BASIC TECHNOLOGY PROJECT LEADERS WORKSHOP
29-30 April 2003
Lakewood Conference Centre, near Bristol

REPORT

Introduction

The workshop was organised by the management team responsible for the Basic Technology Programme. Attendance at the workshop was by invitation to the project leaders and their senior co-workers involved in the 15 projects supported under the Basic Technology Programme and to project mentors appointed to the first tranche projects.

36 project researchers and 2 project mentors participated in the workshop. Dr John Taylor, Director General of the Research Councils, and Dr Keith Winters, Chief Technologist, AEA Technology, gave keynote presentations. There were three breakout discussion sessions with reports given at plenary sessions, each considering important aspects of delivering the Programme: project mentoring; evaluation; exploitation, intellectual property and dissemination. A fourth session on project management was held in plenary. There also were opportunities for informal discussions around project poster displays throughout the workshop, during which there was much animated discussion of the various projects supported by the Programme. The workshop programme and the list of participants are attached.

Welcoming the participants, Dr Alasdair Rose, Basic Technology programme manager, spoke of the significance of the Basic Technology Programme and the high expectations that the significant public investment of over £100 million had created. He attached great importance to creating an environment of partnership and trust between the Basic Technology Programme researchers and the funding stakeholders – the Research Councils and the Office of Science and Technology. He hoped that the workshop would help to establish networking links and synergies between project scientists, thereby leading to benefits from sharing of ideas and information, both of a technical and managerial nature.

The specific aims of the workshop were to:

- Enable communication and networking among those leading the projects supported by the Programme to date;
- Share experiences and best practice in the projects;
- Consider the monitoring and evaluation aspects of the projects and the development of the Programme;
- Raise the profile of the Programme.

The Basic Technology Programme: Origins and Vision, *Dr John Taylor, Director General of the Research Councils*

John Taylor presented the origins and vision of the Basic Technology Programme. The Programme is one of several cross-Research Council activities, with a single earmarked funding stream that is managed by one Research Council on behalf of the other Research Councils, and monitored by the cross-Research Council group RCUK.

He outlined his vision for the Programme. Basic Technology is part of a spectrum of research distinct from basic research. Motivation is the key to appreciate the vision for the Basic Technology Programme: the driver for basic science is the acquisition of knowledge and understanding, whereas the motivating factor for basic technology is capability that will create new opportunities in basic science. The objective is not to pursue pre-market driven research. Dr Taylor believed that Basic Technology needs to become an established and acceptable activity with similar levels of esteem as those accorded to basic science research.

The challenges for Basic Technology are to:

- create new capabilities and achieve technological advances that could not be achieved before by conventional funding routes;
- support high risk, high return truly innovative ground-breaking research;
- create an environment for thinking outside mono-discipline boxes that will support exciting research that transcends interdisciplinary boundaries;
- build cross-disciplinary research teams with the ability to share new knowledge and know-how;
- make leaps in technology that will lead to significant impacts in addressing research opportunities in a variety of research applications.

The Basic Technology Programme is a strategically important, high profile activity that was established following the government's 2000 spending review, with an initial allocation of £41 million. A further investment of £60 million was made to the Programme following the 2002 spending review. The future of the Programme will shortly be reviewed in the context of the 2004 spending review.

Dr Taylor said in view of its high profile and significant investment of public money it was very important that the Programme is successful. In view of the high-risk nature of individual projects he expected that not all will be successful in creating the hoped-for impacts in the advancement of basic science research. But failures should be for the right reasons, and not because:

- new avenues of research became pedestrian and outcomes were incremental;
- the individual project researchers had merely continued their existing lines of research;
- the overarching innovative objective of the project did not become lost by diffusion into lots of little projects with little synergistic value;
- the risks had not been adequately managed.

Effective management of the individual Basic Technology projects will be vital to the success of the Programme. Careful selection of lines of research will be important to manage and maintain the high risk, high impact strategy of the Programme.

In discussion, Dr Taylor accepted that there are some barriers to overcome to achieve a multidisciplinary culture. Among these is the need to create opportunities and rewards for scientists who wish to invest time and energy to learn and absorb the culture and know-how of a different discipline, and to create the opportunities for networking with scientists in other disciplines.

New Developments in the Basic Technology Programme, *Dr Alasdair Rose, Basic Technology Programme Manager*

Alasdair Rose described new developments in the Programme. A new feature of the third call for proposals is that in addition to inviting the submission of outline proposals as in the previous calls, there is now the opportunity to seek resources for short proof-of-concept feasibility studies and for networking activities with scientists in other disciplines as a precursor to developing ideas and research consortia for the next call for proposals in 2004. It is also hoped to develop a web-based facility in which research ideas can be posted that will help to put researchers in different disciplines in contact with each other.

Training forms part of the objective of the Basic Technology Programme. Provision of high quality training of young research students is part of the vision to create basic technology capability in the UK. Doctoral and postdoctoral positions are supported by project studentships and research assistant posts on the project grants. Dr Rose was interested to know whether the opportunity to obtain research studentship resources as part of project proposals was sufficiently appreciated. The Research Councils had given some consideration to training at Masters level, but had concluded that such training in basic technology would not be appropriate, straightforward to organise, or cost effective. In discussion, the point was made that there is an inconsistency between the need to pursue high risk research with the requirement to train doctoral students with research projects that have a reasonable outcome of leading to the award of a PhD. Dr Taylor, while acknowledging the importance of training as being a valid contribution to the vision of the Programme, stressed that high-risk research must not be compromised by doctoral training. He did not advocate earmarking a proportion of the Basic Technology Programme budget for doctoral training. Such training should remain an integral aspect of the individual projects. Additional resources for doctoral training should be obtained from the Research Councils.

Dr Rose made reference to the intention of the Research Councils to appoint some technology "champions" to help develop the Basic Technology Programme. Their task would be to promote the creation of research networks and facilitate interactions between different research communities. They would not assist in drafting research proposals or promote the special interests of particular research communities. Those appointed as technology champions would be experienced researchers or others with appropriate expertise who could demonstrate an ability for and a commitment to working at the interfaces of different scientific boundaries and engaging with researchers in different disciplines.

Mentoring, *Dr Mark Hylton, Basic Technology Management Team*

There is a balance to be found between encouraging risk and adventure on the one hand with appropriate monitoring and reporting on the other. No one wants these projects to be burdened with reporting, but as stated by John Taylor they should fail

for scientific or technical reasons rather than managerial ones. The approach taken by the Basic Technology Programme is to appoint a mentor to each project with the aim of taking an external objective view of the team and their work. This session was to introduce the concept of mentoring and also to define what it is and how mentoring might work.

Qualities expected of a mentor

A mentor should have an appreciation of technology and be a generalist with experience complimentary to that of the project consortium. It was recognised however that it would be impossible to find an individual capable of covering all angles. Furthermore, the individual should not be a competitor, and should function in a purely advisory capacity that would be best described as 'friendly'. With the continuation of the Programme a suggestion was made that successful project leaders be engaged in this role. An industrial background was also viewed as potentially beneficial especially in dealing with issues surrounding project management.

A mentor should ideally be experienced in dealing with management/project problems and be able to provide the group with an objective point of view and "detect" the human feel of the project.

A number of projects face issues surrounding project management soon after the funding decision, and an advisor at this stage would be of great benefit. The management team would also be happy to consider suggestions of potential mentors from the project teams themselves.

Nature of the Interaction

The workshop participants recommended that the mentors did not receive pre-packaged information annually from project leaders, but preferred the option of the mentor having access to all internal project documentation including a copy of the minutes from all project management meetings (subject to signing an appropriate non-disclosure agreement with the team). However, they noted that the level of comfort with such an arrangement would vary amongst projects. It was suggested that the mentor should visit the project at least twice in the first year of the project as most problems would arise at this stage. Subsequent visits would occur on an annual basis with the option of more frequent interactions where necessary and mutually agreed.

The conclusions reached were:

- The project manager leader should forward to the mentor a bullet point 2-page report on achievements etc. of the consortium, which the mentor would pass on to the Research Councils.
- Additional commentary from mentors to the Research Councils should be open and transparent.
- The method/content of reporting back to the research councils should be agreed by the research team
- It is very important to define the role of the mentor as being part of the team and not an assessor or evaluator

Evaluation, *Dr Sivasegeram Manimaaran, Basic Technology Management Team*

Basic Technology is a new programme still in an early stage of its development. As a result any evaluation plan must be flexible enough to accommodate change over the Programme life-time, whilst remaining focused on the need to deliver the vision and objectives. By its nature, this Programme and the projects are high risk and any evaluation must acknowledge the "freedom" of the research projects within an acceptable framework of the original objectives. Evaluation takes place at two levels: at the Programme level against the vision and objectives; and at the project level against the criteria of the original funding review and the individual objectives. While considerable progress has been made on the frameworks for both levels of reviews, this workshop was an opportunity to discuss and develop the evaluation approach.

Evaluation of Projects

Project level evaluation focuses on learning and improving to aid informed direction and evolution of the research projects and their exploitation. It should enable the success of projects to be identified as well as monitor their progress. The workshop explored metrics, formats and type of reviews.

Metrics

The workshop participants did not feel it was appropriate to pre-define metrics for assessment of projects that were meant to be high risk and long term, and felt evaluation against objectives would also be difficult given the dynamic nature of the interactions. In some ways, the research should be judged against the objectives and vision of the programme itself. Judging projects against criteria such as publications and IPR were also considered problematical as the projects would take time to generate worthy outputs and some of these may well follow the funding phase. Furthermore, these would also vary considerably between the projects.

However, management and outcomes were felt to be two issues open for assessment, with the former being assessed by the mentor while the latter would be better assessed at the end of the project. Except in extreme cases, the teams did not feel any project would succeed or fail completely and that project specific objectives would have to be judged flexibly.

The participants also discussed the view that measurement process should only start after three years; some even felt that project can only be measured at its end. The importance of following up on the progress of technology after the project funding ends was also stressed, e.g. spin off companies that may have formed as a direct result of the new technologies, patents, perhaps different groups would have used this technology to develop new/other technologies and businesses. The accumulation of all these factors would be a measurement of the success of a project.

Format and Participants

Overall the participants did not favour the option of a formal review involving experts. An open day after two years would be of more value, where projects were invited to exhibit posters and demonstrations of their work. Users and other interested parties would also be invited to this event so as to open up possibilities for exploitation and collaboration with the consortia. There was a concern that this activity overlapped with the role of the mentor.

Accounting for risk and adventure

It is essential the evaluators are in a position to differentiate between a project that is a complete failure and a project that did not give a positive result. The aims and objectives of projects have already been defined and in essence the projects would not have been funded if they were lacking in adventure and risk. These objectives should therefore be used for assessing progress.

Monitoring arrangements

Evaluation should be carried out annually after the second year, i.e. in year 3 and 4. It is important that feedback is provided to the research team. Part of the evaluation process should also include laboratory visits by the management team/evaluators.

Reviewers

It was suggested that some of the original reviewers be involved with the progress reviews. The project team should also be involved with the selection of the reviewing panel.

Project Management, *Dr Keith Winters, Chief Technologist, AEA Technology*

The management of scientific or engineering projects has one set of requirements which is further complicated by large collaborative teams with multiple objectives working at geographically separate sites. Complex projects are not likely to succeed without good management but the right management process has to be able to act from a clear specification through suitable project governance. Large collaborative projects tend to have the characteristics of high uncertainty, non-linear dependencies coupled with high technical risk.

Dr Winters illustrated one potential management structure and explained the role and purpose of each element comprising a steering group, a project leader, a project manager, team leaders and topic leaders, the last two forming a management matrix. The steering group was responsible for the objectives and vision of the project; it also had the power to reallocate finances. The leader and the manager chose the tactics by which the targets set by the steering group were achieved. While seeming an expensive overhead, a steering group is required because people working with the project every day usually loose sight of the project objectives. Team leaders were associated with particular technologies while topic leaders championed particular scientific problems across all technologies. Overall, project management should consume 10-20% of total resources.

A copy of the slides used by Keith Winters for his presentation is attached by kind permission.

As background to the ensuing discussion, Alasdair Rose said that most of the Basic Technology projects were characterised by large multidisciplinary consortia, many working at different geographical sites, and the high degree of technical risk associated with their research. In addition, the wide scope of many of the projects have the potential for creating high levels of multi-dimensional non-linear dependencies and complex relations between sub-projects, and the risk of divergence in various research directions. This had led the Research Councils to include a

session in the workshop specifically devoted to project management. Dr Rose introduced four key questions for the workshop participants to discuss:

1. Are project goals clearly defined, regularly reviewed and success evaluated?
2. Are the research uncertainties understood and identified? How are the risks managed to reduce the likelihood of lack of progress in unproductive lines of research?
3. How are the communication channels managed: internal to the project, and external with the stakeholders?
4. How are differences of view resolved (e.g. research direction of the project or resource allocation within the project), and how is consensus achieved?

The participants discussed the management structure described by Dr Winters but thought that it could not be applied in academic institutions operating through collaborative partnerships. Although simpler management systems were suggested, no one method adequately addressed all the potential problems.

Exploitation, Intellectual Property and Dissemination, *Dr Michael Van Der Merwe, Basic Technology Management Team*

It should be stressed that the generation of IP is not specifically or solely the aim of the Basic Technology Research Programme. However, given the nature and focus of the research programmes undertaken exploitable results could reasonably be expected to arise. The ability of a researcher to recognise such potentially exploitable research and take appropriate action is thus very important.

The Research Councils, through the Basic Technology Research Programme, make no claim to the intellectual property rights arising from research that it supports, but delegates responsibility for it to the institutions where the research is being carried out.

Industry collaborative research funded in the Programme may be undertaken for three reasons: for the inherent knowledge value of the results; for any products and processes arising from the research that might help create wealth or improve the quality of life; and for access to expertise. Proper exploitation of the project outcomes should include a balance between academic and commercial expectations.

The guidelines for such collaborations are that any intellectual property arising from the research will reside with its generator – academic, industrial, or other – unless alternative prior and mutually acceptable agreements have been made. The Research Councils would expect that collaborative research projects are likely to focus on pre-competitive generic topics, where the researchers can expect their results to be published possibly after a delay, and where potential avenues for dissemination are open.

Intellectual Property Protection

There was considerable variation among the breakout discussions groups in terms of approach to IP issues.

- Not all participants felt that IP arrangements were justified until the grant had been awarded. Initial filing fees could cost ~ £20k. The projects have varied in approach at this early stage. In one case, the project PI appropriated funds from other sources to fund this activity.
- Templates from previous agreements at institutions have also been used to draw up new IP agreements.
- Institutions generally have not agreed to fund IP protection activity from overheads on the grant and in one case IP protection costs were included under contingencies in the grant application but which were not awarded.
- A number of project leaders did not feel there was much near market IP in their projects.
- In some cases, institutions have circulated IPR agreements and members in the project consortia in other institutions have signed it.
- Several multi-centre projects are in the process of preparing IPR agreements. In one particular case where four universities are involved a compromise version of the different universities IPR arrangements is being drafted. The projects that involve only university are using the existing procedures. The research Councils could help by providing a model contract (EU model) with the full proposal guidance notes.

Collaboration Agreements

- No formal collaboration agreements have been signed in some of the projects. However, there has been some concern expressed by institutions in terms of the liability associated with signing contracts of this nature. These liability issues have been a greater concern than IP.
- Some project leaders are more concerned about publications and the names to appear on them than about IP.

Take-up

- Some project consortia will develop websites to publicise their activities at a variety of levels and use bulletin boards and hold workshops to publicise their work.
- The use of pre-existing contacts/networks and special issues in 'popular' journals are also being investigated.
- One consortium has given assurance that others seeking to replicate the work upon completion of the project would be given help and encouragement to do so.
- The consortium need to be pro-active and form networks with potential technology users. Some of these potential users should also be invited to attend steering meetings. The rational behind forming an initial contact base is that this should be the ground roots for a "mushroom" effect i.e. contacts lead to new contacts.

- The press/media should also be used to advertise progress/new developments, i.e. advertise the Basic Technology programme and its success stories. The Research Councils also need to provide a publicity point of contact so that the research teams liaise over the issue of potential press releases.

Research Councils' Role

- Contact with the Research Council press officers to promote 'good news' was seen as potentially valuable along with help with costs and expertise in website development.
- A Research Council seminar providing background information about IPR prior to the submission of full proposals would also be valuable – a presentation from a patent attorney would be highly informative and appropriate.

Workshop Conclusions

Due to a lack of available time, there was limited opportunity at the conclusion of the workshop to sum up the various discussions. Some of the main points to emerge were:

- The workshop produced useful networking between the project scientists, and had stimulated some research ideas;
- It is crucial for the researchers to keep faith with the government's vision for the Basic Technology programme, and to deliver outputs that will create the breakthroughs in innovative technology that will create the capability for widespread impact in scientific research for new research opportunities;
- Project management is crucial, but there are aspects that require a number of different approaches depending on the nature of the individual projects;
- The concept of project mentors is welcome, but further clarification of their role and relationship with the Research Councils needs to be considered;
- The requirement to monitor and subsequently evaluate the Basic Technology programme is accepted, but the information to be captured and the precise reporting arrangements have still be decided;
- Every effort should be made when publicising projects to acknowledge the Basic Technology Programme and the financial support of the Research Councils and the Office of Science & Technology;
- A generic template of an IPR agreement should be circulated to the project leaders to help avoid nugatory effort.

Dr Rose closed the workshop by thanking the participants for their contributions to the discussions, and to his colleagues for their help for facilitating the sessions, and to Dave Godfrey for making the practical arrangements for the workshop.

BASIC TECHNOLOGY GRANT HOLDERS WORKSHOP
THE LAKEWOOD CONFERENCE CENTRE 29-30 APRIL 2003

PROGRAMME

Tuesday 29 April 2003

Time	Activity
12:00 – 13:00	Arrival, registration and set up posters
13:00 – 14:00	Lunch
14:00 – 15:00	**Afternoon Session**
14:00	Welcome – *Dr Alasdair Rose, Basic Technology Programme Manager*
14:10	Opening Address – *Dr John Taylor, Director General of the Research Councils*
14:40	Developments in the Basic Technology Programme –*Dr Alasdair Rose, Programme Manager*
15:00 – 15:30	**Poster Display Session & Coffee break**
15:30 – 16:30	**Breakout Discussion Groups – 1**
15:30	Introduction to session 1 – **Project Mentoring*** – *Dr Mark Hylton*
15:40	Breakout to four discussion groups
16:10	Groups report back to plenary
16:30 – 17:30	**Breakout Discussion Groups - 2**
16:30	Introduction to session 2 – **Evaluation*** – *Dr Sivasegaram Manimaaran (Mani)*
16:40	Breakout to four discussion groups
17:10	Groups report back to plenary
17:30 – 18.00	**Discussion & summary of day 1**
18:00	Transport departs to Hotel
19:00	Transport departs for Lakewood for Pre-dinner drinks and Dinner, transport to Hotel

Wednesday 30 April 2003

Time	Activity
08:45	Transport departs hotel for Lakewood Conference Centre
09:00 – 09:30	**Morning Session**
09:00	Presentation on Managing Technical Research – *Dr Keith Winters, Director of Technology Development, AEA Technology plc*
09:30 – 10:30	**Breakout Discussion Groups - 3**
09:30	Introduction to session 3 – **Technology Research Project Management*** – Dr *Alasdair Rose*
09:40	Breakout to four discussion groups
10:10	Groups report back to plenary
10:30 – 11:00	**Coffee break & poster session 2**
11:00 – 12:00	**Breakout Discussion Groups - 4**
11:00	Introduction to session 4 – **Exploitation, IPR & Dissemination*** – *Dr Mike van der Merwe*
11:10	Breakout to four discussion groups
11:40	Groups report back to plenary
12:00–12.30	**Discussion, conclusions and close**
12:30	Lunch & depart

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THE LAKEWOOD CONFERENCE CENTRE 29-30 APRIL 2003

LIST OF DELEGATES

Dr Anil Bharath	Imperial College London
Professor Bob Bingham	Rutherford Appleton Laboratory
Professor Andrew Briggs	University of Oxford
Dr WS Brockleby	University of Southampton
Professor CRA Catlow	The Royal Institution
Professor WIF David	Rutherford Appleton Laboratory
Dr Pete Dobson	Queen Mary London
Dr Roger Eccleston	Rutherford Appleton Laboratory
Dr Jeremy Frey	University of Southampton
Professor Alan Gillespie	University of Abertay
Dr David Hasko	University of Cambridge
Dr Graeme Hirst	Rutherford Appleton Laboratory
Professor Dino Jaroszynski	University of Strathclyde
Dr MW Johnson	Rutherford Appleton Laboratory
Professor Martin Leach	Royal Marsden Hospital
Dr Craig MacKay	University of Cambridge
Professor Peter Morris	University of Nottingham
Dr Cameron Neylon	University of Southampton
Professor Richard Palmer	University of Birmingham
Professor Maria Petrou	University of Surrey
Professor Sally Price	University College London
Dr Albert Reitsma	University of Strathclyde
Dr Peter Roach	University of Southampton
Dr Carol Robinson	Queen Mary London
Professor Roy Sambles	University of Exeter
Professor Paul J Smith	University of Wales College of Medicine
Professor John Stark	Queen Mary London
Dr John Taylor	Office of Science & Technology
Dr John Tisch	Imperial College London
Professor Bill Truscott	UMIST
Professor B Vojnovic	Gray Cancer Institute
Dr Keith Winters	AEA Technology
Professor Guang-Zhong Yang	Imperial College London
Dr Alasdair Rose	Basic Technology Programme Manager
Dr Mark Hylton	Basic Technology Management Team
Dr S Manimaaran	Basic Technology Management Team
Dr Michael Van Der Merwe	Basic Technology Management Team
David Godfrey	Basic Technology Management Team