

The BBC R&D in the 90s

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■ 1. Introduction

The BBC, in common with many other public service broadcasters in Europe, has faced considerable pressure during the 1990s. This pressure has resulted from a combination of two principal factors. The first of these is the reluctance of Governments to increase the level of the television licence fee in real terms. For the BBC this is particularly significant as the licence income is far and away the main source of funding. The second is the rapid growth in the number of commercial broadcasters – financed either via advertising or subscription – and the consequent increase in competition for key events and individuals. Thus the costs of rights and artists fees are escalating at a time when the income to the broadcaster is held relatively static.

Under these circumstances, it became vitally important for the BBC to concentrate on driving down its costs and achieving significant increases in efficiency. To achieve this, an internal

The last five years have been a period of immense change within the BBC. In common with all other parts of the organization, R&D has also been subject to upheaval.

This article describes the issues that have forced the changes, and attempts to summarize some lessons that have been learnt during this – sometimes uncomfortable – process.

market known as *Producer Choice* was introduced in 1993. This set up internal suppliers – such as studios, post production and outside broadcast facilities – as separate business units which would compete with external facilities houses to attract BBC programme-making custom.

This approach was also extended to the supply of research effort within the BBC. In recognition of the unique role that research plays within the organization, the majority of the budget necessary to pay for this activity was provided from Corporate funds. The R&D department, based at Kings-

wood Warren, became an in-house “supplier” of research facilities, with the projects being purchased by a separate “customer” within the corporate centre of the BBC (the Engineering Policy unit of the newly-created Policy and Planning directorate). At the same time, in order to reduce costs and overheads, the research function was combined with that of development of equipment for operational use, which had previously been carried out in a separate department, based at Chiswick in west London.

2. The climate changes

By the end of 1995, the BBC in general had improved its efficiency considerably. Producer Choice had achieved its objective of driving down costs within the BBC to values either similar to, or in many cases less than, those charged by external facilities houses. The progress being made by the BBC, together with its positive attitude towards the new technological opportunities, had resulted in the BBC’s Charter being extended by the Government for a further period of ten years, together with a guarantee of access to the new digital broadcasting channels. However, difficulties were being experienced in applying the market approach to the purchase of R&D. Partly these resulted from the need for the amalgamated department to deal with multiple customers, each with different priorities, and partly from the generally increased workload, due to the rapid change in the technical environment of broadcasting – higher than at any time since the introduction of colour television in the 1960s.

In an attempt to overcome these difficulties, a contract was therefore placed with external consultants to examine the role of R&D within broadcasting and how its effectiveness might be maximized. This contract was in two phases. In the first phase, the situation facing the BBC was examined and analysed. In the second phase, together with key BBC management individuals, the consultants embarked on a programme of visits to other influential R&D establishments, to investigate how industry leaders organized their own R&D operations.

3. The first consultancy phase

The results of the first phase of the investigation confirmed that problems did indeed exist. In particular it confirmed the increasingly challenging external environment, as the technologies of broadcasting, communications and computing continue to converge. This is opening up new opportunities for multimedia production and distribution and is encouraging the amalgamation of

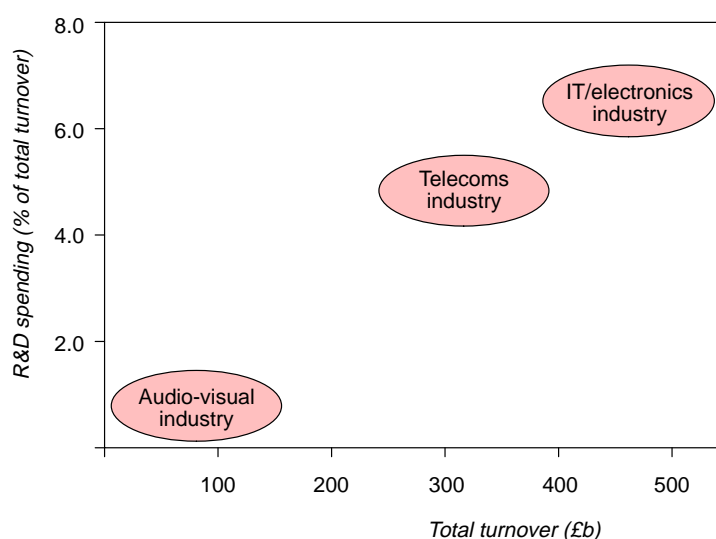
companies into technical alliances. The investigation also demonstrated the relatively low level of research spending by broadcasters, when compared with that of telecommunications or information technology organizations. And it identified the danger that, prompted by commercial objectives, the new private technological alliances will create “gateways” to the new digital broadcasting opportunities. Whoever owns those gateways will control access to the broadcasting channels of the future.

The BBC is only a modest spender when it comes to research (about 0.3% of total turnover). *Fig. 1* demonstrates that, not only is this a smaller proportion of turnover than that routinely spent by the telecommunications and computing industries – industries whose business is rapidly converging with that of the BBC – but that in general the broadcasting industry turnover is also significantly smaller. Thus the absolute value of the BBC’s research spending is doubly hit, in comparison with that of the rival technologies. However, in the context of the other demands made on the BBC, it is unrealistic to expect that the level of funding devoted to research can be increased to match that of the other players. It is therefore even more necessary to ensure that the limited funds are deployed with the maximum effectiveness. Thus it is important to focus on the exact role that research will play in the broadcasting world of the year 2000 and beyond.

The most appropriate roles, given the limited funds available, were identified as that of:

- giving “early warning” of emerging technologies likely to impact on the BBC’s business;
- providing advice on the best use of such technologies;

Figure 1
Multimedia industry
spending on R&D.



- influencing their development in directions favourable to the BBC.

The consultants confirmed that the use of “in-house” research facilities is a significantly less risky choice than that of using external contractors; in-house facilities make it much easier to be flexible in setting priorities and in stopping projects that are failing to meet their desired objectives. The consultants also underlined (i) the need to focus on research in areas having the maximum strategic impact, in order to ensure that the work carried out is of the highest priority, and (ii) the need to increase “leverage” by collaborating with other organizations wherever possible.

Several different “levels of involvement” were identified, in order to give progressively greater advance warning at the expense of progressively greater investment of resources (Fig. 2). The most manpower-intensive levels of engagement would be reserved for the highest-priority areas, with lower intensity involvement in less strategically important projects. Projects not identified as having a proven impact should be reduced to a “watching brief” level, while effort should be deployed to monitor the developments outside the BBC, in order to provide an early warning of potential threats. At the same time, efficiency should be maximized by removing the causes of wasted time (seen as excessive bureaucracy and unnecessary administrative chores), and effectiveness should be maximized by ensuring that the work carried out is to the highest standards of quality.

A number of procedures were suggested by which the most strategic R&D activities could be identified. High-impact areas are those which either yield a competitive advantage (e.g. by reducing the costs of BBC programme production

with respect to competing organizations), or where the BBC needs to be involved in order not to lose an existing advantage. If the gain in competitive advantage is likely to last for a long time, consideration should be given to “going it alone”, while if the advantage is not likely to be long-term it may be more appropriate to collaborate with others. Consideration also needs to be given to whether the technology involved is in its infancy, and hence likely to develop further, or whether it is a “legacy” from the past. Activities in such “legacy” areas should be minimized, either by stopping them altogether or else by handing over responsibility to operational departments. The use of open standards should be maximized wherever possible, in order to minimize the impact of “gateways”, and standards-making bodies should be influenced in order to ensure that suitable standards are available in as many areas as possible.

4. The second phase – looking at the best practice elsewhere in the world

The second phase of the consultancy study was started at the beginning of 1996, with a series of visits to leading R&D labs in Europe, Japan and the USA. All of these visits confirmed the importance of maintaining an “in-house” R&D capability. Comments that were frequently encountered included “How can you influence what you do not understand properly?” and “Nobody talks to you unless you have something to contribute in return”. Analysis of those organizations that had subcontracted their R&D in totality, revealed that they were becoming increasingly vulnerable to their competitors: “If you lose R&D, you lose Intellectual Property Rights; you’ll save on costs for three years and then you’ll really lose money and control” ... “Vendors are developing technol-

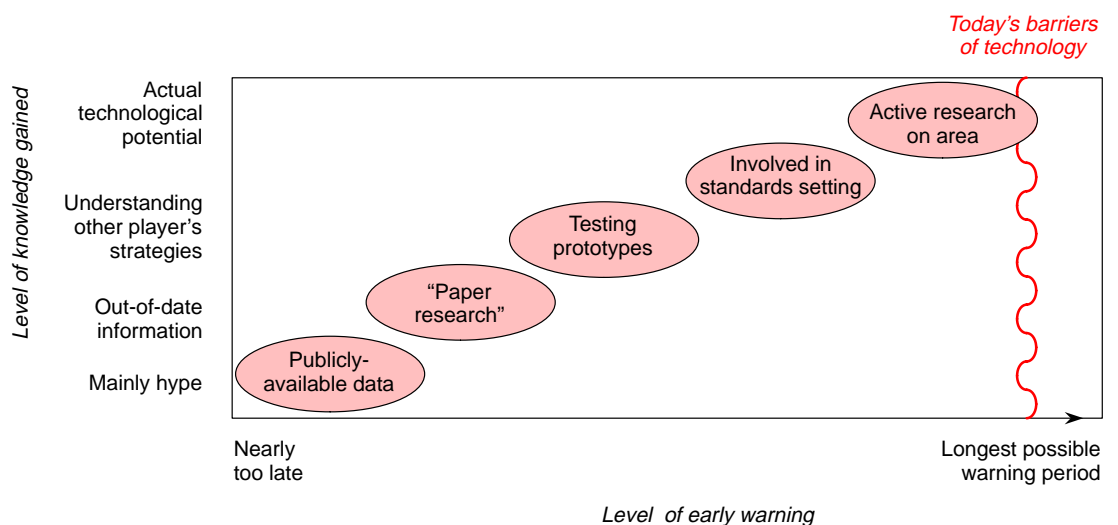


Figure 2
Early warning available from different levels of R&D activity.

ogies based on what is best for their business, not for the media companies; many of their products do not fit the particular needs of broadcast-quality audio-visual transmission”.

Most laboratories were predominantly working on applied technology research, which they defined as either (i) adapting existing technologies from other areas to suit their own industry or (ii) simulating the effects of technological developments. Original development of new technology (so-called “blue sky” activities) were seen as being more appropriate to a university department. Nevertheless it was seen as important to include a small proportion of speculative “blue sky” activities, as a too short-term view was seen as being potentially damaging to long-term competitiveness. Typically, such speculative research would be limited to about 10 – 15% of the overall research budget.

The need for stability in the year-by-year allocation of research funding was also strongly identified. R&D was confirmed as a long-term investment which requires long-term funding. There is a growing consensus that funds should be set by means of a “tax” imposed on the operating divisions – as a fixed percentage of their turnover budget. At the same time, the operating divisions should be involved in setting the priorities for the research activities (referred to as “taxation with representation”). The research portfolio can be set by a *Board of Directors*, headed by the chief executive of the overall organization, while responsibility for carrying out the agreed workplan is given to the *Research Director*.

This system is seen as having three major benefits:

- all parties can plan around a known level of funding;
- the operating divisions have a high level of influence on R&D priorities;
- the prioritization (once agreed) is from a single source, rather than multiple competing voices (Fig 3).

There should, however, be some flexibility for “tactical shifts” in project priorities, once agreed by the board, in order to respond to market shifts. Most labs report that priorities change faster than is optimal for efficient R&D; attitudes vary from “*We recruit people who can cope*” to “*If there are frequent priority shifts then the strategy is wrong*”. The main approaches to dealing with such frequent shifts of priority were to deploy some form of “flexible resource” (either by buying it in from outside, or by switching it over from other projects), by organizing short-term “tactical” projects that

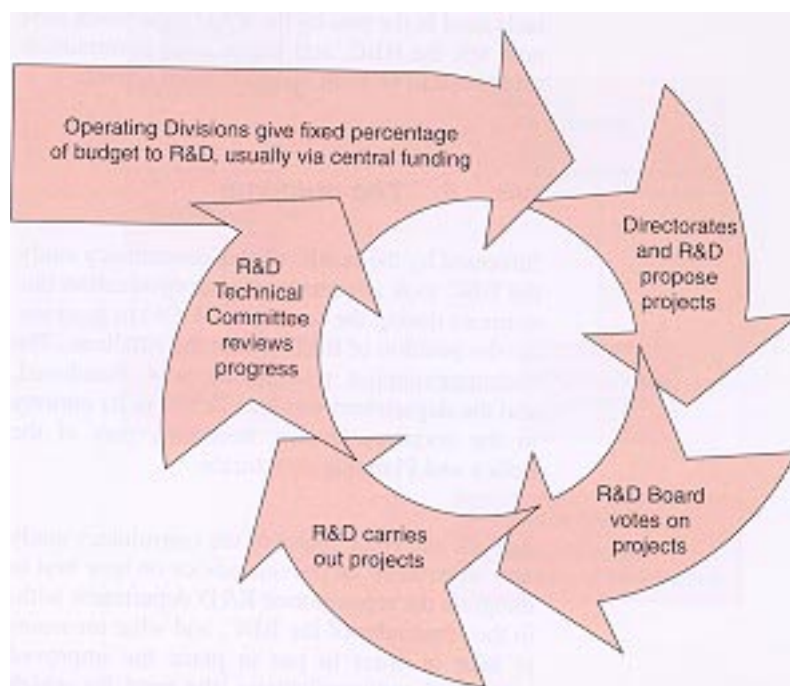


Figure 3
A “virtuous circle” of R&D funding.

allow for quick changes in priority, and by using transparent project control systems that make it easy to see what else will suffer.

The quality of the research staff is seen as paramount. To recruit and maintain the best staff, factors such as personal growth, recognition for achievement, and a degree of autonomy in choosing the work seem to be more important than money (once a comfortable level of salary has been achieved). It is also important to give staff the best working environment, which includes factors such as location, access to the necessary equipment to carry out the task, the appropriate selection of suitably challenging problems and the imposition of minimal levels of bureaucracy and administration. Once this has been done, demands should be set appropriately high, focusing on costs and results, and with an intensive annual inspection by the top levels of scientific management staff. In many (but not all) of the organizations interviewed, there was a formal procedure for the regular monitoring of research projects, using a committee of technical experts reporting to the individual directors of each of the operating divisions. Such a team of technical advisers was also seen as being a useful aid to communications between R&D staff and the remainder of the organization.

This theme – the importance of good communications – was consistently identified in all of the interviews conducted. It was particularly stressed by the consultants, given the special circumstances faced by the BBC: having gone through a

period of radical restructuring, many of the contacts used in the past by the R&D department have now left the BBC, and hence good communications need to be built up again from scratch.

5. The outcome

Informed by the results of this consultancy study, the BBC took advantage of a reorganization (announced during the summer of 1996) to re-evaluate the position of R&D within the structure. The customer/supplier relationship was abandoned, and the department was transferred in its entirety to the corporate centre, becoming part of the Policy and Planning directorate.

A third, and final, phase of the consultancy study was undertaken, to provide advice on how best to integrate the repositioned R&D department within the remainder of the BBC, and what measures to take in order to put in place the improved system of communications (the need for which had been identified during the earlier phases). A series of staff workshops were held in order to canvass views on how best to ensure that the most effective working practices were established, from which a number of useful ideas were distilled. At the time of writing, such an improved system of communications is not yet fully clarified, but some elements are becoming clearer.

The formal committee structure which was identified in *Section 4* has now been set in place (*Fig. 4*). It comprises a *Board of Directors*, on which the Chief Executives of each of the operating divisions has a seat, and a *Technical Committee* of senior advisers. The Board of Directors is responsible for setting the overall workplan, while the *Senior Technical Advisers* monitor the progress and achievements of the individual research projects, and communicate them at high level throughout the operational divisions.

Within the R&D department itself, the research staff are organized in a number of *specialist teams*, giving a single point of contact for technical and staff issues (this emerged as a major motivational factor during the in-house workshops).

Each technical group is supported by a *principal researcher*, who complements the activities of the line manager by:

- pro-actively monitoring the workplan of the group;
- ensuring good inter-group communications;
- identifying gaps and overlaps in the complete departmental workplan;
- proposing new projects where appropriate to allow the BBC to respond to developments in the external environment.

A dedicated unit will be set up with the responsibility for analyzing the likely business impact of technological developments both inside and outside the BBC, and for widespread communication of the results of this analysis. This unit will also serve to boost communication, to the R&D department, of the needs of the operational divisions. A further formal committee has been set up within the R&D department, to allow cross-group discussions between the principal researchers and the communications group leaders, as a vehicle for the further refining of the workplan and communications issues.

These formal structures are, however, only the first step towards a better communications environment. All observers agree that the best communications are informal, and at all levels within an organization from working level to senior management. One of the objectives of the committees will therefore be to establish a network of contacts between individual researchers and members of the operating divisions. To aid in this objective, it is hoped to arrange for suitable exchanges of staff between the R&D department and other parts of



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the BBC. It will take some time before the success of these initiatives starts to become apparent, but at least a start has now been made.

6. In the meantime . . .

Against the background of this upheaval in management structures and philosophy, it has been important nevertheless not to lose sight of the ongoing research workplan. In this respect, the past few years have been ones in which the achievements of the R&D department have been particularly significant to the BBC. You may recall that broadcasting “thinking” at the beginning of the 1990s was dominated by the transition towards HDTV, and in particular the likely adoption of the HD-MAC satellite transmission system. In the intervening years, this situation has been almost completely transformed. The BBC launched an operational terrestrial DAB service in September 1995, using the standard developed by the Eureka-147 project, and to which BBC R&D has been an important contributor. Similar developments are under way for digital television; the BBC has confirmed that it intends to start digital broadcasts via satellite, cable and terrestrial distribution technologies, rolling out over the coming twelve months.

It has been the development and integration of these new digital technologies that has occupied much of the engineering effort of BBC R&D over this period. A very large proportion of this effort has been directed into the relevant European collaborative projects, to take advantage of consensus between partners and to share the burden of the overall work. As well as the Eureka-147 project mentioned above, the BBC has participated in RACE projects studying the digital compression of video and audio signals (HIVITS, COUGAR), the distribution of digital signals via optical fibre and wireless channels (WTDM, COBRA, MBS), the conversion of video formats for display (TRANSIT) and the transmission of digital TV and HDTV to the home via satellite (HDSAT) or terrestrial (dTTb) channels. Projects within the ACTS umbrella have included ATLANTIC (the consideration of digital compression, cascaded in the programme production chain), AURORA (the processing of archival material to enhance its quality and the efficiency of any subsequent digi-

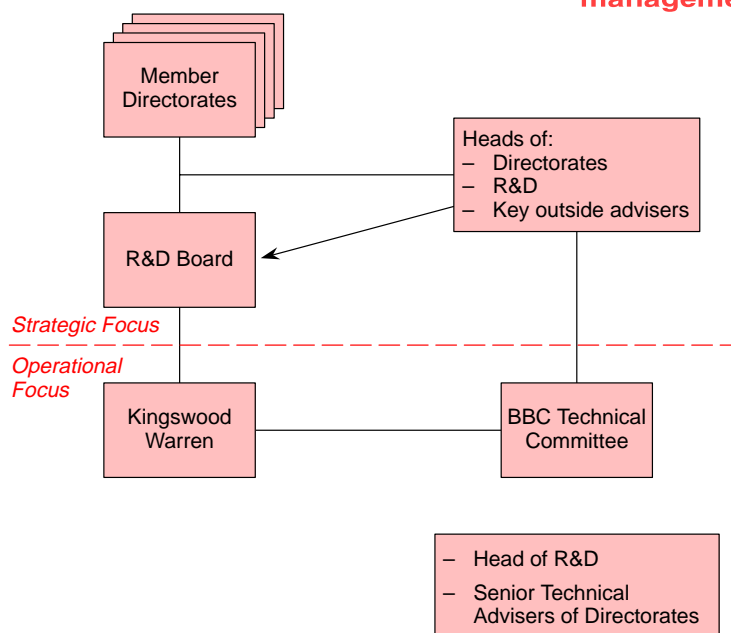


Figure 4
Formal supervisory structure for R&D.

tal compression) and VALIDATE (terrestrial digital TV transmission). Work has also been carried out on the use of virtual reality studio techniques to boost the efficiency of programme production, initially as part of the RACE Mona Lisa project and subsequently in collaboration with the production departments of the BBC. In addition, investigations have been made into multimedia developments, and the implications that these will have for the production of new types of interactive programming in the future (RACE MARS project).

The range and depth of these activities demonstrates the BBC’s continuing commitment to being in the vanguard of technical developments in broadcasting. In collaboration with the other public service broadcasters in Europe, and with partners elsewhere in the world and from other industries, it is the BBC’s firm intention to press forward into the new millennium. It is only by doing so that we are able to uphold our responsibilities to the licence payers for the production of high-quality programmes, available on a universal basis, and using the most cost-effective technologies.