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**EUROPEAN RESEARCH ADVISORY BOARD
FINAL REPORT**

**RESEARCH MANAGEMENT IN THE
EUROPEAN RESEARCH AREA**

EDUCATION, COMMUNICATION AND EXPLOITATION

May 2007

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1 Summary and Recommendations

The European Commission has a unique opportunity, at this stage in the evolution of the European Research Area, to champion a major advance in research management throughout Europe. This is an opportunity not to be missed, for research management – the process of leading, administering and creating value from research – is vital for Europe's economic and social prosperity.

Four themes run through this Report, where we believe fresh initiatives can make a real contribution to improving the quality, performance and depth of capability in research management throughout Europe.

First, **education** is essential, to raise the level of skill in project management and more generally in managing research strategy, intelligence and resources.

Second, **communication** is vital, not just between functions within one organisation but increasingly critically between organisations across Europe.

Third, research cannot deliver the benefits that Europe needs without managing the **exploitation** of results.

Finally, this Report is just a beginning; there needs to be a **continuation** of efforts to promote and develop research management excellence.

Research, technology development and the exploitation of results – referred to simply as 'research' in this Report – are vital to Europe's future. The *management* of research is therefore critical, wherever that research is done – in universities, public sector research organisations, research and technology organisations, or in industry and the other productive sectors of the economy. While Europe has some research management strengths that it can celebrate and its leading firms are the match of the best worldwide, there is a great deal of room to improve and far too little strength in depth. This Report recommends actions that the European Commission should take to stimulate improvements.

The core task in research management is the operational control of individual programmes and projects. But there is much more to it than that: other tasks include making strategic choices about topics and directions, informed by good intelligence about technologies, competitors and markets; the effective transfer and commercialisation of results; and managing ideas and resources.

These research management tasks are becoming more and more demanding, as those who invest in research expect ever greater accountability and performance. In addition, the growth of research partnering and open innovation is creating fresh challenges, as research managers increasingly have to operate on a truly global basis and deal with teams whose members come from multiple organisations, nationalities and cultures.

Yet Europe's provision for educating research managers, both the professional specialists and researchers in general, is poor. There are examples of excellent courses but these are far from sufficient.

The growth of partnering emphasises the importance of good communications, both to help potential research partners to find each other and to enable partners to build lasting and productive relationships. Much has been done to create support mechanisms and frameworks. The next challenge is to improve the 'soft' side, where factors such as trust, cultural flexibility and shared understanding of the research and innovation process can all – if missing – obstruct effective partnering.

Europe's need to get better at executing research and turning it into economic and social benefit is well known and much discussed. Among the challenges, we highlight the ability of organisations to absorb or appropriate new science and technology and, especially among universities, to pursue commercial opportunities; while partnering creates additional challenges. Education and communication have roles to play here, for example to promote recent developments in frameworks for exploitation of jointly developed intellectual property.

The European Commission has a vital role to play in driving this growth in research management excellence, both through its own actions and the leadership and support it provides to others. This vital role will involve a multi-year programme of initiatives. Key elements of this programme include setting standards of excellence; promoting better education, communication and exploitation; and creating appropriate mechanisms and institutions.

We therefore recommend that the Commission:

- R1 establishes a '**European Gold Standard**' in **Research Management**. This should define (a) the activities involved in research management and, in each case, what is meant by excellent performance; and (b) the personal attributes and range of skills required to be a research manager and, in each case, what is meant by excellent quality.
- R2 launches a programme to (a) **identify and monitor the shortfalls** in the provision of research management education and training, compared with what is needed to achieve the Gold Standard across Europe and (b) **fill those gaps**. This should include working with member states and collaborating with consumers and providers of research management education to develop appropriate curricula and delivery programmes; including research management content in the Lifelong Learning Programme; and increasing the number of institutions providing research management education.
- R3 encourages member states and requires future Framework Programme actions (in FP7 and its successors, if any) to **adopt the Gold Standard**, progressively as it becomes established, as a way of encouraging the demand for and uptake of research management education and the general raising of professional and ethical standards. This should include the setting of minimum qualification standards for those managing FP7 projects.
- R4 launches projects, within Framework 7 or elsewhere, to improve understanding of the **role of communication, trust and ethics** as enablers of stronger RTD partnering across Europe; of the barriers to better communication; and of the practical actions that will deliver better communication.
- R5 uses the Framework Programme and all available support programmes to promote **policies, tools and good practice** that will strengthen communication and trust within and between Europe's RTD actors, including by launching appropriate Calls for Proposals and by making deliberate efforts to transfer learning from elsewhere into the Framework Programme.
- R6 encourages **other European organisations**, national bodies such as member state administrations, and the professional associations for industrial and public sector RTD actors, to devote more effort to build better communication within and between Europe's RTD actors.

- R7 encourages the greater **harmonisation of guidelines and practices** across Europe regarding the ownership and exploitation of intellectual property arising from collaborative research.
- R8 establishes programmes, within FP7 or elsewhere, to study intra- and inter-organisational **barriers to exploitation** of research results, to identify practical improvement actions and to implement those actions.
- R9 sponsors a **conference** for industry and academic experts to consider the critical barriers to exploitation that concern research management and to provide guidance as to the content and priorities of the programmes recommended at R8 above.
- R10 launches and maintains a **strong campaign** to communicate to Europe's RTD actors, related organisations and member state administrations the great importance of excellent research management and, in particular, the value of better education, communication and exploitation. This should include collecting and disseminating benchmarks and best practices and publicising and celebrating examples of outstanding achievement. Mechanisms could include websites, seminars, conferences, workshops and road shows; and a new 'European Research Management Forum' to act as an observatory and to serve as a platform for launching actions. EURAB is ready to participate in delivering these.
- R11 launches **further work** to explore research management issues, improvement targets and opportunities for action, to extend both the breadth and the depth of this Report. This could include inviting the participation of other organisations, such as EURAB and the proposed European Institute of Technology.
- R12 **reviews and reports progress** towards the vision of research management excellence across Europe, in two years' time and at regular intervals thereafter, including progress by each member state.

2 Mission

Previous EURAB reports^{1, 2} have dealt with the promotion of European research and development. In preparing those reports, EURAB was conscious of the importance of effective *research management* as a critical enabler of success. Encouraged by discussions with the Cabinet of Commissioner Potočník, which identified research management as a topic of interest³, it resolved to examine research management in more depth and to offer recommendations for actions to strengthen research management throughout the European Research Area (ERA). This Report provides those recommendations.

The inquiry was led by a EURAB Working Group, whose membership is listed at Annex 1. The mission was follows:

The objective is to propose actions by the European Commission that will improve research management throughout the European Research Area.

The reason to address research management is that improving it will make an important contribution to strengthening Europe's economic competitiveness.

"Research", in this context, includes basic research in the natural and social sciences, applied research and development and the transfer and exploitation of results in economically valuable applications.

"Research management", in this context, takes place in academic and public research institutions, in Research & Technology Organisations (RTOs) and in industry. Many aspects also take place in member state administrations.

The inquiry addresses research management within and between these organisations; not at the level of national or multi-national policy. It deals with the management of all European research, including but not limited to research within the Framework Programmes.

This Report offers advice to the European Commission (specifically to the Directorate-General for RTD, though implementing the Report's recommendations will in some cases involve DG RTD working in collaboration with other Directorates-General).

This advice should also be relevant to those who perform research, such as academic and public research institutions, research and technology organisations and industry, especially SMEs. Here, we do not try to teach the best how to manage research; rather, we want to encourage the transfer of good practice and competence from the best in Europe to those who still have much to learn.

¹ EURAB 05.036: *Boosting European Private R&D*, Final Report, October 2005

² EURAB 05.037: *Research and Technology Organisations (RTOs) and ERA*, Final Report, December 2005

³ EURAB 06.023: *Research and Technology Organisations (RTOs) and ERA* Cabinet presentation report, March 2006

3 Research management issues

Research, in the broad sense of 'research and technology development' (RTD) in which we use the term in this Report, is a vital contributor to the economic and social prosperity of Europe. It creates and applies the knowledge on which Europe's global competitiveness will increasingly depend, as manufacturing shifts to other regions of the world. This growing dependence of Europe on research and knowledge was recognised by the EU in its Lisbon and Barcelona innovation agendas^{4, 5, 6, 7}.

The quality of research management is also vital; without excellent research management, Europe's RTD will simply not deliver the benefits expected and needed. Excellence in research management is also an essential enabler of the ambitions in the European Commission's recent Green Paper on the future of the ERA⁸.

Research management excellence is needed both at a strategic level – doing the right things – and at an operational level – doing things right; research management is about far more than just financial reporting. Excellence is needed at all stages of the research process, whether these stages are defined in traditional terms as a sequence from basic research through to near-market development (a linear model that does not truly describe the complexity of today's innovation process) or in other terms such as the Technology Readiness Levels and Integration Readiness Levels used in the aerospace industry.

We see six elements in our view of research management, shown in Figure 1:

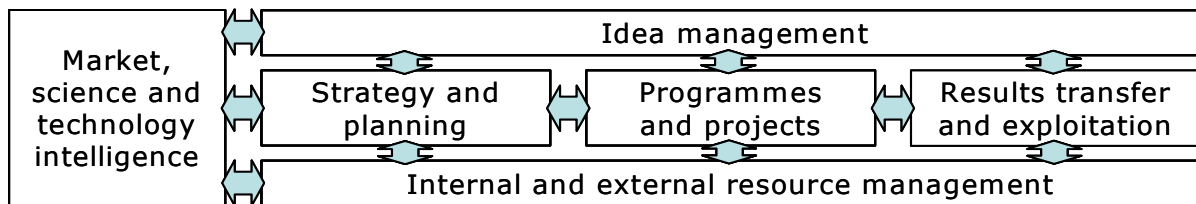


Figure 1: Elements of research management

Programmes and projects are at the core of this view: this is where the research gets done and creates applicable results. In some cases, especially for basic research and 'big science', research managers are responsible for continuous research activities in defined fields of interest and against long term goals. In many other cases, project managers plan research projects with specific objectives and end points, as stand-alone projects or as components of on-going programmes; control project execution to time, cost and results targets; and ensure the outputs are properly reported and used.

Programmes and projects depend for their success on many factors, including deep technical knowledge and good problem definition and research method selection; leadership, inspiration and motivation; and facilities. While all these are necessary, their relative importance may vary, especially between research aimed at increasing understanding and at meeting an application. When the research is close to market, additional factors also become increasingly important, such as the understanding of the target applications. Managing on-going and project-based RTD needs a range of tools.

⁴ See, for example, *Global Competitiveness Report 2006-2007*, World Economic Forum, September 2006

⁵ European Commission, *Investing in research: an action plan for Europe*, Communication from the Commission, Brussels, COM (2003) 226 Final

⁶ European Commission, *Innovation in a knowledge-driven economy*, Communication from the Commission to the Council and the European Parliament, Brussels, COM (2000) 567 Final

⁷ European Commission, *Innovation policy: updating the Union's approach in the context of the Lisbon strategy*, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Brussels, COM (2003) 112 Final

⁸ European Commission, *The European Research Area: New Perspectives*, Green Paper, April 2007

Similarly, managers require a wide range of skills, from administration and finance, through risk, information and intellectual property management to communication, people management and, sometimes, a very good sensitivity to public opinion.

This wide variety of tools and skills illustrates the complexity of the research management task. Several strong trends are making the challenge ever tougher. First, everywhere in the innovation process, from basic research to development and exploitation, everything is becoming more and more result oriented, objectives are more and more precise and deadlines are more and more important. The research manager's task becomes ever more difficult. This is particularly the case in publicly funded research such as the EU Framework Programme where, despite the simplifications being introduced in the Seventh Programme, there is an inevitable bureaucratic burden.

Second, financial justification for project proposals and financial reporting for ongoing work are getting harder as funding sources seek better returns on their investments. There is a particular need to be able to demonstrate and communicate the value of research, especially the more 'up stream' activities and in industrial and similar situations where research counts as a cost to be deducted from profits. This is also important in public research, where the potential value of the work is an important factor in raising the funds necessary to establish routes to commercialisation such as spin-out firms.

Third, research partnering and collaboration brings additional complexity, for now the research manager must also ensure the smooth running of the partner relationships and work with a research team many of whose members are outside his own organisation. The team may all be in one place but, very often, the research manager must cope with a team that is scattered across multiple countries and languages, and master the use of electronic collaboration tools to keep the team together.

Managing programmes and projects is far from the whole of the research management story. As Figure 1 shows, there are several other vital elements:

Results transfer and exploitation requires the organisation to ensure that the outputs of each project are properly captured and disseminated and, particularly for applied research and development, are fully exploited. Europe is well recognised as being relatively poor at this, a weakness attributed to many causes including inadequate risk capital, the lack of an entrepreneurial culture and poor management processes.

Strategy and planning determine whether an organisation 'does the right things' – or will waste its resources by choosing projects that are inappropriate, even though they may be well managed. Common challenges here include ensuring that projects fit the organisation's overall business or research strategy and that the portfolio of projects properly balances factors such as reward versus risk and incremental versus radical. While tools exist and good practice has been documented, they are far from fully adopted throughout Europe's research-active public and private sector organisations.

Strategy and planning also include, in the best-run organisations, establishing a clear understanding before a research project even begins about how the results of that project might be used. For applied research and development, this means having a clear view of the preferred route to market or exploitation path.

When work is done in partnership, the key strategic and planning issues may expand to include assessment of the balance between public and private benefit, at the level of the individual project and for the institution as a whole.

These issues are particularly relevant to the debate about Europe's need to raise its investment in RTD. While the '3% of GDP' target challenges European organisations to spend more, as the Aho Report⁹ points out it is just as important for them to make sure that, whatever they spend, they spend it on the right things. The growing use of Technology Platforms is helping to define what the right things are.

Market, science and technology intelligence should inform the research strategy and planning but is often poor, usually because it is seen as having relatively low priority for resources. As a result, the organisation is 'flying blind', unaware of opportunities and threats. SMEs can find it particularly hard to allocate sufficient resources here – though evidence about individual examples shows that some SMEs can and do manage this process perfectly well.

Frequently, an organisation will believe that it has a strong intelligence function but in fact is only good at collecting information, not at analysing that information and turning it into insights that can inform strategy and planning. Yet these insights are vital if the organisation is to spend its research investment on the right things.

Idea and proposal management is well practiced by some organisations, who have understood that innovation is a process that can be managed and that one of the keys to successful innovation is to pick the right ideas to pursue. Risk management is particularly important: to be able to screen out unattractive ideas early, before too much money and effort has been spent on them – while, at the same time, being open to potentially radical breakthroughs and not filtering out all the really exciting ideas. Strong idea management skills are critical to Europe's intentions to be a world-leading innovator. However, there is much to do to raise the general level across Europe.

Resource management has always presented management challenges within organisations, in particular the difficult task of balancing research freedom and creativity versus efficiency and a focus on results and applications. It includes managing diverse groups of researchers, from PhD students in a university to development engineers in an industrial firm. The growth of partnering with external organisations, including in particular through consortia such as those inherent in the EU Framework Programmes, adds to these challenges.

Lastly, **communications** between these elements is critical. As the arrows in Figure 1 suggest, elements feed forward and inform those that follow while there are also important learning and feedback loops at work. Yet, in many organisations, line management responsibility for each element belongs to different parts of the organisation structure. The challenge here is to connect across internal boundaries.

While the concept of multi-functional working has become a cliché, it remains a difficult process for many; and the growth of collaborative research is simply making it more difficult. Differences amongst collaboration partners in their understanding of the research and innovation process, in their cultural preferences for 'top-down' versus 'bottom-up' management and in their maturity in terms of their skills in research management, can get in the way of effective partnering, just as much as differences in language or culture.

In sum, research management is a vital yet complex task. Europe does it well in certain instances; there are examples of excellence to be found in the public sector, such as at CERN and ESA, and in industry. But, in general, there is much room for improvement.

⁹ EURAB 06.005 *Creating an Innovative Europe*: Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit, January 2006

We believe that there are three common themes running through these research management issues, where fresh initiatives can make a real contribution to improving research management performance.

First, **education** is essential, to raise the level of skill in project management and more generally in managing research strategy, intelligence and resources.

Second, **communication** is vital, not just between functions within one organisation but increasingly critically between organisations across Europe.

Third, research cannot deliver the benefits to Europe demanded by Barcelona and Lisbon without managing the **exploitation** of results.

We discuss these themes in more detail in the following chapters.

4 Education

Management of research strategy and operations – from gathering intelligence and planning a research project, through executing that project, to exploiting its results – is a complex task that requires many skills. While there are examples of European excellence, we believe that Europe lacks enough of these skills. If anything, this skills gap is widening as the challenge of managing research gets tougher.

A particular challenge is that of managing across partnerships. An increasing proportion of European research is done through partnerships, for example through alliances between firms, through industrial contracts with RTOs, through industry-university links, and through consortia of various kinds including in particular those within the EU Framework Programmes. Managing partnerships takes special skills. Again, we believe that Europe lacks enough of these skills and, moreover, that this skills gap is limiting Europe's ability to adopt partnering and open innovation as effectively as it could.

Closing the skills gap is not just a matter of educating more people in traditional research management skills; it is also about developing new skills. The nature of research across Europe is changing, not only as more research is done through partnerships but also as the very nature of the economy changes and new productive sectors emerge alongside traditional manufacturing industry. Equipping tomorrow's research managers is therefore shooting at a moving target. Even the best of today's research managers cannot be expected to have all the skills needed to meet tomorrow's management challenges.

Efficiency of research management is as important as the range of skills required. Ever-tightening research budgets and a shortage of skilled managers mean that research managers must constantly be learning to do more with less.

The importance of closing these skills gaps has been underlined by a high-level conference dealing with the future of Europe's manufacturing industry¹⁰. This identified the weaknesses of fragmentation of research activities and the urgent need to develop skills in managing broad teams and to expand education in 'soft' skills.

The growing complexity of the research management task, at both project and organisation levels, calls for more professional specialists – the task is more and more difficult for a researcher to do in their 'spare time'. Yet such specialist skills can only develop when there is adequate education. At the same time, young scientists need to learn the basic skills early in their careers, in order to work well in harness with the specialists; one goal of the education system should be to bring on this new generation of young managers.

Thus the issue of professional development for research managers, for today's needs and for the future, is becoming increasingly critical. The skills gap between what is needed to manage research well and what is currently available by way of training and professional development has widened in recent years. This seems to be the case, more or less, in all European countries. Project management is quite well taught in many places but the wider scope of research management is not. At the same time, skills shortages make it harder for people to learn from experience and from each other.

It is worrying to note, for example, that few European universities or business schools offer programmes that focus on research management in a practical, 'hands-on' sense. There are, of course, examples of good and relevant provision for education and professional development at this level: Table 1 gives some examples. But these are fragmented and, in sum, woefully short of what is needed.

¹⁰ MANUFACTURE 2003, Milan, December 1-2, 2003

Institution	Programme	Scope
CHAMPS, Chalmers University, Gothenburg	Executive Masters in Technology Management	Mid-career executive development
University College, Dublin	Masters in Technology Management	Current or new managers in technology-driven businesses
IMD, Lausanne	Driving Strategic Innovation (6-day course)	Technology and innovation strategy for senior managers
INSEAD, Fontainebleau	Strategic R&D Management	Executive programme for senior managers

Table 1: Some examples of senior-level research management education

Apart from dedicated courses, there is scope to provide research management education as part of a broader programme, for example in a two-track programme combining science and management. Current examples include a medical PhD that combines healthcare management with medical research; UK engineering degrees that include law and project management in their final year; and French MBAs that are taught jointly by academia and industry. We suggest that PhD programmes should more commonly include results transfer and intellectual property management issues¹¹. Similarly, MBA programmes should more commonly include research management issues.

Of course, research management education is not simply a matter of postgraduate degree courses. Shorter courses, of a few weeks or months, are essential, both for specialists such as university industrial liaison and technology transfer staff and to expand the skills of researchers and managers in general. These can include both residential and e-learning delivery.

As is the case with formal degree-level education, there are examples of good short course provision but much more needs to be available. One example, which may serve as a model for expanded provision, is the UK's Continuing Professional Development in Knowledge Transfer programme¹². There is also a range of smaller independent suppliers, some of whom provide very important and relevant training: their contribution is vital as they are able to respond quickly to changing demands. Frequently these providers are experienced ex-research managers who are able to establish credibility and good rapport with today's research managers.

Mentoring of research managers, for example in EU CRAFT projects, can help their skills development. Staff transfers and secondments provide similar opportunities to gain from experience. For example, the US National Science Foundation allows visiting scientists to gain experience in Research Councils. The Academy of Finland and France's CNRS have similar schemes but Europe could use this approach much more widely, including transfers between industry and public sector research.

Taking this topic of industry-research transfer a stage further, we note that in certain cases the USA deliberately outsources the management of large government-owned research laboratories to industry. This promotes the transfer of industrial approaches to research management into public sector research, and is a possible model for Europe.

¹¹ See also *European Universities: Enhancing Europe's Research Base*, Report by the Forum on University-based Research, European Commission DG-RTD, May 2005.

¹² <http://www.auril-cpd.org/>

One approach worth exploring is the use of regulation: for example, a special certificate in research management as part of the education system; quality management systems that include research management as a special method; and encouragement by the European Commission to member states to include research management education within their national education agendas, while also encouraging harmonisation.

In all this, one barrier to progress is the lack of a clear definition across Europe of what research management is – and is not. Yet an agreed definition is essential for identifying the minimum skills necessary to be an effective research manager, for developing appropriate education and training curricula, and for selecting education providers. It would also provide a benchmark to help raise the standard of research management performance.

Such a definition, and its associated performance standards, should recognise that research takes many forms, each with its own research management challenges. There is no single, uniform way to manage all research. Rather, the definition should cover the range of research management activities. It should also make the distinction between research administration and leadership. Much of the current provision for research management education and training focuses on administration. Leadership is also important, yet there is less provision for developing the additional skills required to be an excellent research leader.

We note that education in research management is an issue of potential concern to several parts of the European Commission. We suggest that this issue should be a joint responsibility between the Directorates-General for Research, Enterprise and Education, rather like the responsibility for developing plans for the proposed European Institute for Technology.

We therefore recommend:

That the Commission

- R1 establishes a 'European Gold Standard' in Research Management. This should define (a) the activities involved in research management and, in each case, what is meant by excellent performance; and (b) the personal attributes and range of skills required to be a research manager and, in each case, what is meant by excellent quality.
- R2 launches a programme to (a) identify and monitor the shortfalls in the provision of research management education and training, compared with what is needed to achieve the Gold Standard across Europe and (b) fill those gaps. This should include working with member states and collaborating with consumers and providers of research management education to develop appropriate curricula and delivery programmes; including research management content in the Lifelong Learning Programme; and increasing the number of institutions providing research management education.
- R3 encourages member states and requires future Framework Programme actions (in FP7 and its successors, if any) to adopt the Gold Standard, progressively as it becomes established, as a way of encouraging the demand for and uptake of research management education and the general raising of professional and ethical standards. This should include the setting of minimum qualification standards for those managing FP7 projects.

5 Communications

RTD efficiency and effectiveness are critical. However much is spent on RTD, it is vital to get maximum value from the investment: the most 'bang for the buck'. One factor that influences the efficiency and effectiveness of an RTD activity is the ability of everyone involved to be aware of what is required, how those requirements are to be addressed, and who can best contribute. That awareness depends on effective communications.

Good communications contributes not only to getting more from existing levels of RTD expenditure but also to progress towards the EU's 3% expenditure target. Much of the increase in RTD expenditure implied by the 3% goal is expected to come from the business sector. Businesses will only spend on RTD when they believe that this will lead to commercial benefit, and will only contribute to the 3% goal if they are able to run successful businesses as a result. One way to encourage this is to start by improving the value they receive from today's RTD expenditure. If they see their economic return on RTD increasing, relative to returns on other uses of available resources, more resource will tend to flow towards RTD.

Communication is an especially critical issue in RTD partnering and open innovation. RTD partnering is increasing across most industry sectors and between the private and public sectors, especially with the growth of open innovation^{13, 14}. The days when companies needed and could afford to maintain all their RTD resources in-house have gone. However, increasing reliance on external sources of RTD can only be sustained when it is possible for potential partners to know what is on offer and what others require, and when there can be some confidence that partnerships will be mutually beneficial.

Creating the conditions for successful partnering is partly a matter of enabling tools and mechanisms. Here, much has already been done. For example, the EU has put in place mechanisms to encourage and support greater communication and connectivity between RTD actors: the trans-European networks of National Contact Points and Innovation Relay Centres are good examples. Another example is the Responsible Partnering initiative, involving industry, universities and RTD organisations (and encouraged by the Commission) to develop a European framework and guidelines for RTD partnering¹⁵. EURAB itself has also identified the need to encourage more partnering between RTD actors, from both the private and public sectors, and recommended actions to integrate SMEs more fully into the European innovation system and to encourage more industry connections with public research institutions¹⁶.

However, experience shows that the existing patterns of communications and relationships between RTD organisations across Europe are far from perfect. Something more needs to be done, to make Europe a real hotbed of innovation¹⁷.

An obvious place to start is the existing set of enabling tools. The challenge here is primarily about making these existing tools (such as websites, databases, networks) more effective, augmenting these with new tools only where this will offer something distinctively different and better. 'More of the same' is unlikely to deliver much benefit.

¹³ Coombs, R. and Georghiou, L., *Research and Development: a new "Industrial Ecology"*, Science **296** 471 (2002)

¹⁴ Chesbrough, H., *Open Innovation: The new imperative for creating and profiting from technology*, Harvard Business School Press, 2003

¹⁵ <http://www.responsible-partnering.org/>

¹⁶ EURAB 05.036: *Boosting European Private R&D*, EURAB Final Report, October 2005

¹⁷ See, for example, Dearing A., *Enabling Europe to Innovate*, Science **315** 344-347 (January 19, 2007)

However, raising communications quality is about much more than simply building better tools. Tools have no value if people will not use them. So, in addition to upgrading today's tools and perhaps creating new ones, it is necessary to understand and deal with the soft issues that affect how people use the tools available to initiate and develop productive relationships.

A major issue across Europe is that of cultural differences, which create (or are often perceived to create) enormous difficulties facing an organisation trying to develop a relationship with an RTD partner. These include differences between Anglo-Saxon and Latin traditions, between Northern and Southern Europe, and between established and more recent member states, as well as between academia, large firms and SMEs.

There are also enormous differences between organisations in their understanding and adoption of research management processes and best practices, and a frequently poor understanding of the behaviours necessary for successful partnering. These are major barriers to collaboration, since they increase business risk. Sophisticated firms are reluctant to collaborate with prospective partners that appear unprofessional or naive in the way they do business – even though their technological skills may be ideal. Unsophisticated organisations may feel diffident about entering into partnerships, for fear of being exploited by 'smarter' organisations or becoming trapped into dependent relationships.

All these differences affect something that lies at the heart of successful partnering: trust. In recent years, social scientists have come to see trust as a central issue in organisational theory, in particular in inter-organisational relationships¹⁸. An SME in one country may well use existing tools to identify an RTD institution in another that has the research skills it needs; but questions such as "Can I really trust these people to deliver what I need?" and "Can I really trust this firm to use my ideas properly and treat me fairly?" may prove overwhelming. The two organisations may not connect, simply because neither knows if it can trust the other and neither is willing to risk relying on an unknown entity. Ways to help trust-building are badly needed.

Some form of accreditation scheme, which would enable organisations to 'prove' their trustworthiness through independent verification, might be possible. The existing practice of giving references follows this principle. However, we believe that such a scheme would have limited effectiveness. It would be more effective for organisations to communicate better with each other; trust would then follow naturally.

Action must also deal with the supporting and enabling policy frameworks, at EU and national levels. These can be a potent force for good, encouraging the necessary changes in RTD communications. New policy measures may focus on tools and mechanisms, enhancing the usefulness of today's tools and encouraging the creation of new tools; they may also deal with the softer issues, aiming to break down the fears and suspicions that can inhibit open communications. The challenge is to find policy developments that will have the most powerful impact for the least intervention, and that build well on (or even simplify) the existing extensive body of measures.

In passing, we note that issues of communication and trust affect society at large and its perceptions of science and research. While actions to improve European research management should have as their priority the communications between organisations doing research, we suggest that the Commission could do more to promote research management and its benefits to the population at large, for example through more use of the media. We return to this point in Chapter 7.

¹⁸ Kramer, R. M. (Ed.): *Organizational Trust: A Reader*, Oxford University Press 2006. ISBN 0-19-928850-X

It is appropriate to ask whether there is room to improve the tools, mechanisms and policy frameworks for supporting RTD partnering across Europe. But it is even more important to consider the underlying issues of communications, trust, behaviour and shared research management practices that make the difference between patchy performance and a truly vibrant European innovation community.

We therefore recommend:

That the Commission

- R4 launches projects, within Framework 7 or elsewhere, to improve understanding of the role of communication, trust and ethics as enablers of stronger RTD partnering across Europe; of the barriers to better communication; and of the practical actions that will deliver better communication.
- R5 uses the Framework Programme and all available support programmes to promote policies, tools and good practice that will strengthen communication and trust within and between Europe's RTD actors, including by launching appropriate Calls for Proposals and by making deliberate efforts to transfer learning from elsewhere into the Framework Programme.
- R6 encourages other European organisations, national bodies such as member state administrations, and the professional associations for industrial and public sector RTD actors, to devote more effort to build better communication within and between Europe's RTD actors.

6 Exploitation

We focus especially on this element of research management because it is so critical to Europe's economic and social development. Europe faces the frequent problem of how to improve the efficient transfer and exploitation of knowledge and research results to create business and social benefits. The concept and programmes of the proposed European Institute of Technology were formed in the spirit of this challenge.

Improvements are needed in several areas:

The desire and capacity of industry to absorb research results

Barriers to effective appropriation include

- the inability of different functions within the firm, such as R&D and marketing, to work effectively together
- difficulties in identifying future markets and products. This is especially difficult in emerging high technology markets where technology potential, customer needs, applications and product concepts are all poorly understood
- lack of access to complementary technologies.

While these barriers are well recognised and some solutions are known, more can be done both to understand how to overcome the barriers and to promote the practical application of solutions. SMEs, in particular, will benefit from more help with processes such as market intelligence.

The ability of firms, research and technology organisations and universities to work together, in particular to manage their often conflicting needs regarding intellectual property.

The frequent conflict between private sector and academic partners, for example over rights to publish and achieving a fair share of economic rewards, is well known¹⁹. Much has been done to address this in Europe in recent years, chiefly through developing guidelines and model agreements such as the Lambert Agreements in the UK²⁰ and the collaborative research frameworks in Ireland²¹ and Denmark²².

However, much remains to be done. The present guidelines are primarily national in scope and different member states have not always followed the same approach. Exploitation of trans-Europe collaborative research will be helped by greater harmonisation of these guidelines; the Commission has expressed its intention to address this^{23, 24} and has recently published a Communication setting out policy for improving knowledge transfer²⁵. At the same time, as the guidelines are mostly rather new, there is now an enormous amount of education to be done to bring the guidelines into common use. This should be an important part of the education initiatives we propose earlier in this report.

¹⁹ *Role and strategic use of IPR in international research collaborations*, Expert Group Report, European Commission EUR20230, April 2002

²⁰ <http://www.innovation.gov.uk/lambertagreements/>

²¹ *National Code of Practice for managing and commercialising intellectual property from public-private collaborative research*, Forfás/ACSTI, November 2005 (EURAB 06.004a)

²² *Contacts, contracts and codices: Research cooperation between universities and companies*, Confederation of Danish Industries and The Danish Rectors Conference, September 2004. ISBN 87-7353-553-2

²³ *Enhancing university-industry partnerships* (EURAB 06.009b)

²⁴ http://ec.europa.eu/invest-in-research/policy/cooperation_en.htm

²⁵ European Commission, *Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation – implementing the Lisbon agenda*, Communication, April 2007

The ability of a university or public sector research organisation to exploit its research

Where a university does research as part of an established relationship with an industrial firm, the route to exploitation of the results is usually clear. There are good examples of such relationships across Europe, such as Rolls Royce' network of University Technology Companies in the UK, Germany and Sweden; the Fraunhofer institutes in Germany; and many bilateral and trilateral research contracts between university, RTO and industrial partners, though these are more common in some member states than in others.

A greater challenge is to exploit results created by a university or public sector research organisation on its own. Academic results frequently do not make it through to commercial application due to lack of focus on supporting industry, inadequate funding for spin-outs and other forms of exploitation, or simply staff skills and motivation. The notion of industrial support as the 'third leg' of a university's mission (alongside teaching and research) is gaining ground in Europe and is to be encouraged; today, there are positive examples in France and the UK but, generally, this is still weak. Lack of funding for university spinouts is a well known and serious issue: if Europe does not find a way to deal with this, countries from regions such as Asia have shown themselves quite able to step in and take up valuable ideas. Action by the European Commission to find ways to narrow this funding gap – including the possibility of using regional funds – would help.

Yet there is great potential. Already, Europe has its successes in commercialising academic research results. Some universities have become adept at spawning new businesses and triggering the growth of substantial hi-tech clusters, such as Grenoble²⁶, Cambridge²⁷ and the biotechnology cluster around Munich²⁸. More broadly, while the USA is often seen as strong at commercialising academic research, not all experiences from the US are positive²⁹ and parts of Europe are at least as good. For example, comparison of US and UK experience shows that, after adjusting for differences in GDP and research expenditure between the two countries, UK universities created more spin-out companies and executed more licences (though they had far fewer licences yielding income and earned less gross licence income)³⁰. Similar results can be seen in other European member states.

There is potential for universities and other public research organisations to do a great deal more to manage the commercialisation of their results. This may involve more effort actively to seek a commercial outlet, perhaps through licensing or collaborations with industry; or to create an outlet through a spin-out business. Various professional associations of university industrial liaison and technology transfer offices (such as The Association for University Research and Industry Links in the UK³¹ and ProTon-Europe across Europe³²) already promote this and we commend their efforts. But, despite the good examples, there is more to do. The planned objectives of the proposed European Institute of Technology (EIT) address this issue but this, by itself, is not sufficient.

²⁶ <http://www.grenoble-universites.fr/>

²⁷ *The Cambridge Phenomenon Revisited*, Segal Quince Wicksteed, October 2000. ISBN 0951020218

²⁸ <http://www.bio-m.de/>

²⁹ See, for instance, the 2006 findings of the Government University Industry Round Table within the US National Academies of Sciences, <http://www7.nationalacademies.org/guirr/>

³⁰ *Second Annual Survey of University Technology Transfer Activities*, UNICO, 2003

³¹ <http://www.auril.org.uk/>

³² <http://www.protoneurope.org/>

Often, the institutes that are strong in this area today have taken years to achieve that situation and their early efforts were not always successful. It is now more than a quarter of a century since the US introduced the Bayh Dole Act which pushed the American higher education system towards its current situation. Similarly, IMEC, Europe's world-leading research centre in nanoelectronics, is a great example of European success: but it has taken twenty years for it to become pre-eminent³³. Without in any way recommending the adoption of a European equivalent of the Bayh Dole Act, we do not feel that Europe can afford slow, incremental learning.

We therefore recommend:

That the Commission

- R7 encourages the greater harmonisation of guidelines and practices across Europe regarding the ownership and exploitation of intellectual property arising from collaborative research.
- R8 establishes programmes, within FP7 or elsewhere, to study intra- and inter-organisational barriers to exploitation of research results, to identify practical improvement actions and to implement those actions.
- R9 sponsors a conference for industry and academic experts to consider the critical barriers to exploitation that concern research management and to provide guidance as to the content and priorities of the programmes recommended at R8 above.

³³ <http://www.imec.be/wwwinter/Welcome.html>

7 Continuation

This Report has only begun to address the issue of improving research management in the European Research Area. Europe now needs a sustained campaign to raise standards. The European Commission should play a leading role in this campaign.

A valuable initiative will be to raise the awareness of the importance of research management excellence amongst all those concerned. Increase awareness will generate support for the specific actions recommended in previous chapters, in the three areas of education, communication and exploitation.

At the same time, more needs to be done to understand what is really meant by 'research management excellence' and what can be done to achieve it. We are conscious that we have only scratched the surface in this Report.

If Europe is to improve its management of research, it will be essential to have some way to measure and report that improvement. There is work to be done to identify useful metrics. As a first step, though, Europe should adopt the practice of taking stock of progress at regular intervals. Since significant parts of the improvement effort must be done at member state level, this taking stock should look at both the overall European position and the positions of individual states.

We therefore recommend:

That the Commission

- R10 launches and maintains a strong campaign to communicate to Europe's RTD actors, related organisations and member state administrations the great importance of excellent research management and, in particular, the value of better education, communication and exploitation. This should include collecting and disseminating benchmarks and best practices and publicising and celebrating examples of outstanding achievement. Mechanisms could include websites, seminars, conferences, workshops and road shows; and a new 'European Research Management Forum' to act as an observatory and to serve as a platform for launching actions. EURAB is ready to participate in delivering these.
- R11 launches further work to explore research management issues, improvement targets and opportunities for action, to extend both the breadth and the depth of this Report. This could include inviting the participation of other organisations, such as EURAB and the proposed European Institute of Technology.
- R12 reviews and reports progress towards the vision of research management excellence across Europe, in two years' time and at regular intervals thereafter, including progress by each member state.

Annex 1 Membership of EURAB Working Group 7

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Cathérine Césarsky	Director General, European Southern Observatory, Germany
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Ian Halliday	President, European Science Foundation, and Chief Executive of The Scottish Universities Physics Alliance
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