

**Роль библиотечно-информационного обслуживания
проектно-конструкторских технологий при получении
новых знаний – опыт Великобритании**

**The Role of Library and Information Services In Supporting Knowledge
Creation In Technology Research and Development – A UK Experience**

**Роль бібліотечно-інформаційного обслуговування
проектно-конструкторських технологій при отриманні
нових знань – досвід Великобританії**

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Главной задачей британской Научно-технической лаборатории обороны является ведение научно-исследовательской деятельности для правительства. Созданная с нуля всего пять лет назад, Служба поддержки знаний содействует приобретению и распространению знаний в рамках лаборатории. Основой философии данной службы является понимание процесса получения знаний как функции обучения. Определенные виды библиотечно-информационного обслуживания, напрямую поддерживающие деятельность организации и включенные в научно-исследовательские проекты, а не разрозненные, пассивные и основанные на запросах услуги, – вот ключ к успеху. Лишь выявив направления, на которых мы действительно принесем пользу, мы не только увеличим эффективность и результативность исследовательской деятельности Великобритании, но и повысим собственное влияние и статус в рамках Лаборатории.

The United Kingdom's Defence Science and Technology Laboratory's primary function is to carry out research best done within Government. Created just five years ago, Dstl's Knowledge Services designed from scratch services and functions to help support and enhance knowledge creation and knowledge sharing within the organisation.

Core to its philosophy has been identifying that knowledge creation is a learning function. Targeted library and information services offering direct support and involvement into research projects, rather than solely conventional passive and reactive services, are the key to success. By identifying where we can make a useful difference, we are not only improving the efficiency and effectiveness of UK research, but also increasing our influence and status within the organisation.

Головним завданням британської Науково-технічної лабораторії оборони є ведення науково-дослідницької діяльності для уряду. Утворена з нуля всього п'ять років тому, Служба підтримки знань сприяє придбанню і поширенню знань в рамках лабораторії. Основою філософії даної служби є розуміння процесу отримання знань як функції навчання. Визначені види бібліотечно-інформаційного обслуговування, які прямо підтримують діяльність організації і які включені в науково-дослідницькі проекти, а не розрізнені, пасивні і базовані на запитих послуги, – ось ключ до успіху. Лише виявивши напрямки, на яких дійсно принесемо користь, ми не тільки збільшимо ефективність і результативність дослідницької діяльності Великобританії, але й підвищимо власний вплив і статус в рамках Лабораторії.

Introduction

It is a great nuisance that knowledge can only be acquired by hard work.

– W. Somerset Maugham

The UK's Defence Science and Technology Laboratory was created in 2001 following the division of the Defence Evaluation and Research Agency. Its primary functions are to carry out research considered best done within Government and to provide the UK's Ministry of Defence with impartial expert advice.

From its inception knowledge was given a high profile and one of our five stated organisational values is to «cherish Knowledge». Our predecessor organisations had a record of invention and scientific

investigation second to none in the world, but because Dstl's role was to be fundamentally different to that of its predecessors, what were the information needs of the new organisation. How were we going to support the Dstl experts in their new role, and how must our preconceived notions and role change?

A new Department, Knowledge Services, was created within Dstl to meet this challenge. Its primary function is to support the information requirements of the whole of Dstl, and support similar requirements throughout the Ministry of Defence and other Government Departments. Although we had some staff already, much of what we have come to offer had to be built from scratch. While daunting (and very hard work) it allowed us to implement many new initiatives, without having too much baggage from the past to hold us back

The senior management in Dstl set the broad outlines of the organisation's philosophy and technical framework. By designing our strategies to align closely with that philosophy, and (more importantly) to support and enable it, we have been able to provide a service with a definite and targeted purpose.

What Is Knowledge?

Over the last ten or fifteen years there has been a proliferation of the use of the word 'Knowledge' in a variety of applications. Knowledge Management is one of the biggest misnomers going, and one regretted by its one-time major proponent. But let's go back to basics. What is Knowledge?

«Knowledge – the sum of what is known.» That's one definition from the Oxford English Dictionary (not sure how this is going to translate!) and is probably as good as any other. Knowledge is that which is known.

Our contention is that Knowledge can never be transferred from one person to another. New knowledge is created in a person's head, and is a function of a variety of factors; what that person has read, his education, his societal upbringing, his working environment, in short everything that has gone into creating that person.

The Knowledge that is created in someone's head therefore is limited to that person. They may attempt to transfer that knowledge to another, but all they can transfer is an imperfect image of what is in their head – an information product. These information products may take the form of a conference paper, article, report, presentation, teaching lesson, conversation, letter, television programme, videoed lecture, web site or whatever. What you can be certain of is that what is transferred via that information product will not be «the sum of what is known» by the person imparting it, but an imperfect subset. I am transferring my 'knowledge' to you today, to most of you through the medium of an interpreter. I might just confuse the interpreter by switching to another language – «est veritatem temporis filiam» – assuming you all speak Latin, or I could just explain that «Truth is the daughter of Time». Or that «Time's daughter is Truth», or that «The daughter of Time is Truth» which are all valid translations of the Latin to English. Heaven only knows how many different ways that can be translated into Russian and Ukrainian.

What I hope to have just shown you is that something gets lost in translation, and that when passing knowledge from one person to another is translation at its most basic. Recording that knowledge imperfectly as an information product will not, and can never be perfect. And the only Knowledge Management that actually exists is the way you organise the knowledge in your own head!

The Knowledge Gap

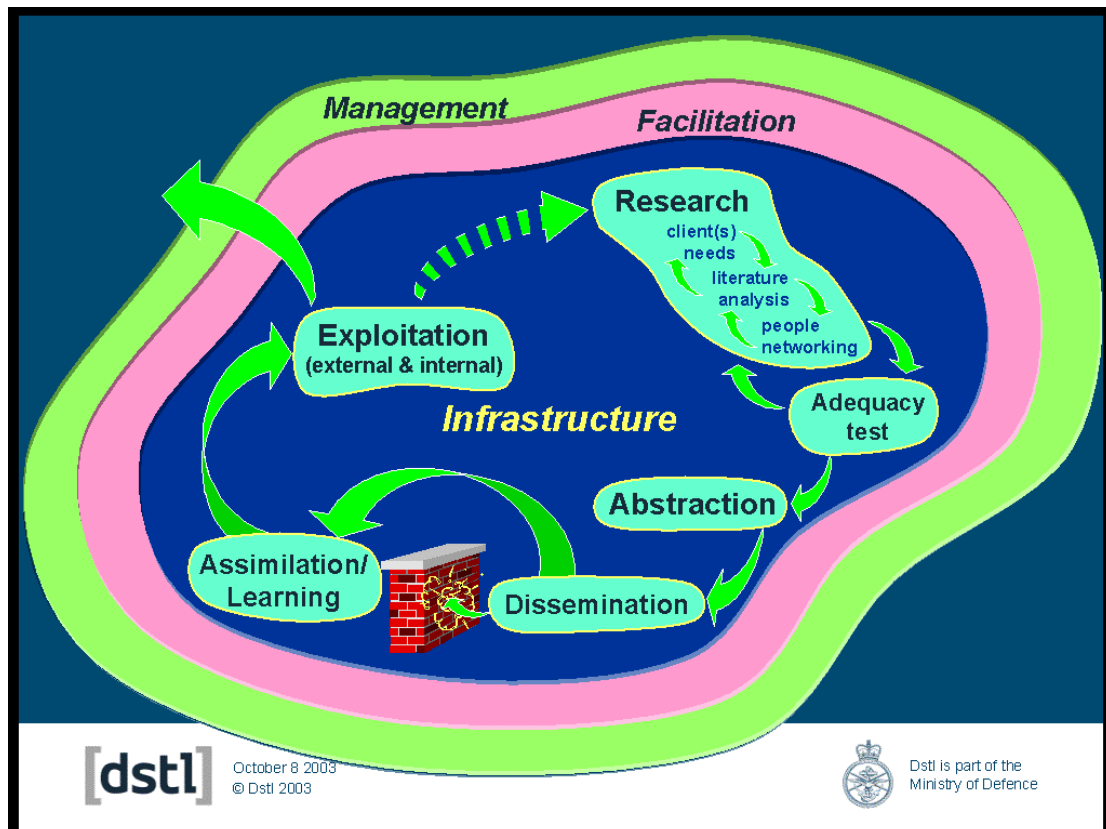
For many of us there will always be a gap between that which we know, and that which we need to know to accomplish our tasks or role. But we have a major advantage over «the savages» as George Santayana called those societies where instinct has learned nothing from experience. As he said, «Those who cannot remember the past are condemned to repeat it.» Our advantage is that for the last 2,000 years or so we have been attempting to record our knowledge – however imperfectly – and making it available to our fellows.

Information products have got better and better as time has gone by and as technology has improved. From hand copied scrolls and papyri to printed books and journals, to film, electronic recording, and video that we have today. And even these tools are changing and improving faster and faster, bringing more and more complications and problems. Transfer of information is becoming quicker, easier and in many ways more effective, but carelessness increases and self-perpetuating mistakes can creep in. Prob-

bly the greatest problem is that there's too much information out there which could fill the knowledge gaps, if we could find it, and if we can guarantee its accuracy. And that is where competent Library and Information Services come in.

The Social Learning Cycle

Based on work by Max Boisot, we have developed the following model of his social learning cycle theory. We've reviewed and tested this model against reality, and it seems to stand up to everything we can throw at it. In many ways it seems to fit into and match several other societal models, so perhaps it is more general than we thought when we started working on it.



Modified Boisot Social Learning Cycle

Our model of facilitated learning embeds Boisot's concept within an organisational learning framework, and uses slightly different labels to increase its relevance to Dstl. Now, for many organisations the Library sits solely within the Infrastructure as a passive guardian of resources, and it is up to the clients to carry out these steps in the creation of new knowledge using those passive resources. Others provide a limited number and range of services. Our Library and Information Service – called Knowledge Services – was designed from the start to go a lot further than that. We are the information specialist, the information retrieval experts. Our aim was to integrate ourselves into the whole of the research programme, to become an integral part of the project management structure, and far from being a passive service to become aggressively active.

How does it actually work? Starting from this point, Research. The research team community is given a task, for which there is usually a client (internal or external) who specifies what the task is, and – more importantly – who funds the work. Having identified the clients needs, some form of literature analysis is carried out, and this is usually accompanied by networking among other people in the field.

As the research team gathers the required information it carries out adequacy tests, assessing whether they have enough to carry out the task, or needs to do more work, more experiments etc. If satisfied then abstraction of the facts from the mass of information is the next step.

Dissemination distributes the collected and abstracted material to the team members and/or prospective learners.

Assimilation is the phase when learning actually takes place, when knowledge is created within the team.

Exploitation, the ultimate objective, releases the potential of the new knowledge created, using the learning to create solutions to our problems.

This whole cycle sits within the organisation, and relies on an infrastructure, management support and facilitation to carry out research. That's our version of Mox's learning cycle, but how does it work in practice.

Dstl's Learning Infrastructure

The infrastructure element in which the learning cycle sits, represents a wide range of both tangible and intangible supports to learning, and without which the process become very much harder. These include:

- **Corporate Culture:**
 - Encouragement from Dstl's senior management to provide the best research and advice to our employers;
 - Acceptance on all levels of the value and cost of learning, training and sharing – as well as the ultimate penalties of not doing so;
 - An acceptance that these are not short-term targets – there is no quick-fix for excellence.

- **Physical Infrastructure**

We have moved away from the usual idea of the Library as a collection building repository of printed information. With the vast range of subjects of importance to MoD, there is no way that we could even scratch the surface of gathering all of the significant material of interests – and the clients would never have time to digest it all. So we don't try. What we provide is a welcoming reading area with a very small collection of key works, current newspapers, journals, books and reference works. Most importantly we provide a convivial atmosphere (and coffee!) with an intelligent staff who know their stock, the customers and their interests, and how to meet their customers needs as quickly as possible. I can't stress that the value of employing the best staff going.

We have also looked closely at how Dstl's staff communicate. Although we largely have open-plan offices, with an extensive electronic intranet, much useful discussion takes place either when travelling to or from the coffee point, or at the coffee point itself. To mesh with, and encourage, this internal culture of discussion and knowledge sharing, what we have put into place in terms of «physical» infrastructure are:

- One, fairly large (for a special library) conventional library;
 - Three small site libraries (small focussed collections) with a dynamic stock and a dynamic staff, as part of an information sharing resource designed to encourage and stimulate thought;
 - Tea Boat collections – unmanned tea room sites with small collections of books, internet terminals, white boards, relevant journals etc, scattered around our various sites. Maintained by, and supported by the local Knowledge Services staff;
 - Anti-Bistros – the alternative to the busy open-plan office. Small, individual work areas where scientists can get down to serious thinking and study, away from the telephone and the insidious all-pervasive e-mail.
- **Electronic Infrastructure**
 - Network and related infrastructures need continuous investment and development, and need to be aligned to the needs of the clients.
 - **Information Infrastructure**, much of which either we provide directly or lead on provision.
 - Our reports catalogue, including 60,000 full text documents (still growing);
 - Electronic information resources such as Web of Knowledge, Jane's etc;
 - Electronic journals access;
 - E-Learning courses;
 - Portal sites to many major information sources.

But the infrastructure is just that. It is developing and growing in light of our clients needs, but to limit ourselves to just to those short-term needs and not think ahead would be not carrying out our job properly. We go far beyond the infrastructure, Knowledge Services plays a greater role in the learning cycle, an information facilitation role. As I have said, a proportion of conventional library and information services usually support some of the *Research* phase of the learning cycle – defining the client’s needs and literature gathering to meet those defined needs. Knowledge Services goes further than these limited aims.

In many ways we were lucky. We had to set up our services from scratch, had the whole hearted support of our senior management, and didn't assume we knew what our clientele needed – we asked them instead. We didn't provide them with exactly what they wanted – usually a University quality library with massive book stock and journal back-runs – but we identified from information needs gathering exercises what they really needed to do their jobs properly. While they felt capable of meeting a fair proportion of their needs from a variety of sources including desktop, communities of practice, professional or newsy journals etc., they wanted and needed high quality information professionals on tap for those occasions where comprehensiveness, certainty and speed were essential, and where they needed to apply analytical techniques beyond their existing skills set. Consequently, we offer a wide range of services designed improve the efficiency and sustainability of the research process.

We felt it surprising that many organisations provide their experts with a wide range of bibliographic sources, and then leave them to do any and all information gathering, sifting, sorting and analysing themselves. It is generally accepted that this tends to be a very expensive use of their valuable and limited time, and one for which unless you carry out the task frequently, the non-expert quickly becomes inefficient. Our approach is to provide a variety of trained information specialists to handle such tasks, and to facilitate knowledge creation and sharing: Information Specialists, Information Scientists, Knowledge Agents and of Knowledge Research Team.

The Information Specialists are another term for our Librarians and Assistants. Although ‘conventionally’ trained, we expect much more from them. They must be very active among their community, and be very aware of their clients’ needs and expertise. They have very little physical room to play with, so what collection building there is has to be highly selective and effective to make to best use of the space available. They also serve as trainers, teaching clients locally on the resources available at the desktop, either in one-to-one sessions or in one of the more formal courses we make available. By making these small focussed collections (or libraries as everyone from the Chief Executive down calls them) a social and friendly environment, they make a valuable contribution to helping create a knowledge sharing culture.

Fortunately there is an acceptance amongst the majority of Dstl that if you don’t know, you can bring expertise in. Our Information Scientists are either librarians information scientists or scientists trained in many techniques of information work. They are our true specialists, our experts in bibliometric analysis, patent analysis, data visualisation, technology roadmapping, etc., and their expertise is bought in when and where needed in support of specific pieces of work, either directly or in support of our generalists. The Information Scientists, and to a lesser extent the Knowledge Agents, analyse the information at their disposal, identifying research trends and developing technologies. They can also identify key players and groups in the areas of interest, pointing out those people that our clients should be interested in, following, talking to and co-operating with, thus supporting the *people networking* element of learning cycle.

Our generalists, the Knowledge Agents, have either scientific or information qualifications – most have doctorates or MScs – and have been subsequently trained up to a reasonably high level in any skills we think they lack. They can be bolted into projects to handle anything from single basic literature searches to handling the total information requirements of a whole research package. Although their tasks are not usually related to their individual specialism, their scientific expertise and knowledge has led to widespread acceptance of the concept throughout the organisation. One, bolted into a project as a Knowledge Agent, also fills the role of inorganic chemistry expert within it. Most have received training in facilitation, and act in dual roles in workshops as facilitators and information experts. In fact, the skills that they have demonstrated have led to them being included in a range of projects for which standard «librarians» would never have been considered, culminating recently in a organisation wide capability analysis, with the unforeseen benefit that they now know more about what is going on across Dstl than some senior managers! They tend to be the most widespread public face of the Department, and key to their success is a wide knowledge of all of the skills, strengths and weaknesses of the rest of the Depart-

ment. They operate singly, or as part of ad hoc teams, drawing in skills and talents wherever needed from the rest of Knowledge Services.

Going on from the *Research* phase in the cycle, our staff have been trained to identify whether the information supplied and sources used meet *Boisot's «Adequacy Test»*. We have all come across clients who have carried out a «comprehensive literature search», which has turned out to a quick delve into the Internet that has barely scratched the surface. Our staff are trained in, and have access to a far greater range of potential sources than many clients have any idea exist, and can select from this range of material to provide the appropriate depth of research needed for the task in hand.

They can also supply the *abstraction/summarisation* phase, producing technology reviews to a very high standard. Many of these skills were found among librarians in the past, but sadly do not seem to be taught these days.

They also can assist in *dissemination*, with expertise in shared network drives, stand-alone bibliographic databases, and a range of other skills aimed at sharing information. For many of our scientists and knowledge integrators, the ability to take sub-sets of bibliographic databases or analysed data to meetings both in this country and abroad or to mount on separate networks, is seen as a real advantage.

In the final phase of the cycle, we assist in the *exploitation* of the new knowledge created by the *assimilation* phase. Scientific and technical reports form the concrete product of Dstl's research, and these are recorded and indexed not only on our corporate catalogue, but also on databases and hard copy abstract journals which are made available to the rest of MOD and the defence community. By making this information available we are encouraging the exploitation of our research by the wider community.

Finally, our small but highly respected Knowledge Research Team develop novel techniques and concepts to improve the resources available to the other teams, provide critical analysis of new products and developments in the science, and act as expert advisors not only for us or just Dstl, but for MOD and a range of other government departments.