

# **A STEP Towards the Adoption of Data-Exchange Standards: A UK Defence Community Case Study**

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# STEP Overview

- STEP - Standard for the Exchange of Product data – ISO10303
  - Fully published in 1994
  - Uses EXPRESS and implemented using flat file, SDAI and XML
  - Implementable data specifications: Application Protocols
- ISO Technical Committee 184 (Industrial-Automation Systems and Integration), and the Sub-Committee 4 (Industrial Data):  
**ISO/TC184/SC4**
- Very limited research into the adoption of STEP and SC4 standards
- General standards adoption-related studies
  - DOI Theory, Economic perspective and Game Theory
  - Innovation-centric and Adopter-centric.

# Research Question and Methodology

## ■ Question

- What are the factors and barriers critical to the adoption of data-exchange standards like STEP within an organisation?

## ■ Methodology - Case study approach

- Adoption of STEP – Application Protocol AP224 in the UK MoD
- 14 interviews with end-users and implementers
- Document analysis and informal discussions.

# Case Background – UK MoD

- UK MoD
  - annual budget exceeding approximately £30 billion, over 210,000 service personnel and more than 100,000 civilian staff
  - works closely with a number prime and sub-contractors or industry partners and armed forces of other nations to achieve its goals.
- Standardization is key to ensuring the interoperability, quality, safety, reliability, maintainability, effectiveness and efficiency of the equipment used by the Armed Forces - *Support Solutions Envelope – Engineering and Asset Management: Guiding Principals 4 – Standardization*
- UK government policy is that civil standards are used wherever possible in preference to military standards.
  - In support of this and the European Commission’s Public Procurement Directive, European standards are the first choice of standards in the MoD followed by international, national, commercial and finally military standards.

# Case Background – UK MoD RAMP project

- For this reason, it has been announced in the Defence Contracts Bulletin that, ISO 10303 STEP is the uniform “standard of preference” for the electronic exchange of product model data
- RAMP (Rapid Acquisition of Manufactured Parts) project
  - STEP application protocol - AP224 – “Mechanical parts definition for process planning using machining features”
  - The development of STEP-AP 244 emerged from the desire of the US Navy to standardize data exchange to support the RAMP process.
- The principle of RAMP is that a reduction in the cost of carrying a large spares inventory can be achieved by the storage of electronic definitions of spare parts as opposed to the manufactured items themselves.
- UK Navy
  - had a desire to better control its stockholding of spares in order to reduce the size of its inventory, which was very large, and predominately made up of a lot of mechanical parts
  - Two RAMP pilot projects in 1998 and 2001
  - These two projects concluded that RAMP using AP224 could significantly reduce lead times involved in the procurement of mechanical spares
- In December 2003 a prime contractor embarked on the implementation of the UK’s first production application of STEP-based RAMP within an MoD Integrated Project Team

## **Case Study findings (1) - Barriers**

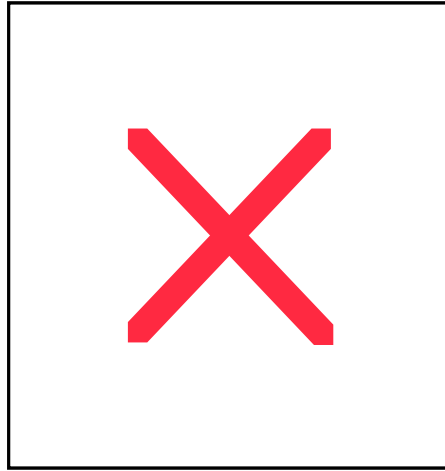
- Difficulty understanding the standard
- Standards revision process
- Cost of the Standard
- Resistance to change
- Organisational restructuring
- Industry reluctance to adopt RAMP
- Characteristics of related technologies

## **Case Study findings (2) - Facilitators**

- General adoption of STEP
- Pilots and Demonstrations
- Standards revision process
- Financial backing
- Managerial Influence
- MoD position on standards
- Contractual Arrangement

# Conclusions and ongoing work

- DOI factors
  - Complexity, relative advantage, maturity, price, compatibility and trialability
- Organizational
  - User need recognition, champions, change management, culture, managerial influence
- Economic
  - Network effects, switching costs, sponsorship and innovative contracting
- Developing a taxonomy of factors that impact the effective uptake of data-exchange standards like STEP
- Present recommendations to both the SC4 community and defence stakeholders on way to facilitate the effective uptake of data exchange standards.



**Questions**