

## The ITC A strategic approach to R&D

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### 1. **Why should broadcasters do R&D at all?**

It may not be immediately obvious why companies whose core business is the production and distribution of television programmes should be involved in the exploration and development of new technologies. One key reason has always been that broadcasting operates as a commercial and technical symbiosis with the consumer electronics industry. As a new or enhanced service technology is conceived, it has been necessary to ensure that its features are designed to the mutual advantage of both industries. This way, both parties will be confident of making the required investments, and both will be able to launch their services and products in synchrony. For a broadcaster to influence the service specification, this requires at least a thorough understanding of the potential of the technology – at best, this technology will have been developed by the broadcaster himself.

*Unlike most other principal EBU members, the (UK) Independent Television Commission “out-sources” most of its R&D work.*

*In this article, the Author describes why – in the case of the ITC at least – a comprehensive in-house R&D facility is not considered necessary.*

Today, however, the close relationship between the broadcasting and consumer electronics industries is weakening. This is partly because the delivery of moving pictures to the home is no longer a business which they jointly monopolise, and it is partly a reflection of the fact that the strategic interests of the broadcasting community itself have diversified as its numbers have increased. In the past, public service broadcasters have been able to represent the technological interests of the whole industry but, in today’s competitive broadcasting environment, this approach is no longer realistic. It has become almost impossible to identify common requirements for new services which suit all broadcasters. Technology is firmly becoming part of the competitive strategy of individual broadcasting businesses.

The computing, publishing and telecommunications industries are also positioning themselves for a future in which they too will be competing in the broadcast business (although in future we might know it as “the digital media business”). This convergence of interests is further complicating the commercial environment, giving rise to the establishment of strategic alliances and speculative joint ventures which cross the traditional business divisions. As the media landscape widens, the value of in-house technological expertise will assume an even greater strategic importance because it will be necessary to assess the threats and opportunities posed by emerging developments in parallel industries.

So, an R&D resource is likely to be a powerful asset in the future, but this will only be so if it is structured to respond to the strategic interests of the business. Such a structure must be different from that of the *traditional* broadcasting laboratory, which has been organized as an autonomous (and sometimes isolated) engineering resource.

## ■ 2. A strategic approach to R&D

The strategic R&D of the future will be diverse in its activities, extending well beyond engineering, and encompassing all those disciplines which must contribute to the development and evaluation of new business opportunities. It will be managed by people who may well be trained as engineers, but who will implicitly apply a holistic and commercial attitude to their projects. Their outlook will therefore be diverse, bringing them into contact with areas such as economics, ergonomics, psychology, sociology, marketing, or whatever knowledge is appropriate. Naturally, they cannot be experts in all fields, but they will be expected to communicate with, understand, appreciate, manage and inspire such specialists, who could well be working outside their organization. Strong interpersonal skills will therefore be an essential characteristic of the R&D project managers.

The R&D department will certainly not be regarded as academic or elite, and its direction must be firmly integrated with the rest of the organization (especially its corporate strategy and marketing functions) if it is to play the desired strategic role. Its staff must identify themselves with the organization and must achieve satisfaction from developing and contributing strategic information as well as the more familiar engineering prototypes, theoretical analyses and reports. For many, this will represent a different set of values and will be difficult to accept, so a change from traditional

to strategic R&D must be accompanied by a sensitive cultural change programme.

The especially key individuals will be those at the bridge between the technological and the general corporate strategies. Both technologists and their business-orientated colleagues must share a genuine appreciation of each other's contribution to the overall corporate goals. There will be no room for historical prejudice or cultural misunderstandings.

## ■ 3. Diversity and out-sourcing

For most broadcasters, maintaining active research across the sphere of today's broadcasting technology is impossible because of the high infrastructure costs and the fine specialisms now involved. In fact, throughout the world, only NHK in Japan can claim this diversity with a research budget greater than all of Europe's public service broadcasters put together! Within the UK's commercial television sector, however, a diverse strategic R&D programme has been managed for several years by the ITC's Standards & Technology (S&T) department. This programme is unique among Europe's broadcasters because the ITC has no research laboratories; instead the entire portfolio of projects is “out-sourced” or managed through contractual relationships with other organizations. This approach is the key to attaining the required diversity and access to specialist knowledge.

The practice of out-sourcing has become extremely common as businesses strive for increased efficiency by concentrating on their *core competencies* and contracting out as many peripheral activities as possible. There are many familiar examples: catering, IT, travel arrangements, low-volume manufacture and security. The out-sourcing of R&D is relatively rare, especially in the manufacturing industry where in-house know-how provides the vital competitive edge. However, where the required output is *strategic knowledge*, it can operate very successfully.

Several years' experience have demonstrated some significant advantages of this approach: research can be commissioned from the most expert companies and universities in the field, no capital is tied up in expensive specialized equipment, and little re-training or learning time is required when changing topic, as it would be for in-house staff. This low-inertia approach is exactly what is needed in strategic research to respond rapidly to changes in the fast-moving media environment.

The lack of a need for re-training is more fundamental than might first appear, because strategic

R&D is becoming less about pure technology, as has already been mentioned. Strategic broadcasting research emphasizes such activities as: exploring opportunities for new services, assessing commercial strategies for launching them, determining the economics of producing them, examining new practices needed in the workplace, and even studying health and safety or ergonomic issues for users. The designing of services also requires a different mix of skills from the designing of engineering systems. In fact, of the tens of people currently contributing to the ITC's R&D, only one half are engineers or computer scientists. The remainder are: multimedia creatives, psychologists, optometrists, sociologists, business analysts, cartographers and gerontologists.

to a manufacturer of a broadcast laboratory's in-house design is rarely a straight-forward process. Often the original designer did not have manufacture in mind, the hand-over of tacit knowledge is time consuming (influencing the time to market) and, after all this, the licensing income generated by the intellectual property rights (IPRs) hardly ever covers the development costs.

In the ITC contractual arrangements, both the registered IPRs and the know-how arising from the work are owned by the ITC and can be licensed back to the contractor (not necessarily exclusively) for commercial exploitation. This not only provides income to support future R&D projects, but it also provides an incentive for specialist organizations to offer their services to the ITC as contractors.

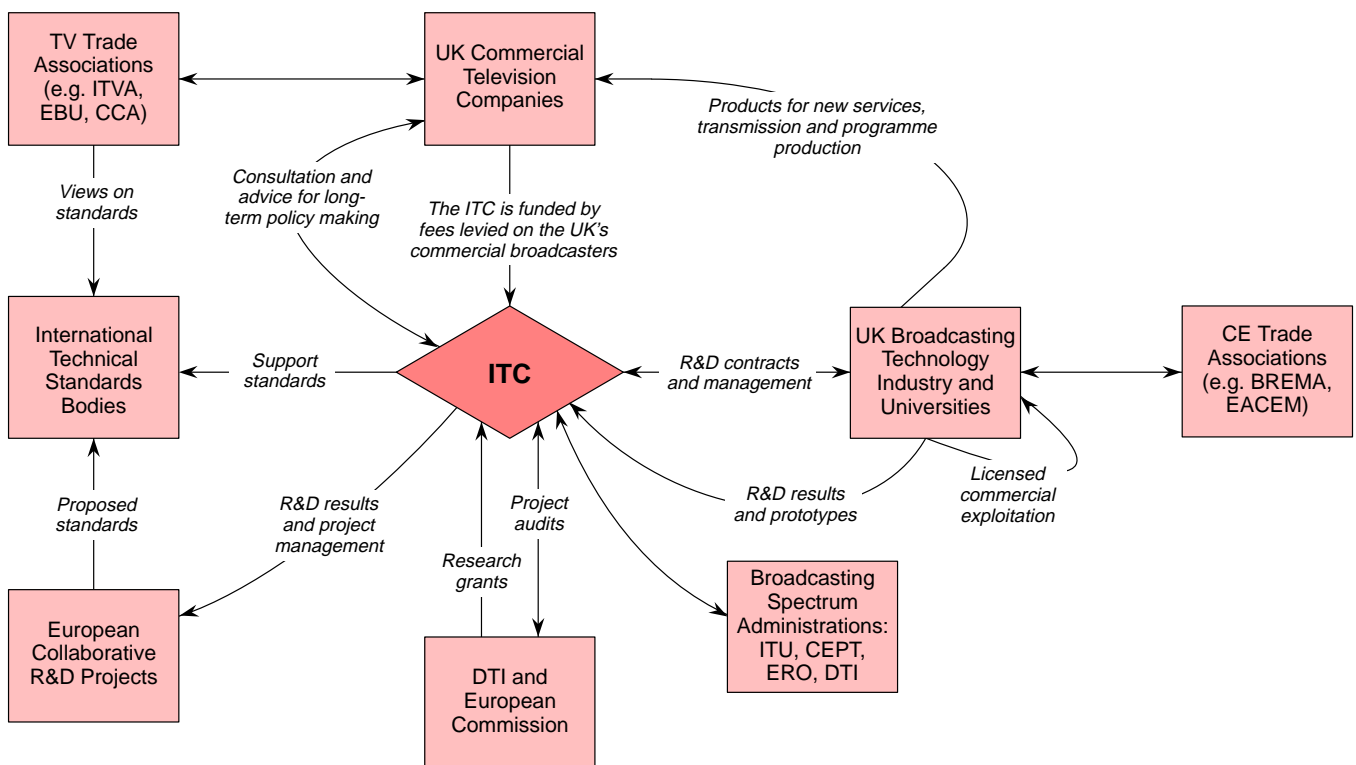
Another common reason why broadcasters perform R&D is to progress the development of specialist equipment for use within their core activity of programme production. For extremely novel ideas, in-house development can occasionally give a competitive advantage but usually the establishment of an out-sourcing arrangement or an early collaboration with an appropriate manufacturer is more efficient. This is because the transfer

Fig. 1 illustrates the inter-relationships between the ITC and the broadcasting technology world.

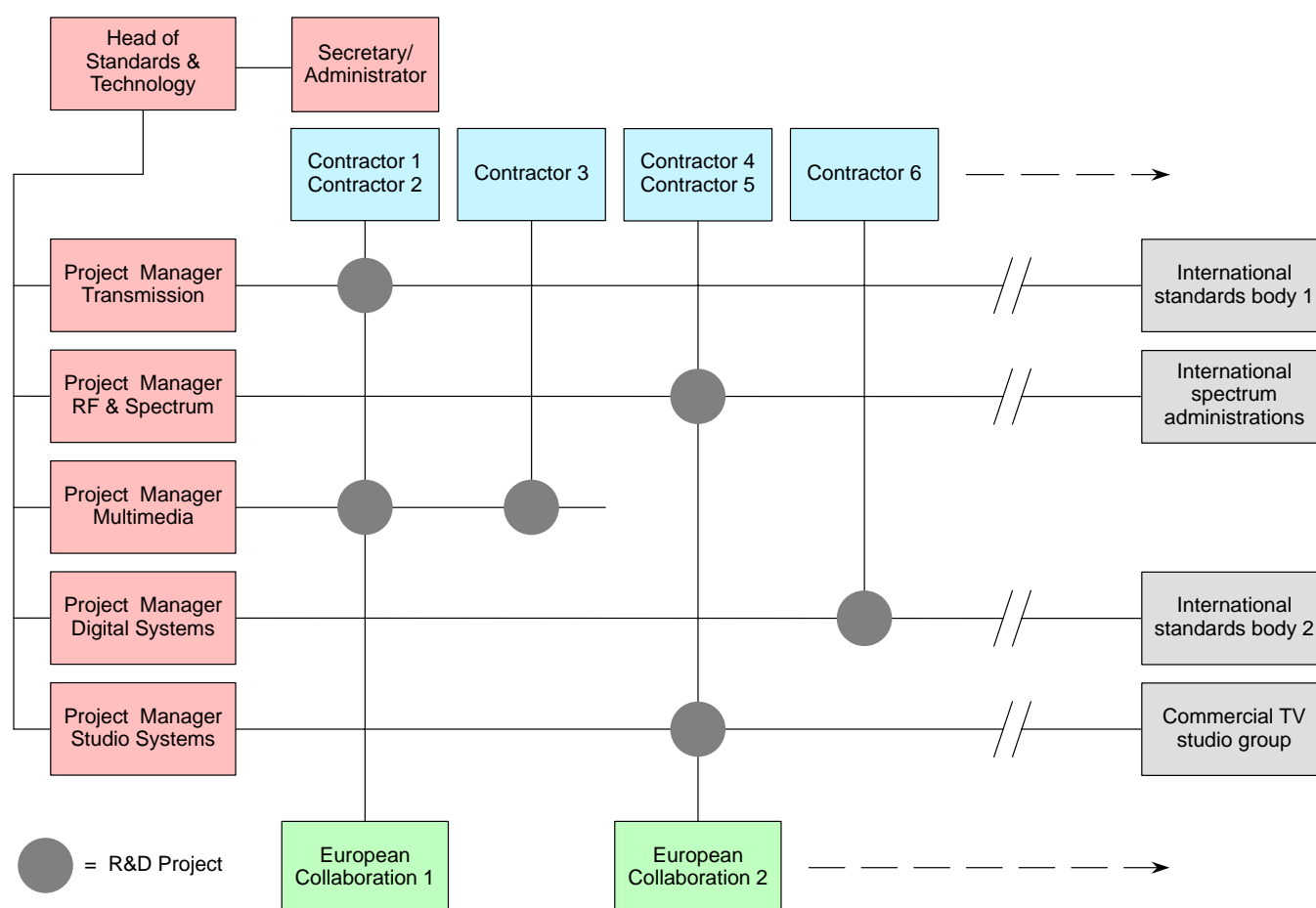
#### 4. The Structure of the ITC's R&D

Although the day-to-day running of the R&D projects is out-sourced, the overall management of

Figure 1  
Relationship between the ITC and the broadcasting technology world.



Abbreviations					
BREMA	British Radio Equipment Manufacturers Association	CEPT	European Conference of Postal and Telecommunications Administrations	ERO	(CEPT) European Radiocommunications Office
CCA	(UK) Cable Communications Association	DTI	(UK) Department of Trade and Industry	ITVA	(UK) Independent Television Authority
CE	Consumer electronics	EACEM	European Association of Consumer Electronics Manufacturers		



projects remains under the control of the ITC's project managers. This is necessary because most projects have been formed by bringing together the expertise of more than one contractor, and the project managers must direct the work to ensure that it continues to meet strategic objectives. Currently, the ITC's managers also lead three European collaborations under the ACTS programme and two under the Eureka umbrella. These important international initiatives operate with carefully-chosen partner companies, and not only contribute significantly to the body of strategic technical knowledge, but also provide a harmonious route to the agreement of international standards. The benefits of these collaborations do, however, have to be measured against the bureaucratic overhead of dealing with EC administrators!

The out-sourcing of R&D is certainly not an easy option for the project managers. Handling several projects and controlling the contractors across different areas of broadcasting technology is challenging and provides the exciting and enriching opportunity to work with people from many orga-

nizations. Being slightly removed from the work itself does allow the managers to take a wide perspective of the activities under their control and affords them the opportunity to think strategically about technological trends and future possibilities. They are encouraged to attend conferences and exhibitions, to contribute to national technology forums, professional associations and standardization bodies. They are also encouraged to take a pride in project and contract management, and in exploring new approaches to: planning and structuring the projects, negotiating the agreements, inspiring creativity, managing and exploiting the IPRs, contributing to publicity and developing close relationships with contractors.

Within the S&T department there are five specialist project managers, working within a task-based culture and organized in a matrix structure (Fig. 2). This not only provides a high degree of autonomy and permits the managers to be judged by their results, but it is also extremely adaptable to changes in the external environment. Meetings of the whole department take place every 2 or 3 weeks and provide an opportunity to consider

Figure 2  
The matrix structure  
of Standards & Tech-  
nology department.

progress across the entire portfolio of projects, as well as to discuss issues of general interest in the broad world of media technology. In this way, everyone keeps up to date with developments. These meetings are also occasions at which some key decisions are taken and the planning of demonstrations, workshops and exhibitions takes place.

Since the ITC was established in 1991, the S&T team has contracted work to over 40 companies and universities, has managed over 40 projects and has participated in European collaborative ventures with over 50 partner companies from outside the UK.

## 5. Avoiding the pitfalls

The out-sourcing of R&D places considerable demands upon the ITC's project managers to ensure that potential drawbacks do not occur. Most of these can be avoided by skilful and thoughtful contract negotiation and by maintaining trust and good personal relationships between managers on both sides of the contract.

By its definition, the path, progress and potential success of research is unpredictable. This does not make it impossible to handle research through a contractual relationship, but it does mean that sufficient flexibility has to be built into an agreement to allow the work to change direction when required. The main value of the contract itself is not its legal tie, but lies in the fact that it forms a disciplined written statement of the relationship between companies. It is absolutely vital, therefore, that it contains an understanding of the process by which a change of direction can be made. Naturally, as a paying customer, the ITC will expect to retain a strong element of control, but it must be remembered that these contracts are entered into with an expectation of mutual technological benefit. It would therefore be damaging to

the working relationship if any changes were not sensitive to the interests of the contractor too.

In the most severe cases, a change of direction could lead to a conflict of interests between contracting parties. Although this has never been a problem for the ITC, appropriate mechanisms are agreed for this, potentially leading to a termination of the contract on harmonious terms.

A key issue in the management of contract research is ensuring that a contractor encourages its research staff to be *creative*. Creativity, innovativeness and the search for "spin-off" ideas and applications cannot be *required* contractually, and achieving them implies some risk-taking which is not conducive to the cautious fulfilment of a contract's terms. This is one of the most difficult issues, since creativity is strongly related to the contractor's organizational culture and this is not under the control of the ITC's project manager. There are some steps which are taken, however. The first is to make creative performance a criterion in the selection of a contractor. Another is to ensure that incentives are provided, at both individual and company level, to stimulate creative and innovative ideas. These incentives may take the form of recognition and publicity for the contributions of individuals, and a commitment from the ITC that if it chooses not to exploit its ownership of a new idea, it will license the rights on exclusive and favourable terms (or give them) to the contractor.

Inevitably, much know-how arising from projects will remain in the heads of the contractor's staff. This is fine if the same company and people are available for future contracts. However, few would be prepared to guarantee this. The careful definition and checking of contract "deliverables" by the project manager is therefore vital. Of course, no matter how detailed the deliverables are, it is impossible to record all the tacit know-how and experience which arises during a project and, consequently, a previous contractor is almost



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*In 1991 Nicolas Lodge joined the ITC, and became head of its Standards & Technology department in 1992. In this role, he has responsibility for the long-term R&D and international standardization activities carried out for the UK commercial television sector. He has initiated and led several successful European collaborative research programmes, and takes a keen interest in managing: strategy, innovation, cross-cultural issues, collaborations and intellectual property rights.*

*Nick Lodge is a fellow of the (UK) Institution of Electrical Engineers, the Royal Television Society and the Broadcast Engineering Society of India.*

always the best candidate for any follow-on research. This can, however, be a concern because it increases the reliance on this contractor and could give the company the upper hand in any future negotiations. Generally, this is avoided by the maintenance of good relations between the ITC and its contractor, with the expectation of a long, mutually beneficial, working relationship. In such conditions, it is not in either party's interest to exploit the relationship unfairly.

## 6. Choosing the contractors

The criteria for choosing contractors are similar to those for selecting partners for a collaboration; business management literature contains the results of much research into the elements of successful relationships of this type. Some are obvious: reputation, competence, creativity, financial stability and labour costs. However, for the success of a project, it is more important that both companies understand each other's strategic objectives for being involved in the relationship and that both share a similar organizational culture. On visiting a potential contractor, it is surprising how quickly you can sense whether this is a company with which you could collaborate.

It has already been seen that so much of the contractual relationship depends upon trust, informality and the ability to discuss and resolve openly any difficulties which arise. Not only does a strong social structure favour this, but it also gives rise to a synergy which frequently results in unplanned opportunities and successes.

## 7. Links with the broadcasters

The ITC licenses and regulates more than 250 commercial broadcast services (20 terrestrial, 87 cable and 147 satellite) and this makes it impossible to respond to the strategic wishes of every individual television company. None the less, the research projects are chosen to be topical and relevant to their interests, while spanning the different broadcast delivery media. The expectation is that the results of R&D work will influence the marketplace on a 2--to 7-year time span. Apart from the broadcasters' businesses, projects are also chosen to support:

- the interests of viewers (particularly those who are elderly or disabled);
- the use of broadcasting spectrum;
- the ITC's own regulatory function;
- the international standardization of technology.

Ideas for new work mostly originate internally and are then considered with senior representatives of the ITC's licensees or their trade associations. When results become available, they are distributed as written reports in advance of their more detailed discussion at ITC workshops. Here, the potential implications for the licensees' businesses are considered and analysed.

## 8. Conclusions

This article has discussed the changing face of R&D in broadcasting, as the industry moves towards a competitive era in which the main focus of technology will be as a contributor to the strategy of the core business. It has argued that this change will require a diversification of interests beyond that which is the traditional domain of broadcasting, and that the management of this activity will require people whose values and

Figure 3 (upper)  
An OFDM-modulated MPEG-coded digital TV signal above a PAL broadcast, received from the SPECTRE trials in January 1993.

Figure 4 (lower)  
A blind family member listens to an audio-described broadcast during the national AUDETTEL trial in 1994.

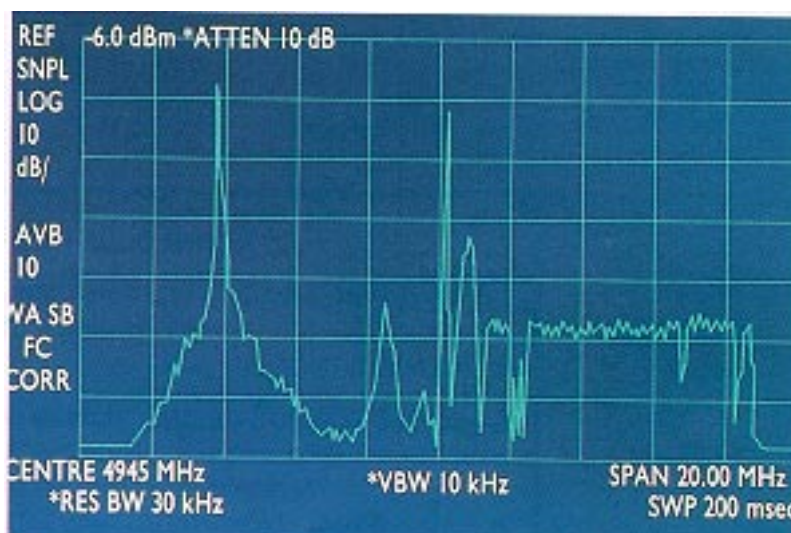




Figure 5  
The making of *Eye-to-Eye*, an experimental stereoscopic TV programme within the MIRAGE project in 1996.

skills will be different from those of today's broadcast engineer.

An example of a strategic R&D programme is that of the ITC, where out-sourcing has been operated

successfully for several years, and some of the experiences of managing this have been discussed here.

*Figs. 3 – 5* illustrate some of the variety of projects which have been managed by the ITC over recent years. Although total out-sourcing of R&D works well for the ITC, where it is performed on behalf of many broadcasters and their viewing public, there are undoubtedly benefits for a broadcaster in retaining some R&D in-house. These are activities which are so close to the core business that they result in know-how and experience which have a strategic value too great to be left in the heads of a contractor's employees; for example, developments in studio or production technologies, together with associated studies in economics and ergonomics.

A carefully integrated portfolio of both in-house and out-sourced R&D, along the lines described here, is therefore likely to be optimal for providing a broadcasting organization with the technological intelligence it needs to prosper in the digital media age.

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