QUALITEST™

Prominent Producer of Unmanned Systems Transforms Their IoT Testing

The successful launch of autonomous systems and products rested on ramping up virtual labs and building an end-to-end technological framework—plus finding the right people to make it all work.

Challenges

Client needed to develop and deploy improved methodologies and business processes in IoT, RF and automation technologies.

Success required a comprehensive strategy to test hardware and multiple layers of embedded and integrated systems.

Solutions

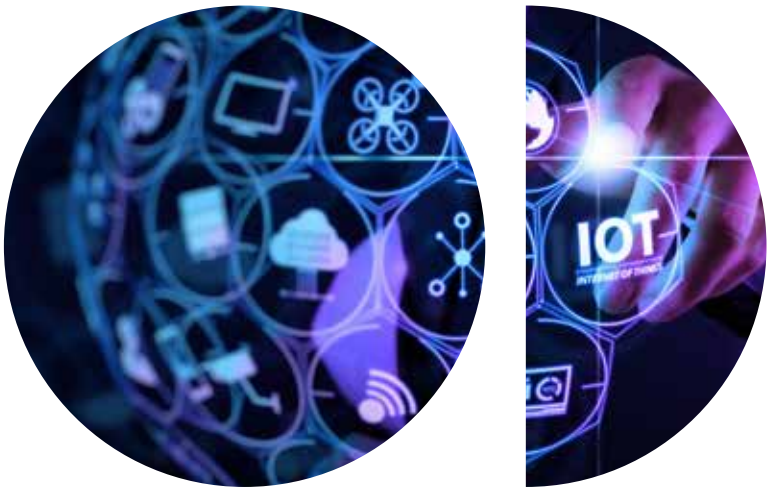
Qualitest created an end-to-end technological framework and ramped up virtual and physical labs.

We recruited needed automation experts and trained dedicated IT staff to implement.

Results

90% reduction in field testing operations and 50% cost savings through virtual labs.

75% decrease in errors through streamlined operations and controlled testing and 80% fewer defects through shift-left testing.



Client overview

The Client is an Israeli defense company that produces and supplies autonomous airborne, land and naval systems, products and services. Their offerings include a wide range of UAVs and UGVs (Unmanned Aerial/Ground Vehicles) for defense & homeland security departments as well as commercial applications. The Client is recognized as one of a small group of elite IoT and IoMT (Internet of Military Things) providers, whose solutions integrate command, control, communications, computer, intelligence, surveillance, and reconnaissance systems into a single ecosystem, enabling information-sharing for situational awareness and control.

Some solutions combine manned and unmanned autonomous platforms with AI-based tools. Systems and products are installed on new platforms; Client teams also perform comprehensive platform modernization programs and offer training and support services.

Facing fundamental challenges on all IoT fronts

The Client faced a lack of fundamental knowledge in methodologies, implementation and execution of IoT solutions. They were challenged in constructing the end-to-end technological roadmap required to deliver solutions and products suitable for their customers' demands. They were also challenged in terms of knowledge acquisition, especially in finding individuals proficient in automation and effectively matching them to develop code and construct automation tools.

Until this time, the Client had been conducting tests on hardware and software systems in the field, resulting in logistical complexity and costly, time-draining errors. They needed a faster, more efficient and accurate process that was also scalable, adopted an OSI (Open Systems Interconnection) model and could adhere to stringent compliance regulations for controlled tests.

Stepping out of the box to bring testing out of the field

The complexities of IoT technology called for technology-based, out-of-the-box creative thinking. Qualitest leveraged our deep experience with IoT to identify gaps and develop a comprehensive testing-focused technological framework, encompassing eliciting Client needs as well as execution and implementation, while actively collaborating with the Client on other projects in Israel and internationally.

The Qualitest solution integrated hardware and software testing into an end-to-end, repeatable, scalable process and replaced costly, error-prone field testing with controlled simulated testing. Six significant features were:

1. Virtual & physical labs

At the heart of the solution was the construction of seven laboratories to simulate software, hardware and field scenarios. Each lab is equipped with a server housing 32 virtual machines, enabling simultaneous testing to verify load resistance. The machines replicate field conditions by incorporating RF (Radio Frequency) matrices that simulate real-life field environments.

2. Automation

Qualitest identified and recruited automation experts who specialized in developing custom automation tools for software testing purposes, thus catering to the Client's preference of avoiding off-the-shelf products. In the hardware domain, automation tools were developed by integrating with testing tools and leveraging knowledge from various testing equipment in the RF field, such as spectrum analyzers, signal generators, network analyzers and digital oscilloscopes.

3. Team building

As the Client's IT team lacked staff who could fulfill additional tasks while prioritizing our solution, Qualitest carefully selected, trained and equipped a dedicated team of IT professionals to provide continuous support for both ongoing projects and laboratory initiatives. Also, recognizing the need for a comprehensive approach, we selected and trained certain employees in both product marketing and technical expertise, providing a valuable unified execution team.

4. OSI model

The teams function according to the Opens Systems Interconnection model, which illustrates the various operations involved in data transfer within a communication network, outlining the order and interactions between the operations. It provides a comprehensive explanation of network components and the roles of participants, ensuring efficient operations and testing across hardware, RF, modems, software platforms and integration. The model's seven-layer structure ensures that each layer is tested independently, while also highlighting their interdependencies.

5. Scalability and infinite flexibility

Over two years, the initial team has grown to over 100 employees, and the Client's IoT solution has become a leading division. The division's structure is strategically designed to accommodate an unlimited number of projects, achieving the flexibility and scalability the Client sought. It comprises 13 teams, which can expand or contract based on the number of active projects. Seven teams are dedicated to international projects, spanning Europe, Canada and South America, while the remaining six teams handle projects local to Client's headquarters.

The division's operations encompass hardware, RF, modems, dedicated tools and applications, software platforms and an integration team responsible for controlled tests in compliance with strict regulations.

6. Harmonious collaboration all the way through

This project was built layer by layer, with each layer presenting its own set of challenges. Every challenge was strategically introduced to facilitate smooth acceptance of organizational changes by the Client's employees. Through every stage, Qualitest and the Client have worked in harmonious collaboration.

Key benefits

The Qualitest solution has led to improved efficiency, reduced errors, cost savings, increased testing capacity and realistic field simulation, resulting in a more robust and reliable testing process.

- By establishing **seven laboratories with simulation capabilities**, the need for field testing was eliminated, resulting in a **90% reduction** in field testing operations.
- **75% decrease in errors** through streamlined operations and controlled testing.
- Defect identification moved to early stages, with **80% reduction in errors** escaping to production compared to previous field-testing methods, ensuring higher-quality outcomes.
- The **elimination of complex logistical operations i**n the field has resulted in a **cost reduction of 50%,** leading to significant financial savings.
- By **leveraging automation personnel and tools,** testing times have been significantly reduced and employees can be redirected to higher-priority areas, allowing for more focus on critical tasks.
- **Capacity to scale** operations for Client's end customers was enhanced and business opportunities increased.
- A mechanism enabling the handling of a **continuous influx of projects** was established.
- The teams ensure prompt and efficient responses to the evolving needs of the projects, thereby ensuring **seamless operations and successful outcomes.**

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