Mission Readiness, Together. Project OdySSEy

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"There is an element of irony in that, in our effort to deliver a comprehensive collective training environment for our customers, we have, as partners, come together collectively as a whole team."

Sir Stuart Atha – Project OdySSEy Business Sponsor, UK Demo debrief, March 2023.

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Personal Introduction

- BAE Systems for just over eight years
- Previous life – served in the Royal Air Force as an Aircraft Avionics Technician
- Project OdySSEy – my first Modelling & Simulation (M&S) project:
  - Led the project from concept through to demonstration
- Overall responsibility for delivering the future training capability for BAE Systems
- Passion/Obsession for exploring the latest technologies
- Undefeated boxer (1 fight, 1 win)

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Agenda

1. Strategic Context
2. Project OdySSEy Overview
3. Project OdySSEy Operating Principles
4. Project OdySSEy Result
5. What next for Project OdySSEy?
6. Conclusion

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Strategic Context

The drive for a synthetic collective training solution can be broadly categorised into the following headings:

1. Physical Space
2. Asset Availability
3. Distance
4. Adversaries
5. Affordability
6. Environmental Challenges

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Project Odyssey Overview

- ‘Project OdySSEy’: the title given to a proof-of-concept / path-finding project that focusses on how multi-domain, large scale synthetic training exercises, can better prepare the armed forces for complex high-intensity warfare.
- The following principles were agreed at the outset – principles that we would continuously hold ourselves accountable to:
    1. Complexity
    2. Fidelity
    3. Security

‘Odyssey’: *a long series of adventures, filled with notable experiences and hardships.*

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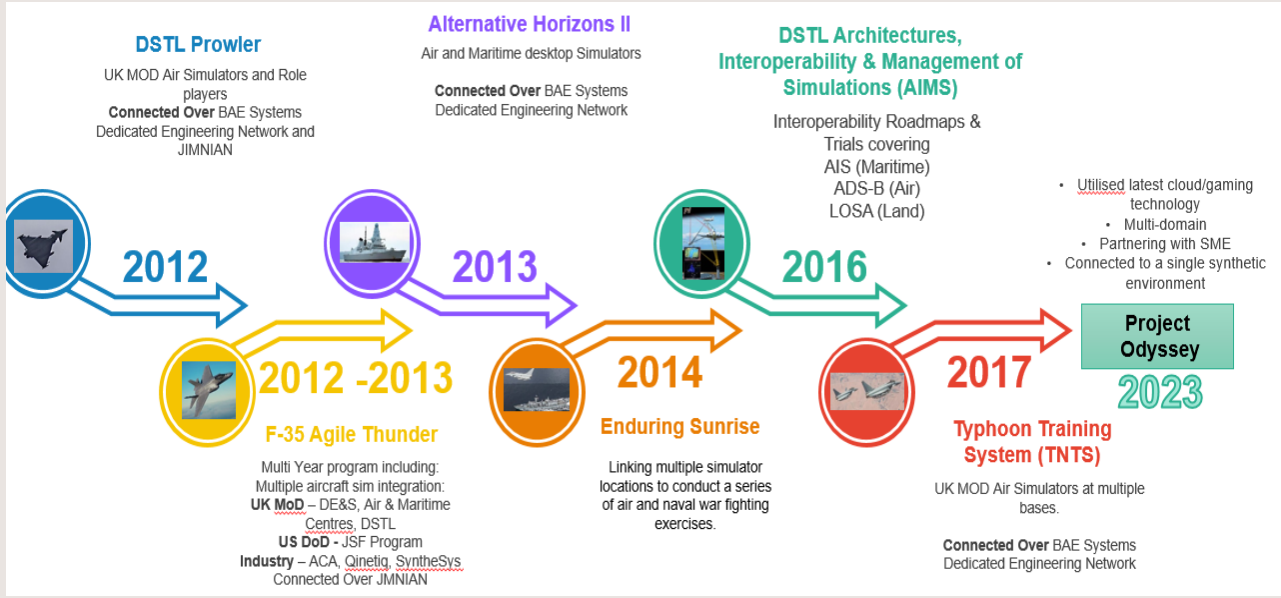
Standing on the Shoulders of Giants

- BAE Systems has a rich history in leading and supporting M&S trials.
- Previous M&S trials have supported the development and advancements of synthetic capabilities e.g. TFST (Typhoon Future Synthetic Training) and TVE (Typhoon Virtual Environment).
- Project OdySSEy focusses on exploring the disruptive and complementary impact of next generation technologies.



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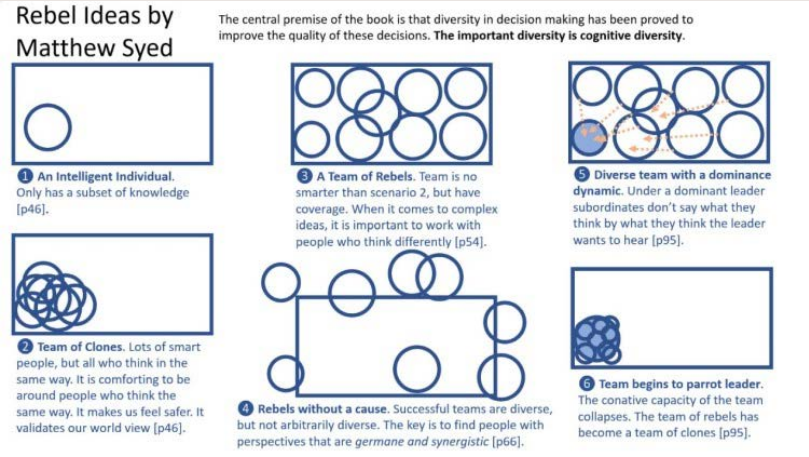
Prime and SME Collaboration

- Project OdySSEy partners; SME expertise and thought leaders in their own respective domain.
- Embraced Cognitive Diversity and Rebel thinking (see figure below).
- BAE Systems able to provide strategic direction, customer/stakeholder exposure and their own technical expertise in M&S and other specialisms e.g. Human Factors.



Integration by BAE SYSTEMS

Powered by HADEAN

Simulation by Bohemia Interactive SIMULATIONS

Insights by VRAI

Instruction by inzpire

Interoperability by PITCH

Immersion by D3A DEFENCE

Visualisation by PAULEY Empower Immersive Innovation

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AGILE Development Methodology

AGILE Principle	Compliance Status (RAG)	Rationale
Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.		The first development sprint (+ 1 month into development) delivered a Minimum Viable Product (MVP) demonstration to all stakeholders, enabling vital feedback to be captured. This was repeatedly incremented throughtout the development programme and continues to be iterated.
Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.		Constant changes were rapidly assessed for feasiblity and captured into development. Examples include the late inclusion of the battlespace viewer and 3rd party software as well as training scenario adjustments.
Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.		As per rationale 1, rapid development was a priority through the project.
Business people and developers must work together daily throughout the project.		A major success. The core project team created the training strategy and project vision, ensuring close relationships between the developers, the SMEs and the business stakeholders.
Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.		Trust and accountability given to the SMEs and the developers to deliver the vision, led by a highly motivated project delivery team.
The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.		A by-product to a constraint for remote development. All integration sprints were face-to-face, ensuring the most complex issues were properly assessed, debated and concluded.
Working software is the primary measure of progress.		Project development was completed on the day of the customer/stakeholder demonstration, with a software update delivering multiple key fixes tested on the demonstration morning.
Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.		Business processes/mindsets require evolution. The extra effort to overcome this means the pace was not sustainable.
Continuous attention to technical excellence and good design enhances agility.		Steep learning curve for the team on how to capture and configure the design in an agile manner.
Simplicity: the art of maximizing the amount of work not done is essential.		The 3 principles “Complexity, Fidelity and Security” ensured no waste incurred investigating or developing non-relevant solutions.
The best architectures, requirements, and designs emerge from self-organizing teams.		Multiple examples of team self-forming, e.g. the project software requirement and architecture lead was initially a developer and development lead, but naturally progressed into the broader role as the programme matured.
At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly.		Utilisation of engineering Lifecycle Change Management (LCM) reviews and regular sprint After Action Reviews (AAR) ensured the team pro-actively adjusted approaches to development. A key example was the movement of the development area from 4 separate lab rooms to 1 open plan demonstration space, enabling greater collaboration and freedom of movement and a project location identity.

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MVP vs Sunk Cost Fallacy

- A Minimum Viable Product (MVP): a version of a new product which allows a team to collect the maximum amount of validated learning about customers, with the least effort.
- Sunk cost fallacy: a cognitive bias that impacts decision making; continuing with an endeavour we have invested money, effort, or time into, even if the current costs outweigh the benefit.
- Project OdySSEy rapid development approach coupled with MVP development milestones – engaging with business and engineering stakeholders, mitigated this risk.

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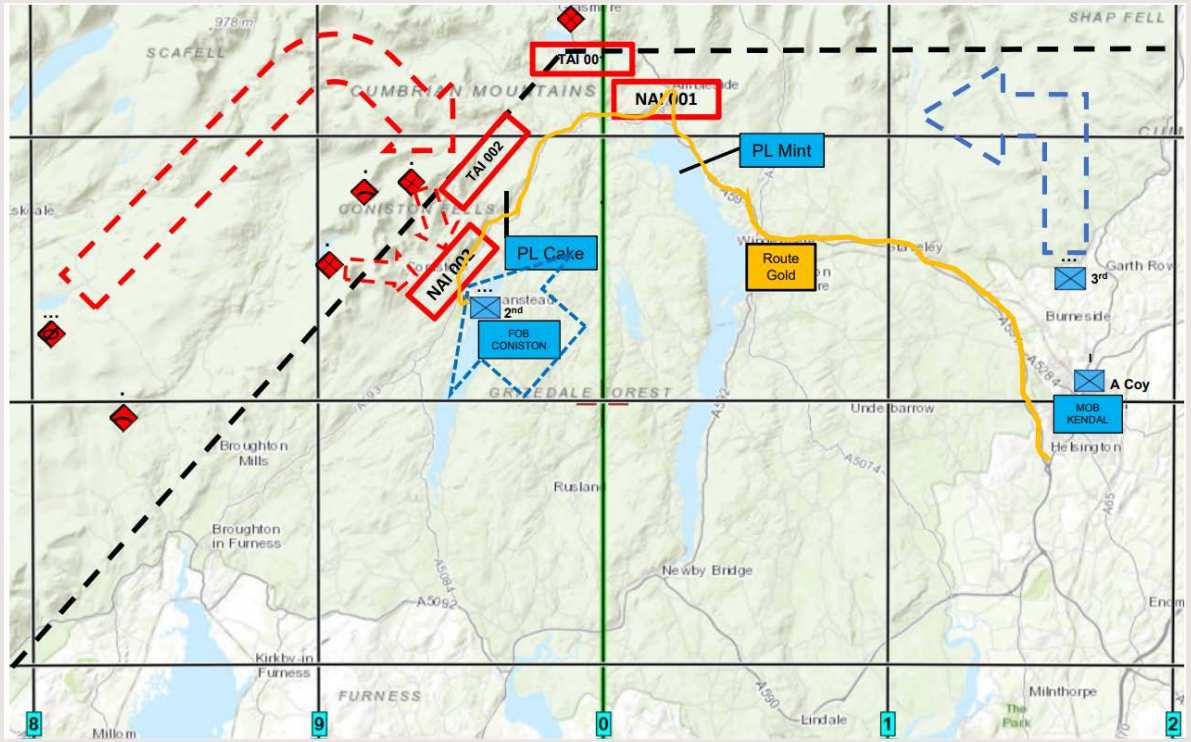
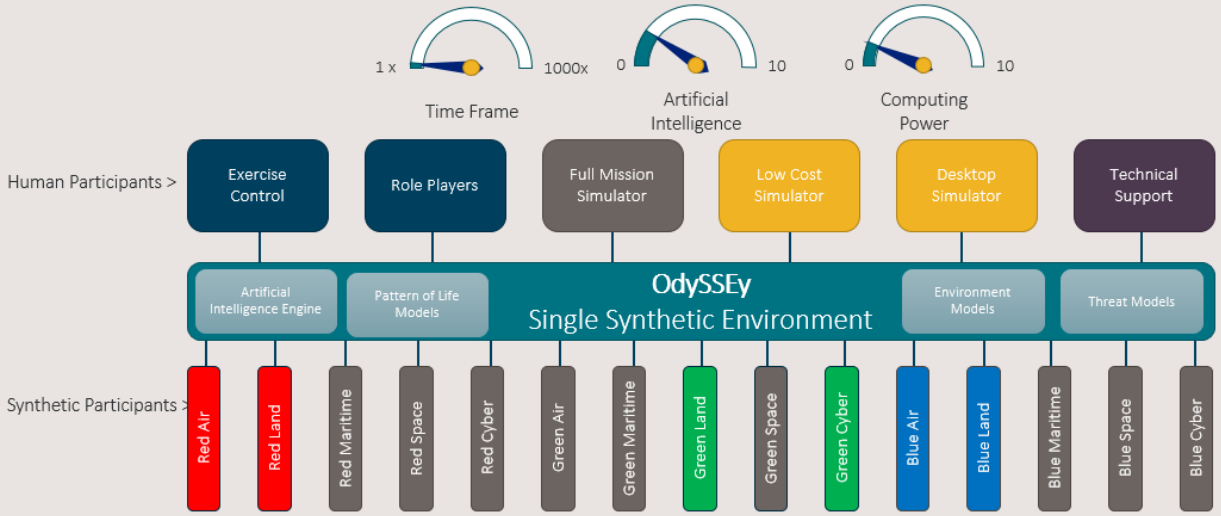
Project OdySSEy Solution Description





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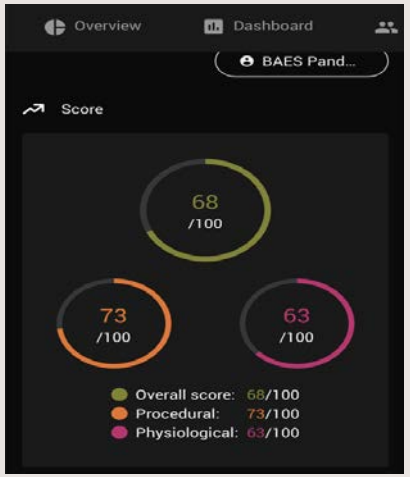
Project OdySSEy Key Capabilities

IG/Simulation Integration

- ‘Legacy’ IGs (DiamondVis Genesis)
- COTS Gaming (Unity, UE5)
- VBS 4 / Blue IG
- Hadean Simulation

Data Insights



- Procedural Data Capture – Per Training Role
- Psycho-Phys Data Capture
- Detailed Data Analytics – using XR biometrics and external wearables, designed per role.

Civilian and Social Media Simulation

- Up to 40,000 Civilians
- Objective based: based on a set of behavioural states.
- Reacts to the military simulation (VBS and DIS plug ins).
- Integrated Social Media generation – per civilian.

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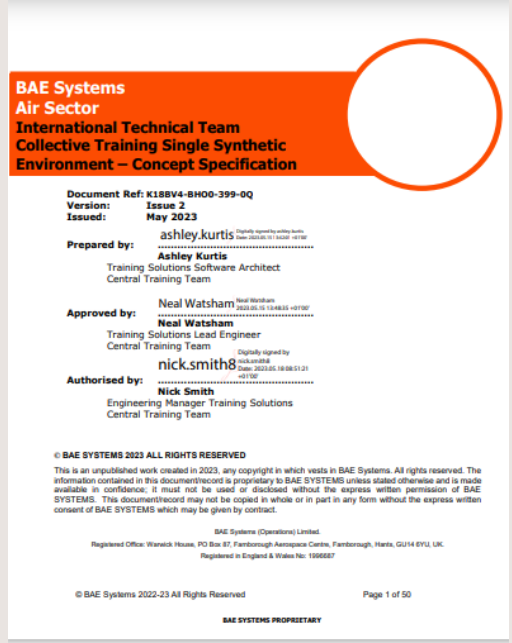
Limitations

Learning from Experience was high – evidence based lessons learnt that have shaped the Project OdySSEy development roadmap:

1. Entity Visualisation Limits
2. IG Visualisation Discrepancies
3. Simulator Limitations
4. Civilian Behaviour Stability
5. Data Upload



BAE Systems
Air Sector
International Technical Team
Collective Training Single Synthetic Environment – Concept Specification

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Demonstration Assessment

- Audience: BAE Systems Senior Leadership, Multiple Export Customer representatives, UK Media and internal M&S subject matter experts.
- Original Week Plan: 7 scenario run-throughs / 10 hour 30 minute system runtime.
- Actuals: 12 scenario run-throughs . 18 hours system runtime.
- Zero major fails – a testament to the high volume of scenario tests conducted during development.
- Software upgrade deployed between demos – to assess stability improvements.

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The Unintended Benefits

During the development and testing of Project OdySSEy, multiple benefits beyond the focus of the project aims were identified and explored:

1. Training as a platform to Accelerate Technology Readiness.
2. Competitive / Gamified Training
3. XR Impact
4. Augmented Reality Use Cases
5. Pattern of Life Impact

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What Next?

Deployment of Project OdySSEy to DSEI – showcasing the following advancements since phase 1:

1. Integration of ASCOT 7 into the Project OdySSEy synthetic environment
2. Cloud Connectivity for Data Analytics
3. Integration of 3rd party simulators
4. Development of the Battle Space Manager viewer and the Pattern of Life / Social Media capability

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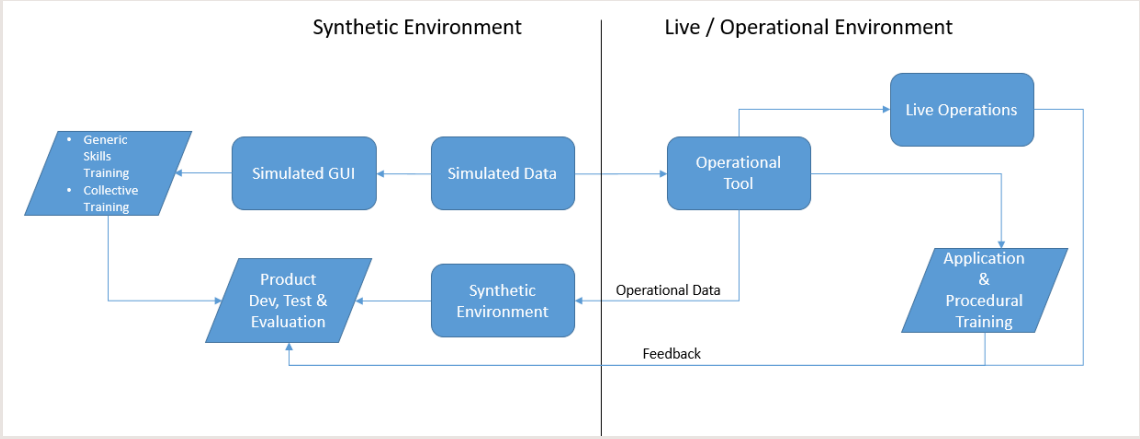
Future Capabilities / Direction

1. Collective Training Initiatives – Examples such as the Platform Enabled Training Capability (PETC)
2. Scalable Military Entities – e.g. Swarm Drones
3. Human Terrain / Pattern of Life Development
4. Calibrated and Validated Collective Training Metrics
5. Cross-Domain Security
6. External Parties
7. Live Virtual Constructive (LVC)
8. Operational Tools
9. Broader Use Cases
10. SME Input



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Thankyou For Your Time

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Any Questions?

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