What Happens if We Don't Test Interoperability?

Should we dangle a carrot or beat you with a stick?

When I was asked to write this article, I was asked to think of it from a different angle – "stick rather than carrot" I think was the phrase.

We, in the Tactical Data Link (TDL) industry (or industry in general), have a tendency to frame our business in a positive manner, it's all about 'features and benefits' and 'return on investment'.

Whilst it is obviously important to understand what you may get from product investment, or by undertaking some no doubt expensive work, it is also important to understand what the consequences are if you don't invest. Here is my article doing just that.

I have been involved in testing and trials just about continuously since 1993. My first trial was when I was in the Royal Air Force (RAF) and tasked with testing a Link 11 ground station (a Racal system if my memory serves me). Suffice it to say, the system failed the trial (which ironically in my view was a trial success!). What would have happened if we hadn't tested it?....well, it simply wouldn't have worked operationally as intended, the full effects of this are, of course, unknown.

Move forward 25 years, and with more modern TDL systems it may not be as clear cut as that simplistic example. The majority of intended functionality may support operational use, but failure of individual functions reduces capability, not just at platform level, but increasingly at force level. More and more it is necessary to perform interoperability testing with coalition partners focusing on force level functions, not just against other national platforms. Answering the question 'what happens if you don't test interoperability?' is a challenge, so I have decided the best way to answer the question is to give a number of real-world examples of interoperability issues that I have observed.

Whilst I can't be specific about the platforms in the following examples, these are some examples of my experiences supporting platforms integrated into a coalition test environment over secure Wide Area Networks (WAN):

- There are many issues with digital aircraft control, reducing the effectiveness of being able to assign missions digitally without resorting to voice procedures, resulting in the operational community being unable to rely on the process consistently and therefore stopping using it / forgetting how to;
- A platform unable to process command orders dependent upon the population of the Friendly Weapon System data field. This would cause delays in executing the command, with the transmitting platform having to resort to voice procedures once the operator realises there is a digital issue;
- A data forwarding platform failing to forward command orders from Link 16 to Joint Range Extension Application Protocol Type C (JREAP C). JREAP platforms therefore unable to respond and failure of the digital function, resulting in delays in executing the command, and reversion back to voice procedures;

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- A data forwarding platform failing to forward Precise Participant Location and Identification (PPLI) between Link 16 and JREAP C, resulting in loss of Situational Awareness (SA) and, more importantly, potential for more serious fratricide consequences;
- A platform making a fundamental decision to not process globally addressed messages. Relatively low impact in some situations but loss of SA and potential need to revert to voice if the transmitting platform even realises the platform hasn't received the information;
- A platform unable to process a received pointer message unless it's Source Track Number is in the first address field. The receiving platform will therefore lose SA, but the transmitting platform will not be aware that all of the intended recipients did not get the message, so may not resort to other procedures.

Rather ironically if we did not test interoperability, we would not have observed these issues and subsequently not been able to report and address them.

So testing costs, and it unveils issues that cost some more; cheaper not to, so let's not bother. Much better to ignore blue on blue engagements, air collisions and enemy fire, and pin our hopes on it just not happening. After all, we generally have workarounds for these issues, such as revert to voice, it's good to talk, right?

Well I don't believe the previous paragraph any more than you do but we have to address the issues before they bite us in an operational environment.

So, what factors allow them to happen? It is a complex conundrum that platform integrators and platform teams responsible for a TDL-equipped platform continue to grapple with. I therefore leave you with some thoughts and conversation points on the possible causes:

- Funding and affordability is always a problem that platform teams struggle with, despite their best efforts to do the right thing;
- Pressure to get the platform into service and avoid requirements creep resulting in a 'fix it later' attitude. Does this really happen?
- Lack of knowledge / training. I once read a TDL requirement that simply stated that the platform shall be interoperable, which was accepted by the integrator. I still have the bruises from my head hitting the brick wall repeatedly;
- Are coordinated changes necessary, and how does that work programmatically? Can we ignore Information Exchange Requirements (IERs), or can we just do that when we think someone else should pay?
- How do you coordinate resolution of issues across different platforms? An even more complex issue between nations;
- Classification of data will always have a stranglehold on what we can do (for some very good reasons!). Interoperability, however, could be considered as the continued battle between the need to exchange information and the need to keep things to ourselves.

National governance may seek to give guidance and direction to platform teams, but without the funding, collaboration and coordination between platforms, and ultimately nations, I can only see that issues will continue to remain and be discovered, and so a detailed understanding of them is necessary to allow for their mitigation. Ultimately, testing is important and apart from giving me the excuse to allow my sarcastic juices to flow in this article, it is fundamental as the first step in finding and informing on information exchange between TDL-equipped platforms.

I would love to hear your views on this article and the discussion points, but remember, only if your grammar and punctuation is correct or my system will discard your communication and we will have to revert to voice. *(Tongue firmly in cheek.)* *Mark Hudspeth, Managing Director, SyntheSys Defence.*

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