INFORMATION IN DEFENCE RESEARCH & DEVELOPMENT

G.J. NARAYANA
Information Centre & Library
Aeronautical Development Establishment
Bangalore

The paper brings out the characteristics of scientific research in general and defence R&D in particular. The processing of information in defence research is viewed in its overall perspective. It considers, besides the library and information services, supply of information for management decision making, patent and specification framing, technical co-ordination and liaison, technology transfer for civilian use, reporting to government and public.

INTRODUCTION

Maintenance of territorial integrity, safeguarding and promoting national interests are fundamental aspects of statecraft. To achieve this a nation builds and maintains its defence services. With the advancement of science and technology and its impact on the weapons development, the defence research and development (DRD) has become a major concern in all countries. Information resource forms a vital component of the infrastructure needed to support, develop and exploit DRD. Role of communication and dissemination of information in the growth of science and technology is fairly well understood, where as it is not so in DRD.

DEFENCE RESEARCH & DEVELOPMENT

A study of the characteristics of DRD and how it differs from the mainstream of scientific and engineering research and technology (SR) will be useful for understanding and handling of information requirements for DRD.

Figure 1 gives the characteristics of the world of SR and that of DRD.

Scientific and technical research can be categorised broadly into pure or basic research, theoretical and applied research including development. The nature and quality of research output, and the working environment generally distinguish the two types. An analysis of scientific research (=SR) seems to indicate that about 10% of the work is philosophic and abstract in nature, 70 to 80% theoretical and applied, and the remaining 10 to 20% directly involved in development of processes and hardware. In contrast, in defence R&D (=DRD) abstract research is almost negligible, while theoretical and applied research and development of hardware account for 10-20% and 80-90% respectively*. What distinguishes DRD from SR is the dominant emphasis placed on hardware development in the former.

Another important feature that characterises the two is the work environment. The environment surrounding the world of SR is that of academic, research, industry and government, whereas in DRD it is defence forces, government, and industry. Tight security restrictions guarding DRD is a factor that has a bearing on all aspects of handling information. Target time is vital.

Weapons Development Programme

Within the DRD framework, weapons development programmes constitute the core. Information systems have to be geared to meet their requirements. Such programmes generally feature five phases as follows:

a) Exploratory development. Efforts to demonstrate feasibility or to identify possible specific military applications short of major development projects. It may vary from fundamental applied research, fairly fundamental in nature, to minor development activities,
World of scientific and engineering research and technology

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Environment: Academic, research, industry, government

Defence research and development

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Environment: Battle-field, research and development, government, industry, secrecy

Fig. 1. Feature of scientific research and the defence research

b) Advanced development. Includes all projects that develop components and subsystem hardware for experimental tests.

c) Engineering development. Activities to develop engineering items for service use, but before a decision has been made for procurement or operation;

d) Operational systems development. Development, engineering, and testing of systems, support programmes, and vehicles and weapons that have been approved for production and service employment forming major development projects; and

d) Management and support. Includes support of R&D installations.

Though DRD is directly concerned with the development of weapons, equipment and structures the information gathered during programmes forms a valuable aid to decision making in weapons system selection, acquisition and marketing processes and in turn influences the DRD policies.

DEVELOPMENT PROJECTS

The selection and successful completion of defence projects, according to Zuckerman Committee involve - a) formulation of a draft operational requirement (staff target), b) finalization of operation requirements and technical specifications; c) feasibility study; d) project study; e) “holding” contract where necessary, and f) development contract. In any major
development programme, project study is a key component. Important aspects to be covered in project study are:

a) Identification of scientific and technical problems that need to be solved;

b) Bridging the technological gaps that may exist as well as the development of requisite industrial facilities within the time schedule;

c) Calculation of cost of R&D in terms of money, manpower and time;

d) Estimation of products costs, operational life of the weapon, and possible market;

e) Consideration of possible benefits of the technology developed during the project to civil industry; and

f) Final decision on the project after re-evaluating the original operational requirements in the light of the factors mentioned above and the possible technological capabilities, present and immediate future of the enemy that may affect the weapon capability.

Initiation of Projects

The development, production and procurement of weapons and engineering items is a joint task involving Department of Defence, the Service Headquarters, Defence Research & Development (DRD), and Production units. The sponsoring agencies initiate the requirement for a new item or modifications to an existing weapon to the General Staff (GS). The GS coordinates the various requirements, and exercises control over their execution. A proposal formulated by the sponsor is referred to R&D for technical comments and feasibility. In the light of the comments received from the R&D and other concerned agencies, the qualitative requirements are framed. The progress on the project is periodically reviewed.

At the development stage, continuous interaction is maintained between the R&D, sponsor and production units. This is the broad outline of the process; but it may vary from country to country and from service to service.

Scientific & Technical Information Needs

The information requirements of defence research needs scanning vast areas covering science, technology, engineering, medicine, behavioural sciences, management and industry. It follows that meeting information needs of DRD stipulates:

a) Continuous monitoring of research in the fields of science, engineering, and technology, as well as in specific areas of research;

b) Collection of information pertaining to ongoing defence R&D work within the establishment/government;

c) Providing specific information required for the projects and policies thought out by the general staff; and

d) Dissemination of information generated during the project to the benefit of civil industry and general public.

Once a project is approved, the next stage involves development of prototypes, followed by production. The development of prototypes and the production could take place within the government sector or could be contracted to industry. The latter course brings in a new feature to defence information work, in that, the government will be required to supply relevant information of government origin or control to the contractor who may not have access to it otherwise.

By and large DRD is a government activity and hence management of information is subjected to government procedures and bureaucratic control.

Information system has to (a) meet the requirements of projects and project-oriented activities; and (b) keep up with the latest scientific and technical developments. This distinction gives rise to priority treatment to the first. Though in theory it sounds logical, the two cannot be separated as the latter forms the basic structure and unless it is sound the former activity cannot be fully met. Time and cost factors are critical, since projects are time-bound programmes.
INFORMATION FLOW

There is a close link between DRD activities, the defence services and the industry. At present the information transfer/exchange is mostly between the DRD and the defence services as shown below:

World of Information DRD Defence Services

Industry and other government agencies are two other components with which the DRD has to maintain effective interaction. Such interaction is of mutual benefit. When such an interaction is established, the pattern of information flow takes the following shape:

Other Govt. Agencies

World of Information DRD Defence Services Industry

Types of Information Activities

Handling of information activities in DRD may be grouped under the following heads:

a) Information centre and library
b) R&D management information
c) Technical coordination and liaison
d) Transfer of technology for civilian use
e) Reporting to government and the public
f) Patenting, standardization.

Information Centre and Library

Scientific and technical information plays a dominant role in achieving the DRD objectives. Hence, the information centre and library has an active part to play. The organization of the Centre is dictated by the nature and needs of the DR and the objectives of the individual laboratory/establishment. Important factors to be considered are: a) the need for emphasis on building up non-book materials i.e. reports, standards, patents, drawings; b) access to unpublished related information available outside the establishment, including firms, c) managing for change in the environment caused by different pattern of projects and users d) project-oriented approach to information; e) time factor; and f) security.

R&D Management Information

Management information is handled by staff officers, technical officers, and heads of various units dealing with equipment, finance, personnel, research programs, assessment and control; besides inter-ministerial and defence service bodies that have a say in shaping DRD policies and programmes. The primary task of these functionaries is that of collecting, selecting, synthesising and reformatting of data and information that goes to make the DRD policies and programmes. The information is transmitted generally in the form of briefs, notes, minutes, summaries, comments, proposals and reports. The data and information are also generated during the process of routine government business, discussions and meetings. In the decision making process, one may use formal sources of information to support, contradict, initiate, find a precedent, compare and solve problems. However, one can trace a published account to be the original source behind many of the DRD management policies and proposals.

Handlers of such information need to be fully acquainted with government procedures, must have an eye and ear for locating and obtaining information from formal as well as informal sources and also the intellectual ability to select, analyse, assess, and draft. They play the role of an aid, advisor, and initiator of policies/proposals. They also control the flow of information at the top, act as sieves and hence play a crucial role with far reaching consequences.

Science decision makers also need to be kept aware of the latest developments in general scientific research outside DRD. Such information provides intellectual stimulus to the top decision makers. Primarily, it is the responsibility of the technical information officer attached to the secretariat to provide such information.

Technical Coordination and Liaison

DRD management is complex in nature. Control is an important function of effective management; and DRD is no exception to this. Control
is in relation to the objectives and the charter of duties which in turn decide the various projects and programmes, the facilities to be built up and resource allocation against the progress made towards attainment of objectives. Because of the complexities, coordination plays a vital role in control. A primary function of coordination work is collection of data. The data could be of routine nature or special purpose. There is always a general inertia in gathering and furnishing data at the originating end. Making too many and too frequent demands for data, cumbersome proformas as well as lack of clarity in approach act as hindrances in obtaining data. Data received should be reliable. It is only on such data one can draw scientific conclusions and thereby help control.

In a way, technical coordination is the nerve centre of an R&D establishment. It is here one gets an overall view of the activities of the unit. Because of this, it is possible to coordinate the various activities and programmes, suggest remedial measures when required. Another feature of technical coordination is its referral function, wherein it acts as transmitter of information between a local unit, the DRD corporate headquarters and other related organisations.

Technical coordination in a local unit is also concerned with the collection, control and communication of internally generated information. Often, compilation of periodical, technical and administrative reports, editing and distribution of project reports and data compilations fall within its purview. Hence, persons dealing with technical coordination, apart from having sound technical knowledge, should be conversant with technical writing and effective communication methods.

Other activities coming under coordination are liaison, representation of the unit outside, and development of communication channels within the unit. In all these activities knowledge of the information specialists, trade and tools would be very useful.

Transfer of Defence Technology for Civilian Use

Some of the results of R&D work can also be utilized for civil use, apart from industry. Thus, the money spent on DRD can also contribute to national development. Exploitation of DRD research for civilian use calls for establishing a systematic and continuous process of:

a) Evaluation and dissemination of DRD results that have potential applications in civil field;

b) Identification of users and organizations who could benefit from DRD information; and

c) Restructuring of DRD information in a form that is easily disseminated, quickly assimilated and utilised.

It is in this area, where the various information centres of DRD and the persons involved in technical coordination and liaison can contribute most. The task is difficult and calls for a policy decision to this effect at the highest level and the use of techniques of salesmanship and liaison in technology transfer. Communication can take the form of information sheets or bulletins, consultancy work by DRD experts, free access to DRD patents and their exploitation; and permitting the use of DRD held equipment and facilities subject to security safeguards.

Reporting to the Government, Parliament and Public

In a parliamentary democracy, the government is answerable to the parliament. Since DRD is a government activity, DRD authorities are accountable to the Ministry of Defence. Apart from submitting periodical reports to the Ministry, DRD is often called upon to furnish information to the parliamentary bodies such as Public Accounts Committee, Consultative Committee and also to the Planning Commission. Collection, compilation and submission of information on the working and achievements of DRD forms a part of DRD information handling. Persons handling such information have the onerous task of ensuring that the reporting is precise, factual and unbiased.

Apart from the government and the parliament, the public needs to be kept informed of the achievements of DRD. Enlightened discussion and public interest in DRD work are the surest way of obtaining support for DRD and also dispel wrong, false or twisted opinion that may be created due to closed approach.

Patenting, Standardisation

DRD generated information includes data for patents, standards and specifications. Dealing
with this type of information is a specialised job. Those entrusted with patenting should have the knowledge of patent procedures (filing, sealing, inspection and selling) and also the patent law. Framing and issuing defence standards and specifications are also a part of the DRD work. Persons concerned with this work should have an in depth knowledge of the defence requirements, tolerance limits and environmental conditions, sound technical background, and method of framing standards or modifying an existing specification due to changing requirements.

CONCLUSION

Information handling for defence research and development is a multifaceted activity. Besides library and information services, the spectrum of DRD information handling includes a variety of functions such as information part of DRD research, management decision making, patenting and specification framing, technical coordination and liaison, technology transfer for civilian use, reporting to government and public. An understanding of the nature of DRD and development projects in relation to information is essential for efficient and effective handling of DRD information. Persons concerned with DRD information handling should also note that the most effective and creative information handler is the scientist or service engineer who is not only the user of information but many times the originator; although he handles information for himself.

REFERENCES
