LUNIQ

Tech solutions for digital success, backed by experts.

Delivering Digital Twin Technology for BAE Systems

LUNIQ provides BAE Systems Naval Combat Ships with the latest Digital Twin development platforms to support the Royal Navy surface fleet.

Case Study

↳ Digital Twin, BAE Systems

weareluniq.com

We enable BAE Systems to reduce software development life cycle times and costs with Digital Twin Platforms.

About the Client

↳ BAE Systems Naval Ships

BAE Systems Naval Ships enable navies to protect nations through the design and manufacture of naval ships and their state of the art combat systems and equipment.

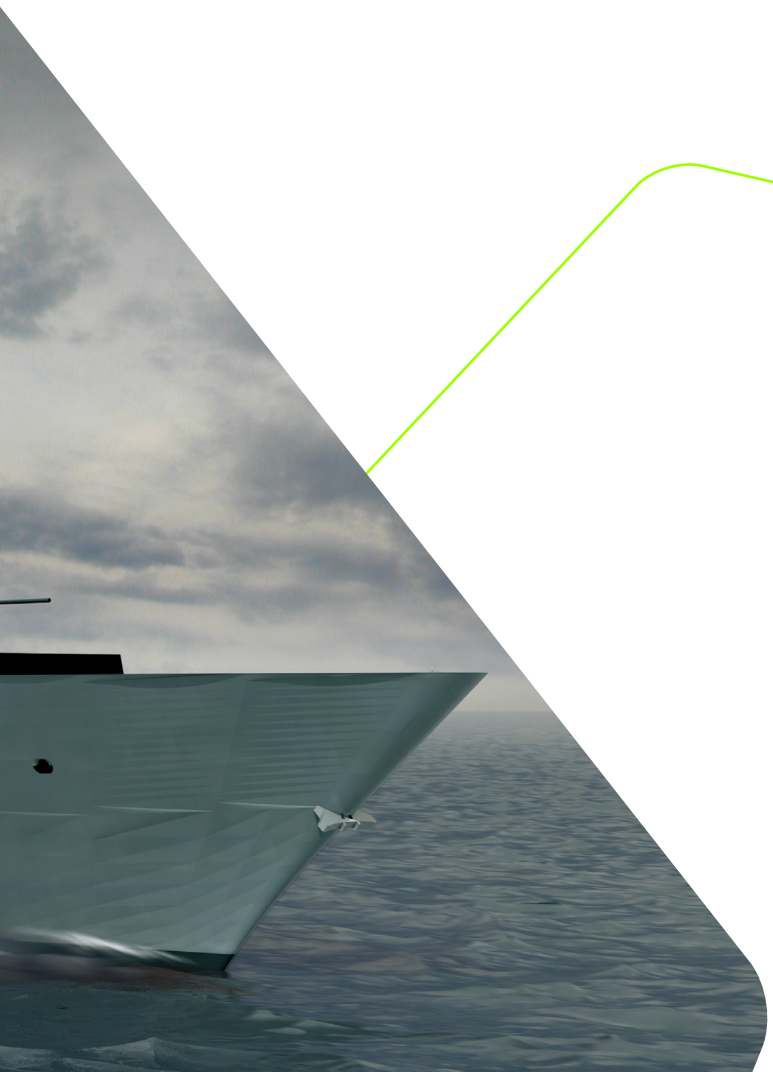
BAE Systems combat systems products feature across the Royal Navy's surface fleet aboard Type 23 frigates, Type 45 destroyers and Queen Elizabeth Class aircraft carriers. The new Type 26 Global Combat Ships, under construction at our site in Glasgow, will also use the next generation of our combat systems.

The Brief

↳ Design, Build & Deploy Digital Twin

Through a longstanding relationship with BAE Systems, Defence Enterprise Solutions (DES) was engaged to assist the software development teams with a cost-effective solution that enables them to quickly create environments for testing and developing the software used onboard Naval ships.

In addition, the solution would be used to deploy pre-built environments to assist with troubleshooting by enabling the deployment of exact replicas, or twins, of currently deployed systems, as well as building future capabilities.



> *"Increasingly we need to provide agile and flexible development platforms to respond to customer needs at pace. Virtualisation and Automation of hardware is a key tool in removing cost, risk and lead times on hardware procurement and configuration."*

Jon Whitehurst
Chief Engineer, Naval Ship Combat Systems, BAE Systems

Background

↳ Ship Software for Sea Operations

BAE Systems Surface Ships development teams have a unique set of requirements for developing software that keeps ships at sea. From controlling the air conditioning systems onboard ship to managing the weapons and combat systems. Both are critical.

Systems onboard ships are complex, and due to the nature of the environment they operate in, with vessels being out at sea for extended periods, these systems are built for resilience and availability. This means the software onboard is made up of multiple elements.

To develop and test these apps typically means that BAE Systems developers would need large amounts of IT resource, and even if this resource was available, it would come with significant cost implications as well as time constraints in deploying environments.

Then there is troubleshooting. Given ships are out at sea it is a significant challenge to provide support in the field. Developers need to quickly and accurately reproduce the systems onboard ship on land.

The Requirement

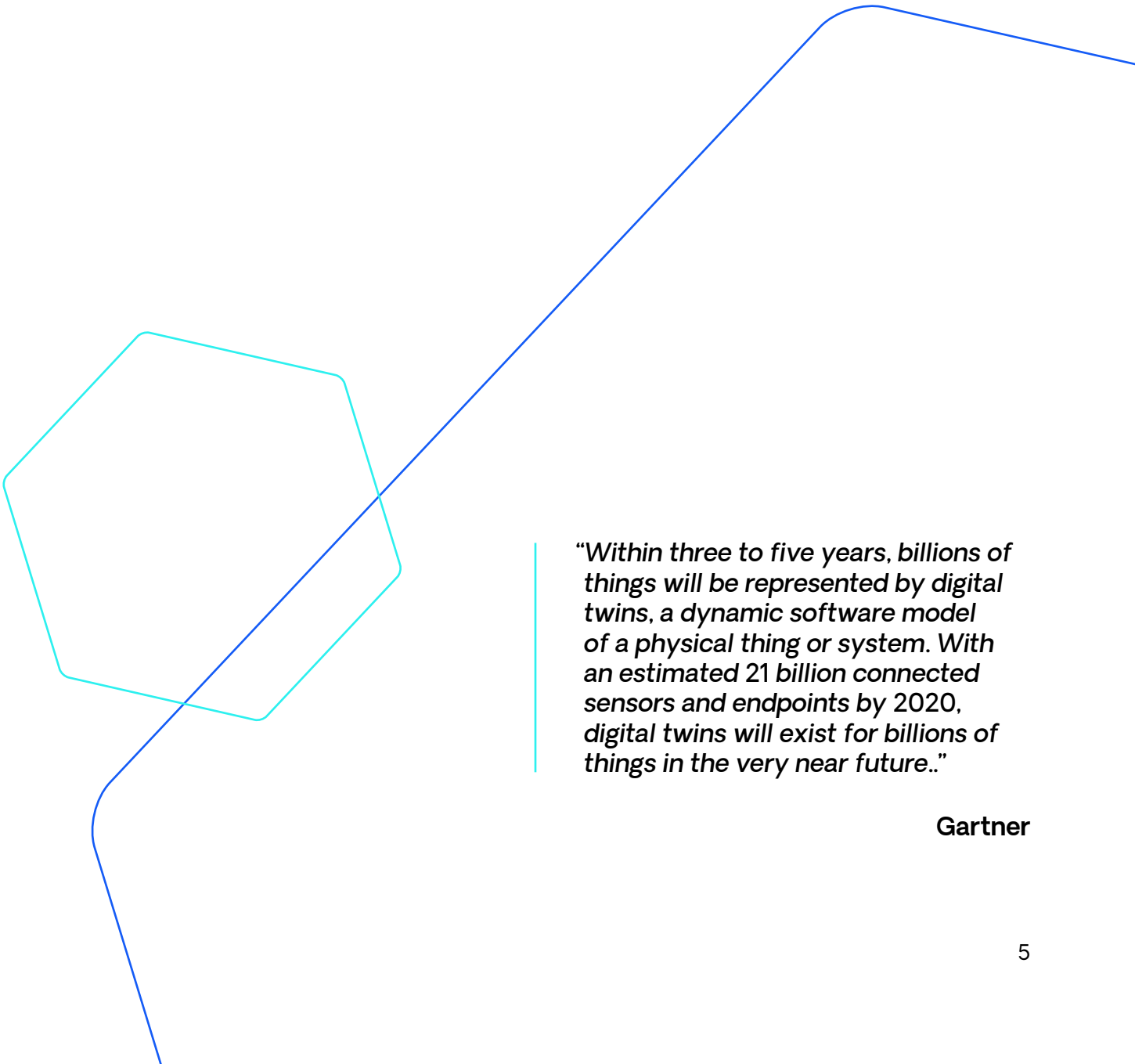
↳ Cost-effective Project Platform

BAE Systems development teams require a platform for the testing and development of software-based systems that enables them to create project environments quickly, accurately, and cost effectively.

The Solution

↳ Digital Twin

To deliver the requirements, DES designed and implemented a digital twin solution using the VMware solution stack to provide development teams a platform on which to test and develop their software.



> *"Within three to five years, billions of things will be represented by digital twins, a dynamic software model of a physical thing or system. With an estimated 21 billion connected sensors and endpoints by 2020, digital twins will exist for billions of things in the very near future.."*
>
> **Gartner**

Digital Twins

↳ Building Virtual Replicas for Test & Development Environments

Digital twins are, put simply, a digital representation of a physical system. In other words, a second and exact copy of the original system, hence the name twin, that is built on a virtualised platform.

Now running on a virtualised platform, digital twins take real-world data about a physical system and use that data to produce a set of predications or simulations of how that physical system will be affected by making any changes.

This enables the simulation of the physical systems in real-time using the digital twin.

In turn, simulations enable you to understand the performance characteristics of your physical systems and to identify and rectify any potential problems before they are implemented into a production environment.

Using a simulation also enables you to test updates and new features thoroughly before deployment, meaning that you are safe in the knowledge that nothing will go wrong once deployed. A critical and key use case, not only in the defence industry, but also in other service industries such as healthcare and manufacturing.

Why Digital Twins?

↳ The Benefits of Digital Twin Technology

First and foremost, digital twins enable you to deliver increased reliability and availability, reduced risk and product issues, and speed up your time to market.

Equally as important are the huge cost savings to be made in not having to procure additional hardware.

This in turn also delivers greater sustainability by not having to build and duplicate physical systems.

Overview

↳ BAE Systems Digital Twin Solution

The foundation for BAE Systems digital twin platform takes advantage of the VMware software defined datacenter solution, coupled with the VMware end user computing virtual desktop and app delivery stack.

There are two distinct layers to the digital twin solution; the access layer to enable developers to connect, and then the management and orchestration layer that enables them to deploy digital twin environments.

Developer access to their digital twin platform, using their laptop, is via a virtual desktop machine.

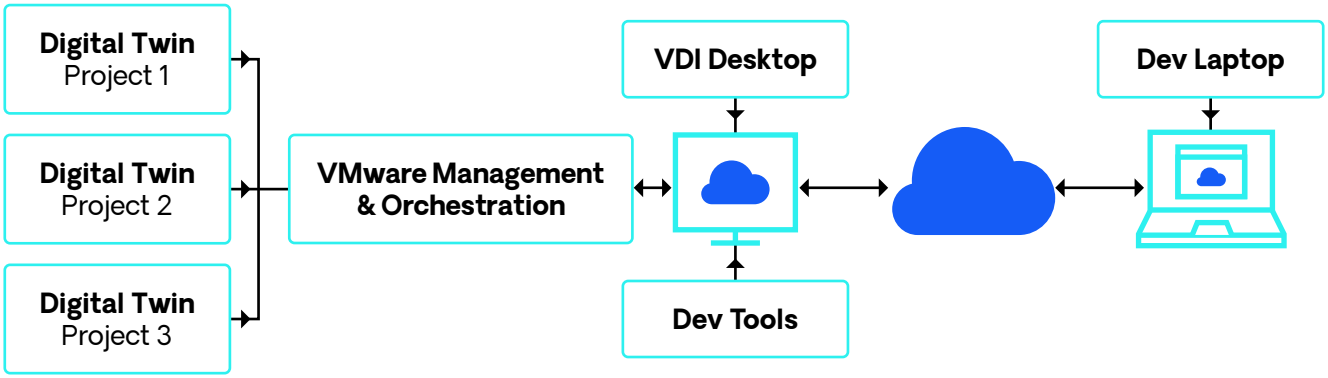
This virtual desktop machine is built on demand with all applications and tools installed and ready to use.

From here developers have access to their own set of infrastructure components, delivered using a VMware software defined virtualisation platform.

This platform enables developers to simply build and deploy new project environments, or to create a digital twin of an existing project environment.

Changes and updates are quickly saved and shared with other developers for testing, meaning environments can be very easily deployed to new developers or the testing teams, thus speeding up the overall test and development lifecycle.

This approach enables currently deployed systems to be duplicated on-shore for testing and remediation.



The Benefits

↳ How Digital Twins Solve BAE's Development Challenges

Typically, for their test and development environments, the BAE Systems development teams would procure and deploy additional hardware and platforms.

Often this would need to consist of multiple environments, such as one for development, one for testing, and another for user acceptance testing.

That approach still does not take into consideration deploying another environment that could be required quickly and to provide a simulation of the production deployed environment for troubleshooting.

> *"Digital Twins empower our customers to make strategic operational business decisions by simulating real world systems and processes in a cost efficient manner."*
>
> **William Vargo**
> Managing Director
> LUNIQ

Providing access to a digital twin environment solves BAE Systems software developers' challenges and is consistently delivering the following benefits:

- Enables developers to quickly and accurately deploy complete copies of existing platforms.
- Significant decrease in the time taken to deploy development project environments.
- Delivering better sustainability by decreasing the need to purchase additional hardware and the power requirements needed by that additional infrastructure.
- Increased productivity by enabling developers to quickly create new project environments.
- Provides a platform for developers to mirror and simulate existing production environments to enable faster troubleshooting, faster time to resolution, and faster time to market.
- Centralises, protects, and secures developers IP.

Future Evolution

↳ The Digital Twin Platform

More and more developers requesting access to the platform demonstrates the overall success of phase one of the project.

Given the number of users requesting and using the platform, LUNIQ are now embarking on phase two of the digital twin project with an objective to build in high availability to ensure developers remain productive.

"The ability to work in digital twins allows us to build consistent system representations allowing us to de-risk multiple solutions simultaneously with a high level of system fidelity. We can rapidly build twins of systems in multiple configurations in a way that is logistically and financially impossible with physical systems.

Jon Whitehurst
Chief Engineer, Naval Ship Combat Systems, BAE Systems

LUNIQ

About

↳ Tech solutions for digital success, backed by experts.

LUNIQ prides itself on providing a best-in-class experience for our clients. Some of our consultants have literally written the book when it comes to their particular area of technical expertise.

LUNIQ can solve the most demanding challenges our clients face today on their Digital Transformation journeys.

weareluniq.com

7 Bell Yard
London, WC2A 2JR

0204 551 2377
contact@weareluniq.com