

# FLIS: an opportunity for transformation

*A paper from Eurostep Limited*

## 1 Executive Summary

FLIS is a large program that will need to adopt its approach to information management to match the differing requirements from different business domains.

In the E&AM domain new, standards-based interfacing and data consolidation capabilities offer major opportunities for improving data quality, increasing data integration and transforming MoD's capability to respond to and to manage change.

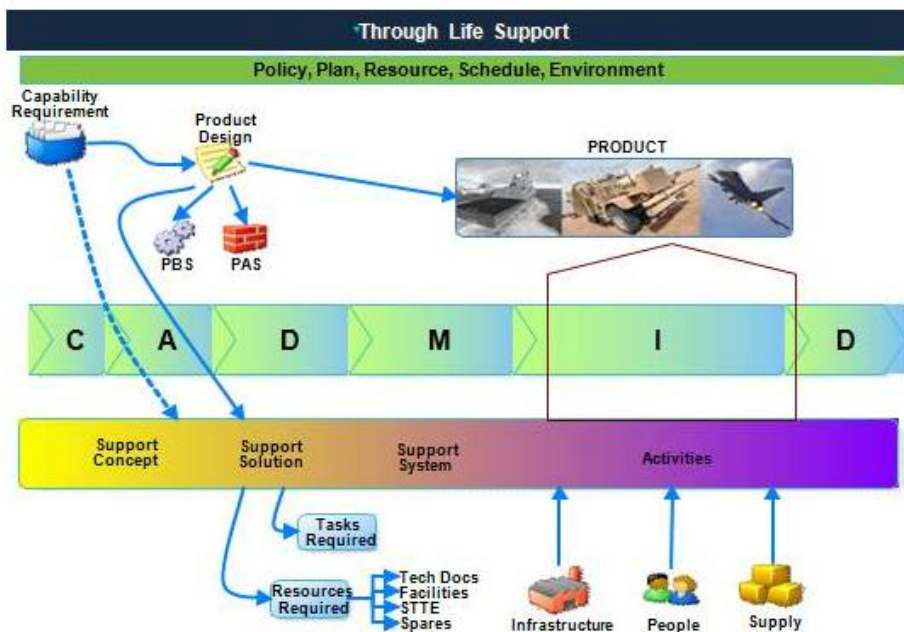
Data exchange or federation techniques alone cannot deliver these benefits because they are unable to create and sustain the necessary long term relationships between related data from different systems across life cycle phases. Federation also raises difficult issues on the control of access to commercially sensitive information and systems.

Eurostep have explicitly addressed the collaboration problems that arise in managing complex product data through life and has built an experience base of direct relevance to FLIS.

The aim of this paper is to offer a view as to the challenges and opportunities facing the FLIS program, especially in the E&AM space.

## 2 Focus of Interest

This paper is focused on those aspects of FLIS which relate to the management, through life, of engineered assets. Such assets are a major factor in the cost-effective delivery of logistics and of military effect. The main areas of interest are illustrated by the figure below.



## 3 Key considerations for FLIS

### 3.1 FLIS information types

FLIS will have to handle at least four different types of information, relating to the E&AM space, which each pose different challenges. These are:

- Configured Information, or “Master data”
- Manual Feedback data
- Feedback from HUMS and other automatic recording systems
- Supply Chain Transaction data

The nature of each data type is examined briefly in the following paragraphs.

#### **Configured information, or Master Data**

Master Data includes those outputs from the engineering, manufacturing and support solution development activities which are required for logistic delivery, plus the persistent data which describes the people, organization, roles, locations and resource types required to deliver logistics.

- Master Data is a much wider set of information than many realize, including, for example, all technical documentation, training products, spares recommendations, IPCs, etc., plus the personal, organization and location data, required to prime in-service E&AM systems.
- Master Data is characterized by a complex web of effectivity relationships which have to be managed through time (e.g. this version of the manual, applies to that version of the product design, and those individual products).
- Master Data has a lifecycle matching that of the product.
- Although *relatively* stable through time, Master Data often change more rapidly than appreciated, especially when:
  - tracking the configuration of individual assets
  - managing continuous acquisition
  - striving for continuous improvement in support system performance
- Master Data must be trustworthy, or lives can be put at risk.

#### **Manual Feedback data**

Manual feedback data comprises all records captured<sup>1</sup> by users and maintainers on what has actually been done or observed.

- Manual Feedback data includes information on product usage, fault states, work done, changes made and resources used.
  - This can imply changes to Master Data.
- It is characterized by a large number of individual records or messages, which can add up over time to a huge volume of data.
- Data quality is strongly affected by the mechanism provided to capture the information from users. Quality depends both on human behaviour and the IT capability provided. Get this wrong and feedback data may not be trustworthy.
- It is often hard to decide how much feedback, and particularly how much context (who, when, why, etc.) to capture. Capturing enough to measure

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<sup>1</sup> Including data captured using mechanisms such as Barcode readers and RFID tags.

performance is necessary but not sufficient, as it may not provide sufficient information for diagnosis of the root cause.

- High context capture is possible (using PLCs), but it may be cost effective to minimize the feedback volume, and to derive context (even if with limited degrees of certainty) using Business Intelligence capabilities.
- Feedback data has a medium, but limited life.
- Feedback data is a primary focus of attention for OEMs engaged in availability contracts as it holds the key to managing performance, and driving availability improvement.

### **Automated Feedback data**

Automated Feedback data is that provided by Machinery Health and Usage Monitoring systems (HUMS data) and other automatic recording systems provided as part of the operational product.

- Some Automated Feedback data will correspond closely the manual feedback data described above, and require handling in a similar way.
- Other Automated Feedback data – typically the majority – includes detail on the actual physics of failure<sup>2</sup>, including for example, records of how pressure, temperature, stress or other physical properties vary over time.
- This type of Automated Feedback data needs analysis by specialist facilities before its significance or value is apparent.
- Data volumes are huge, and often necessarily in specialised formats.
- Automated Feedback data, like other feedback, typically has a medium life, although much of it may never be analysed unless evidence of problems arise.

### **Supply chain transaction data**

Supply chain transaction data concerns information relating to the dynamics of the extended supply chain.

- Supply chain transaction data is of crucial importance to logistics delivery.
- Typically, supply chain transaction data has a much shorter lifetime than Feedback or Master Data, as interest in a transaction drops rapidly after execution.
- Supply chain transaction data will generate its own form of feedback, through supply chain performance metrics, which share some of the characteristics listed above for Manual Feedback data from the E&AM domain.

## **3.2 FLIS over time**

The capability to be delivered by FLIS will exist in an environment of constant change. The chosen approach will be affected by, and will need mechanisms for handling:

- MoD driven changes to military equipment, the rate of which may further increase to support continuous acquisition and the greater use of Urgent Operation Requirements.
- OEM driven changes to equipment, required to address availability shortfalls, obsolescence or reduce through life costs.

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<sup>2</sup> As opposed to a record of the fact that a failure is suspected, or known to have occurred.



- OEM driven changes to support solutions (and all related Master data), without which logistics performance improvement simply cannot be realized.
- Organizational and contractual change, leading to changes to the community of FLIS users.
- IT system and technology changes.

The requirement to manage IT system change applies to both MoD and industry, particularly as MoD continues to rationalise its application base. The life span of typical equipment programs is many times longer than that of commercial software.

We note that as well as managing change to content, an audit trail of change is also often required.

### **3.3 FLIS delivery mechanisms**

Based on Eurostep's experience in providing collaboration capabilities across different organizations, including between Government Defence departments and OEMs, three key mechanisms are likely to prove of particular significance to the successful delivery of FLIS:

- data consolidation using hubs;
- the use of standards-based interface mechanisms;
- mechanisms for subscription, notification and the control of access to data.

#### **Data consolidation using hubs**

By nature of the problem it addresses FLIS must encompass a set of asynchronous and independent processes resulting in many different and partially overlapping data sets. This is true even for data related to a single platform. Under these circumstances point to point exchange, whether implemented as file exchange or via an enterprise service bus, will not enable the effective management of change over time.

Eurostep now has several years experience of using a consolidation hub based on STEP and PLCS in support of inter-enterprise collaboration. Combining consolidation with a notify-and-subscribe mechanism enables a data orchestration service. Consolidation is used to maintain a consistent and coherent data set for the collaboration. This is not straightforward and requires detailed understanding of the sources and a comprehensive pre-defined library of options for handling the incorporation (or not) of incoming data.

#### **Standards-based Interface mechanisms**

The large number of potential interfaces between existing MOD and OEM applications, plus requirements for ongoing change, makes the availability of re-usable and robust interfaces based on standards a pressing imperative for FLIS. MoD's focus of attention should lie with standards which specify required information content, including<sup>3</sup>:

- ISO 10303-239 Product Life Cycle Support (PLCS) for Master Data and Manual Feedback
- OAGIS 9.0 primarily for Supply Chain transaction data

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<sup>3</sup> This list is not complete. Other standards, such as ASD 2000M may be needed to deal with legacy systems.



- S1000D for Technical Publications
- MIMOSA for Automated Feedback data

The choice of FLIS technology standards, such as XML and the WS-\* family of web-service standards<sup>4</sup>, should be left to the Delivery Partners.

Eurostep is successfully using PLCS, one of the key logistic information standards selected by DE&S, both as a primary interface standard and as the consolidation data model for our commercial collaboration hub software.

### **Access and ownership control**

The FLIS project will have to control access to information which is both commercially and militarily sensitive. Other players are better placed than Eurostep to address military security, and much can obviously be learned from the ongoing TSCP program.

The biggest lesson learned by Eurostep, when deploying information sharing capabilities in the commercial domain, is the great importance placed by all participants on controlling what information is published, or otherwise made available, to other “partners” in the domain. This has major implications for the technical approach adopted for sharing and exchanging information. Our approach is to maintain clear responsibility for data ownership and publication, to support this with subscription and notification services and to provide a distributed control mechanisms which provides those responsible for data with control over its visibility to others.

## **4 FLIS Opportunities**

FLIS presents an opportunity for transformation through far greater automation of information handling throughout the entire support network and hence to radically accelerate progress to realization of Through Life Capability Management.

Adopting the right approach to information sharing in FLIS would offer the following opportunities in the E&AM space:

- Improved agility
  - By enabling rapid and accurate change of Master Data for products, their support solutions and the supply chain.
  - By making business change easier to deliver by decoupling process dependencies and by both simplifying and accelerating processes, through the automation and consolidation of data and the use of notification and subscription mechanisms.
  - By encouraging much greater re-use of data, imported from earlier processes.
- Improved quality of engineering master data
  - By deployment of standardized data exchange capabilities that force a first level of improved data quality.
  - By consolidating data, a process that highlights differences in data that should be consistent, enabling their correction and associated process improvement.

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<sup>4</sup> WS-\* is shorthand for the family of standards supporting web services from W3C and OASIS.



- By ensuring clarity of responsibility for data and correction of errors.
- By automating data exchange capabilities such that automatic error detection and correction, where appropriate, is built into import adaptors to minimize the requirements for expensive human intervention.
- Reduced dependency on specific applications (or versions thereof)
  - By deployment of a consolidation hub between applications and organizations.
  - By utilising applicable standards to the maximum extent.
- Improved accessibility and confidence in logistics data leading to faster, better decisions.
  - By deployment of a consolidation hub which provides immediate access to the latest master data and associated feedback data and removes the need to merge data from different sources to satisfy each query.

The technology and experience to deliver these benefits is already in use elsewhere. Its early deployment as part of FLIS could offer valuable and impressive “quick wins” for this large and complex project.

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Eurostep has deep expertise in information management on both sides of the MoD/industry boundary, backed by experience from a wide multi-national context, within and beyond defence. In the particular domain of Engineering and Asset Management, Eurostep has unique knowledge and experience of the problem space, gained notably from our leading role in developing and deploying PLCS. Eurostep’s Share-A-space™ product is in production use in a variety of contexts, including between Government and Defence OEMs, and provides a tried and tested consolidation capability, based on the PLCS standard.

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