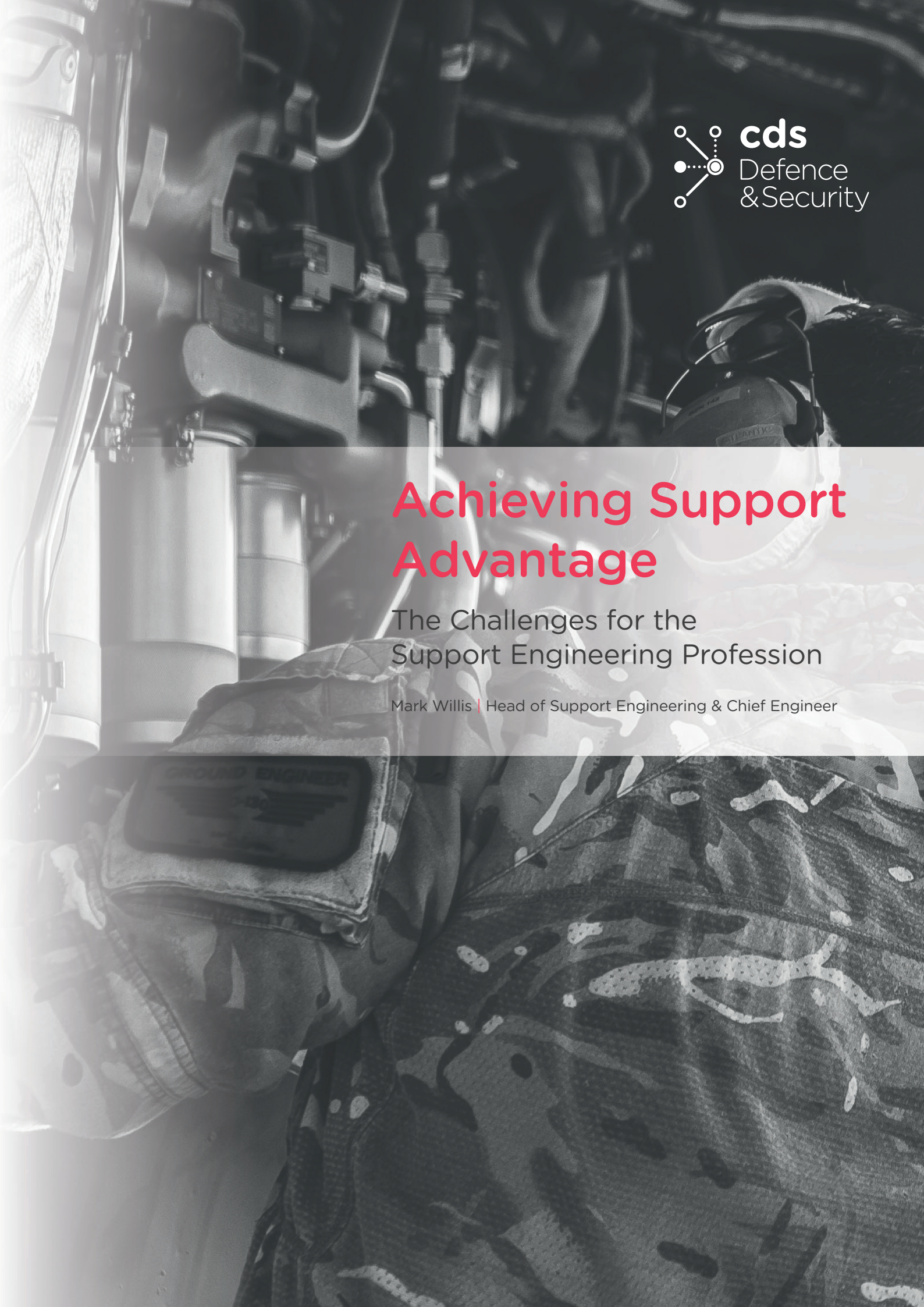


cds Defence & Security

Achieving Support Advantage

The Challenges for the Support Engineering Profession

Mark Willis | Head of Support Engineering & Chief Engineer

One of the major questions that perplexes me is why the profession of Support Engineer appears to be so undervalued? Given that 75 to 80% of life-cycle cost is spent during the 'in-service' phase, here is where significant cost savings can be achieved.

So why is it that the first thing cut on a major capital project is the support budget? So why is it, despite numerous initiatives to optimize support costs, they remain stubbornly high? Why is it that senior people talk about the importance of availability but very few people really understand it when it is quite a simple concept?

At the genesis of Integrated Logistic Support (ILS), there was a tendency for companies to lodge their less talented engineers in the customer service area delivering ILS; thus, contributing to the low regard of ILS Engineers. The failure to employ ILS Engineers alongside the design team undermined the ability of the ILS Engineer to influence design from a support perspective. The ILS Engineer's data analysis requirements often led to the design progressing ahead of ILS analysis input. As systems became more reliant on COTS/MOTS solutions, system engineers failed to recognise the importance of ILS influence on system integration.

Today, there is the emergence in UK MOD of the Total Through Life Support (TTLS) Engineer. My experience to date of this 'new generation' is that they are under qualified (neither Engineers nor Suppliers) and lack the necessary training and understanding of through life support. Most of the TTLS operatives that I have met have never heard of James V Jones let alone possess a copy of the ILS Handbook.

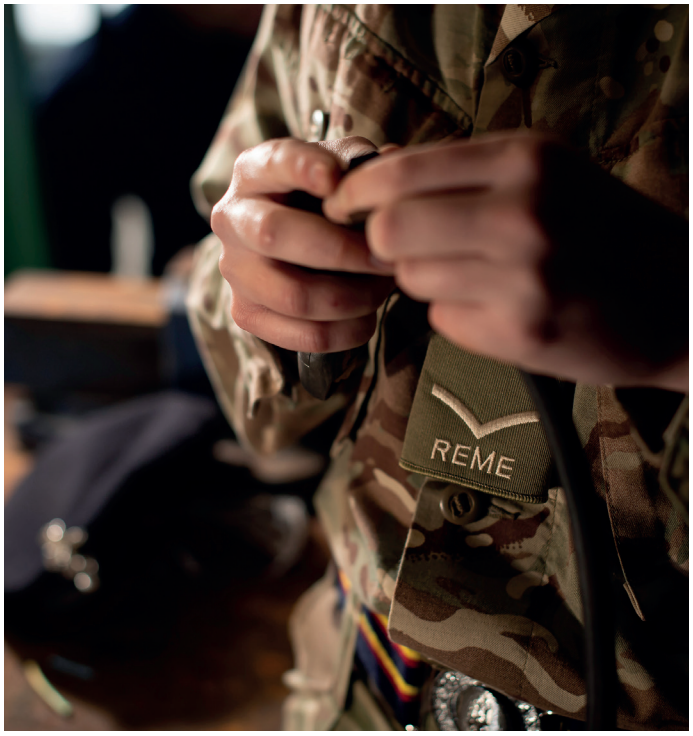
There is a reducing number of Support Engineering SMEs in Defence. I would characterize the Support Engineering profession today, with a few notable exceptions, as consisting of men and women in the Autumn or Winter of their careers. Within UK MOD's DE&S organization there is a recognition that a significant amount of ILS experience has been lost. Too often, those of us providing ILS deliverables to the DE&S Delivery Teams find ourselves having to explain the intricacies of our work to people who do not understand what we are delivering.

Here lies a significant challenge – how do we reinvigorate the Support Engineer profession and develop the future Support Engineers in order to deliver Support Advantage?

Training

A major change in the support domain is the introduction and adoption of the ASD/AIA S series of IPS specifications. Many will be familiar with S1000D and S2000M, but the specification suite has been expanded (S3000L, S4000P, S5000F and S6000T) and includes SX000i which is the International Specification for Integrated Product Support – the new name for Integrated Logistic Support.
The S suite of specifications provides guidance on documentation, materiel management, logistic support analysis, preventive maintenance, product in-service feedback and training with SX000i providing the overarching framework for conducting IPS programs of work. Since 2019, IPS has replaced ILS as the accepted abbreviation. Having developed this new suite of specifications, the IPS Council recognizes the training challenge; today there are very few accredited training organizations and not enough to meet a colossal training demand.

In the UK, Government and Industry are no longer providing accredited and effective training in the support disciplines. Consequently, a new entrant to Support Engineering (and the companies which employ them) has a challenging time finding good quality training. The MOD's Defence Learning Environment provides ILS introductory courses, but they are ageing and in need of update.



The Defence Academy, Shrivenham, provides courses but, again, they need an update. The Defence Logistic Framework (DLF) replaced JSP886 as the guidance document some years ago, but the MOD recognizes that the DLF is outdated and is in the process of producing another JSP (888) to replace it. The excellent Masters level courses in Logistics Engineering and Systems Operational Effectiveness (Exeter) and ILS (Portsmouth) appear to have been discontinued. The US DoD has extensive ILS and IPS resources via the Defense Acquisition University (DAU); US resources are probably the best available. Defence Standard 00-600 still refers to ILS when the discipline's name changed to IPS over two years ago. SX000i - International Specification for Integrated Product Support contains chapters which explain the IPS process, but the specification is not designed to be a training resource.

In sum, unless significant investment is made in training infrastructure and resources, the Support Engineering discipline is in danger of disappearing complete with the ability to deliver Support Advantage.

Support Data

For the last 40 years the support domain has been struggling with management of support data. In the early days of ILS, the data challenges began to emerge with the balance having to be struck between timely progression of the system design versus educating the 'support solution'. Twenty years ago, an agreement was reached across the industry to establish a data protocol for exchange of in-service data between the User and OEM communities. This agreement heralded Product Life Cycle Support (PLCS) supported by ISO 10303 data protocols. Today the S series specifications are founded on an UML common data model which enables data transfer to all stakeholders as they deliver the IPS project. Work is in hand to attempt to align PLCS with the S series specifications.

Key to the delivery of Support Advantage is the feedback of in-service data relating to operational availability to the OEM to facilitate system improvements. The establishment of this data feedback loop is the major benefit of S5000F.

A deal of work is being undertaken by Cranfield University, for instance, to develop support engineering digital twins. Whilst this work is very valuable in enabling manipulation of vast quantities of support data, as I explain later, operational availability is a relatively simple concept, so care needs to be taken not to over-complicate it.

(Cont.)

The Link to Support Advantage

Having addressed the Support Engineering training and data challenges, we now need to look at Support Advantage. The term was introduced in the Defence Support Strategy published in December 2020. The UK's Chief of Defence Logistics and Support (CDLS) has stated that:

Support advantage is no more complicated than recognising the ability of UK Defence to be able to outcompete its near peer enemies by our key equipment capabilities being more available more of the time where and when we need them and possessing support chains which are more resilient than those who oppose us.

The definition of the term operational availability includes dimensions of time, location, and support chain effectiveness. Consequently, CDLS could have been more succinct by saying simply that we need our key equipment to be more 'operationally available'.

I do not apologize for being a purist where the term 'availability' is concerned. Too often the term is used throughout Defence without a thorough understanding of what is being said. I am often concerned at how poorly availability requirements are specified. I understand 'availability in the following terms:

- In academia there are three measures of availability which go beyond the top-level and simplistic view of 'uptime over uptime plus downtime':
- Inherent Availability: a measure of how reliable the system or equipment is and how easy it is to repair if it fails – a measure of reliability and repairability.
- Achieved Availability: adds the preventive maintenance dimension – how much preventive maintenance do I need to undertake to optimize my system or equipment reliability.
- Operational Availability: adds the support chain effectiveness dimension by asking what needs to be designed into the support chain to reduce logistic delays to a minimum.

From the above it can be seen that operational availability is a function of reliability, repairability, maintainability and supportability (the effectiveness of the support chain).

Given that most of the system or equipment programs today are either COTS/MOTS-based or have a significant COTS/MOTS element within them, the opportunity to affect reliability and repairability is limited. Indeed, on several COTS/MOTS projects that I have worked on recently, the supplier was unable to provide reliability information because reliability work had not been undertaken during design or they were relying on reliability predictions. Similarly, the support chains on COTS/MOTS-based programs are usually well-defined providing little opportunity to refine the support chain to reduce logistic delays. With the foregoing in mind, in the modern system and equipment environment, I would opine that the real opportunity for influencing operational availability (Support Advantage) is at the achieved availability level by addressing equipment support and optimising preventive maintenance. We need to find the 'sweet spot' in the support solution to achieve the best operational availability for the least preventive maintenance.

In Summary

One needs to question why the Support Engineering profession is undervalued. There is a shortage of SMEs, the current contingent of ILS/IPS engineers are demographically challenged and the solutions to fill the employment gaps have resulted in lower quality replacements. Without an effective training structure to deliver, to MOD and industry, the IPS engineers of the future, we cannot deliver Support Advantage.

The data models to deliver product feedback are contained in the S series specifications and the work on digital twins is progressing well but we must be careful about over complicating the feedback systems.

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