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A conceptual framework to assess the impact of training on equipment cost and availability in the military context

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Abstract

Designing military support is challenging and current practices need to be reviewed and improved. This paper gives an overview of the Industry current practices in designing military support under Ministry of Defence/Industry agreements (in particular for Contracting for Availability (CfA)), and identifies challenges and opportunities for improvement. E.g. training delivery was identified as an important opportunity for improving the CfA in-service phase. Thus, an innovative conceptual framework is presented to assess the impact of training on the equipment availability and cost. Additionally, guidelines for improving the current training delivery strategies are presented, which can also be applied to other Industry contexts.

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Keywords: Availability Contracts, Support Design, Training, Equipment Availability, Cost;

1. Introduction

Over the last decades the collaboration between Industry and UK Ministry of Defence (MoD) has been increasing towards achieving more cost effective solutions to support military equipment. Currently, this collaboration is typically established by means of Performance Based Contracts (PBC) [1]. These contracts are agreed between MoD and an Industry Contractor and aim to reduce the cost of the assets ownership while ensuring the system performance [2]. They also include incentives for both parties to improve efficiency and effectiveness over the duration of the contract [3]. A typical example of these contracting approaches is Contracting for Availability (CfA). Under CfA agreements Industry is responsible to design and deploy support to the military equipment by maintaining it at an agreed level of readiness over a period of time [3]. However, designing support strategies for CfA is challenging and Industry recognizes that current processes and techniques need to be improved. On the other hand, there are important cost and performance contract drivers that are not fully understood either by MoD and Industry. In particular, the nine Defence Lines of Development (DLoD) stated by the UK MoD (Training, Equipment, Personnel, Information, Doctrine & Concepts, Organisation, Infrastructure, Logistics, and Interoperability [4]) are recognised by Industry and MoD experts as having an important impact on the contracts success, as they provide a pan-Defence taxonomy for development and management of the military capability [5]. There is a gap in understanding the benefits of the effort over each DLoD on the contracts outputs.

This paper is focused on the Training DLoD and aims to assess the benefits of Training on the equipment availability and cost. The objective is to demonstrate that investing more in Training delivery can significantly improve the Personnel efficiency on operating the Equipment so that less failure occur; consequently, the money saved with maintenance can be significantly higher than the money spent with extra training.

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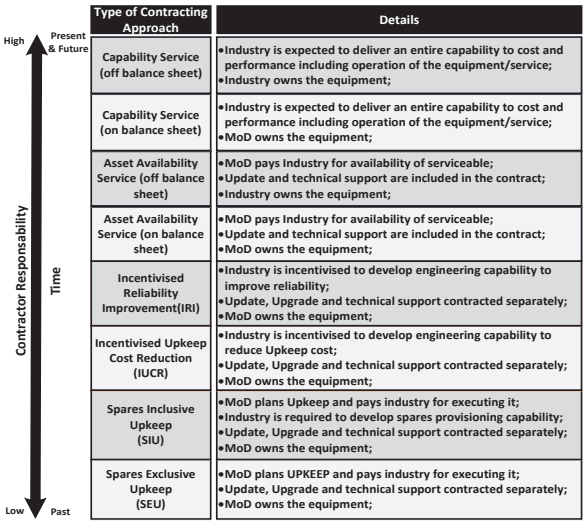
This document is structured in the following way: section 2 describes the current UK MoD acquisition processes and the agreements with Industry for provision of military support. Then in section 3 challenges and gaps are identified in the industry current practices of military support design and deployment, as well as the opportunities for improvement. A conceptual framework is then presented in section 4 to provide guidance in how to measure the impact of training on the personnel skills development and consequent impact on the equipment availability and projects cost. Finally in section 5 the key conclusions are presented and some future work suggestions are made.

2. Approaches for Support Contracts

The UK Defence Government recognises the important contribution that Defence Industry gives to the military capability support. Since the Defence Industrial Strategy (DIS) policy published on 15 December 2005 [6], the engagement of MoD with Industry has developed by creating new type of partnering arrangements towards more cost effective solutions to support the military equipment. Currently, MoD follows the Support Options Matrix (SOM) to distinguish the level of cooperation with Industry; developed for Project Teams by the Equipment Support Continuous Improvement Team (ESCIT), the SOM is used to identify support contracting options and indicates who is best placed to manage the equipment performance and cost drivers (Industry or MoD) [7]. The SOM is granular in terms of rising of responsibility for Industry for support delivery and has 8 different contracting options as shown in Figure 1.



Type of Contracting Approach	Details
Capability Service (off balance sheet)	•Industry is expected to deliver an entire capability to cost and performance including operation of the equipment/service; •Industry owns the equipment;
Capability Service (on balance sheet)	•Industry is expected to deliver an entire capability to cost and performance including operation of the equipment/service; •MoD owns the equipment;
Asset Availability Service (off balance sheet)	•MoD pays Industry for availability of serviceable; •Update and technical support are included in the contract; •Industry owns the equipment;
Asset Availability Service (on balance sheet)	•MoD pays Industry for availability of serviceable; •Update and technical support are included in the contract; •MoD owns the equipment;
Incentivised Reliability Improvement(IRI)	•Industry is incentivised to develop engineering capability to improve reliability; •Update, Upgrade and technical support contracted separately; •MoD owns the equipment;
Incentivised Upkeep Cost Reduction (IUCR)	•Industry is incentivised to develop engineering capability to reduce Upkeep cost; •Update, Upgrade and technical support contracted separately; •MoD owns the equipment;
Spares Inclusive Upkeep (SIU)	•MoD plans Upkeep and pays industry for executing it; •Industry is required to develop spares provisioning capability; •Update, Upgrade and technical support contracted separately; •MoD owns the equipment;
Spares Exclusive Upkeep (SEU)	•MoD plans UPKEEP and pays industry for executing it; •Update, Upgrade and technical support contracted separately; •MoD owns the equipment;

Definitions:
Upkeep - Maintaining the current state of an asset;
Update - Maintaining the current state of an asset, while dealing with obsolescence;
Upgrade - Increasing the capability of an asset;

Figure 1 - Support Options Matrix (adapted from [8]).

All the different contracting approaches differ in terms of applicability, level of support involvement/responsibility, and equipment ownership.

This work is focused on the Asset Availability Service Contracts or CfA. These are typically fixed price contracts but can also include mutual benefits to be gained from incentives and gainsharing of any profit and efficiencies [9]. Under these contracting arrangements the outcomes are defined in terms of availability and can be applied to: platforms, systems, sub-systems, equipment, spares, personnel, services, or facilities [3]. Availability is achieved as long as the equipment passes a working test, demonstrating that it is ready to be operating.

Design support to CfA requires a mature consideration over a wide range of factors such as: maintenance, operational safety, possible changes in the support requirements (i.e. equipment upgrades, change of mission scenario, etc.), obsolescence, gain share and training. The next sections present the current MoD contracting process and identify which are the challenges and gaps in the Defence Industry environment.

2.1. Methodology

The preparation for this paper started with performing several structured and semi-structured interviews and workshops with experts from Industry and UK MoD, aiming to understand the current practices in the Defence acquisition and support design, and to identify which are the gaps and challenges faced by the several stakeholders involved in the process. The amount of interaction with Industry included: 9 interviews and 1 workshop with Industry project managers, modelling engineers and engineering managers, and 1 interview with a project manager from MoD (DE&S); all of the interviewees had an average of 15 years of experience in-house. Each interview had an average duration of 1.5 hours whereas the workshop lasted 4 hours in duration. At these sessions the following type of questions were performed: "what kind of CfA does the company runs with MoD?'', "what challenges does the company faces to design these contracts", or "which resources are more critical to meet availability?". After each interview all the findings were registered and posteriorly validated by all the participants.

A literature research was also implemented in parallel, aiming to investigate techniques that could be applied to provide support and solutions for the challenges and gaps identified. As a result, a conceptual idea was developed to assess the impact of training on equipment cost and availability. The process was monitored and validated by bid managers from an UK military contractor company, based on their experience of previous contracts.

3. Current Design Practices – Industrial Interaction

From the identification of the military needs until the award of the contract with the Industry there is a detailed process involving several governmental and non-governmental entities. This process may vary depending on who identifies the gap and what type of gap is identified. There are two types of military gaps: capability gap and optimization gap. When a military contractor is in a contract with the MoD it may identify some opportunities of improving the current support strategy or a need for making an equipment upgrade; it can also be the case that Industry identifies external factors that are harming its current deployment plan; in both cases it is said that an optimisation gap was identified. The contractor may then report it to MoD