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Evolve or perish! The Continued Development of Information and Knowledge Services in the UK Defence Science and Technology Laboratory

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Abstract: Timely provision of the right information to inform decisions and support research within the Defence Science and Technology Laboratory (Dstl) ensures that the public purse is not wasted and, in extreme cases, saves lives. Dstl provides Library and Information Services (LIS) through a centralised service model with a high reliance on staff that can embed themselves into the work of their user community. The service model focuses on the provision of cost-effective resources and supports exploitation of the organisation's, and others', intellectual capital. This model has been successfully developed over a decade and has stood the test of re-organisations and cost saving measures where many other LIS models in other organisations have failed.

Keywords: Knowledge Management, Knowledge Exploitation, Information Management, Organisational Learning, Library and Information Services, Information Exploitation, Project Support, Knowledge Acquisition, Knowledge Transfer, Knowledge Workers, Information Workers

1. Introduction

Knowledge and Information Services (KIS), a support Department within Dstl, the UK Government's in-house defence S&T organisation, has evolved significantly over the last decade. To some extent, this evolution has been driven by re-organisation and cost-cutting measures imposed upon the organisation. However, some of the evolution has been guided by innovative individuals who have looked upon the necessity for change as an opportunity rather than a problem. This paper will build on what has been reported previously: Thornton (2009, 2004), and will present how the KIS Department works with an outsourced information and communication technology service partner to deliver knowledge and information services to fulfill the needs of the organisation.

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When pressed by Government to save money, the first place many Civil Service Departments look is to their Central Support Departments of which the LIS provision is one. In some cases this might not be too great an issue to bear. However, for a Science and Technology (S&T) research and development agency this would be a significant issue. Firstly, it would deprive the agency's researchers of the fundamental information they need to inform their research and their personal learning; secondly, it would give the staff the impression that there was no need to look externally to the work of the agency and thus reinforce the insular cold war mentality that can exist in the defence enterprise.
Even when not being pressed directly for cost savings, the LIS provision can be affected by the impact of other decisions. Site closures and other rationalisations can reshape the nature of the organisation in which LIS resides and can drastically alter the needs and makeup of the user community. In addition to these drivers, UK defence has experienced a fundamental change in focus in the post 9/11 world. Rather than being an enterprise focused on the UK armed forces and operations in other countries, defence has become linked to the wider National Security agenda and its remit for working with other parts of government has expanded (2011 is the first year a Strategic Defence and Security Review (SDSR) has been published rather a Strategic Defence Review).

The idea of the "Knowledge Agent" role within Dstl has been well reported in the literature: Thornton (2004). This role, combined with a centralised library service and provision of electronic access to S&T resources, were the key aspects for the then, Knowledge Services Department in transitioning from a classic LIS provision model to a model more fitted to the needs of the agency in the current financial and political climate.

2. Organisational Change

In 2008 KIS was formed by the merger of Business Systems (IT provision) with Knowledge Services (library and information services and research project support). This was driven by the potential for cost saving in the management area as both departments were small and thus had disproportionate management overheads. This merger offered two other opportunities; firstly, the opportunity to merge the library staff with the Knowledge Agents (project support) to form one group, and secondly, the opportunity to split the group in such a way that the internal teams were geographically co-located with their team leaders. These mixed-discipline teams were named Knowledge Management and Exploitation (KME) teams and were tasked to provide physical library services and research support. The structure of KIS is shown in the organogram below.

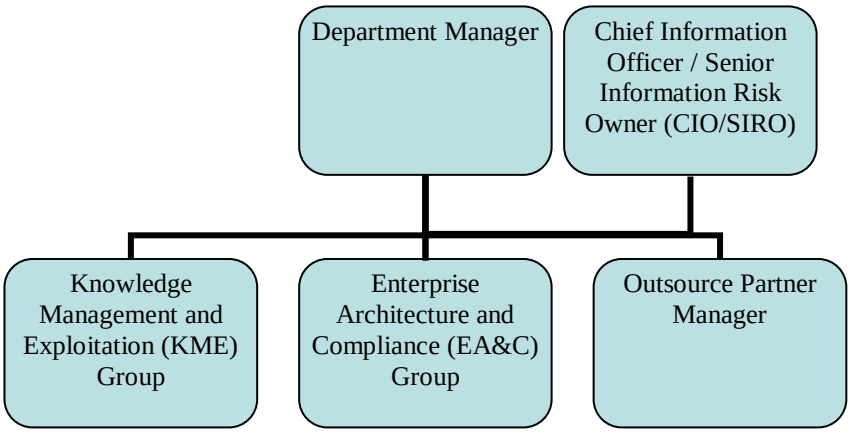

Figure 1. Organogram of KIS department.

The Enterprise Architecture and Compliance (EA&C) group is responsible for the design and security of Dstl's IT systems with the actual the service being delivered through an outsourced contract which is managed by the outsource partner manager. The CIO/SIRO role was formed at the same time as this merger and is the department's technical lead being responsible for policy, strategy, information assurance and risk. The Department Manager is responsible for the line management of the department, finance and has oversight of the IT service delivery and improvements projects.
This reorganisation did not embed immediately into the new department. Significant effort was required to build trust between the two groups and for each group to understand how their work impacted on the others. However, with hindsight, it is possible to identify some significant improvements which have come out of this new structure:

1. The combination of library and project support roles has resulted in a significantly increased quality of information provision by the library collections and much better knowledge of information sources for the project support staff. To reflect the inclusion of library staff into the group, the Knowledge Agent role was renamed Knowledge and Information Agent (KIA).
2. Close working with EA&C has enabled the KME Group to have a much better understanding of what is acceptable within the policy and security of the IT infrastructure. This has improved the provision of electronic information through subscriptions and ensured that any proposed Information Management (IM) solutions are feasible on the IT system.
3. The separation of the CIO/SIRO role from the Department Manager has removed the dichotomy of one person trying to balance cost against

quality and risk for IT, IM and Information Exploitation (IX) provision.

4. The merger of the two departments has resulted in one entity which is responsible for the provision of Computer and Information Systems (CIS), IM, IX and KM&E products and services. This has allowed the department to develop a mature understanding of how the systems, processes and people interact within the complex, dynamic and learning system which delivers these products and services to the organisation. This understanding offers many opportunities for increased efficiency and effectiveness in their delivery.

3. Further drivers for change

There are a number of external drivers to which Dstl must respond; many of these are aimed at increasing the efficiency and effectiveness of the civil service through cost savings and improved governance. These drivers deliver improved Information Assurance (IA) of civil service information assets, increased transparency of government data sets and improved control of CIS spending. All of these must be achieved in addition to acting on those drivers coming from the MoD (Ministry of Defence) which requires Dstl, as a trading agency of MoD, to improve its KM&E capability to enable it to deliver S&T advice and research.

The first stage of achieving this was to clearly assign ownership of responsibility for Dstl's knowledge and information capabilities and assets. This was achieved at board level by their acceptance of a short paper detailing the responsibilities and their owners. These are as follows:

- Dstl's Chief Information Officer (CIO) / Senior Information Risk Owner (SIRO) is responsible for IM and IX (including IA and other information policies). Additionally, the CIO/SIRO is charged with providing CIS infrastructure which supports these information capabilities and those of KM&E activities.
- Dstl's Chief Technology Officer (CTO) is responsible for the quality of the S&T advice and research delivered by Dstl and owns the responsibility of knowledge management and exploitation.

With ownership clearly established, the development of strategies to deliver improved knowledge and information capabilities became a priority as they needed to be joined up and their chances of being acted upon was significantly increased by high level champions within Dstl. These strategies have been developed under the title of the "Knowledge Management and Exploitation strategy 2011-16" and "ICT and Information Management Strategy 2011-16". These strategies deliver a joined-up position for the deployment of CIS technology required by Dstl which supports IM, IX and KM&E.

Clear ownership, mature strategies and significant external drivers have enabled a significant change in Dstl's planning about how KM&E should be developed and delivered. Instead of a disparate collection of local systems, processes and tools, it has been decided to introduce a coherent organisational improvement approach. Dstl is now developing a programme of work to deliver improved knowledge and information practices coherently across the organisation. The aims of this programme are:

1. To deliver improvements by ensuring existing systems and technologies are being exploited efficiently and effectively.
2. Where benefit can clearly be achieved through implementation of new systems and technologies, investments will be considered in the prioritised environment of the CIS programme.
3. To nurture the culture in Dstl and behaviours of its staff towards the management and exploitation of knowledge and information, to improve delivery of its role.

4. Operational Model

The operational model, which is used to think about the flow and transformation of knowledge and information within Dstl, has been developed through experience and is influenced significantly by the work of: Orna (2005), Boissot (1998) and Kim (1993). This model is outlined below:

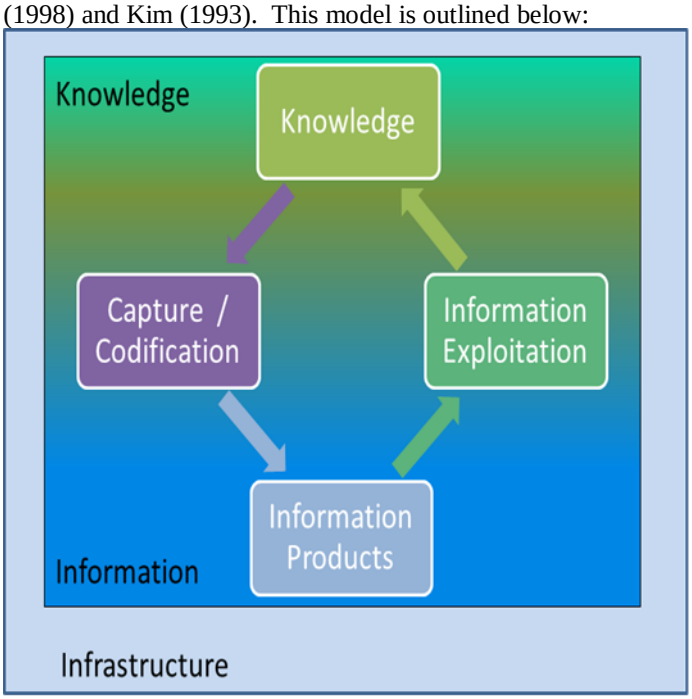

Figure 1. Operational Model showing the flow and transformation of knowledge and information.

Infrastructure is the CIS infrastructure which is used to deliver platforms and tools which support IM, IX and KM&E. This includes hardware, software, and connectivity. It is critical that this supports the aspirations of the organisation for the delivery of knowledge and information capabilities. For example, in the highly controlled environment of defence, firewalls and script blocking can impinge significantly on the software platforms which can be installed or the external information sources which can be accessed. Close co-operation between the CIS and Information Services teams is required to ensure that the needs of the business are met in a manner that is compatible with the security model employed.

The knowledge and information domain is shown on top of the infrastructure to show that their management and exploitation relies heavily upon it. All knowledge and information is not contained by the infrastructure. Knowledge is the result of learning derived from information and is thus contained by the human brain. Knowledge is not managed or exploited by the CIS infrastructure but the platforms and tools which are mounted upon it enable KM&E in an electronic environment for a geographically dispersed enterprise. This includes platforms like collaborative working environments and community sites. Information is physical or electronic and can thus be stored by electronic systems as documents, media files or in data bases *etc*. Information products on the electronic system are entities which have been organised and categorised to enable them to be identified by users for exploitation. Examples include technical reports, newsletters and process or policy documentation.

Information products from Dstl's internal holdings and external sources, such as journal subscriptions, can be identified and retrieved to create a corpus of information relating to a current research project. The researchers can exploit this corpus of information, through learning, to create knowledge which they can apply to their research project. Ultimately a research project would either deliver advice to the customer or would advance the understanding of science and/or technology. The process of research generates new knowledge within Dstl's researchers. The act of writing a report, or codifying new knowledge through other means, such as wikis, blogs *etc* results in a new information products which can be exploited by future research projects.

4. The KME Group

The management and exploitation of knowledge and information within Dstl is the responsibility of all the staff; however the KME Group provides a range of products and services and can carry out specific tasks on research projects. The KME Group offers advice on how to best carry out work in the knowledge and information domain. These tasked services are not carried out on Dstl overheads; the time and costs of KME staff, who are embedded into project teams, are charged to the project they are supporting. This 'embedded' approach to KME Group's working has facilitated the Group to grow and

establish a good professional network within the organisation. This business model reduces the overhead cost of the KIS department and has not proven to be a barrier to the utilisation of the Group over the last decade. In fact, the Group is very much in demand and has grown from five people to around thirty over the last decade. The KME teams are made up of a mixture of all the roles described below. The responsibilities and competencies and responsibilities of these roles are outlined below:

- Information Centre Assistants (ICA)

The ICAs are responsible for the management and day-to-day maintenance of the physical library collections. These collections are small compared to a University Library and their content is focussed towards the research of the staff on the site they support. In addition to this, ICAs also acquire and release classified defence reports to Dstl and externally. They are competent to carry out searches for clients in a range of information sources, such as journal subscriptions and the internet, and they deliver information literacy and induction training to Dstl.

- Information Specialists (IS)

The IS staff, often professionally qualified librarians, work in both the library and the project support domains. They are responsible for the strategic direction and policies of the physical libraries and are competent in information searching and delivering training. In addition, their experience in Information Classification and Management makes them very capable in the advice and delivery of improvements in the IM systems and practices of Dstl.

- Electronic Resources Specialist (ERS)

The ERS is a specific instance of the IS role. They are responsible for managing the electronic library (e-library). The e-library represents a significant investment by Dstl in information and data base subscriptions from commercial suppliers and is critically important to the S&T research programme. The ERS negotiates with suppliers and manages the budget as well as ensuring that any IT issues are dealt with as quickly as possible. The ERS works with the rest of the Group's staff to ensure that the e-library provides a suitable resource set for Dstl and that training on how to use the resources is available to Dstl.

- Information Application Specialists (IAS)

The IAS staff have very high levels of IT literacy and can develop and administer electronic information management solutions. These solutions can range from the effective use of spreadsheets up to tools to manage complex data and information collections. They also work in an advisory role to ensure that proposed solutions are fit-for-purpose and acceptable on the CIS infrastructure. Whenever possible, they recommend the use of existing tools, or development on existing platforms, to avoid nugatory development or cost.

- Knowledge and Information Agents (KIA)

The KIAs have been recruited from a diverse range of backgrounds covering S&T as well as information science. They are usually educated to at least degree level, often higher. KIAs are the core of the research support capability within the Group. They work with the research projects to understand the knowledge and information requirements of the project and to plan and deliver solutions for these needs. This can range from short literature searches and review tasks to long periods embedded in a project team leading literature-based research work which delivers a significant portion of a research project. KIAs are competent in information discovery, management and analysis. The analysis techniques they use range from abstraction, review and summary to formal techniques such as bibliometric and text analysis. KIAs also work with the team leaders to develop and deploy knowledge and information capabilities for Dstl. This has included formal technology watching, analysis techniques, dissemination methods and developing methodologies to codify knowledge of Dstl experts that support succession within the organisation. Over the last decade the KIA role has become respected within Dstl and has developed an identity of its own. It is believed that some of this success is due to recruiting S&T professionals and training them in the knowledge and information competencies needed for the role. Their S&T backgrounds enable them to communicate effectively with the researchers of the organisation and gives them the scientific credentials needed to rapidly embed themselves into research teams.

- Team Leaders (TL)

The TLs are responsible for the day-to-day management of the KME teams but also carry out the role of a KIA; currently they have all been KIAs before becoming a TL. TL responsibilities include the development of staff competency and Group capability to ensure that the Group can deliver to its clients or develop new products and services for Dstl. Additionally, they work with the GL, the CIO and the CTO (Chief Technical Officer) to deliver strategy, policy and solutions to improve the knowledge and information capabilities of Dstl.

- Group Leader (GL)

The GL is responsible to the Department Manager for the management of the Group and its delivery to the Group's clients. Either directly, or by delegation, they support the CIO and the CTO to deliver strategy, policy and solutions to improve knowledge and information management and exploitation in Dstl.

- Departmental Points of Contact (DPoC)

The DPoC is not a specific job title; it is a role which can be held by any member of the KM&E group. DPoCs are responsible for the communication and relationship between the KME Group and Dstl's Research Departments. This communication is in both directions, the DPoC informs the departments of information KIS would like them to be aware of, and they receive feedback

from the department on how the products and services KIS offers support the work of the department. It is an established and respected role within Dstl and the relationships the DPoC form with the management and researchers of a department have proven extremely beneficial. This can be seen from the frank feedback the departments have given, as well as by the amounts of tasked research support which KME receives through this channel. DPoCs are not responsible for delivering all the work tasked by a department, but they are aware of it. This gives KME a mechanism to inform the physical and e-libraries of the information sources a department is interested in and has resulted in an excellent knowledge of the work of the departments. This knowledge has in turn enabled the beneficial cross linking of expert knowledge areas across the organisation.

5. The Future

To support Dstl's challenge to improve the Knowledge and Information Management and Exploitation capabilities of the organisation the KME Group needs to move away from undertaking information retrieval tasks and concentrate on developing and delivering new products and services where their competence adds significant value. Additionally to developing and deploying new systems and tools for Dstl, the group will actively engage with Dstl to achieve the cultural and behavioural changes required to maximise the value obtained. To this end, the Group aims to concentrate on improving the baseline competence of Dstl staff in information literacy to empower more of them to undertake their own literature research in their S&T domain.

It is believed that this will create a virtuous circle where the KME group has resource available to develop new systems and tools and or to influence knowledge and information culture and behaviour. This will enable the group to deliver increased knowledge and information capability and improved culture and behaviours to Dstl, which will in turn create a demand for improved systems and tools from Dstl.

6. Conclusions

1. The combination of CIS, LIS and KM&E responsibility within one department significantly benefits the provision of CIS infrastructure to support IM, IX and KM&E, whilst ensuring that the aspiration of the organisation in these areas are realistic within budgetary and policy limitations.
2. Clear ownership and strategies for ICT, IM and KM&E support the development and deployment of programmed improvements in the Knowledge and Information Domain.
3. A centralised group of flexible and competent knowledge and information workers can deliver effective products and services to an organisation which is interested in a diverse range of subjects. Domain specialisations are not necessary.

4. The DPoC role and its approach of 'embedding' staff within project teams, as adopted by KM&E Group staff, has facilitated the Group to grow and establish a strong professional network. This gives the KM&E Group an advantageous access to an informal 'knowledge network' and the ability to identify where expertise and knowledge resides within Dstl.
5. Knowledge and information services do not have to be delivered solely as an overhead. Where specific support is required, it can be a charged service.

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