1. Entity posing the challenge

- **ELDU**

2. Challenge statemento

Digital transformation of medium- and high-voltage electrical installation operation and maintenance.

3. General context

ELDU is a leading company with over 50 years of experience in the **high-voltage electrical installation assembly and maintenance** sector. It currently has a workforce of 550 professionals, an annual turnover of 70 million euros, and references from over 6,000 clients worldwide including the Port of Valencia, Bilbao Metro, Airbus, and Aena. It is a consolidated leader in Spain and has an extensive international presence with activities in: Chile, Argentina, Brazil, Nicaragua, Venezuela, Mexico, USA, France, Portugal, Nigeria, and South Korea.

Over the years, the company has diversified its activities towards the provision of engineering services, assembly, and preventive, predictive, corrective and conductive maintenance of different types of installations, energy audits, customer support services during technical-legal upgrades according to current regulations, and many others. All its services are aimed at achieving the maximum energy efficiency of its clients' installations, minimising their operating costs, and maximising savings.

With this background, ELDU's vision is to continue to be a leading organisation in the provision of energy services for installation maintenance and assembly activities. As such, to continue to be at the forefront of the sector, and above all, to continue to offer the highest standards of quality and performance while guaranteeing excellent service provision and the correct operation of the assembled and/or maintained installations, the challenge is to **improve the digitalisation of its daily operations**.

4. The Challenge

1. Description of the challenge:

Among the service areas that ELDU covers, the following challenge is closely related to **Electrical Maintenance services**. To better understand ELDU's Electrical Maintenance service line it is important to note that the company maintains **non-domestic consumer electrical installations (i.e. infrastructure with high. to medium-voltage or medium- to high-voltage transformers) and carries out the regulatory reviews and inspections for these facilities**

according to RD 337/2014. Based on this decree, high-voltage installation owners must sign a maintenance contract with a maintenance company.

These inspection and maintenance services include activities such as: predictive, preventive, and corrective maintenance tasks for low-voltage systems and systems up to 400 kV; infra-red thermography on site and using drones (for solar panels and overhead lines); detecting and repairing faults on underground electrical cables; maintenance of classified areas and premises in public areas; transformer maintenance; inspections by Authorised Control Bodies (OCA); recording and analysing electrical supply quality parameters; generator maintenance; electric vehicles charging stations; maintenance of wind, offshore wind, and photovoltaic facilities.

An essential component of such tasks is to **correctly collect and record parameters for transformer centre and/or substation elements such as switches, disconnectors, transformers, control equipment, etc.** These parameters are used to exhaustively analyse the installations, providing basic inputs to correctly supervise the processes and machinery under review. Other key factors to consider when maintaining medium- and high-voltage electrical installations are internal and external isolation, electrical contacts, earthing, mechanical component lubrication, sealing, corrosion protection, and the legibility of signals to guide operators if required, among many others. The company estimates that it **reviews around 50 different types of elements** across all its installations. Small installations may involve around 5-10 elements, whereas larger ones such as steelworks may involve 30 elements. In turn, each element to be inspected may have from 1 to 5, or even 20 or more units depending on their size. For example, inspecting a transformer centre for a university is not the same as inspecting one in a cinema or a small or large industrial company. In terms of scale, the company carries out more than 4,000 annual inspections on different installations for different clients. These activities involve collecting millions of control parameters.

Clearly, **data collection is one of the company's critical processes**, which **consumes significant resources** (mainly person-hours) and is a relatively simple and automatic process. The **main output of this data collection process is an inspection report detailing the condition of the inspected electrical installation.** One of the company's main advantages is the ability to classify 95% of the problems detected at customer installations. To date, it has detected and coded over 3,000 recurring problems.

A second block of maintenance-related services for electrical installations involves providing **24/7 assistance services, 365 days a year**. The company has service points (service headquarters) in the Iberian peninsula that are within 150 km of the installations to provide immediate breakdown assistance. However, this involves a significant deployment of company personnel, as it implies ensuring several technicians with a high degree of experience are always operational. High-voltage installation maintenance services are generally characterised by being knowledge-intensive, i.e. the operator needs several years of training and experience

to be able to carry out inspection tasks. This is mainly due to the amount of information to be processed, but above all, to the danger involved in operating in such environments.

Within this context, ELDU sees several opportunities for the digital transformation of its activities. These opportunities can be summarised as those involving optimising data capture and management, and improving dialogue with customers.

- Collecting data and observations from inspections through automatic and digital systems such as **voice-controlled or other systems** on mobile devices (computers or tablets), which can be used to generate recommendations or obligations regarding corrective actions to be taken by the client. The aim is to improve data collection in an industrial work environment that could be noisy at times.
- To this end, a **new digital platform (maintenance management software) must be created for these data collection processes which can be used to embed photos, videos, etc. This platform would subsequently enable automatic data analysis, and the generation of inspection reports that could later be sent and/or used to inform the customer online of the status/progress/completion and conclusions of the inspection**. For example, this could be **in the form of an app**, which would also allow new value-added services for customers to be provided. A **new, much more visual display of information to the customer** is appreciated.
- Finally, and given that the company has been collecting historical data from its customers and the different installations for many years, the application of **technologies based on predictive models** to offer new and more accurate features for maintenance services would be appreciated.

2. Main impacts

In summary, ELDU seeks to comprehensively transform and digitise its entire maintenance service for medium- and high-voltage electrical installations. To this end, the development of a new digital interface/platform is considered a priority, which will improve internal data collection operations and present information more quickly and visually. At the same time, it will allow new functionalities to be integrated that help to provide new services with greater added value to customers (e.g. remote assistance or geolocation).

ELDU views this as a pillar to consolidate customer loyalty, as the modernisation of current features will allow for improvements in process efficiency (reduction of operator hours in the first place, and remote assistance to less experienced profiles in the second), while also improving the portfolio of services with higher added value (e.g. through remote assistance or predictive maintenance models).

3. Main questions to be solved

- Is voice-controlled data collection possible? What alternatives exist in an occasionally "noisy" data collection context?
- Would it be possible to design an enterprise platform that integrates different functionalities such as: material sharing, report generation, remote assistance, live information transmission (regarding the inspection itself)?
- Would it be possible to apply some kind of artificial intelligence to develop predictive models of the data collected by the company for new value-added services?

4. Technical characteristics of the challenge

The expected solutions to address the company's digital transformation challenges are:

- Software (app) to communicate with customers.
- Software/platform where data on inspections, authorised technicians, equipment to be used, library of technical specifications, etc. is stored. This data can be consulted by commercial managers and used to generate budgets with recommendations and typical anomalies.
- Non-manual data capture systems/technologies, such as voice-controlled systems.
- Artificial Intelligence that can be used to establish predictive models, for example using historical data, sensors, or other measurement systems.