Improving Network Operations **through Cognitive Intelligence and Automation**

## Vodafone Global NOC Transformation

"Artificial intelligence allows to extend automation to complex use cases never considered in the past, thus boosting network operations efficiency and ultimately for improving customer experience. Vodafone partnered with Celfocus to transform the Global Network Operations Center (GNOC) and deliver the Cognitive Intelligence Automation Solution."

Mario Volonterio
Head of OSS and Network Infrastructure
Engineering at Vodafone

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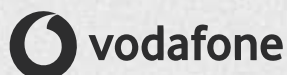
Keeping up with
OSS transformation

Digital transformation has impacted CSPs' business and operational strategies over the last years, changing the customer relationship and leading to the emergence of a new digital ecosystem.

The telecommunication industry responded by becoming more digital and closer to customers, by evolving from traditional Communication Service Providers to Digital Service Providers.

For this transformation to be effective, it must impact the entire IT infrastructure, covering both BSS and OSS systems to provide a holistic and integrated perspective.

From the OSS stance, agility, integration, automation and flexibility are key to be developed and effectively applied on the network-focused dimension for the whole system to be efficient, competitive and adaptive to the dynamic environment.

In the OSS domain, the **Network Operations Centres (NOCs)** is where this transformative potential is higher. The opportunity for automation and tighter integration is very significant due to the predictable and standardised nature of network events, along with the exponential data growth, which is already occurring because of IoT, 5G and other related digital offerings.

Embracing next-generation NOC architectures anchored on cognitive intelligence and automation benefits the delivery of an improved service, thus enhanced customer experience, as well as revenue growth driven by resources utilization, performance optimisation and lower operational costs.
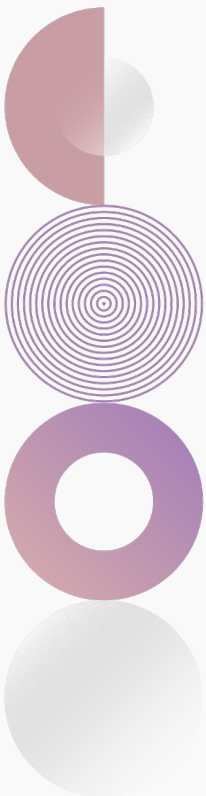
The **Challenge**

The Vodafone Group's NOC mission is to monitor, control and ensure network availability across multiple geographies. To cope with a dynamic and unsteady environment, the company designed a long-term strategy for its OSS transformation, composed of three stages:

1. **Operational Centralisation**
Process synergies and cost optimization led Vodafone Group to centralize network operations, selecting Portugal and Romania as the two locations to set up their global Network Operation Centres. The global NOCs support 13 markets throughout Europe, uniformising working methods, procedures and courses of action.

2. **Tools Standardisation**
The following step for Vodafone Group consisted of centralising and standardising key OSS assurance tools (Incident Problem Management, Inventory and Fault Management), setting a common ground for further efficiencies.

3. **Process Automation**
Although some automation has been introduced over the years, handling network incidents still fully depends on human reaction and contextual experience. Focused on continuous improvement and looking for sustaining competitiveness in a highly competitive and fast-paced market, the Vodafone Group identified the advantage of further automating network operations, ensuring higher efficiency levels and service quality, along with significantly reducing human error.

Bearing this in mind, the Vodafone Group set a **3-year goal of reducing 80% of the effort** allocated to first-line support activities through automation.

These activities involve regular, thus repetitive, events for troubleshooting, resolution and dispatching of incidents.

In addition, **the challenge included the creation of an Agile Centre of Excellence**, introducing DevOps methodology and a specific team to implement it at a certain stage of the project, assuming the mission of continuous improvement.
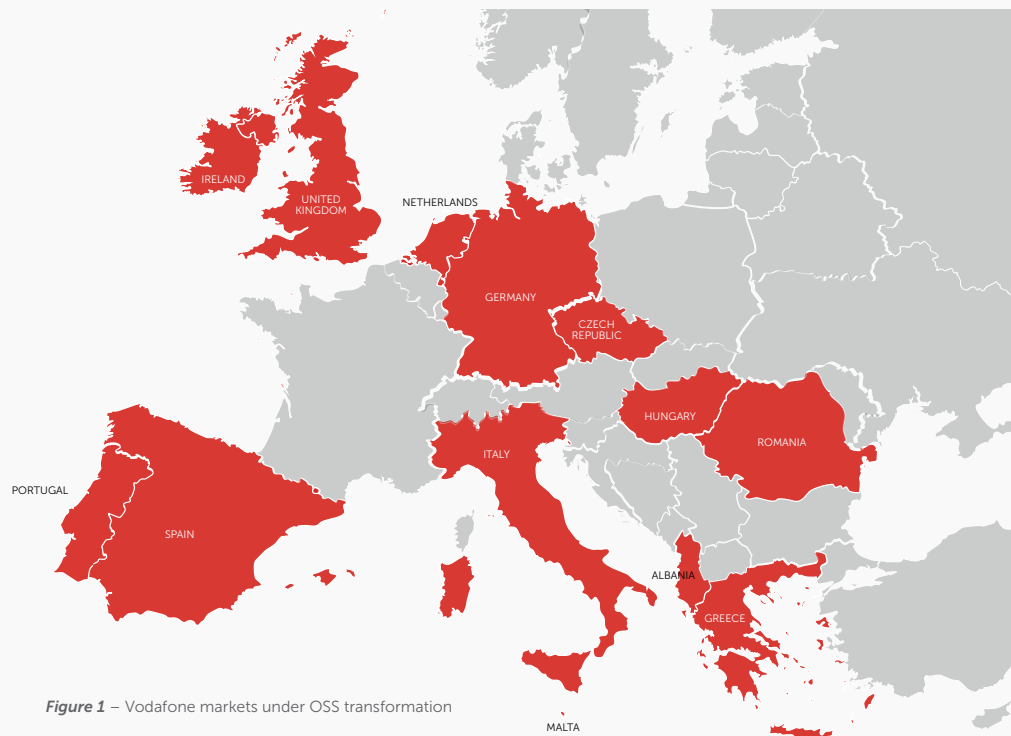

Figure 1 – Vodafone markets under OSS transformation

Project in a Nutshell

- **Process automation and advanced analytics featured with machine learning** to decrease 80% of the effort spent on first-line network support activities within 3 years.

- **13 OpCos covered** from Network Operations Centres in Portugal and Romania, including these two geographies.

- **Project solutions:** Cloudera (Analytics & Cognitive), Resolve (Automation) and CELFOCUS Omnichannel (Unified Operations Portal).

- **Celfocus domains involved:** Online & Digital Solutions, OSS and Analytics.

Solution and Project Delivery

Celfocus supported stage three of Vodafone Group's OSS transformation strategy, aimed at **improving efficiency and reducing by 80% the effort of first-line support activities** through cognitive intelligence and automation. The project comprised two streams:

1. Automation & Cognition Suite Setup

A cognitive dimension was integrated in the solution so that the Vodafone Group could take further advantage of data by understanding, reasoning and learning from it, which allows the access to wider and more valuable information on the network itself and the environment around it, along with gaining insights for strategic actions.

Celfocus distinguishes two automation approaches:

- **Automation for human assistance ("human-guided" automation):**
  Automations built for humans to trigger when needed. Time-consuming tasks and errors are greatly reduced.

- **Automation with human assistance ("exception-based" handling):**
  Full processes that run autonomously and require less human intervention.

The goal was to pursue end-to-end automation running autonomously and asking users' assistance when needed.
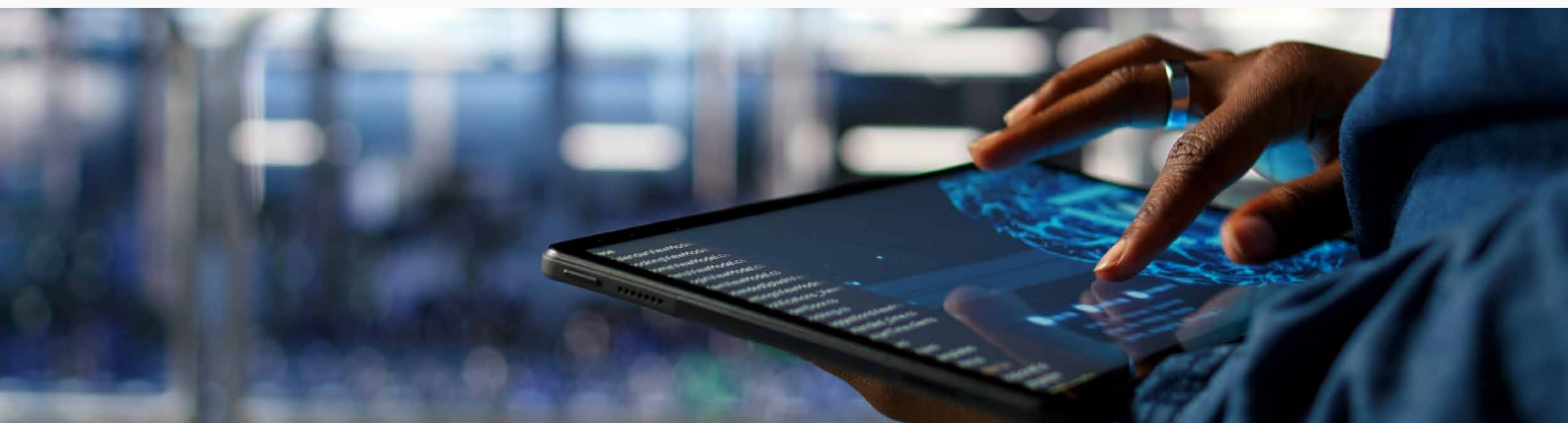
To provide the solution with capabilities that decrease human intervention, three building blocks were implemented:
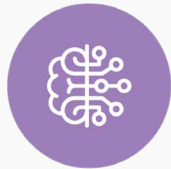
Analytics and Cognitive:
Acting as the «brain» of the operations, this component is responsible for adding a layer of intelligence to the ingested, processed and stored data lake, aimed at finding patterns and correlations. It consists of a real-time decision-making engine, fueled by Artificial Intelligence, which detects incidents based on alarms, external events and data from automation, classifies and groups them into scenarios, allowing to identify the root cause and to trigger resolution automation.

Automation:
As «hands», the automation framework orchestrates an end-to-end procedure of incident resolution. It provides a real-time collaboration to the decision engine, inclusively on minimizing events escalation, contributing to accelerate incident resolution.

Unified Operations Portal:
This interface represents the «eyes» through a holistic dashboard which provides actionable information to handle first-line events exceptions, both processual and technical, that may not be automated. This portal allows to decide on the best path to solve those exceptions, mostly related to a need for further human (physical) intervention, even with incomplete or misleading information (allowing to fill in or correct, respectively).

Covering most of the European territory, Vodafone Group's automated NOCs **rely on Artificial Intelligence to understand the context and identify issues**, launch the automation blocks to solve them and consider past events to determine the best course of action.

2. Automation Improvement DevOps

Stepping in at the end of the first stage of the automation setup, the DevOps team is responsible for Analytics, Machine Learning and Data Exploration continuous modeling and algorithm operationalisation, aimed at **automation improvement**.

In a collaborative model between Vodafone and Celfocus, this value-oriented and multidisciplinary team creates a unique backlog and ensures a consistent delivery of every sprint from different geographies.

Empowered by a bottom-up approach, the team works to align production (development) and support (operations), constantly adapting to the inherent complexity of the environment.
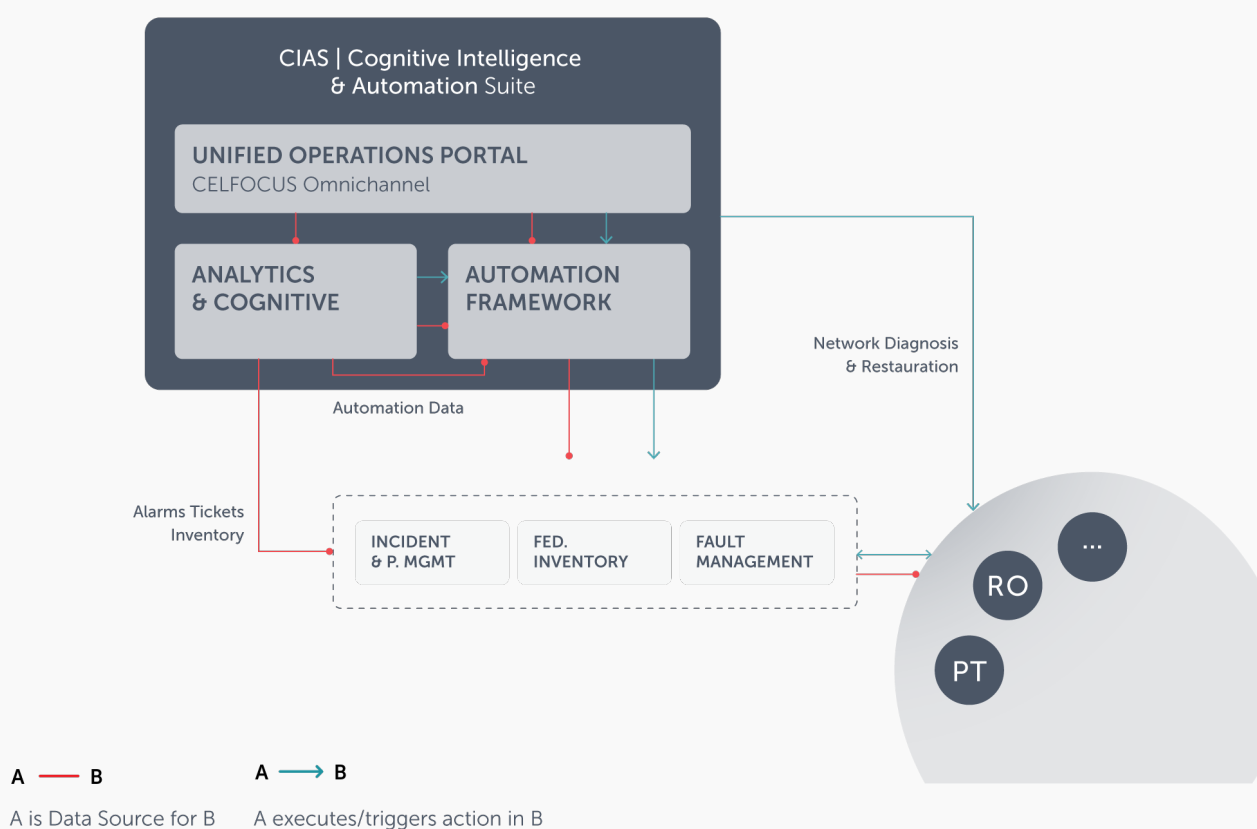

Figure 2 – Project Architecture

Loss of network signal event – use case

Picture a sharp drop of temperature, followed by a loss of network signal, that takes place in Madrid.

With the added cognitive capabilities and its automatised processes, Vodafone's upgraded NOC can automatically analyse and classify the issue, group alarms from the area affected and provide the best response. All these processes are feasible through an accurate assessment of the context and respective diagnosis, keeping the knowledge for future occurrences.

The Unified Operations Portal will only ask for next steps in case it is not provided with the information necessary to solve the issue, which will be automated for the next time the same fault happens, or if a local technical intervention is required.

Benefits

Supported by machine learning, cognitive intelligence and automation lead to a faster, more effective and tendentially zero-human effort resolution of network issues, thus decreasing manual activities. Furthermore, the upgraded NOCs benefit an overall improved customer experience, based on an increase of network and service availability and of SLA compliance, complimented by the following functionalities:

Integration: all the decoded data is gathered together, breaking silos of information;

Intelligence: the system keeps a record of past events, learns from them and faces them more effectively in the future;

Prediction: the cognitive component of the solution allows to deploy a predictive analysis based on standardised network operations journeys, along with a higher control over operations;

Convergence: the system has the capacity of grouping alarms according to location, level of severity or related to the same issue;

Lower operating costs: the process starts with a notification and is only closed when the problem is solved, either automatically or after little human intervention (exceptions), which contribute to reduce expenses.

Next Steps

There are various scenarios for this solution to evolve.

Firstly, as it was designed to be future-proof, it offers **scope for replication to other geographies**, expanding centralisation, standardisation and automation of Vodafone Group Operations.

Furthermore, **it has the potential to scale upwards in the IT architecture to integrate the service and the customer layer, evolving to a Service Operations Centre (SOC)**, which will play the role of an intermediary between the customerfacing departments (BSS) and network-focused and back-end teams (OSS). This means being able to measure and attend to the impact of network issues on customer service. Therefore, supporting the need to adopt a more customer-centric approach, thus putting service quality and customer experience at the heart of the business strategy and operational processes.

Moreover, the capabilities of capturing and analysing data and answering efficiently and effectively to environment events around a system shall be transported to **Internet of Things (IoT)**, as it too has a network to connect devices and make the interaction among them possible, but also for 5G and VoLTE.

Why **Celfocus?**

OSS and Analytics are two of the domains in which Celfocus has extensive knowledge and expertise, in the telco world. Furthermore, Celfocus' investment in areas like Machine Learning and Big Data Analytics, combined with a deep understanding of the OSS layer, made it the right partner to deliver this next-generation Network Operation Centre.

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