

# Chapter 2

## The Development of a UK National Strategy for Through-Life Engineering Services: Rationale and Process

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**Abstract** This chapter describes the journey of the development of the UK National Strategy for Through-life Engineering Services (TES) from initial discussions with industry as to the need, through the issuing of a number of sector strategies in the UK, which omitted any reference to TES, to the design of the strategy development workshops. Initial industrial soundings are detailed which supported the need for the UK National Strategy as is the creation of an emergent industrial momentum. The importance of coherence of vision is underlined by extensive work with the voluntary industrial steering committee. The methodology adopted to generate the launch event white paper and cross-sectoral industrial economic study is given in detail. Pilots, tests and the consequent evolution of the workshops are described together with the range and depth of industrial engagement with the process. The chapter begins with a description of the industrial engagement strategy of the EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services from which the UK National Strategy was born.

### 2.1 Introduction

The EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services was launched in July 2011 as a research collaboration between Cranfield and Durham Universities. Early on in its initial five year funded life it established extensive contacts with relevant industrialists through the establishment of a Think Tank to better guide research directions and outputs in order to achieve maximum impact. Over time it was observed that the UK government was developing a number of sector strategies, most notably in aerospace [1] which made little or no reference to the service and support of complex engineered products.

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The concept of generating enhanced value by combining the provision of complex engineered products with associated services has been well documented under a number of different headings including product service systems and servitisation [2–6]. More complex contracting arrangements including leasing of assets such as trains and aircraft have prompted the investigation of different business models, and these have been championed by some key customers such as the UK Ministry of Defence (MOD) with availability contracting for both Tornado and Typhoon aircraft [7].

With practice varying between sectors and best practice sometimes hidden in sector silos, there is an opportunity to bring coherent and joined up thinking to a wide range of UK industry where they may be able to gain significant commercial advantage. Early consultation with the industrial network created by Centre established the need for the development of a coherent strategy for the UK. The Centre, its advisory board and executive committee decided to pursue the development of a National Strategy in TES. This fulfills in part the Centre’s remit to act as a National resource.

## 2.2 The Initial Journey

The industrial network of the Centre was brought together in mid-2014 at the Institution of Mechanical Engineers in London for a dinner where a series of sector leaders spoke of the growing importance of TES to their industries. Chris White MP co-chair of the all-party parliamentary manufacturing group, gave the keynote speech. Interest and momentum was generated in building closer ties between sectors and learning best practice. This meeting identified the need for a coherent UK National Strategy in TES.

Following the dinner in London an event was organised in parallel to the 2014 TES conference in November. Seven key themes were identified at the dinner. These were Knowledge Management, Lifecycle Management and Lifecycle Extension, Technology Innovation, Supply Network, Human Resources, Socio-Technical issues and the Defence Context. The first four of these themes were selected for detailed discussion at the conference session. The findings of the session in the four key areas explored led to a growing belief among the industrial and academic participants that there was a need for a TES National Strategy.

In May 2015 a further and much larger workshop was held at the Royal Academy of Engineering in London to address this need and move the debate on. A group of about 70 senior engineers, business leaders and government representatives gathered to collate their views on TES, the market position, the market needs, the benefits and challenges, and the possible Future State that a national strategy could deliver.

The key questions addressed were:

- How important is TES capability to the UK?
- What are the opportunities for innovation and development in TES?
- What are the barriers for realising these opportunities, at pace?
- What steps might mitigate these barriers?

The EPSRC Centre commissioned Raj Mehta, a consultant and former Operations Director at Bombardier Transportation and General Manager at British Airways, to prepare a report on the international market for TES [8]. He commented that by 2025, the global market for maintenance, repair and overhaul (MRO) services in civil air will be \$89 billion, whilst in the UK the repair and maintenance (RAM) industry as a whole, as summed over all the SIC codes relating to RAM, will be worth in excess of £35 billion.

He also pointed out that there is strong evidence that TES accounts for high-value employment with wage rates about one and a half times the average earnings in engineering. Raj explained he drew on resources from the Office for National Statistics, and defence and aerospace company annual reports to compile his data.

This report formed the backdrop to the workshop activities. Delegates were asked to share and summarise their most significant issues and experiences with TES, and then to write these points on colour-coded Post-It notes to populate a central “strategic framework” addressing the state of TES in 2030, the state in 2015 and the opportunities and actions to move to the future state. The strategic framework was in the form of a template divided into four layers to assist the groups’ thinking about the issues involved:

Market Context—What are the driving needs for change?

Value Context—Trends in regulation, standards or other policies

Value Capture—How is value captured from TES?

Value Creation—What are the key activities and capabilities?

This provided a comprehensive collection of comments from industry on where TES is, the actions required and barriers to progress, and a vision of how the TES industry in Britain could be. Delegates were invited to discuss each other’s outputs and summary discussions in plenary were held. The main thematic points identified were:

- In future, customers will only buy services—product-only providers won’t exist—leading to polarized manufacturing—between throw-away and circular economy. TES is vital for (the missing link for) sustainability and the circular economy
- The UK leads today. TES is mission critical for long term growth/export in high value manufacturing—If we don’t continue to lead we’ll lose
- Government contracts, especially infrastructure, energy and transport are critical and could provide a game changer for TES and competitiveness in the future. Government can lead with value for money in government contracting

- Need better cost models and data: need to move from “open-loop” to “closed-loop” business with multi-functional management and collaborative behaviors. Needs new skills, training
- TES creates multi-functional, high-value jobs (average wages in engineering services are one and a half times those in mainstream manufacturing (Raj Mehta)
- The importance of standards and regulation—need to be enablers and support cross-industry knowledge transfer (e.g. aero/defence, auto into nuclear/energy and transport, e.g. rail)
- Is it a race to the bottom?—we really need to define cost and value for TES.

The significant consensus was that a national strategy could help with all these main points: there was a big market that the UK would otherwise lose out on, and much to commend a national approach to maintaining the UK’s own long-life, complex assets. A report on the event was produced and circulated to participants. A white paper was prepared based on the outputs of the workshop and this formed the basis for the next stage in the strategy development [9].

### 2.3 The Launch and Development of the Strategy

Over the summer of 2015 Rolls-Royce and the High Value Manufacturing (HVM) Catapult agreed to co-chair a national working group to bring about the development of this strategy. A launch event incorporating the publication of the white paper [9] and a call for participation was held at the Palace of Westminster in early September 2015 with key representation from industry, Members of Parliament, civil servants and academia. Sixty participants heard of the importance of TES from Sir Peter Gregson, Vice-Chancellor and Chief Executive of Cranfield University, Chris White MP and Barry Sheerman MP, co-chairs of the all-party parliamentary manufacturing group and a panel of industrial and research specialist. The panel comprised David Benbow of Rolls-Royce, Vaughan Meir and Alan Murdoch of BAE Systems, Rob Cowling of Bombardier Transportation, Mark Claydon-Smith of the Engineering and Physical Sciences Research Council (EPSRC), Dick Elsy of the HVM Catapult and Rajkumar Roy of Cranfield University.

At the launch a number of organisations agreed to contribute to a steering committee for the National Strategy development under the joint chairs of Rolls-Royce and the HVM Catapult. Organisations volunteering included the UK Ministry of Defence (MOD), UK Government Department for Business Innovation and Skills (BIS), Innovate UK, the EPSRC, BAE Systems, Babcock International, Bombardier Transportation, Siemens UK, Si2 Partners, the Manufacturing Technologies Association (MTA), Aerospace Defence and Security (ADS), and the Universities of Aston, Cambridge and Cranfield.

This steering committee convened for the first time in late October 2015 and set a challenging timetable for the strategy development with a target publication date of early summer 2016. It would go on to meet a further six times endorsing and directing the strategy development process. Three regional workshops were scheduled for the strategy development, the first being held in Bristol in early December 2015 with two further workshops in Glasgow and Ansty near Coventry taking place in January 2016.

The design of these workshops was evolutionary and as new key themes were identified these were added in so that delegates at the final workshop were working on as complete a picture of the issues as it was possible to generate. In total eighty delegates attended the workshops and their output formed the starting point for a detailed piece of analytic work which synthesized these outputs into the National Strategy. Four initial themes came from the white paper [9] and to these a further nine were identified across the three workshops. Table 2.1 lists the themes and their sources.

The steering committee recognised that the early work on the size of the potential TES market was rather limited and commissioned Professor Alan Hughes of the Judge Business School at Cambridge University to undertake a more extensive study into the national economics of TES in parallel to the workshops. This study also included a survey of, and structured interviews with knowledgeable sector experts to validate the reach and influence of potential TES markets. Two reports were prepared, one concentrating on the economic metrics [10] and the other reporting on the sector interviews [11].

**Table 2.1** Themes for the strategy and their source

Theme	Source
Culture and communications (including ‘why TES’?)	Bristol workshop
Collaboration mechanisms	TES national strategy steering committee
Technology and analytics	White paper
Standards	White paper
Supply chain	White paper
Theme	Source
Skills	White paper
Export development	Bristol workshop
Innovation	Glasgow and coventry workshops
Market knowledge	Coventry workshop
Design innovation	Coventry workshop
Institutional leadership	Coventry workshop
Productivity	Coventry workshop
Finance	Coventry workshop

## 2.4 The Presentation of the Strategy and the Next Steps

The national strategy [12], along with the extensive report on TES markets [10] were presented at an event held at the IET in London and introduced by Chris White MP in early July 2016. Around one hundred delegates heard presentations on the strategy, its development, the potential markets and the future of research in this field. The development team formed a panel and answered questions on the reports which were distributed to the delegates at the end of the event.

The team called for volunteers to help form a sector council in TES and a number of individuals from attending organisations have stepped forward. The UK MOD have ordered a print run of 100 copies of the strategy document to issue to their staff and supply and support chains. Work is now ongoing to stand up the council which will have its first meeting in the Autumn of 2016.

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## References

1. Aerospace Growth Partnership (2012) Reach for the skies: a strategic vision for uk aerospace. Department for business, innovation and skills. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/31807/12-954-reach-skies-strategic-vision-uk-aerospace.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31807/12-954-reach-skies-strategic-vision-uk-aerospace.pdf). Accessed 23 Aug 2016
2. Johnstone S, Dainty A, Wilkinson A (2009) Integrating products and services through life: an aerospace experience. *IJOPM* 29(5):520–538
3. Smith L, Maul R, Ng I (2014) Sevritization and operations management: a service dominant-logic approach. *IJOPM* 34(2):242–269
4. Baines T, Lightfoot HW (2013) Servitization of the manufacturing firm: exploring the operations practices and technologies that deliver advanced services. *IJOPM* 34(1):2–35
5. Lightfoot HW, Baines T, Smart P (2013) The servitisation of manufacturing: a systematic literature review of independent trends. *IJOPM* 33(11/12):1408–1434
6. Masood T, Roy R, Harrison A et al (2015) Integrating through-life engineering service knowledge with product design and manufacture. *Int J Comput Integr Manuf* 28(1):59–74
7. Hockley CJ, Smith JC, Lacey L (2011) Contracting for availability and capability in the defence environment, In: Ch13 in Ng I, Parry G, Wild PJ et al (eds) *Complex engineering service systems: concepts and research. decision engineering series*. Springer, London
8. Mehta R (2015) UK support and service industry: a high value employer and a net exporter. EPSRC centre for innovative manufacturing in through-life engineering services. [http://www.through-life-engineering-services.org/downloads/Final\\_UK\\_Support\\_and\\_Service\\_Industry.pdf](http://www.through-life-engineering-services.org/downloads/Final_UK_Support_and_Service_Industry.pdf). Accessed 23 Aug 2016
9. Tasker P (2015) Making things work engineering for life—developing a strategic vision. EPSRC centre for innovative manufacturing in through-life engineering services. [http://www.through-life-engineering-services.org/downloads/27302\\_White\\_paper\\_amended.pdf](http://www.through-life-engineering-services.org/downloads/27302_White_paper_amended.pdf). Accessed 23 Aug 2016

10. Hughes A, Hughes J (2016) Through-life engineering services (TES): market and data review. EPSRC centre for innovative manufacturing in through-life engineering services. [http://www.through-life-engineering-services.org/downloads/Market\\_and\\_Data\\_Review.pdf](http://www.through-life-engineering-services.org/downloads/Market_and_Data_Review.pdf). Accessed 23 Aug 2016
11. EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services (2016) Making things work better for longer: sector report. [http://www.through-life-engineering-services.org/downloads/SES\\_Sector\\_Report.pdf](http://www.through-life-engineering-services.org/downloads/SES_Sector_Report.pdf). Accessed 23 Aug 2016
12. EPSRC Centre for Innovative Manufacturing in Through-life Engineering Services (2016) A national strategy for engineering services: delivering UK economic growth by making things work better for longer. [http://www.through-life-engineering-services.org/downloads/Engineering\\_Services\\_Strategy\\_new.pdf](http://www.through-life-engineering-services.org/downloads/Engineering_Services_Strategy_new.pdf). Accessed 23 Aug 2016