

TDL Technology

4 Tactical Data Link Training: Upskilling in 2022

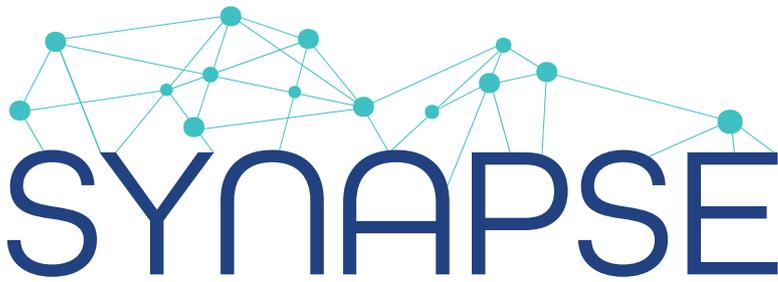
6 Interoperability vs Integration: What's the Difference?

8 NATO's Eyes in the Sky: A Tribute to E-3D Sentry

*Published by SyntheSys
for the Tactical Data
Links Community*

Spring 2022





For more information,
or to discuss your TDL Test, Trials
and Training requirement,
contact:

info@synthesys.co.uk

TEST | TRAIN | SIMULATE

For programme teams and organisations navigating the challenges of integration and interoperability testing and training, SyntheSys Defence introduces its latest innovation, Synapse.

Synapse combines powerful applications with best-in-class expertise to provide a tailored service to test Tactical Data Link interoperability and integration whilst enabling platform participation in a rich training environment.

Synapse improves platform and operator performance by ensuring standards conformance is built into your command and mission system test and training programmes.

A hand is shown pointing towards a glowing network diagram of interconnected nodes and lines, set against a dark blue background with a bright light source.

**FOR TACTICAL
DATA LINK TEST
AND TRAINING**



SyntheSys
— DEFENCE —

Letter from the Director

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Spring 2022 : Issue 13

To subscribe:
www.tdl-technology.com

Resources for the Community

I'd like to extend a warm welcome to Issue 13 of TDL Technology magazine. I am thrilled and privileged to contribute my first letter of introduction.

It pleases us that the TDL Technology readership continues to grow and it is my view that a deep need for knowledge and skills has generated a real appetite for Tactical Data Link (TDL) and related resources across the industry.

The message we took out of our attendance at the 2021 International Data Link Symposium (IDLS) was that training is a big priority and it is with that in mind that I introduce this latest issue of the magazine.

We hope that the technical articles, training features and knowledge pieces we include in these magazines have a lasting impact on you and your organisation and we encourage you to read legacy issues on the digital editions web page (<http://tdl-tech.synthesys.co.uk/digital-editions.html>). Furthermore, our team would be very happy to send you any number of copies if you would like to keep an inventory of past issues. Please send your requests to: tdl-technology@synthesys.co.uk

But the magazine is not the only knowledge-sharing tool we have in place. We are thrilled to receive positive feedback about the SyntheSys Defence Community Portal and we invite members of the wider TDL Defence community to register for free access. The portal gives you secure, easy access to useful tools and information, aimed at both the Tactical Data Link and wider Defence community. Customers and colleagues have FREE access to the portal which gives access to downloadable technical articles, white papers, a capabilities and limitations database and an open forum. To learn more and register for an account, please visit: <http://tdl-tech.synthesys.co.uk/community-portal.html>

With so much happening for both us and the community, Issue 13 is designed to explore key industry themes and what better than a tribute to the E-3D Sentry on Page 8. We continue our demystifier training series on Page 6 whereby we examine the difference between interoperability and integration. You can also read industry news on Pages 10 and 11.

I hope that TDL Technology continues to be useful and enjoyable for our TDL community. I welcome and encourage you to subscribe to receive future issues directly to your mailbox at www.tdl-technology.com

Very best regards

Mark Hudspeth



Mark Hudspeth, Director

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A look back in time



TDL TRAINING CALENDAR

2022

APRIL	14-15	Link 22
JUNE - JULY	27-15	DLM/ICO Netherlands
AUGUST	22-23	Link 22
SEPTEMBER	12-13	MIDS Link 16
OCTOBER	03-21	DLM/ICO
NOVEMBER	15-16	JREAP

To enquire about attendance at any of these courses, contact: training@synthesys.co.uk

DLM/ICO = Data Link Manager Interface Control Officer
MIDS = Multifunctional Information Distribution System
JREAP = Joint Range Extension Application Protocol

SyntheSys News

Continued Success for Senior Administrator, Shelley Fisher - Lead Auditor and STEM Ambassador



CQI
CHARTERED QUALITY
PROFESSIONAL



Since joining the SyntheSys team in August, Senior Administrator, Shelley Fisher, has been taking big strides through her commitment to personal development. It is with that in mind that we celebrate Shelley's recent success having qualified as an ISO9001 Lead Auditor which led to certification as a Chartered Auditor.

The ISO9001 is a quality management system standard which helps organisations ensure that they meet the needs of customers and other stakeholders, whilst meeting statutory and regulatory requirements related to products or programmes. Its general objective is to improve quality and we are continually committed to meeting the requirements of the certification. Developing and nurturing skills and knowledge in this area enhances our commercial and social value.

Shelley is now a qualified Lead Auditor and can assess the capability and effectiveness of our own and our customers' Quality Management System (QMS). But it doesn't end there. Shelley's background and efforts have led to her becoming a STEM Ambassador. STEM Ambassadors are volunteers from a wide range of Science, Technology, Engineering, and Mathematics (STEM)-related jobs across the UK and Shelley will be committing time to working in North East-based schools to promote STEM subjects.

Shelley commented: "Having worked in manufacturing and engineering environments for many years, certification and continued skills development has always been important to me, both professionally and personally. The Lead Auditor qualification is a real 'stake in the ground' for both myself and SyntheSys. Not only does it strengthen our own internal QMS processes, but it also means that we can consult for customer systems and procedures.

Becoming part of the STEM ambassador programme has been the icing on the cake and I am passionate about working with young people to promote these enriching subject areas. I am also looking ahead to other qualifications in health, safety, and the environment. That's all whilst working towards The National Examination Board in Occupational Safety and Health (NEBOSH) degree."

Well done to Shelley!

If you currently have challenges associated with your internal QMS or are looking to take a more formal approach to quality certification and would like to tap into Shelley's expertise, please contact Shelley by emailing: info@synthesys.co.uk

SyntheSys is Delighted to Announce it has Maintained Cyber Essentials Plus Accreditation

Maintaining Cyber Essentials Plus is vital for SyntheSys as, not only does it manage our information security risk, it also helps us meet our ongoing contractual and supply chain needs.

We are delighted to announce we have passed our latest assessment 5 years after our first certification. During this time it has allowed SyntheSys to demonstrate a level of assurance to our customers by showing that security controls are in place to protect the business.

Having 'Plus' certification adds extra value to the company as it gives us access to an external auditor who can give

SyntheSys the peace of mind that our cyber security is up to scratch.

Luke McCarthy our IT Lead expresses the need for cyber security, "As a longstanding tele-working business, the need for security across the company is our highest priority. As cyber threats become increasingly complex, it is vital that we keep our standards high and ensure we have the best possible security in place for us, and our customers."

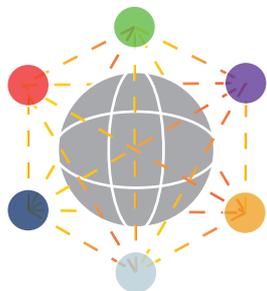
If you would like to hear more about the Cyber Essentials Plus certification, or the work we are doing in this area, contact: info@synthesys.co.uk

Interoperability vs Integration – How can Systems Engineering Effectively Support Technological Development at Pace?

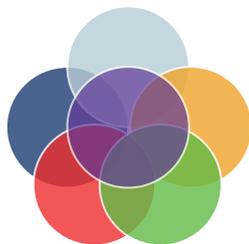
In today's rapid journey of technological development modern organisations are all beginning to identify the challenge of embracing change and accepting risk.

This approach is intricately woven into the simultaneous drive of innovation measured alongside the prospect of failure, which can be costly and halt programmes indiscriminately.

The validation of integration, defined as the process of combining two or more things in a successful way^[1] and interoperability, defined as the degree to which two or more programmes can be used together,^[2] is key for all future development activities, from conception to application and across all domains.



vs



But, how can we make integration seamless and how do we measure success when striving to achieve interoperability? Are we aiming for global integration, to ensure the delivery of standardisation and pre-determined technological development, or are we seeking data and platform integration through a series of secure gateways? The latter thereby allowing the seamless interoperability between mixed domains, thus allowing multiple platforms or programmes to function effectively.

To successfully interpret and deliver future requirements whilst ensuring the ability to function effectively within an integrated and interoperable environment is at the heart of Systems Engineering.

The rapid pace of Research and Development is key if global technology is to keep up with the technological advances that are markedly apparent in all aspects of daily activities. More importantly, transfer these requirements to safety critical and secure domains and the challenges can grow exponentially. How can the initial research activities ensure that the emerging technologies will have the ability to integrate with existing procedures? Furthermore, how can successful interoperability be assured once the integration requirements have been developed?

Validation and assurance are vital if future accountability and risk is to be mitigated. On 26 January 2022, the Law Commission of England and Wales and the Scottish Law Commission published a joint report recommending new laws to regulate Automated Vehicles (AVs) in Great Britain.

The report^[3] defined the changes to accountability in the development of autonomous road vehicles as... 'All software programmers, manufacturers and corporate directors need to acknowledge the associated responsibilities and personal accountability that authorizing the introduction of an integrated and interoperable system may require'. It is key that integration and interoperability is fully assured to safeguard accountability and delivery.

The multiple options available to deliver procurement are expanding through cross-transference of skills into new industries, and the acceleration of global technology means that the speed of concept to delivery is reducing at a rate which may simply be unsustainable.

How can we mitigate these risks and ensure that the emerging technologies can operate effectively alongside existing platforms? There is an all too real risk present; whilst technology can solve almost anything in this time of unprecedented innovation, what keeps you awake at night?

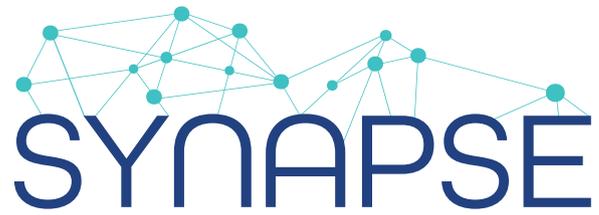
The question that interrupts your slumber may well be whether the developing capability can integrate effectively and be interoperable with your existing portfolio, or how you may be constrained by lengthy trials and validation activities. The application of applied Research & Development, often proving systems integration at an earlier stage within the development phase, can optimise.

SyntheSys has previously delivered both test and simulation training capability, successfully integrating legacy platform rigs not originally intended to join network enabled synthetic test and training exercises, into the worldwide connected environment – both integrated and interoperable.

We have also supported the integration of live and simulated environments for Live, Virtual and Constructive (LVC) exercises. These experiences have been instrumental in the development of our latest *Synapse*^[4] capability, enabling cost-effective live and simulated connected test in addition to simulated training to those platforms that may not have access to existing or developing capability.

This also provides opportunity to make significant contributions to the drive for Net Zero and for the desired increase in synthetic training, and subsequent reduction in use of the live environment.

With a military focus we all know the escalation of conflict is often rapid beyond comprehension, as witnessed with the atrocities in Ukraine.



SYNAPSE

In order to offset the technological complexities of utilising data, systems and equipment from other nations, all kit should be interchangeable. NATO asset numbers exist to facilitate the ease of transference but why is this transition not fully in place with autonomous application? The requirement to facilitate this capability is extant across all domains.

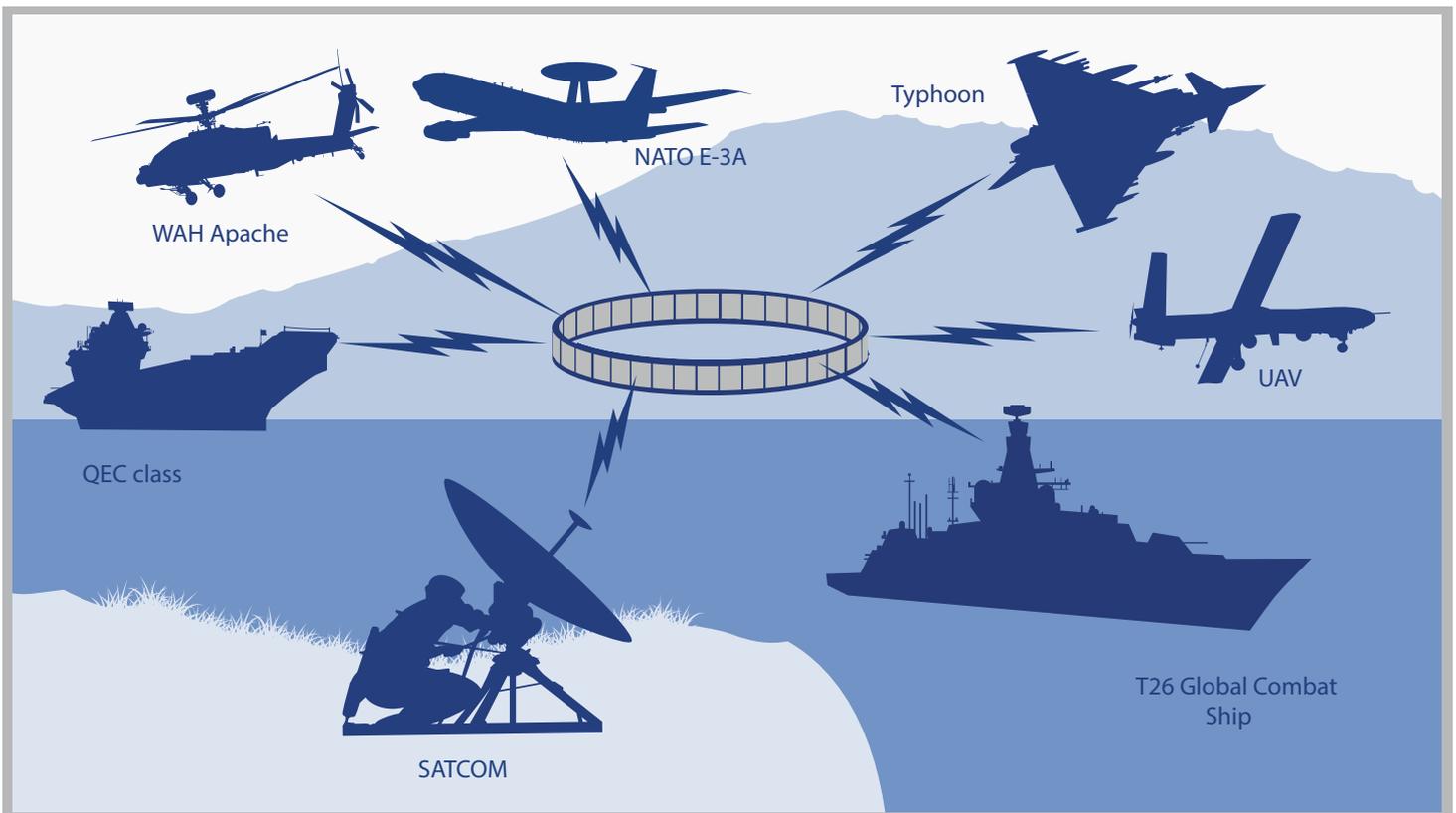
At a recent Royal Navy presentation, the Second Sea Lord Vice Admiral Nick Hine, led the discussions which ventured into the realms of ‘interchangeability’, described as ‘*growing upon the need for interoperability...it is the seamless transfer of assets between allies to achieve maximum operational effect*’. In this instance integration means Multi-Domain Integration, should the focus now be upon interchangeability as opposed to interoperability? To successfully interpret and deliver what future requirements will need is at the heart of Systems Engineering.

[1] Concise Oxford English Dictionary

[2] Ibid

[3] Automated Vehicles Final Report

[4] *Synapse* is a product suite incorporating participant and simulation data, thereby providing the tactical and situational picture to the platform system under test, and also provides the subsequent analysis capability of integration and interoperability. *Synapse* is also a synthetic training enabler, capable of operation over a wider federated network to bring in more platforms, simulation and of course, operators.



A Tribute to E-3D Sentry



The Royal Air Force's (RAF's) Boeing E-3D Sentry returned to its home base at RAF Waddington in Lincolnshire on 4th August 2021, having completed its **final** operational mission sortie.

An iconic aircraft, the Sentry first arrived at RAF Waddington in 1991 as part of the RAF's Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) fleet and completed more than 30 years of continuous service in support of national, coalition and North Atlantic Treaty Organisation (NATO) operations. During that time Sentry operated from its home base at RAF Waddington, as well as from multiple airfields worldwide, more notably across Europe and the Middle East. Whilst in active service, the significant contribution of United Kingdom's (UK's) Sentry facilitated the safe integration and operation of air power against exceptional threats.

In support of the first deployment to Operation Iraqi Freedom, the first Gulf War, the RAF Airborne Warning and Control System (AWACS) force flew more hours than all other RAF platforms combined.

The platform also operated in support of the Balkans campaign, humanitarian support and counter narcotics, to identify just a few of the exceptional missions undertaken. AWACS are one of the few commonly owned defence capabilities of the NATO Alliance.



Crucially, UK Sentry provided both a Recognised Air Picture (RAP) and a Recognised Maritime Picture (RMP), a consolidated and verified picture of all aircraft and vessels within a particular region, incorporating both military and civilian tracks. Each platform is identified as friendly or hostile with additional information including providing a comprehensive situational awareness of vast regions in which the data is gathered and collated.



Immediately prior to retirement E-3D Sentry was recently deployed to RAF Akrotiri, Cyprus. The platform and crew flew numerous missions during the two-month detachment whilst providing direct support of the maiden operational deployment of the Queen Elizabeth Aircraft Carrier and UK Carrier Strike Group during its safe transit from the Straits of Gibraltar to Suez. The final operational sortie over Iraq on 30th of July 2021, was as part of "Operation Shader", supporting the continuing operations against Daesh.

The Sentry E-3D will be replaced in 2023 by an initial fleet of three Boeing E-7 Wedgetails which will operate from the newly commissioned Strategic Facility at RAF Lossiemouth, Scotland. The co-basing will in turn provide a stronger opportunity for ISTAR assets to operate effectively in an integrated fashion. Prior to the operational introduction of the Wedgetail, NATO partners will work in conjunction with UK assets to provide the ISTAR coverage so vital in today's environment.



The Boeing E-7 Wedgetail will be equipped with an L-Band Multi-Role Electronically Scanned Array (MESA) radar, capable of providing the ability for maritime search, intelligence gathering and drone control capabilities. The radar can provide focused reach in a specific area as opposed to being tied to a 360° rotation, a complete shift from the outgoing AWACS deliverable.

UK crews transitioning from the E-3D Sentry are currently on exchange with the Royal Australian Air Force's No 2 Squadron, operating from Williamtown near Newcastle. Once operational, the UK crews will be able to provide control, analysis and onward distribution to a multitude of multi-domain platforms over a variety of data systems aboard the E-7 Wedgetail once introduced into service in the UK in 2023.

You may still see the E-3D in the skies around Lincolnshire for a short while yet. However, they will not be utilised on operations; the airframes are preparing for onward transition to other nations.

Earlier this month Flight Global printed an article confirming that Chile is to acquire three E-3D Sentry airframes from the United Kingdom in order to update its airborne early warning capabilities, the airframes are expected to arrive in Chile in the coming months.

Whilst some may view the retirement of the E-3D Sentry as the end of an era, perhaps not the most timely given the current instability in Ukraine, the future capabilities awaiting delivery will reflect the development of Next Generation and Generation

After Next platforms at the forefront of UK Defence aspirations.



We are proud to have provided our expertise and unique Multi-Link Test Facility (MLTF) capabilities to support an exceptional platform as part of the UK's enduring NATO commitment. We have thoroughly enjoyed operating the MLTF service at the RAF Waddington Mission Equipment Facility (MEF) since 2010, and prior to that, supported the previous MLTF incarnation known as the Link Operability Network (LION).

Our own Tony Castle reflects on his impending retirement by saying:

"It is fitting that my retirement should come in close succession to that of the E-3D Sentry AWACS aircraft. It has been a privilege to have been involved in numerous roles since the aircraft's introduction in 1991. More recently leading elements of test and support and previously as operational aircrew and delivering training, both in the air and on the ground. She has been an incredible platform to experience and her involvement in my professional career at home and abroad also holds many personal moments of reflection."

TDLs - IN THE NEWS



Consolidated defence news pieces from around the globe

HENSOLDT Develops an Independent Next-Generation Tactical Data Link Called ESSOR MIDS

February 2022 | <https://bit.ly/3GE9HfW>

Sensor solution provider HENSOLDT brings its experience in the area of Tactical Data Links, IFF, and sensor fusion to develop an independent next-generation Tactical Data Link through a European project called 'ESSOR MIDS'.

Improving the Reach, Resiliency and Relevancy of Link 16

February 2022 | <https://bit.ly/3HXYwjq>

An increase in interoperable platforms leading to growing networking needs. As military operations become more dependent on networked sensors and shooters seamlessly working together, there is a greater need for sharing critical information in real-time to meet today's and tomorrow's challenges.

How Smiths Interconnect Keeps the World Connected

February 2022 | <https://bit.ly/3Bhpiku>

The defense industry faces several unique challenges when it comes to connectivity, but it still demands reliability and efficiency in all applications, from communication, radar and electronic warfare to intelligence, surveillance and reconnaissance.

Northrop Grumman Successfully Demonstrates New JADC2 Solution

February 2022 | <https://bit.ly/3GLGT5l>

Northrop Grumman has demonstrated new communications capabilities that will help the US DoD JADC2 goals. During two recent USAF demonstrations, Northrop Grumman and Kratos Defense & Security solutions showcased its new Software Programmable Open Mission System Compliant (SPOC) solution.

Royal Navy QEC Carriers Receive 'Super Release' of Software Updates

February 2022 | <https://bit.ly/3oMaGV9>

BAE Systems' Combat Systems teams have provided software updates to the British Royal Navy's two Queen Elizabeth Class (QEC) aircraft carriers. The 'super release' software updates have been delivered as part of a seven-year Joint Service Support 2 (JSS2) contract.





Curtiss-Wright Meets NSA Crypto Mod Deadline for Link 16

January 2022 | <https://bit.ly/3uKXcNm>

Enhanced data links can be used immediately to support MIDS JTRS, MIDS LVT and other Link 16 radio terminals. Curtiss-Wright updated its entire Link 16 tactical data link (TDL) product line to comply with the Link 16 Cryptographic Modernization (Crypto Mod) capability mandate from the US National Security Agency (NSA) ahead of the 1 January 2022 deadline.

SDA Seeks Commercial Earth-Observation Data

February 2022 | <https://bit.ly/3GExZX6>

Lockheed Martin and York Space Systems won SDA contracts in 2020 to produce 10 satellites apiece for SDA's Transport Layer Tranche 0. Fourteen of the 20 satellites, scheduled to begin launching in September, will be equipped with four optical intersatellite links. The other six will have two optical intersatellite links, plus Link 16 tactical data network payloads.

Tactical vs Transformative: The Changing Role of Artificial Intelligence in Digital Transformation

January 2022 | <https://bit.ly/3HFDwOt>

Beyond tactical use cases or pilots, transformative type AI/ML initiatives can fundamentally change how businesses run, shape, and grow uncovering the new possibilities. That is what makes AI different from other technologies enabling digital transformation.

Upcoming Events 2022

Date	Event	Location
6-9 March	World Defense Show	Riyadh, Saudi Arabia
4-7 April	NATO Tactical Data Link Symposium (NTDLS)	Calpe, Spain
5 May	Defence Procurement Research Technology and Exportability (DPRTE)	Farnborough, United Kingdom
17-19 May	Tactical Communications Forum (TCF)	Kaunas, Lithuania
7-10 November	International Data Link Symposium (IDLS)	Halifax, Canada

FREE TACTICAL DATA LINK (TDL) TRAINING

Access your completely free, introductory level Tactical Data Link Training now via the SyntheSys Defence Community Portal:

<http://www.synthesys-defence.co.uk/free-tdl-training.html>

AN INTRODUCTION TO
VARIABLE MESSAGE FORMAT (VMF)

AN INTRODUCTION TO
TACTICAL DATA LINKS

AN INTRODUCTION TO
LINK 22

AN INTRODUCTION TO
MIDS LINK 16

