and the Soil Strategy for 2030, introduces increasingly stringent requirements for monitoring, reporting, protection and restoration of soil quality. For public administrations and stakeholders in the primary sector, regulatory compliance is no longer a formal obligation but a structured process requiring certifiable, traceable and scientifically validated data.

In this context, the Digital Soil Mapping solution represents an enabling technological infrastructure. Through an advanced monitoring and analysis system, it enables highly accurate measurement of the main sustainability parameters: erosion risk, soil organic carbon content and stock, and soil health indicators.

Georeferenced digital maps transform land into an integrated information system, supporting public authorities in planning targeted interventions, assessing policy effectiveness and preparing reports aligned with European and national regulatory requirements.

The result is evidence based soil management capable of ensuring regulatory compliance, resource optimisation and a long term strategy focused on food security, climate resilience and competitiveness.

Designed For

Governments and Public Administrations, food companies and farms

Governments and Public Administrations

Public authorities require scientifically robust tools to monitor soil conditions, ensure regulatory compliance and design agricultural, environmental and climate policies based on objective data.

The service enables them to:

- monitor soil health at scale through measurable and georeferenced indicators
- support spatial, agricultural and environmental planning
- assess the agro environmental impacts of public policies
- strengthen transparency, traceability and data quality in decision making processes
- prepare reports aligned with statutory obligations and reporting requirements

Supply Chains

Supply chains and food companies operate in a context where sustainability, production efficiency and risk management are strategic competitive drivers.

Digital soil mapping enables them to:

- understand production variability and identify limiting factors
- optimise agronomic planning and input management including fertilisers and water
- reduce risks associated with erosion, loss of fertility and water stress
- support ESG strategies and sustainability reporting with verifiable data
- improve operational planning and resilience across the entire value chain

Farms

For farms, soil knowledge represents a direct competitive advantage. Digital Soil Mapping provides a measurable and manageable parameter to guide decision making.

Specifically, it enables them to:

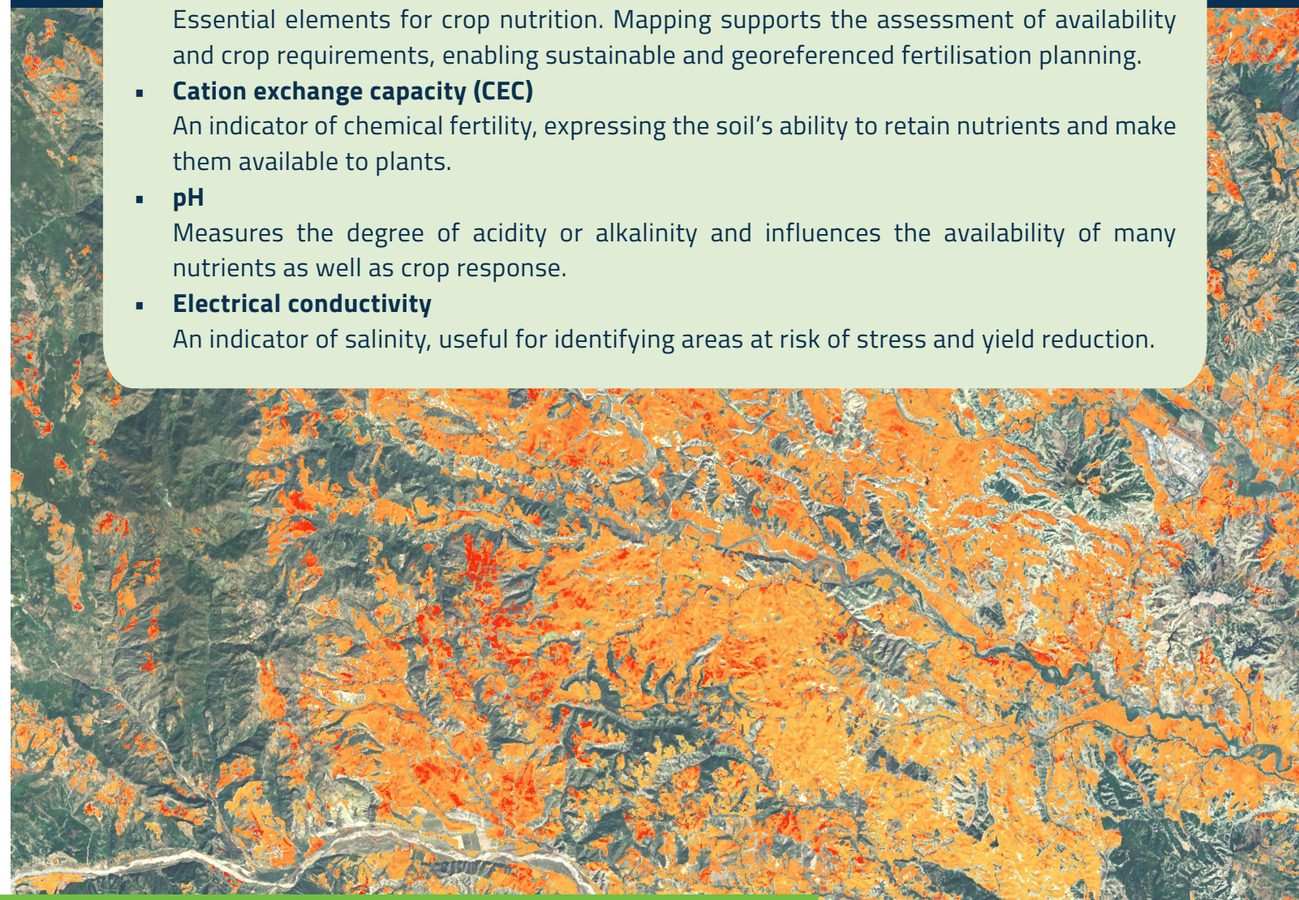
- gain detailed insight into the composition and fertility of their land parcels
- adopt precision agriculture practices based on real data
- optimise yields and production quality while reducing costs and waste
- plan targeted interventions for fertilisation, irrigation and conservation management
- enhance soil carbon stocks with a view to accessing future carbon credit markets

Digital soil maps: key parameters

Digital Soil Maps provide georeferenced and continuous information with an operational resolution of 10 to 30 meters, offering a detailed view of soil chemical and physical properties. Based on field samples, they deliver a comprehensive and coherent overview across the entire surface area.

The main parameters represented include:

- **Particle size distribution (clay, silt and sand)**
  Describes the physical structure of the soil and influences water retention, aeration and workability, with direct effects on water and air dynamics and on the sustainability of agronomic practices.
- **Nitrogen, Phosphorus and Potassium**
  Essential elements for crop nutrition. Mapping supports the assessment of availability and crop requirements, enabling sustainable and georeferenced fertilisation planning.
- **Cation exchange capacity (CEC)**
  An indicator of chemical fertility, expressing the soil's ability to retain nutrients and make them available to plants.
- **pH**
  Measures the degree of acidity or alkalinity and influences the availability of many nutrients as well as crop response.
- **Electrical conductivity**
  An indicator of salinity, useful for identifying areas at risk of stress and yield reduction.



The digital soil mapping service

An integrated process that combines field sampling and satellite data to produce accurate, up to date digital soil maps that are readily usable for agronomic decision making and spatial planning.

Area Definition and Georeferencing
The process begins with the precise identification of the areas of interest. Each surface is digitised and georeferenced, creating the cartographic baseline that enables every dataset collected to be accurately linked to its real world location.

Satellite Image Analysis
Data derived from satellite imagery are processed using spatial analysis techniques to divide the surface into homogeneous zones based on soil chemical and physical characteristics. This classification provides a clear representation of within field variability and forms the interpretative basis for more rational sampling design and intervention planning.

Soil Variability Classification
The data derived from the images are processed using spatial analysis techniques to divide the surface into homogeneous zones in terms of the soil's physico-chemical characteristics. This classification provides a clear representation of within-field differences and becomes the interpretative basis for planning sampling and interventions in a more rational way.

Sampling Plan Design
Using the homogeneous zones as a reference, a targeted sampling plan is developed. Collection points are strategically selected to accurately represent soil variability, ensuring reliable data without redundancy and optimising time and resource allocation.

Georeferenced Field Sampling
Sampling is carried out using precision instruments and standardised procedures to ensure representative and comparable samples. Each collection point is recorded with reliable geographic coordinates, guaranteeing full traceability and data robustness.

Digital Management of Field Operations
Field activities are coordinated through digital tools that guide operators, record data in real time and support quality control. This approach reduces the risk of manual errors and makes the entire process more efficient, verifiable and fully documented.

Laboratory Chemical and Physical Analysis
Samples are analysed in the laboratory to determine key soil parameters including texture, nutrients Nitrogen, Phosphorus and Potassium, pH, electrical conductivity and cation exchange capacity. These measurements objectively describe soil properties and provide the scientific reference framework for the modelling phase

Predictive Modelling
Using statistical techniques and machine learning algorithms, point based field data are integrated with environmental and satellite information. Measurements are therefore extended beyond sampled locations to the entire study area, producing continuous and high resolution digital maps.

Thematic Map Production
Final maps display the distribution of the main soil properties including texture, nutrient levels, pH, salinity and other indicators. The resulting layers are compatible with GIS software and decision support systems and can be used for planning, agronomic management and sustainability analysis.

Soil Suitability Assessment
Digital maps enable the interpretation of soil suitability, meaning the natural capacity of an area to support specific crops or production systems.

A detailed understanding of soil properties makes it possible to:

- select crops and varieties best suited to different zones
- design more effective crop rotations
- better predict production response and reduce agronomic risks

Results Validation
Each model and map is accompanied by quality indices and reliability metrics that allow the accuracy of estimates to be assessed. Validation ensures transparency and enables results to be confidently used in operational decision making.

Service Outputs
The Digital Soil Mapping service delivers structured technical reporting and interoperable operational datasets, ready to be integrated into corporate or institutional information systems including GIS platforms, management software and monitoring and control tools.
Outputs include high resolution georeferenced digital maps and quantitative indicators relating to the main soil chemical and physical parameters, including soil organic carbon content, erosion risk, texture, salinity, water holding capacity and soil health status. These are complemented by comparative and temporal analyses for ongoing monitoring.

The result is a comprehensive, objective and scientifically validated representation of the soil resources, enabling the identification of critical issues, the quantification of resource status and informed decision making at agronomic, managerial and institutional level, from operational planning to reporting and regulatory compliance.

Soil erosion and carbon storage

Soil Erosion

Maps enable the identification of vulnerable areas and the estimation of soil loss over time, supporting the planning of conservation measures and sustainable land management strategies.

Organic Carbon

Maps describe the soil's capacity to accumulate and retain carbon, a key element for fertility and climate mitigation strategies. This information supports monitoring, verification and reporting programmes.

Benefits

The adoption of Digital Soil Mapping delivers measurable benefits in terms of operational efficiency, environmental sustainability and competitive advantage, with tangible impacts across the entire agri food value chain and within decision making processes. The service enables the integration of economic performance, environmental responsibility and regulatory robustness, transforming soil management into a strategic asset.

Resource Optimisation and Cost Reduction

- up to 15 percent reduction in fertiliser use, enabled by targeted interventions based on real data
- up to 20 percent reduction in water consumption through more precise management of soil water holding capacity
- up to 30 percent reduction in operational costs resulting from improved input allocation

Reduced Environmental Impact and Soil Degradation

- up to 10 percent reduction in impacts related to erosion and loss of fertility through site specific and preventive practices

Increased Effectiveness of Agronomic Interventions

- up to 35 percent increase in the effectiveness of site specific interventions, supported by detailed knowledge of soil variability

Monitoring, Reporting and Carbon Valorisation

- up to 25 percent improvement in monitoring, verification and reporting capacity, supported by structured data for climate strategies and access to carbon markets

Strategic Benefits

- strengthened regulatory compliance through traceable and scientifically validated data supporting statutory obligations and reporting requirements
- alignment with market expectations in terms of sustainability, transparency and ESG standards
- enhanced credibility with stakeholders, investors and financial institutions
- stronger competitive positioning within an increasingly sustainability oriented natural resource management landscape

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