Picture credit: US Dept of Defense

TIME FOR CHANGE

Joe Robinson *reveals the value in deploying a Platform-as-a-Service approach to synthetic environment development*

The message from the UK government has been consistent and unequivocal: in the face of today's fluid, fast-moving and complex threats, the need for wide-ranging digital transformation is acute. The UK and its allies need new, more powerful capabilities that allow them to identify, understand and respond more quickly and more effectively.

From the menace of COVID-19 and climate change to cyber attacks and hybrid warfare, the threats to contemporary society are fast moving, opaque and endlessly complex. Virtual worlds can help us meet them. Our governments and militaries can use the latest multi-domain synthetic environments to help them make sense of the threats we face and orchestrate a swift, effective response.

The Ministry of Defence's Single Synthetic Environment (SSE) promises to support such capabilities. But to unlock the full potential of the SSE, it needs to be developed in a way that offers ongoing flexibility and value for money. The global professional services network EY (formerly Ernst & Young) has been exploring the potential of a platform approach to developing this crucial capability. In addition to the improved performance outcomes, EY's report identifies potential quantitative benefits in the region of up to £3-billion over 10 years.

"We need data-driven, inter-connected digital systems that can integrate easily and securely with our partners across Government and our allies (and give) us an asymmetric edge by sensing, recognising and responding to new opportunities and threats faster than our adversaries." said an MOD Digital Strategy for Defence back in April this year.

The UK government's Integrated Review, the Ministry of Defence's Integrated Operating Concept and the newly released Digital Strategy for Defence have all emphasised the need for digital transformation.

Synthetic environments are key to this transformation. New and emerging technologies like these are already demonstrating how they can promote collaboration and coordination across government departments, defence, industry and academia. This is why a range of pathfinder projects is underway to assess one particularly potent capability: the Single Synthetic Environment (SSE).

Our contemporary society is endlessly complex. Ensuring its resilience, security and prosperity is a correspondingly complex task. From COVID-19 and climate change to sub-threshold conflict and hybrid war, threats to our collective security are fluid, fast moving and intricately interconnected. Governments and defence organisations need to be able to respond to them in a way that's fully integrated and every bit as dynamic as the threats themselves.

Alongside Hyperscale Cloud and Next Generation Networks, the Single Synthetic Environment (SSE) is one of three critical components of the UK MOD's Digital Backbone. The SSE will deliver a series of interconnected, interrelated synthetic environments. These virtual worlds can capture the complexity and dynamism of almost any real-world system, from infrastructure networks to operating environments. They can integrate the physical domains of land, air, sea and space with the cyber and information environments. This allows users to identify threats more quickly, understand them better and devise and deliver a swift, effective response.

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Planners, policy designers and decision makers can use synthetic environments to evaluate, analyse and respond to the challenges they face. Users can experience and interact with their environment via a live geospatial dashboard for improved situational awareness, a course-of-action editor for collaborative policy design and an all-domain virtual simulation environment for testing, comparison and rehearsal.

The benefits of technological platforms in other industries are well understood. Platforms – and the ecosystems that they support – have already transformed our industries, economies and day-to-day lives. From commerce and entertainment to work and travel, platforms give users fast, low-cost access to the precise products and services they need.

Similarly, a platform-enabled SSE gives government and defence users access to the most up-to-date, effective, interoperable content and services from a wider range of partners across government, industry and academia. These include the most reliable models and data, emerging technologies such as AI and Machine Learning, and the latest innovations in distributed computation and cloud-to-edge hosting.

This in turn facilitates more powerful, accessible, and versatile synthetic environments – environments that can be applied to activities ranging from network development and future-force planning to operational planning, decision support and collective training.

Governments and defence organisations no longer have to choose the best from what's available – they can use a suitable platform and partner ecosystem to commission the precise synthetic capabilities they need. And they can do it more quickly and economically than ever.

Any platform is supported by a comprehensive range of engineering expertise and professional services. Engineered from the ground up with open standards, it lets users integrate third-party data streams, models, simulation engines, digital assets and infrastructure technologies. This means they can extract the maximum value from their current capabilities while ensuring that their synthetic solutions are always up to date, reliable and effective.

As well as understanding how synthetic environments can improve our collective security and national resilience, it's important to understand the financial benefits of a platform approach to delivering the SSE. To that end, EY has been working with Improbable on a report that has found that there are significant qualitative and quantitative benefits. These include:

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Enhanced versatility
Building the SSE on a platform would allow defence users to access a wider range of interconnected and coherent third-party applications. Until now, they've been forced to rely on more siloed, monolithic capabilities from a comparatively limited range of suppliers.

Improved accessibility
The potential to leverage cloud as well as traditional physical hosting means that synthetic environments can be accessed wherever and whenever they're needed. Data is at the fingertips of decision makers when it really matters.

Greater interoperability
The ability to undertake truly integrated multi-domain training and planning with multiple forces, agencies and allies is expected to be significantly enhanced by a PaaS-based SSE.

Evolving synthetic environment capabilities
Because it allows the MOD to plug content in and out, delivering the SSE on a platform helps to ensure that synthetic solutions are perpetually up-to-date, leveraging the latest technologies and security standards.

Increased scale, complexity and fidelity
Recent advances in distributed computing enable richer, more complex, more realistic synthetic environments that can scale as necessary. The advances that have taken place in recent years should not be understated, and is one of the places where the UK is leading the world.

Access to the best content and insight
A platform architecture would remove barriers to bringing in new assets, both from within the defence

industry and from commercial or academic sectors. By lowering barriers to suppliers, this would also promote greater diversity, competition and innovation within the supply chain, while also enabling the MOD to keep pace with fast-evolving threats.

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Reduced technical and commercial risk
Versatility and access to more relevant, cost-effective assets mitigates the technical and commercial risks in the development of a programme as complex as SSE.

Reduced environmental impact
By accelerating the adoption of synthetics to augment or even replace an ever-expanding range of real-world activities – not least large-scale collective training – the SSE would mitigate at least three factors that impact the environment: the need to travel; the contamination of green spaces; and the use of carbon-heavy equipment and other resources such as ammunition and fuel in testing and training exercises.

Leveraging existing networking infrastructure
A specialised synthetics platform such as an SSE PaaS should be able to drive scale without requiring the significant upgrades to existing infrastructure that more traditional approaches require.

Feedback loop and continuous improvement
A PaaS-based SSE will allow defence to successfully exploit data more effectively, driving continuous improvement in training, planning, decision making and operational outcomes.

The quantitative upsides of a platform approach to delivering the SSE approach are significant. Over a ten-year period, EY has concluded that it has the potential to deliver benefits in excess of £3-billion and include:

Direct quantitative benefits of around £1.2-billion
These include cost benefits (or reinvestment potential) from, for example, the reduced software, hardware, maintenance and development costs. These derive, in turn, from the reusability of applications and models across different synthetic environment applications.

Indirect benefits of between £1 and £1.4-billion
A PaaS-based SSE will promote the use of synthetic environments across a wide range of otherwise resource-intensive activities. These include future-force planning, infrastructure development, collective training and operational planning.

Up to £750-million benefits to the UK economy
These benefits stem from the promotion of innovation, increased productivity, the exportability of technology, as well as an increase in innovation-focused jobs and greater opportunities for SMEs.

The EY report demonstrates that a platform approach to developing the Single Synthetic Environment can deliver not only the necessary digital transformation, but also value for money. Technology and innovation are key for keeping the nation safe and resilient at a time when the diverse threats we face are becoming increasingly more fluid, fast moving and closely interconnected. It's time to develop and deploy the latest in cutting-edge, British-made technology to orchestrate a swift, effective and fully integrated response

Joe Robinson is CEO of Improbable's defence division

SSE gives defence users access to the most up-to-date, effective, interoperable content and services available

Picture credit: US Dept of Defense