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**Assessment of the Impact
of the Actions completed under the
5th Community Research Framework Programme
Survey**

Atlantis

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This report, commissioned by the European Commission, examines the results of a questionnaire survey designed to assess the impact of the Fifth Research Framework Programme. It is part of the "knowledge-base" underpinning the Five-Year Assessment of the European Union Research Framework Programmes 1999-2003, which was carried out by a high level independent expert panel in the second semester of 2004.

This publicly available collection of nearly 150 documents includes 22 Commission assessments or evaluations, 7 evaluation policy and methodology documents and 12 national impact assessments or evaluations. It also contains 69 policy documents and reviews and reference documents such as previous monitoring or Five-Year Assessments, Annual reports on research activities (art. 173), indicators and the Framework Programmes' legal base.

All these documents are available on
<http://forum.europa.eu.int/Public/irc/rtd/fiveyearasskb/library>.

***ASSESSMENT OF THE IMPACT OF THE ACTIONS
COMPLETED UNDER THE 5TH COMMUNITY
RESEARCH FRAMEWORK PROGRAMME***

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Executive Summary

Introduction

During 2004, a questionnaire designed to assess the impact of the Fifth Framework Programme (FP5) was circulated to participants in the programme as part of the Five Year Assessment of EU Research Activities from 1999-2003. This report discusses the results in terms of:

- Who took part in FP5?
- What kind of work did they perform?
- Why did they take part?
- What did they get out of it?
- What made a successful project?
- Did FP5 work?
- How did Europe benefit?

Who took part in FP5?

FP5 encouraged interaction between a rich mix of R&D-oriented stakeholders in the EU, including large and small firms from the private sector, universities and research institutes from the public sector and a number of other types of organisation. Many of these organisations had worked with each other beforehand, but FP5 also allowed participants to extend the scope of their networks and form new partnerships.

Many of the partners in FP5 had also taken part in earlier FPs, though there was no evidence to suggest that FP5 was dominated by participants with extensive prior experience in the Framework Programmes. There was evidence, however, that newcomers to FP5 were both less likely to apply for FP6 and more likely to fail in their applications for funding than more experienced participants.

What kind of work did they perform?

The work conducted in FP5 typically constituted part of a continuous stream of R&D. The majority of FP5 projects built on past work conducted in-house and led to further R&D projects in-house. Many projects also built on work conducted within the context of national and earlier Framework Programmes and led to further work in subsequent programmes of a similar nature.

FP5 R&D projects were generally considered to be strategically important, technically complex projects in core technology areas for the organisations concerned. For many, the work was at the longer-term end of the spectrum but still of an applied nature, especially for industry partners. Only a few projects fell into the high-cost/high-risk category.

Why did they take part?

The majority of both academic and industrial research teams taking part in FP5 did so in order to enhance existing knowledge bases and skills, develop new

tools and techniques and access complementary expertise via the formation of new partnerships and networks. In turn, the parent organisations of these research teams aimed to use project results in-house and sought to enhance their reputations by participating in the programme. Although operating in very different spheres, academics and industrialists alike generally saw FP5 as a means of improving the competitiveness of their organisations and of producing new products, processes and services.

What did they get out of it?

In terms of achievements, FP5 participants generally attained their goals – especially those considered to be most important – with appreciable associated impacts on both the research teams involved and their parent organisations. For research teams, achievements were particularly marked in terms of knowledge-related goals (enhanced knowledge bases, enhanced skills and new tools and techniques) and network-related goals (new networks and access to complementary expertise). Research results were also utilised to good effect by their parent organisations, most of which considered that participation had indeed enhanced their reputations and competitive positions.

Goal attainment and impacts were also high for those participants considering exploitation in the form of new products, processes and services to be important. Although only 38% of participants considered new products to be an important goal, impacts were moderate to high for 88% of this cohort. Similarly, even though many participants (primarily academics) did not anticipate commercial returns from their projects, around 60% did. Half the total population had already benefited from some commercial returns by the time of the survey, with 8% achieving significant returns.

Many of these achievements and impacts would not have been realised in the absence of FP5. Over half (57%) of the participants would not have undertaken their projects without Framework Programme funding, and such funding allowed a further 36% to conduct their projects on a larger scale, with more partners, with more ambitious objectives etc.

Overall, 55% of the project participants felt that the benefits of involvement in FP5 outweighed the costs, with the costs outweighing the benefits for only 14%, though this figure did rise to 21% for industrial partners, who were generally more sceptical about the benefits of participation than academics. Levels of satisfaction with the benefits of participation, however, had dropped since a comparable survey conducted in 2000. At this time, 69% of participants stated that the benefits of participation outweighed the costs. This shift is modest but disturbing if it reflects a genuine lessening of the perceived benefits of participation in the Framework Programmes.

What made a successful project?

Most participants in FP5 agreed on the key factors underpinning success. These spanned the high quality of project leadership; the high calibre of their own technical and managerial capabilities; the high calibre of their partners' technical

and managerial capabilities; the complementarity of partners' objectives and the existence of well-specified and ambitious project goals; good communication between all partners; high levels of interest within all concerned parties; the high quality of the technical equipment available to them; and the availability of suitably qualified personnel. In contrast, the only negative factor or obstacle that a significant number of participants complained of was the lack of availability of additional funding.

Statistical analyses confirmed that many of the above factors were indeed linked with favourable project outcomes and impacts. For example, the availability of suitably qualified personnel, state-of-the-art equipment and additional sources of finance were positively linked with high benefit to cost ratios. Similarly, the existence of well-specified, ambitious goals and the complementarity of partners' objectives were positively correlated with a range of outputs and benefits. The strongest correlations, however, linked the nature of the work conducted with project impacts. In short, projects considered to be of high strategic importance that were tightly linked with other projects in the core technology areas of organisations were generally associated with a wide range of beneficial knowledge, networking, commercial and socio-economic impacts

Did FP5 work?

FP5 worked for participants in that one of its main strategic objectives – namely improved collaboration and networking across the EU – was strongly in line with participants' own priorities. Academics also appreciated the emphasis on scientific excellence, while industry partners empathised with the goal of improving industrial competitiveness. Moreover, in terms of delivering on these goals, all the evidence discussed so far points to the success of FP5 as a vehicle for the majority of participants to attain important goals and reap expected outputs, outcomes and benefits.

Participants' satisfaction with programme implementation, however, was more problematic. Although the majority of participants were moderately satisfied with most aspects of implementation, significant minorities were dissatisfied with FP application and evaluation procedures and project payment arrangements. Disturbingly, satisfaction levels had also decreased over time, with participants generally more dissatisfied with the FP6 instruments than with the FP5 instruments.

How did Europe benefit?

To the extent that participants generally achieved their objectives, the EU benefited from the existence of FP5. Most participants also felt that their efforts had contributed to the attainment of FP5's most important strategic goals. Impacts on themselves and on project partners were generally high, as were impacts on the research community at large. Impacts on other user communities were less widespread, with most projects having modest or more limited direct impacts, though this is the norm for collaborative R&D programmes.

Although the European Council's goal of the EU becoming a leading knowledge-based society by 2010 was set at Lisbon after the onset of FP5, the programme's success in enhancing skill sets and providing more and better researchers has undoubtedly strengthened the European Research Area and contributed to the Lisbon goal.

The fact that many projects would not have taken place, or would have been performed less optimally, in the absence of Framework funding is also an indication of overall European Added Value, especially since the large majority of these 'additional' projects (74% of the whole population) were also considered to be strategically important. Public money was not used to fund projects of marginal interest to the participants or, by implication, the state.

Conclusions

Questionnaires cannot establish the exact impact of individual R&D projects on macroeconomic performance. They can, however, say something about the impacts on individual participants, on levels of goal attainment, and on participant satisfaction levels. They do, therefore, contribute to an understanding of programme effectiveness and efficiency of implementation.

In terms of programme effectiveness, there can be little doubt that FP5 was a success. Firstly, there were high levels of goal attainment and strong knowledge and networking impacts on research teams, all in line with the generic goals of collaborative R&D programmes. Secondly, there were major achievements in terms of the internal use of project results and the enhanced reputations of participating organisations, with indications that competitive position had been strengthened for many and modest commercial returns achieved by significant numbers, especially by industrial partners ranking such goals as important. Finally, although impacts on user communities and even further downstream were weaker, these results were in line with expectations for collaborative R&D programmes.

Overall levels of satisfaction with the benefits of participation and with programme efficiency were in decline, however. Although most participants were broadly satisfied with many aspects of programme implementation, significant minorities were dissatisfied with application and proposal evaluation procedures and with project payment arrangements. The fact that first time participants in FP5 were either less likely to apply for FP6 funding or more likely to fail in their applications than more experienced participants was also a concern.

If future Framework Programmes are to continue to attract academic and industry partners and enable them to attain strategically important goals, steps will need to be taken to improve the acceptability of programme procedures and modalities. Overall programme performance could also be improved by ensuring that proposal selection criteria adequately reflect many of the project attributes associated with successful outcomes. These include:

- The presence in proposals of clearly specified and ambitious project goals
- Evidence of sound technical, managerial and exploitation capabilities within partnerships
- Indications that partners consider projects to be strategically important projects in core technology areas.

Introduction

The Framework Programmes (FPs) for Research and Technological Development (RTD) have been part of the fabric of the European research and innovation policy scene since their inception in 1984. Originally conceived as research support mechanisms promoting scientific excellence and the competitiveness of European industry, by the time of the Fifth Framework Programme (FP5 – 1998 - 2000) they had evolved into a more sophisticated set of instruments providing support for research geared towards the attainment of a broader set of socio-economic objectives. In turn, this expansion of objectives provided a platform for the development of the European Research Area, which was proposed as a major objective of EU research policy in 2000.

FP5 also varied from previous FPs in terms of the instruments or modalities used to implement activities. These included 'Key Actions', which organised research around critical issues and the specific needs of modern society; 'Generic RTD Activities', which focused on a broader range of research areas and acted as a supplement to the Key Actions; and finally 'Support for Research Infrastructure', where the aim was to improve access to such infrastructures and encourage their networking at an EU level.

The 'Key Actions' and 'Generic RTD Activities' were structured into four Thematic Programmes, as shown below. There were also three Horizontal Programmes, designed to ensure the coherence and coordination of activities under the thematic programmes and to carry out a range of complementary activities.

Thematic Programmes	Horizontal Programmes
<input type="checkbox"/> Quality of Life and management of Living Resources	<input type="checkbox"/> Confirming the International Role of Community Research
<input type="checkbox"/> User Friendly Information Society	<input type="checkbox"/> Promotion of Innovation and Encouragement of SME Participation
<input type="checkbox"/> Competitive and Sustainable Growth	<input type="checkbox"/> Improving Human Research potential and the Socio-Economic Research Base
<input type="checkbox"/> Energy, Environment and Sustainable Development	

This report presents the results of a questionnaire survey conducted in 2004 as part of the third Five Year Assessment of the EU's Framework Programmes for Research and Technological Development. It was conducted by ATLANTIS Research Organisation in collaboration with Joanneum Research and three international experts: Ken Guy (Wise Guys Ltd.); Wolfgang Polt (Joanneum Research); and Nicholas Vonortas (George Washington University).

The main aim of the survey was to analyse the impact of projects and actions conducted during FP5. Attention focused on goal attainment, project impacts and participant satisfaction with the Framework Programmes. The study was conducted using an Internet-based questionnaire addressed to the participants of FP5¹. In total, around 1700 participants responded to the first part of the survey covering attitudes to participation in the Framework Programmes generally. Just under a thousand responded to the second part of the questionnaire, which dealt with participation in specific FP5 projects.

In more detail, the study concentrated on answers to the following questions:

- Who took part in the Framework Programmes?
- What kind of work did they perform?
- Why did they take part?
- What did they get out of it?
- What made a successful project?
- Did FP5 work?
- How did Europe benefit?

These questions are also used to structure the report. In addition, separate annexes were prepared presenting a description of the structure, organisation and goals of FP5; details of the survey design, delivery and analysis – including a copy of the questionnaire; the detailed survey responses to each question; and the results of a number of more detailed analyses. All of these were designed to explore the existence of relationships between variables describing the nature of the work conducted; the additionality associated with projects; the factors affecting project progress; goal attainment; and impacts on research teams (First Circle impacts), on the parent organisations of these teams (Second Circle impacts), and on broader user communities and environments (Third Circle impacts) impacts.

¹ Participants in the IST programme were excluded. DG IST conducted a separate exercise in the Mobile, Micro and Health related fields.

Who takes part in the Framework Programmes?

Current thinking about the way innovation flourishes within 'innovation systems' places great stress on the interaction between the 'actors' and 'institutions' in such systems. This is based on the observation that firms do not normally innovate in isolation but in interaction with other organisational actors (other firms, universities, standard setting organisations etc.) within a framework of existing institutional rules (laws, norms, technical standards etc.). In terms of policies supporting the development of sound innovation systems, collaborative R&D programmes thus fulfil an important function by encouraging interaction between important R&D-oriented stakeholders.

Types of Actor

FP5 included a rich mix of such stakeholders, with 'Academic Institutions' – i.e. Higher Education Institutes (29%) and Research Institutes (25%) – just outnumbering 'Industrial Organisations' (SMEs – 30%; Large Firms – 9%) in the questionnaire sample. In terms of ownership, 47% were from the public sector and 40% from the private. The remaining 13% had semi-public or other ownership structures. Compared with the results of a similar questionnaire distributed to FP3 and FP4 participants at the time of the last Five Year Assessment in 2000, the proportions of Higher Education Institutes (33%) and Research Institutes (26%) were very similar, though there was a rise in SME participation in FP5 (from 20% to 30%) and a corresponding drop in Large Firm participation (from 17% to 10%).

Who takes part in the Framework Programmes?

- Higher Education Institutes (29%)
- Research Institutes (25%)
- Small and Medium-size Enterprises (SMEs) (30%)
- Large Firms (9%)
- Others (7%)
 - Public Organisations (47%)
 - Semi-public Organisations (6%)
 - Private Organisations (40%)
 - Other (7%)
 - Independents (75%)
 - Parts of larger organisations (20%)
 - Other (5%)

Roles and Capabilities

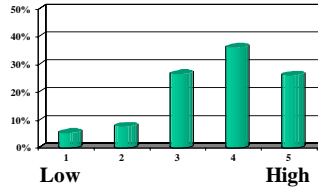
Collaborative R&D programmes are primarily designed for participants with high R&D capabilities, though there is also scope within them for firms with more limited experience to enhance their research skills. In some instances, too, such programmes also involve users in order to benefit from their inputs into the R&D process. About half of the participants in the FP5 sample were solely concerned with the conduct of research, with a further quarter performing mixed roles, including research. The remainder variously functioned as users (7%), suppliers of technologies and subsystems (6%), and in other roles (12%). In terms of R&D capabilities, the majority of FP5 participants had moderate to very high capabilities, particularly amongst Academic Institutions and Large Firms. In contrast, a quarter of the SME population had comparatively low R&D capabilities. Overall, however, slightly fewer participants (12%) had low R&D capabilities than had been the case in the corresponding survey in 2000 (15%).

Framework Track Records

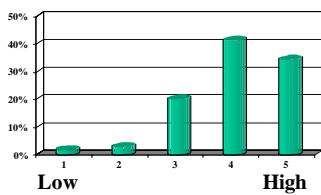
Over time, the composition of successive Framework Programmes can be expected to vary, with some key actors winning proposals and participating in each and every programme; some taking part on an occasional basis (dictated either by their relative success in the competition for Framework funding or by deliberate decisions not to submit proposals); and other organisations participating for the first time. In such circumstances, the balance between different types of participants in terms of their Framework histories can be indicative of the 'health' of the overall system. Too high a proportion of 'old timers' might indicate either that the entry barriers for 'newcomers' are too high or that the programme is unappealing to them. If so, this could lead to a closed, sclerotic system – a club of partners over-familiar with each other and limited in their ability to absorb new inputs from fresh quarters. In other scenarios, high drop out rates might reflect dissatisfaction with the way programmes are implemented or the utility of project results, while high influxes of newcomers in successive programmes could reflect the continued appeal of programmes to the uninitiated.

R&D Capabilities

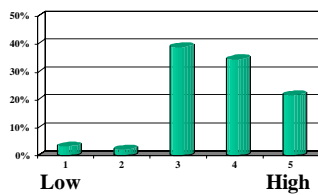
R&D Capabilities - All



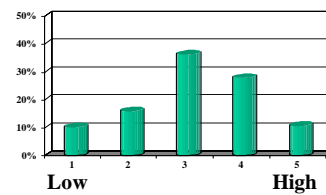
R&D Capabilities - Academics



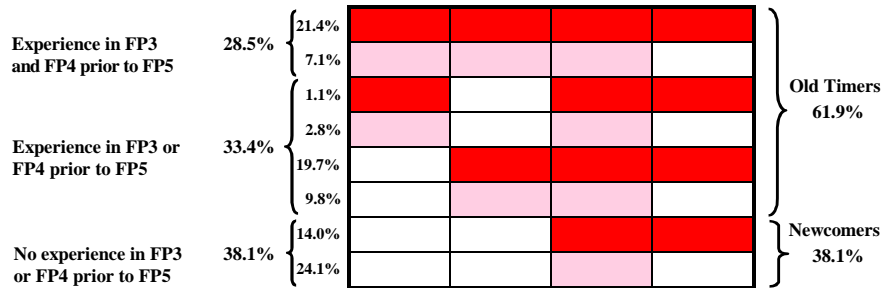
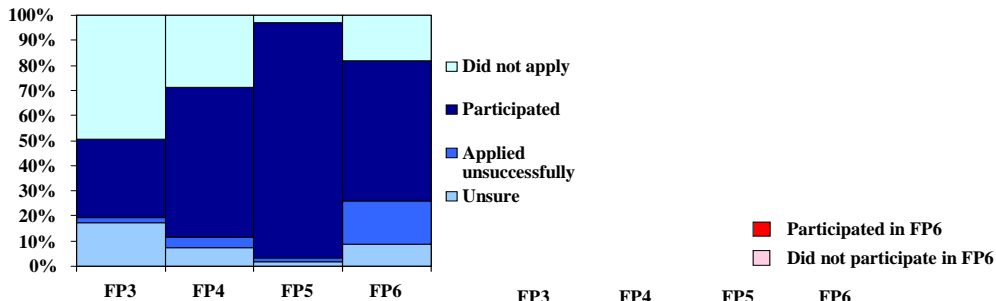
R&D Capabilities - Large Firms



R&D Capabilities - SMEs



Framework Track Record



Amongst the FP5 participants in the questionnaire sample, there is little evidence of the over-representation of 'old timers' or of unduly high exit or entry rates. The proportion of 'old timers' or participants with experience in FPs prior to FP5 was 62%. Approximately half of these (33% of the total) had experience in one FP prior to FP5. The other half (29%) had experience in two. The

remaining 38% were 'newcomers', i.e. they had not participated in either FP3 or FP4. Only 21% of the total had participated in FP3, FP4, FP5 and, subsequently, FP6.

The response of FP5 participants to FP6 is of some concern, however. Nearly three quarters had applied for FP6 funding, 56% of them successfully. Of the remainder, 8% were unsure whether or not their organisations had applied, but 19% had definitely not applied. In themselves, these figures are not unduly disturbing, since the expectation from FP5 was that not all applicants from FP5 would either apply or make successful applications to FP6, but the differences between 'old timers' and 'newcomers' is perturbing, since there is evidence that those participating for the first time in FP5 were less successful than more experienced participants in the competition for FP6 funding. Whereas 68% of those with previous experience went on to participate in FP6, only 37% of newcomers were successful (29% for industrial newcomers). Newcomers to FP5 were also less likely to apply for FP6 funding than other participants. Only 8.5% of the experienced participants did not apply for FP6 funding, compared with 35% of the newcomers (47% of industrial newcomers). This lack of appeal of FP6 to newcomers to FP5, particularly industrial newcomers, and their relatively poor performance when they did apply could, if unchecked, have unwelcome consequences for the composition of future Framework Programmes.

FP5 Partners

		Future			
		Will work with all of them	Will work with some of them	Won 't work with any of them	TOTAL
Past	Had worked with all of them	7%	2%	0%	9%
	Had worked with some of them	14%	59%	1%	74%
	Hadn 't worked with any of them	4%	11%	2%	17%
	TOTAL	25%	72%	3%	100%

Partner Chains

Old Timers and FP5 Newcomers in FP6

	FP5 Old Timers (61.9%)	FP5 Newcomers (38.1%)	All FP5 Participants
Successful FP6 Application	68.2%	36.7%	56.2%
Unsuccessful FP6 Application	17.3%	16.9%	17.1%
Did not Apply for FP6	8.5%	35.1%	18.9%
Unsure or No Response	6.0%	11.3%	7.9%
TOTAL	100.0%	100.0%	100.0%

Collaborative R&D programmes such as the Framework Programmes are designed to strengthen existing linkages between R&D actors within innovation systems and to encourage new linkages. In reality, FP5 did both, though the emphasis lay more on strengthening existing linkages than encouraging new ones. Some 74% of project participants had worked with some of their partners

beforehand, whereas only 17% hadn't worked with any of them. Moreover, these proportions were similar for both academics and industry partners, and most participants expected to work with all (25%) or some (72%) of their FP5 partners in future projects.

Project Chains

		Future			TOTAL
		Will work with all of them	Will work with some of them	Won't work with any of them	
Past	Had worked with all of them	7%	2%	0%	9%
	Had worked with some of them	14%	59%	1%	74%
	Hadn't worked with any of them	4%	11%	2%	17%
	TOTAL	25%	72%	3%	100%

Although some R&D projects constitute entirely new paths for a small percentage of R&D actors, most emerge out of the idiosyncratic research histories and technological trajectories of the individual organisations and owe something to prior experience in earlier R&D projects. Often these have been funded and conducted in-house, but many new R&D projects also emerge out of projects conducted in previous national programmes and EU Framework Programmes. Any single project, therefore, is likely both to owe something to past work conducted in one or more settings and to lead to future work in an equally diverse range of settings.

The Framework Programmes are typically expected to build on past work and to encourage some participants to enter into new areas of research, with subsequent work continuing in one or more of a number of settings. Within FP5, most projects (78%) were based on prior in-house projects, and a large proportion (84%) led subsequently to further in-house projects. Many projects, however, built on work conducted in multiple settings and led to further work in a variety of contexts. FP5 also stimulated some 25% of participants to enter into entirely new areas for their organisations, and very few participants (10%) expected to discontinue working in these technological areas once their FP5 projects had been completed. For those industrial partners entering into new areas in FP5 (29% of the total), the majority (25% of the total) planned to continue the work in-house.

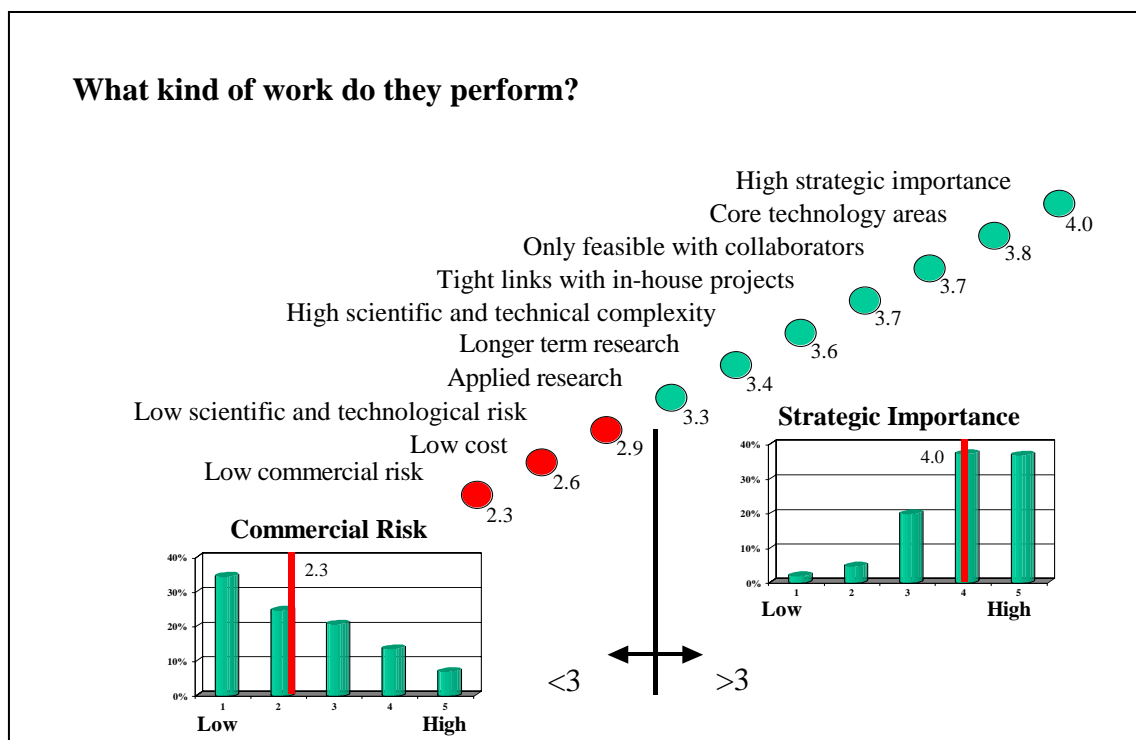
There was little evidence of an overt 'Framework' dependency amongst FP5 participants, with only 28% of participants (31% of academics; 23% of industry participants) claiming that their projects owed something to past Framework projects and were likely to be pursued in future FPs. These figures were comparable to those indicating that their FP5 projects drew upon past participation in national programmes and were likely to be continued in such settings (34%).

What kind of work do they perform?

The work conducted within collaborative R&D programmes is often described as pre-competitive in nature, which is typically taken to mean that it occupies that part of the R&D spectrum just prior to the commercialisation stage. Similarly, collaborative R&D programmes are often thought of as vehicles within which participants can explore new areas outside their core or heartland technology and business areas, or in which they can pursue very high risk work, reducing these risks by sharing them with their collaborators. Collaborative programmes are also thought by some only to facilitate 'marginal' work of no strategic importance.

In reality, the R&D conducted within collaborative programmes can range from work at the fundamental end of the spectrum through to very applied work. The work can also be located in core technology areas and be of great strategic importance to participating organisations, or be of more modest significance in areas of potential but currently peripheral interest.

Nature Dimensions



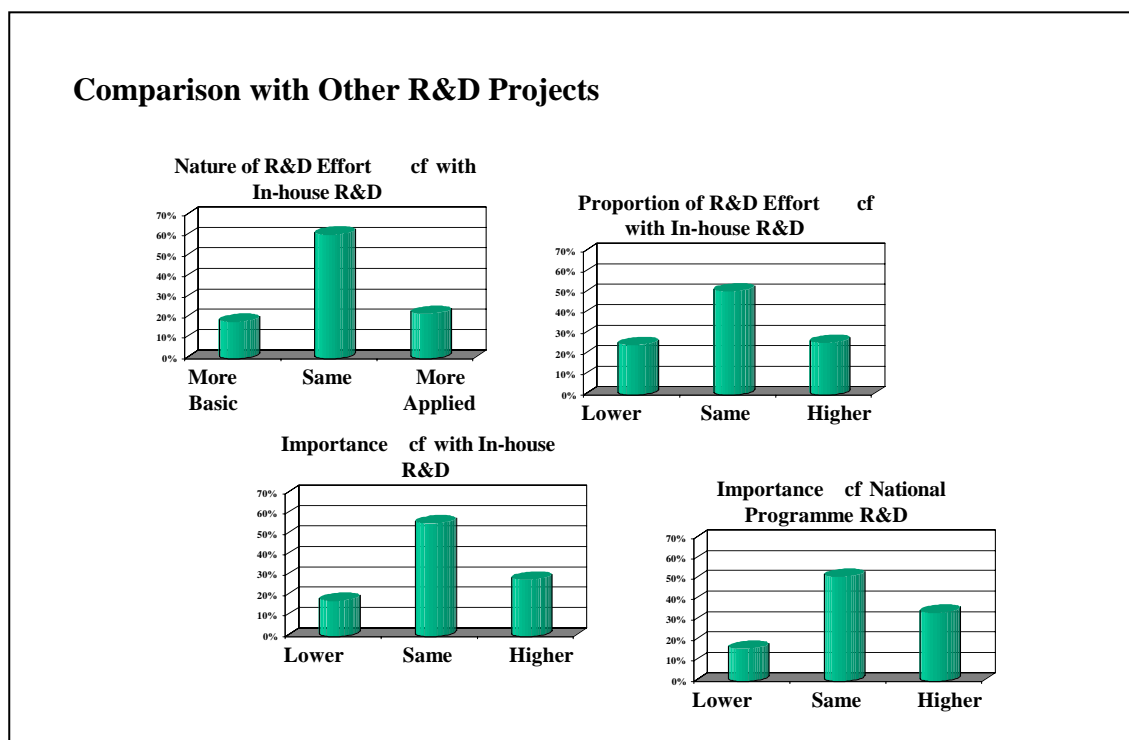
In the questionnaire circulated to participants in FP5, the nature of the work being undertaken was explored. Respondents were asked to characterise the work they were undertaking along a number of dimensions, using a scale of 1 – 5 to distinguish between the extreme ends of the scale. One scale, for example, distinguished between low cost projects (1) and high cost projects (5). Another differentiated between low risk projects (1) and high risk projects (5). Frequency distributions for the responses along each dimension were then produced and the 'average scores' for each dimension calculated and used to indicate the skew of the distribution towards one pole or another. A high score along the dimension of 'strategic importance' indicates that most projects were considered to be of high or very high strategic importance to participants, whereas a low score along the dimension of 'commercial risk' indicates that most projects were considered to pose low or very low commercial risks.

The results of the analysis for the FP5 sample mirrored the results of previous analyses of FP3 and FP4 projects. Most FP5 projects were considered to be strategically important projects in core technology areas for the organisations concerned. Typically they were tightly linked either conceptually or more pragmatically with other in-house projects but were only feasible when undertaken in collaboration with others. Projects were generally of a high scientific and technical complexity and skewed towards the longer-term end of the spectrum. Work of an applied R&D nature nevertheless still predominated over more basic research, especially for industrial participants. The majority of participants also considered their projects to be moderate to low cost and to pose moderate to low scientific, technical and commercial risks. As in FP3 and FP4, there were few high cost, high risk projects.

Cost of Projects

The total budgetary commitment to projects by individual organisations (i.e. the sum of an organisation's own commitment plus the contribution from the Commission) was less than €250,000 for the majority (67%) of participants. A further 19% committed between €250,000 and €500,000. Only 6% of organisations committed over €1,000,000. Not surprisingly, the commitments of Large Firms tended to be larger than those of SMEs, and many of the higher commitments took place in the context of the GROWTH programme.

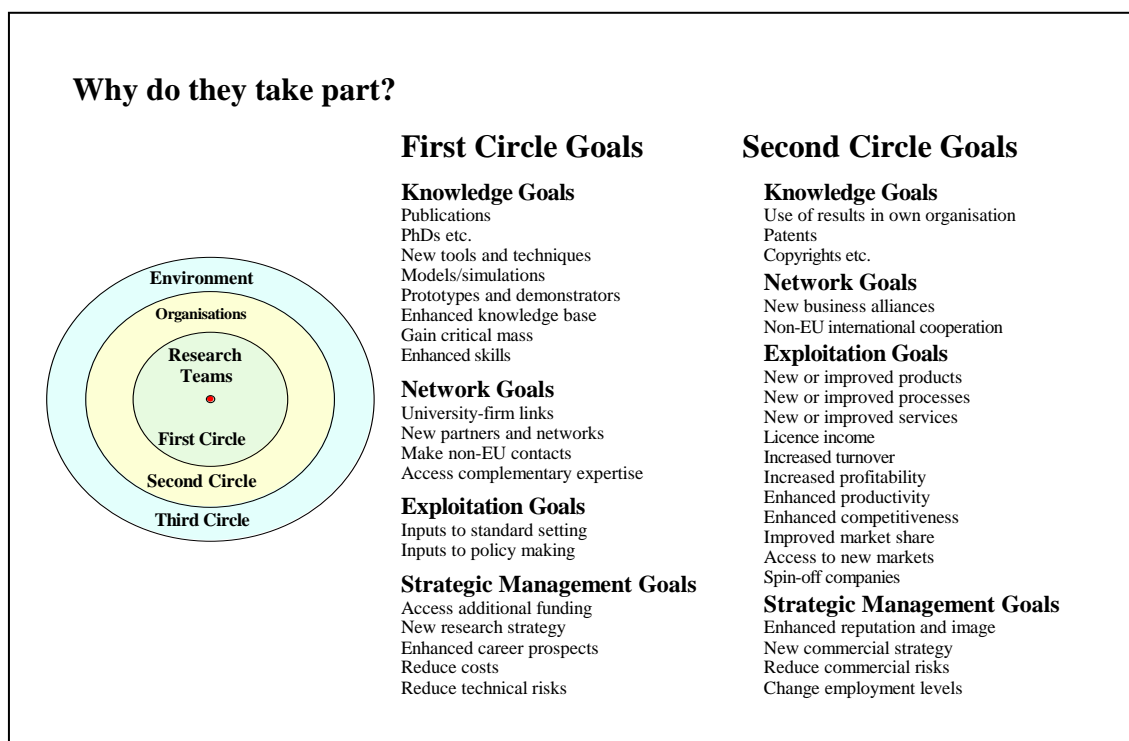
Comparison with Other Work



One often held view is that Framework R&D projects are of only marginal interest and importance to participants relative to in-house work or to work undertaken in the context of national programmes. The fact that most participants considered FP5 projects to consist of strategically important work in core areas that can only be undertaken in collaboration with others is in stark contrast to this view. Other responses to the questionnaire also contradict it. FP5 projects were generally of a similar nature to in-house work for 60% of participants (it was more applied for 21%; more basic for 19%) and required a similar amount of R&D effort as in-house work for 50% of participants (higher effort for 26%; lower effort for 24%). Moreover, FP5 projects were of a similar importance to in-house work for 55% (higher for 27%; lower for 18%), and of a similar importance to work conducted in national programmes for 50% (higher for 34%; lower for 16%).

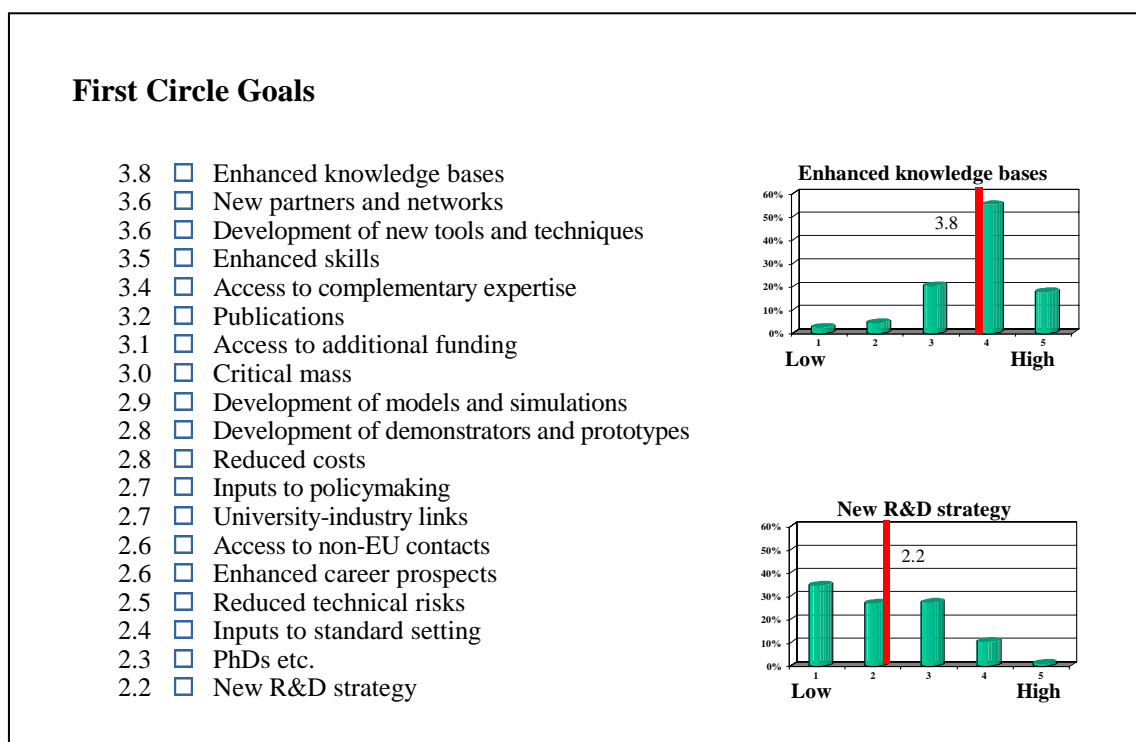
Why do they take part?

There are many reasons why the public sector supports collaborative R&D programmes and why researchers and their parent organisations take part in them. Some of these fall under the general heading of 'knowledge-related' goals. These can range from a desire to attain very tangible goals such as publications, PhDs and new tools and techniques, to more intangible knowledge goals associated with the enhancement of existing knowledge capabilities and skill sets. Other goals fall under the heading of 'network-related' goals. These include the desire to access complementary expertise not available within one's own organisation and an ambition to meet new partners, establish university-industry links and form new networks – of both research and more market-oriented varieties.



Another set of goals, often more associated with the parent organisations of the researchers involved in projects and inextricably linked with the associated attainment of knowledge and network goals, can be termed 'exploitation-related' goals. For firms in particular, these can include goals such as the tangible development of new products, processes and services, together with related downstream goals such as improved productivity, profitability, competitiveness, and market share. Exploitation goals of a non-commercial variety also exist. These include the desire for project results to influence policy-making, regulatory regimes and standards setting. Finally, there are a number of 'strategic management' goals that are often associated with the sound management of collaborative projects. These include the goals of cost- and risk-reduction; the very pragmatic aim of attaining access to additional sources of research funding; and a desire to open new research horizons and develop innovative, long-term research and commercial strategies.

In the questionnaire circulated to participants in FP5, respondents were asked to indicate the importance of different goals in the four categories described above along 1 (low) to 5 (high) importance scales. In the first instance they were asked to consider those goals most important to the research teams themselves. Secondly they were asked to consider those goals most important to their organisations as a whole. These are termed First Circle and Second Circle Goals respectively, in line with an impact assessment methodology that focuses on goal attainment and impacts on the research teams (First Circle); on the parent organisations (Second Circle); and on external organisations and environments (Third, Fourth Circles etc.). In both instances, 'average scores' for each goal were calculated and used to indicate the skew of the distributions towards one pole or another, with high scores indicating that the majority of respondents considered a goal to be of high or very high importance to them.



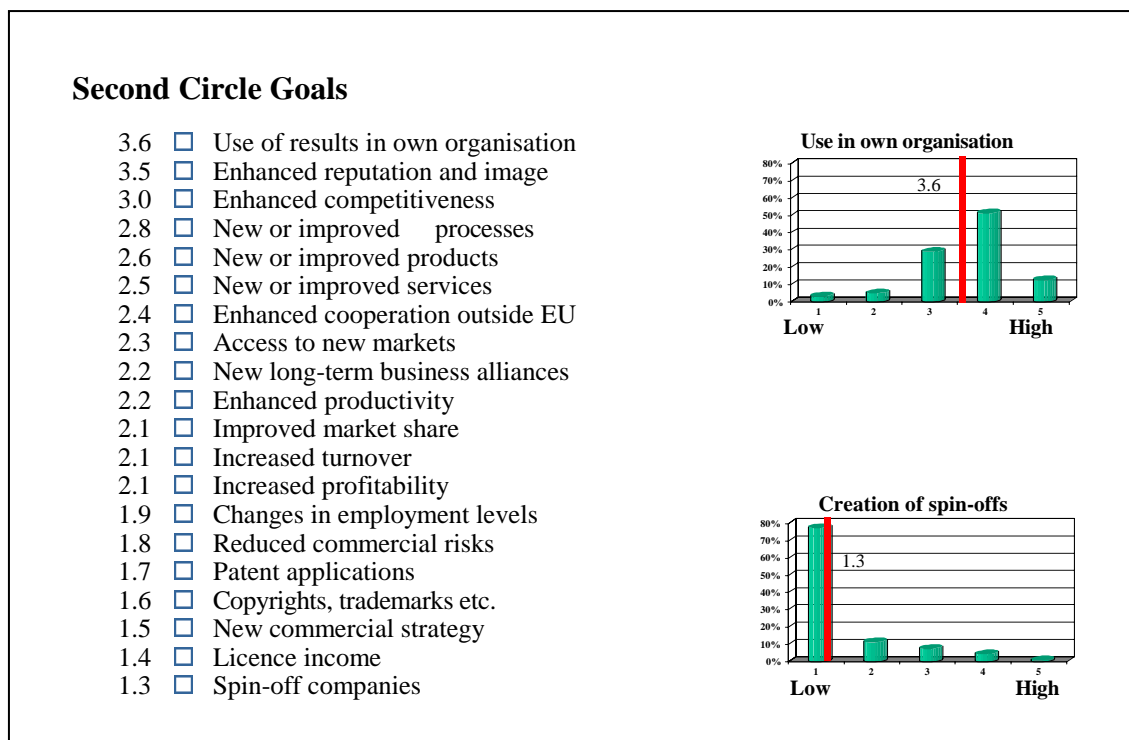
First Circle Goals

In terms of First Circle goals, knowledge and networking objectives ranked highest, with most respondents acknowledging the primacy of project goals geared towards enhancing existing knowledge bases and skills, developing new tools and techniques and accessing complementary expertise via the formation of new partnerships and networks. This was true for academic and industry partners alike, though academics also ranked the production of publications very highly. The results also mirrored those of earlier assessments of FP3 and FP4 projects.

Lower ranked goals included 'strategic' goals, such as risk reduction, the enhancement of career prospects and the development of new R&D strategies, and 'exploitation' goals such as inputs to standards setting. Such goals were important to a minority of participants, but not to the majority, and there were

modest differences between academic and industrial partners. Not surprisingly, more industrial partners considered the production of prototypes and demonstrators to be an important goal than their academic counterparts. More industry participants than academics also considered the formation of university-industry links to be important.

Second Circle Goals



Turning now to Second Circle goals, i.e. those considered important by the organisations to which the research teams belonged, the differences between academic and industrial participants were surprisingly modest. Most of the highly ranked goals were the same, though the ways in which both groups interpreted these goals were undoubtedly nuanced. The highest ranked goal for both sets was the use of project results within their own organisations. For academics, FP5 projects offered the prospect of contributing to the development of institutional research agendas and competence building. Within firms, projects were undoubtedly expected to play a similar role, though the exploitation of project results in a more commercial sense was an additional expectation.

The majority of academics and industry partners valued the opportunity presented by FP5 to work on an international stage and enhance organisational reputations. For academics this went hand in hand with the highly ranked goal of improved competitive position, i.e. their status within academic hierarchies. Industrial partners also regarded enhanced competitiveness as an important goal, though presumably in a market-oriented sense since access to new markets was also considered important by many of them.

The development of new processes and products were other highly ranked goals, even though overall importance scores were less than '3'. For these goals, however, there was a distinct polarisation. Some 38% considered the development of new products, for example, to be an important or very important goal, with a further 16% considering it to be moderately important, but for the remaining 46% it was an unimportant goal. This polarisation was apparent for both academic and industrial partners. Academics placed more emphasis on the development of new and improved processes whereas industry partners ranked product development slightly higher, but the high ranking of exploitation-oriented goals by many academic participants perhaps reflects their increased awareness of the commercial possibilities associated with participation in the Framework Programmes.

Lowly ranked goals were similar for both sets. Neither academics nor industrialists entered FP5 projects primarily to develop new commercial strategies, spin-off new companies or produce copyrights, patents, licence income etc. These were important goals for a small minority, but not for the vast majority.

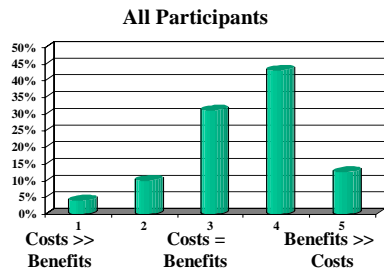
What do they get out of it?

There are many ways to assess the outputs and outcomes accruing to participants in collaborative R&D programmes such as FP5. In the first instance, it is important to understand whether the overall experience was beneficial for them, i.e. whether the benefits resulting from participation outweighed the costs of involvement, and to what extent the resulting success of participants was a consequence of participation (the issue of attribution). Secondly, it is instructive to explore whether or not participation in FP5 allowed them to do something that would not have been possible in the absence of FP5 funding (the issue of 'pure additionality'), or allowed them to do something better or faster than before (the issue of 'behavioural additionality'). Thirdly, goal attainment has to be assessed, particularly the attainment of those goals most prized by participants. Finally, the impacts associated with these achievements have to be examined, for the attainment of important goals does not always lead to large impacts and, conversely, modest attainments in areas of lesser importance sometimes turn out to have significant impacts on organisations.

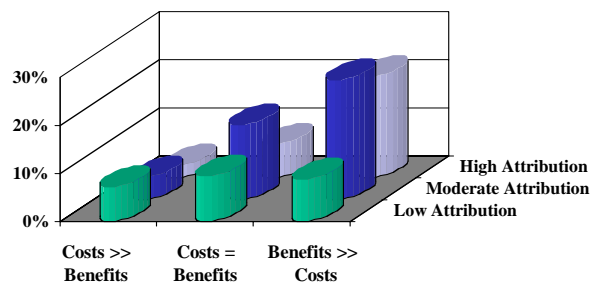
Benefits, Costs and Attribution

There is little doubt that the benefits of participation outweighed the costs for the majority (55%) of respondents, with the costs outweighing the benefits for only 14%. Moreover, many respondents claiming that the benefits outweighed the costs also claimed that the current success of their organisations in these fields could be attributed, to a moderate or high extent, to the benefits accruing from their FP5 projects. This was especially so for SMEs.

Benefits *versus* Costs

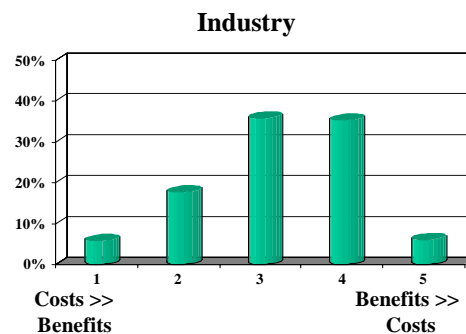
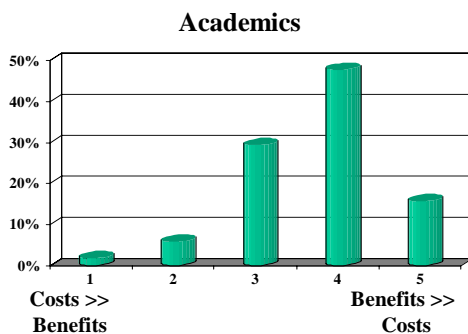


□ How much of their current success do participants attribute to the benefits accruing from their FP5 projects?



Benefits exceeded costs for a greater number of academics (63%) than industry partners (40%). Costs also exceeded benefits for 21% of the industrial respondents compared to 7% of academics.

Academic and Industrial Participants



□ Benefits exceed costs for more academic participants than industry partners

The general picture of benefits outweighing costs for the majority of participants – and more so for academics than industry partners – is similar to the picture that emerged from the questionnaire distributed to FP3 and FP4 participants at

the time of the last Five Year Assessment exercise in 2000. The main difference involves a negative shift, with fewer FP5 participants – both academics and industrialists – perceiving the benefits as outweighing the costs (55% compared with 69% of FP3 and FP4 participants) and more stating that the benefits equalled the risks (31% compared with 19% in 2000). This shift is modest but disturbing if it reflects a genuine lessening of the perceived benefits of participation in the Framework Programmes.

Additionality

A striking proportion of participants (57%) would not have undertaken their R&D projects in the absence of Framework funding. Their FP5 projects constituted examples of 'pure additionality', i.e. projects purely additional to those that they would normally have conducted. Moreover, in a parallel telephone survey of a much smaller sample of rejected applicants, 84% said that they had not pursued their proposed projects once their applications had been turned down, even though many of them (40%) considered that their proposed projects were of great strategic significance to them.

Returning to the survey of successful applicants, it appears that there was also a considerable degree of 'behavioural additionality' for many of the remaining participants (36% of the overall population). FP5 allowed them to conduct their projects in different ways. Without FP5, 29% would have gone ahead with their projects, but on a smaller scale; 23% with less partners; 15% with less ambitious objectives; 14% with lower expectations of resulting benefits; and 12% with more national as opposed to international partners. Another 11% would have taken longer to complete their projects. In terms of funding, ten percent would have replaced EU funds with internal funds and 20% would have attempted to substitute funds from other external sources, but 7% would have gone ahead with fewer funds.

Additionality	
<input type="checkbox"/>	57% of participants would not have undertaken the project in the absence of EU funding
<input type="checkbox"/>	36% of the remainder would have gone ahead with
<input type="checkbox"/>	on a smaller scale 29%
<input type="checkbox"/>	less partners 23%
<input type="checkbox"/>	less ambitious objectives 15%
<input type="checkbox"/>	lower expectations of benefit 14 %
<input type="checkbox"/>	more national partners 12%
<input type="checkbox"/>	a longer time-scale 11%
<input type="checkbox"/>	less funds 7%
<input type="checkbox"/>	10% would have replaced EU funds with their own funds
<input type="checkbox"/>	20% would have replaced EU funds with other external funds
<input type="checkbox"/>	13% would have done at least one thing 'better' without EU funds
<input type="checkbox"/>	There was no additionality of any kind for 7%

These indications of behavioural additionality were paralleled in the survey of rejected applicants. Sixteen percent of these did carry out their projects, though with less partners, over longer time-scales, with less resources etc. The only anomalous result was that some were carried out with more rather than less ambitious objectives.

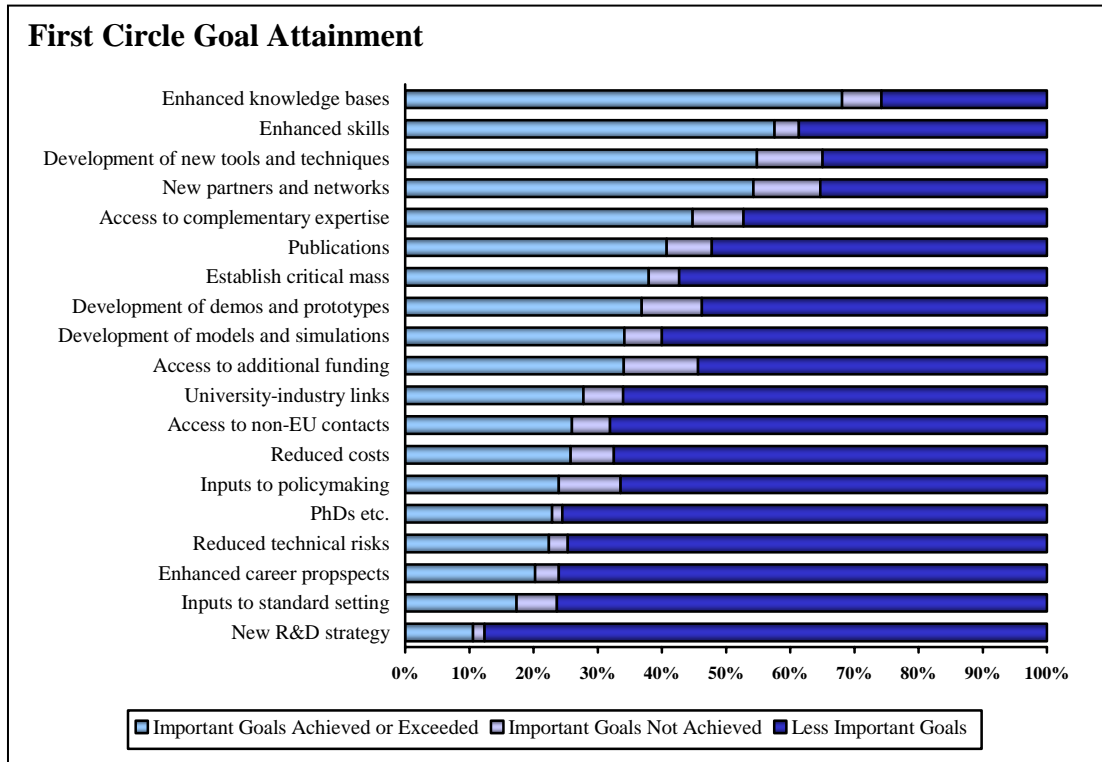
There was no additionality for only a very a small percentage (7%) of the total population. These participants would have conducted their projects in exactly the same way irrespective of whether they had received FP5 funding or not.

There were also a few examples of 'negative additionality', with some participants (13%) anticipating that they would have done at least one thing better in the absence of FP5 funding (i.e. faster, with more ambitious objectives, with greater benefits etc.), but no participants felt that they could have done everything better outside the context of FP5.

In the comparable exercise carried out for the Five-Year Assessment in 2000, the results were broadly comparable, with 63% stating that the project would not have been conducted in the absence of EU funding; 29% stating that they would have carried out the work, but not as well; and 9% stating that they wouldn't have taken part, but that other partners might have continued.

First Circle Goal Attainment

The questionnaire asked respondents to score the importance of individual goals on a 1 – 5 scale and to indicate the degree of goal attainment, this time on a 1 – 5 scale ranging from 'Achievements much less than expected' at one extreme to 'Achievements much greater than expected' at the other, with 'Achievements equal to expectations' at the mid point of the spectrum. For each goal, the proportions achieving or exceeding important goals and those not achieving these goals were then plotted.



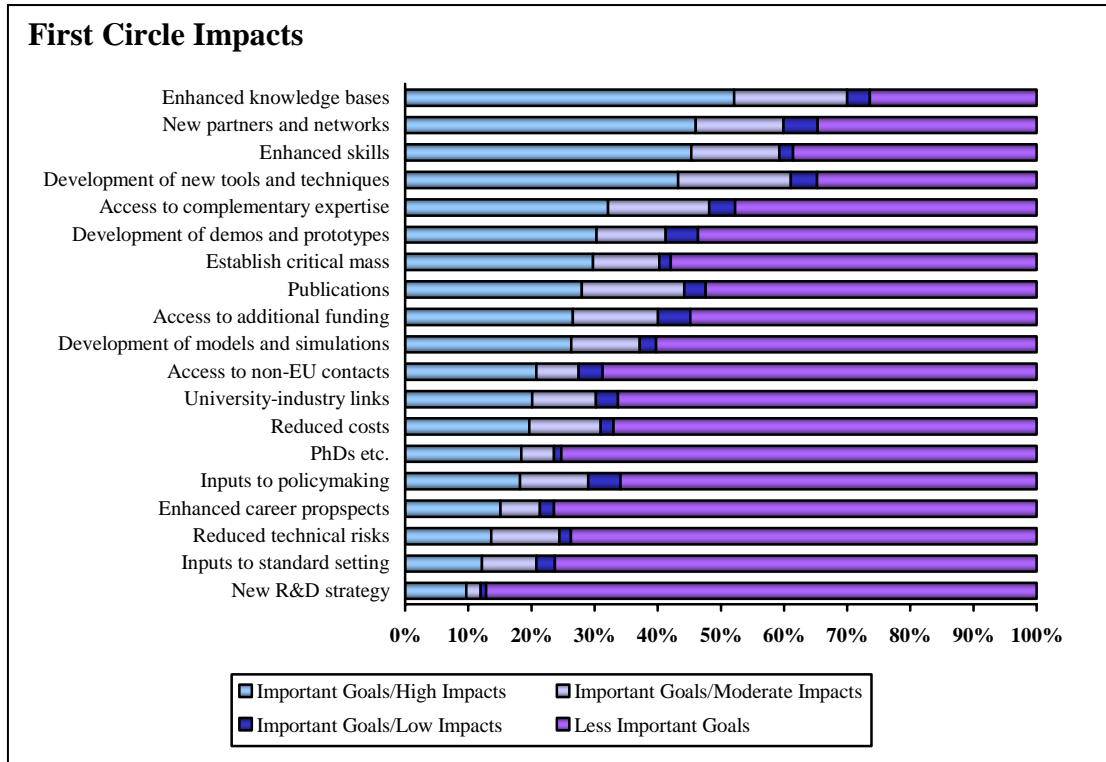
In terms of First Circle Goals, i.e. those most relevant to the research teams performing the projects, the goals considered to be very important or important by most participants were generally either achieved or exceeded. Between 75–94% of those considering any individual goal to be important achieved or exceeded initial expectations. To some extent this result could be a consequence of *post hoc* rationalisation (with the goals that were achieved coming, over time, to be seen as the most important), but this does not detract from the outcome of most consequence, namely that most participants achieved or exceeded their important goals along many dimensions, with achievements being particularly marked in terms of knowledge-related goals (enhanced knowledge bases, enhanced skills and new tools and techniques) and network-related goals (new networks and access to complementary expertise).

Goal attainment was least marked for those envisioning FP5 as a way of accessing additional funding. For 25% of those considering this to be an important goal, achievements did not live up to expectations, presumably because levels of funding were lower than originally anticipated. Sixty-three percent of the remainder, however, did achieve this goal, with a further 11% exceeding expectations.

First Circle Impacts

The questionnaire also collected data on the impacts associated with particular goals, using a scale ranging from '1 – No or low impact' to '5 – Very high impact'. The results here confirmed that, as for goal attainment, impacts on research teams were generally high for goals considered to be important. In terms of enhancing knowledge bases, for example, the majority (73%) of

participants ranked this as an important or very important goal, 74% of those considering it to be important achieved or over-exceeded expectations in terms of goal attainment and 71% of the same population testified that impacts on their research teams were high or very high.



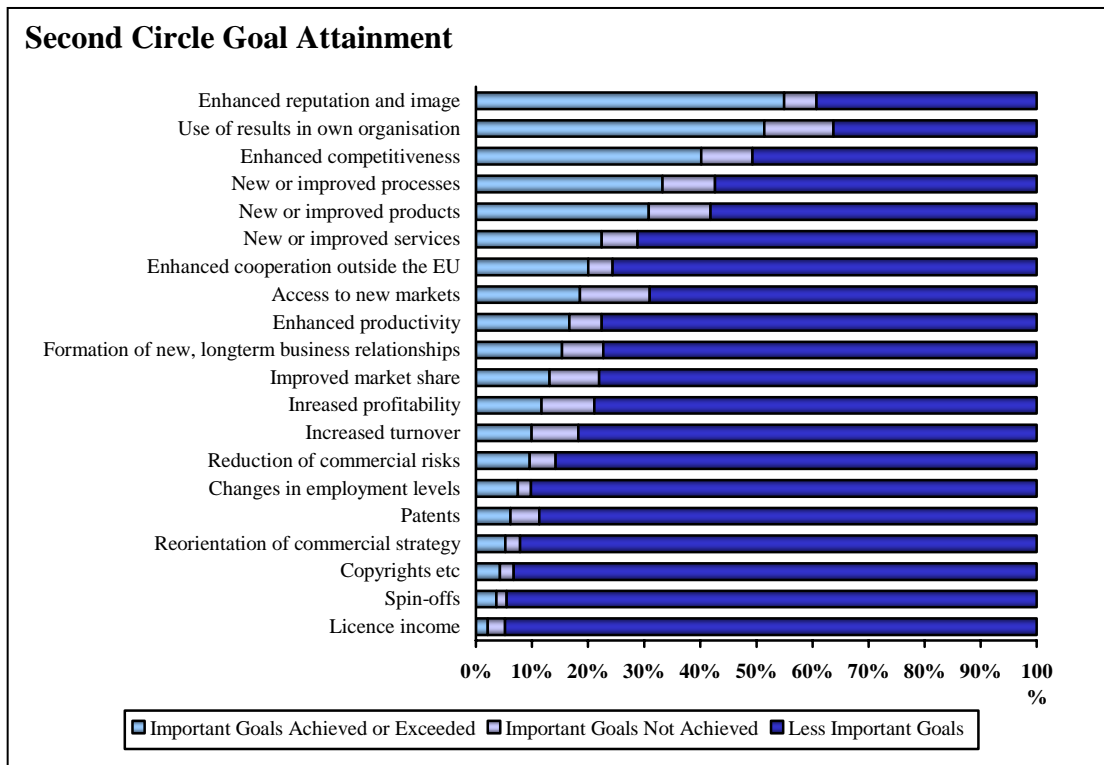
Between half and three-quarters of those participants considering goals to be important experienced high impacts, with a further 20-40% experiencing moderate impacts. Low impacts for important goals were most marked for goals such as those involving a desire to feed into policymaking and standards setting, though even here expectations were realised by many partners and impacts were high for most of them. In terms of impacts on standards setting, for example, this was an important goal for only 22% of participants, yet goals were attained or exceeded for three-quarters of this sub-set and impacts were high or very high for 51% and moderate for a further 36%, with only 12% experiencing low impacts.

The overall conclusion, therefore, is that First Circle impacts were generally high in the areas that mattered most to participants.

Second Circle Goal Attainment and Impacts

A similar picture emerged in terms of Second Circle goals, i.e. those most relevant to the parent organisations of the research teams involved in projects. Goal attainment and impacts were high for most teams when importance was also high. Many teams entered FP5 with the expectation that participation would enhance the reputation and image of their organisations, and they were not disappointed. The majority of participants also sought to use project results

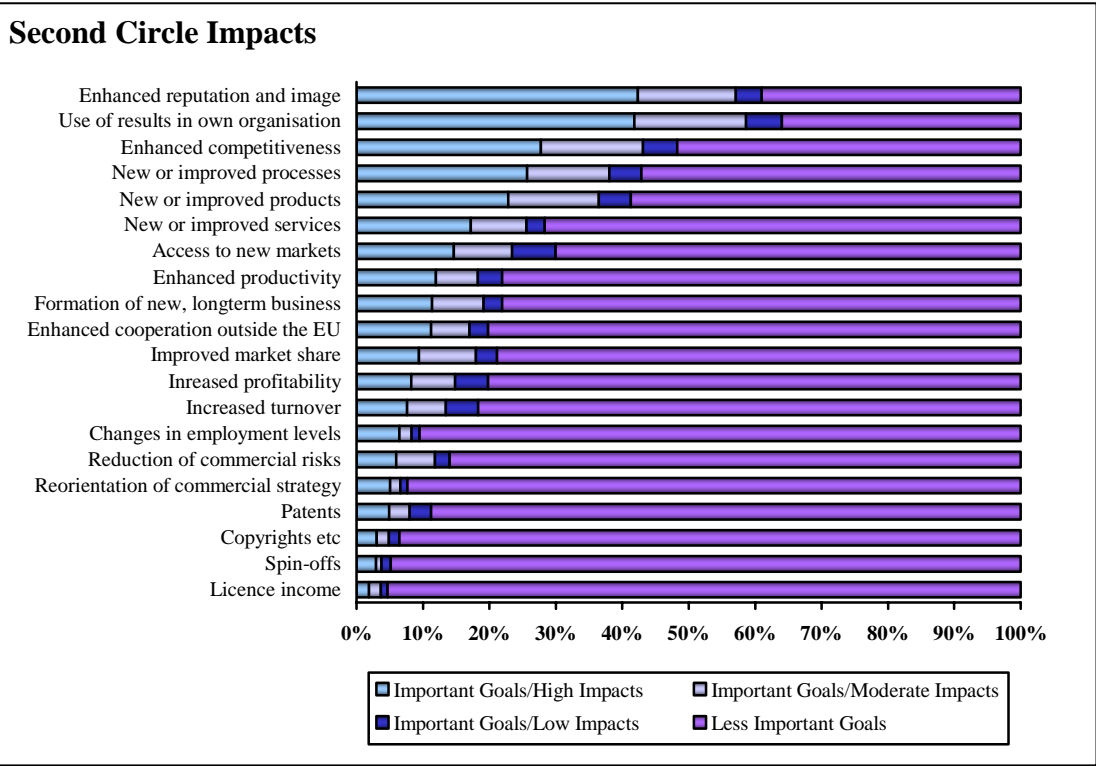
within their own organisations, and goal attainment and impacts were high here too. For example, the majority (63%) of participants ranked this as an important or very important goal, 80% of the total population achieved or over-exceeded expectations, and 50% testified that impacts on their research teams were high or very high.



Concerning the goal of enhanced competitiveness, the achievements of the majority of participants (72%) matched their expectations. Impacts were also high or very high for 31% and moderate for a further 36% of the total population, though they were low for the remaining 33%. The picture is brighter, however, when we look at that half of the population for whom competitiveness was an important or very important goal. The figures for achievement, over achievement and underachievement in this instance were 61%, 20% and 19% respectively. Moreover, impacts were high or very high for 58% of this sub-group and moderate for a further 32%.

Similarly, goals such as new products, processes and services were only important or very important for 38%, 39% and 26% of the population respectively (mainly industrial participants), but goal achievement and impacts were high for these sub-groups. Taking the development of new products as an example, for those regarding this as an important goal, nearly three-quarters achieved or exceeded their goals, and impacts were high or very high for 55% and moderate for a further 33%.

Once again, therefore, the conclusion is clear. Even for goals that were important only to a minority, goal attainment and impacts were significant for the majority of those for whom the goals were important.



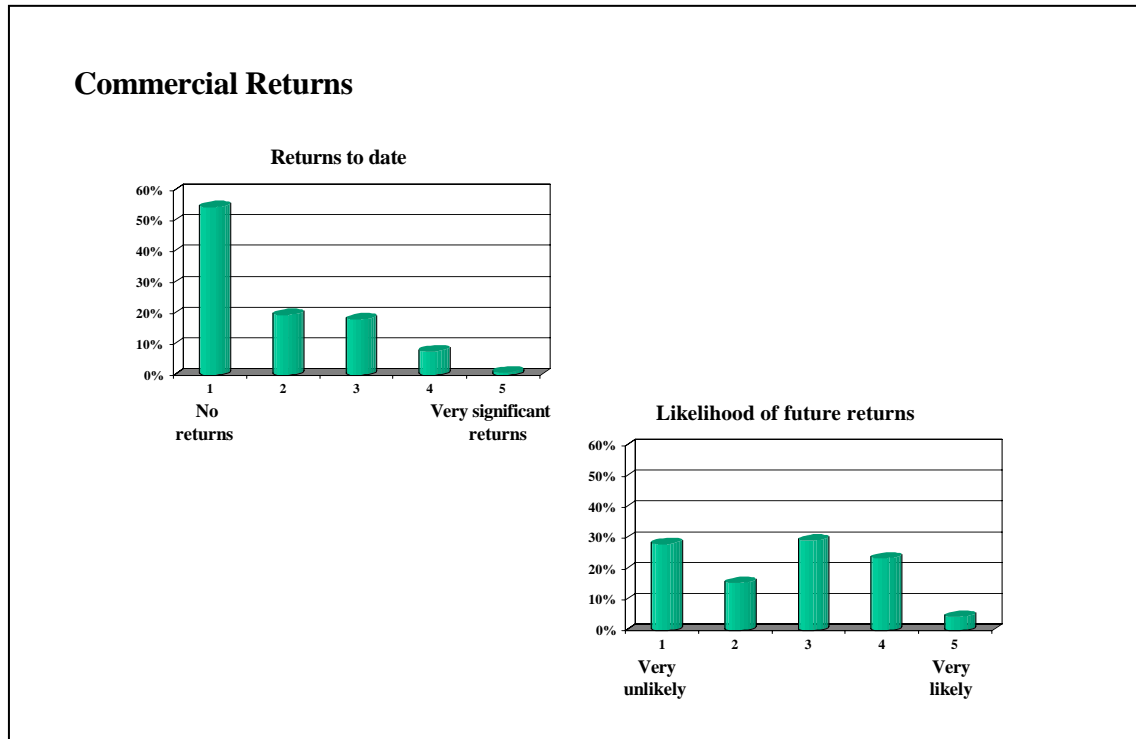
Commercial Returns

Although the majority of participants ranked knowledge and networking goals above exploitation goals and prized the internal use of project results more widely than the subsequent production of new products, processes and services or the attainment of downstream goals such as improved competitiveness, market share etc., the expectation in most collaborative programmes is that projects – albeit directly or indirectly – will enhance the collective commercial prospects of participants, especially industry participants.

The questionnaire to participants in FP5 included a number of questions dealing directly with commercial returns. Low response rates made the interpretation of results very difficult, however. The response rate of academics was 44%. For industry it was 58%. The probability that these organisations had not received any commercial returns and were not likely to in the future is high, though the possibility that they were simply reluctant to discuss commercially sensitive issues cannot be discounted. The figures that follow, therefore, are based solely on the population responding to the questions on commercial returns and should be regarded as upper estimates for the population as a whole.

In FP5, about half the participants had profited from commercial returns by the time of the questionnaire, though only a handful (8%) had had significant returns – a figure not out of line with expectations for commercial in-house R&D portfolios. Over time, however, the percentage likely to receive some form of commercial return was expected to rise to around 60%, with those already in receipt of returns much more likely to receive them in future than those with no returns to date. This was especially so for industry participants. The

overwhelming conclusion is that participation in FP5 had led, and is expected to lead, to significant returns for a few and modest returns for many, but that a sizeable proportion (33% overall; 47% of academics and 20% of industry participants) had not received and were not expecting to receive commercial returns.



The expectation that the proportion likely to receive some form of commercial return in the future will rise is given credence by comparison with the results of two previous analyses of FP3 and FP4 projects: one carried out in 2000; the other in 2004. In the first of these, the results were similar to those for the FP5 sample, i.e. about half the FP3 and FP4 respondents answering the question on commercial returns had received some form of return by the time of the 2000 questionnaire. By the time of the subsequent 2004 survey of FP3 and FP4 participants, however, this proportion had risen to 70%, with 31% regarding these returns as significant.

Staff Levels

About half of all participants took on new staff in order to conduct their FP5 projects, with 28% taking on staff from their own countries; 14% taking on staff from other EU countries; and 6% taking on staff from outside the EU. For academics, the proportion taking on new staff rose to 60%, whereas for industry it fell to 40%. Within industry, however, staff levels tended either to remain the same or even to increase after the end of projects, whereas in academic quarters the situation was more volatile, with staff levels remaining the same or increasing for 70% of those who had taken on staff during the course of their FP5 projects, and decreasing for the remaining 30%.

What makes a successful project?

Although the majority of participants in FP5 attained their overall goals and felt that the impacts and benefits of participation outweighed the costs, there were significant variations in performance between participants. Such variations have many causes. Project progress and overall performance can be affected by a range of factors, both endogenous and exogenous to projects. Within projects, performance can be affected by factors such as the quality of project leadership, the technical capabilities of the partners, the clarity of project goals and the level of communication between partners. Changes in the external environment can also affect progress. The commercial success of a rival technology, for example, can drastically affect the relevance and utility of project goals and outcomes and undermine eventual success.

Obstacles and Success Factors

In the questionnaire, participants were presented with a list of 25 'neutral' factors (e.g. partners' technical capabilities) and asked to describe the 'state' of these factors within the project, using a 1-5 scale to indicate 'negative' states (e.g. with poor technical capabilities scoring a '1' on this scale) or 'positive' states (with good technical capabilities scoring a '5'). They were then asked to use another 1-5 scale to indicate whether these factors had been obstacles or success factors. The proportions of participants considering particular 'positive' factors to be major success factors were then plotted. Similarly, the proportions considering particular 'negative' factors to be important obstacles to success were also plotted.

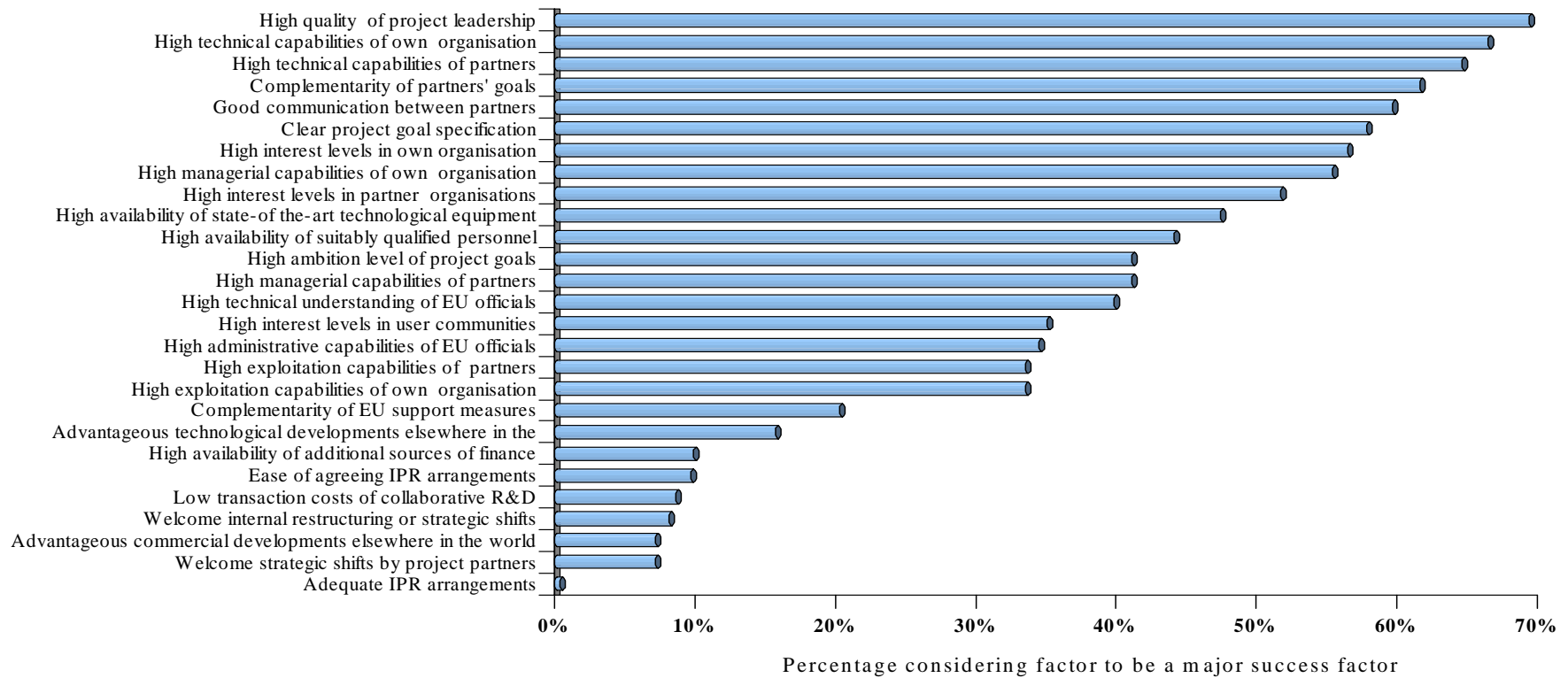
Most participants in FP5 considered a small core of endogenous factors to be key success factors. These spanned the high quality of project leadership (with 69% considering this to be a major success factor); the high calibre of their own technical (67%) and managerial (55%) capabilities; the high calibre of their partners' technical (65%) and managerial (41%) capabilities; the complementarity of partners' objectives (62%) and the existence of well-specified (58%) and ambitious (42%) project goals; good communication between all partners (60%); high levels of interest within all concerned parties (own organisation - 56%; partners - 52%; user communities - 35%); the high quality of the technical equipment available to them (47%); and the availability of suitably qualified personnel (44%).

In contrast, a limited number of participants considered the obverse side of some factors to be important obstacles to success, though only one factor was perceived as a major obstacle by a significant proportion of participants. Whereas just 10% of participants had counted the ready availability of additional funding as a major success factor, the lack of availability of additional funding was seen as a major obstacle to project success by 31%. In comparison, no other factor was seen as an important obstacle to success by more than 10% of the population. The low administrative capabilities of EU officials were seen as a major obstacle by 10%; unwelcome strategic shifts by

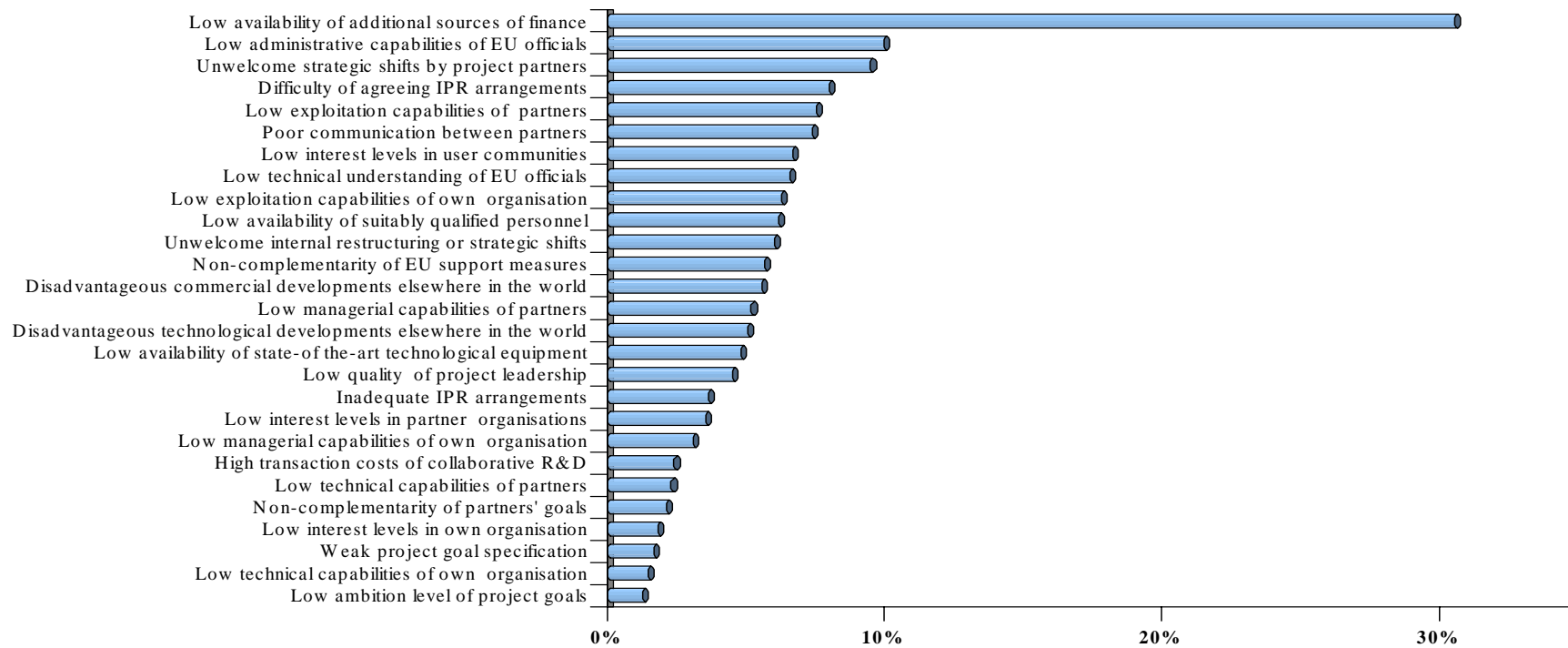
partners hindered progress for 9%; and difficulties agreeing IPR were major obstacles for 8%.

A comparison of the obstacles and success factors for different types of organisation also revealed that life in FP5 was harder for SMEs than for any other group. Almost all factors were perceived in a more negative light by SMEs, and all factors had less of an impact on success, or constituted more pronounced obstacles to success, than they did for other types of organisation.

Major Success Factors



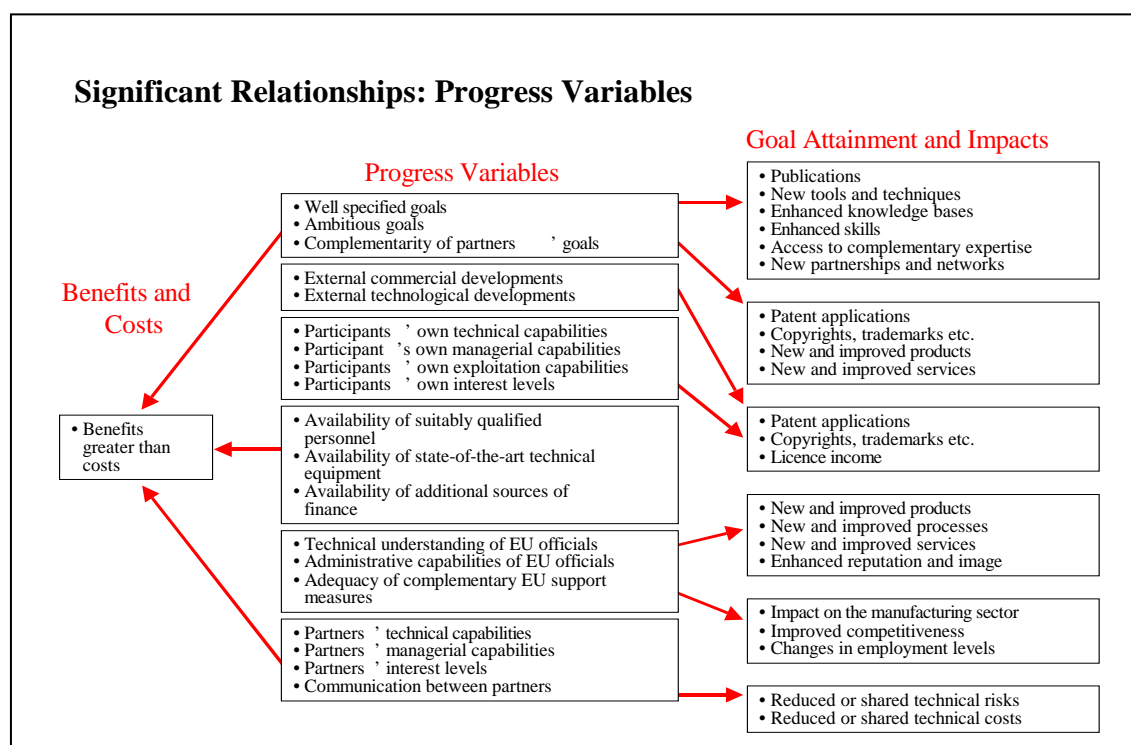
Major Obstacles



Percentage considering factor to be a major obstacle

Significant Relationships

To further explore the factors underpinning project success, a more sophisticated multivariate analysis was conducted.² This looked for significant relationships between five sets of variables spanning the **nature** of the work conducted in each project (e.g. risk and cost levels, work in core or peripheral technology areas etc.); the factors affecting project **progress** (e.g. technical and managerial capabilities, well-specified goals, good communication etc.); levels of **goal attainment** (for both First Circle and Second Circle goals); **impact** levels in First, Second and Third Circles (where Third Circle impacts affect those other than the project partners); and, finally, as an indicator of the overall success of projects, the perceived ratio of **benefits to costs**. In the first instance, the overall number of variables in each of the five sets was reduced to a smaller number of composite variables via Principal Component Factor Analysis. Secondly, these new variables were subjected to a correlation analysis.



The analysis confirmed that a number of significant relationships existed between specific **progress** variables and particular indicators of project success in terms of **goal attainment**, **impact levels** and **benefit/cost ratios**. These can be summarised as follows:

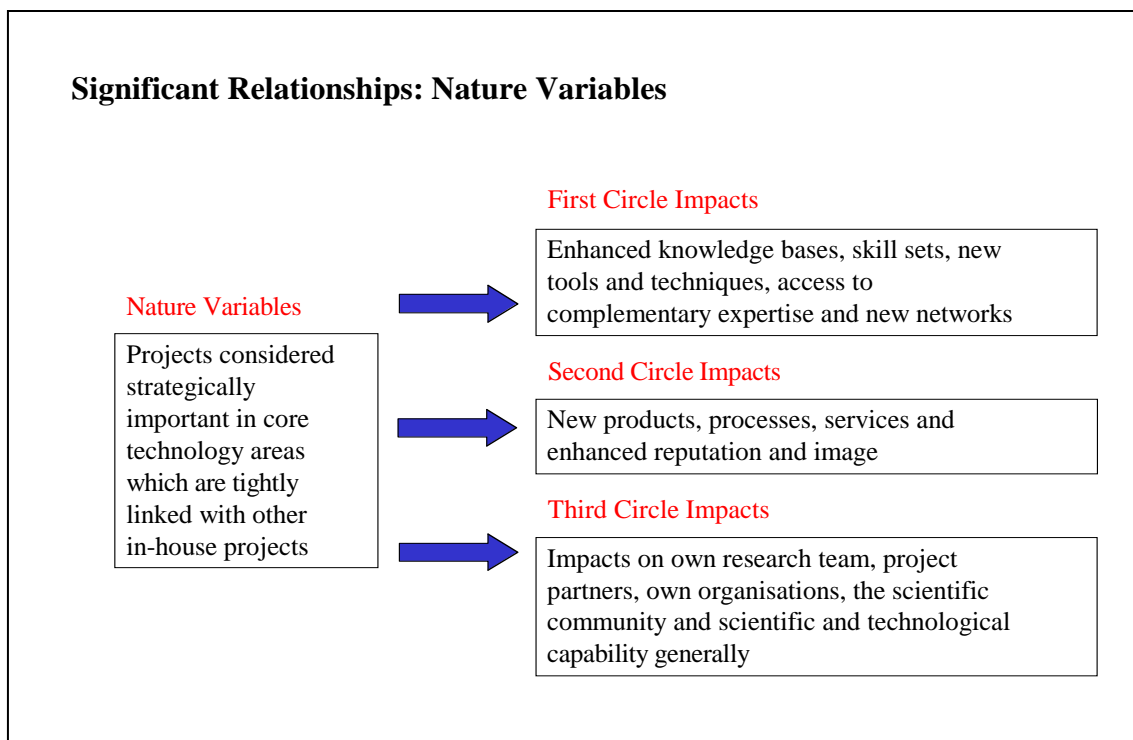
- Participant's own capabilities and interest levels and favourable external technological and commercial events were positively linked with outcomes such as patent applications, copyrights and licence income

² The team is greatly indebted to Valeria Arza of SPRU, University of Sussex, who assisted with this analysis.

- Partners' capabilities and good communication between them were positively linked with successful cost and risk reduction and high benefit to cost ratios
- Well-specified, ambitious goals and the complementarity of partners' objectives were positively linked with high impacts on the knowledge and networking capabilities of research teams, high impacts on parent organisations in terms of outputs such as patent applications, copyrights, products and services, and high overall benefit to cost ratios
- On the input side, the availability of suitably qualified personnel, state-of-the-art technological equipment and additional sources of finance were positively linked with high benefit to cost ratios

Interestingly, the analysis also revealed an association of direct relevance to programme management, since the technical and administrative capabilities of EU officials and the existence of adequate support measures were also found to be positively correlated with outputs such as new products, processes and services; with the enhanced reputations of participants; and with downstream improvements in economic competitiveness and employment, particularly in the manufacturing sector.

The strongest correlations, however, were found not between **progress** variables and other variables, but between **nature** variables and **impact levels**. In short, projects considered to be of high strategic importance that were tightly linked with other projects in the core technology areas of organisations were positively associated with a range of impacts, namely:



- First Circle impacts such as enhanced knowledge bases and skill sets, new tools and techniques, access to complementary expertise and the formation of new networks
- Second Circle impacts associated with the production of new products, processes and services and the enhanced reputation and image of participants
- Third Circle impacts on own research teams, project partners, own organisations, and the scientific community and scientific and technological capabilities generally.

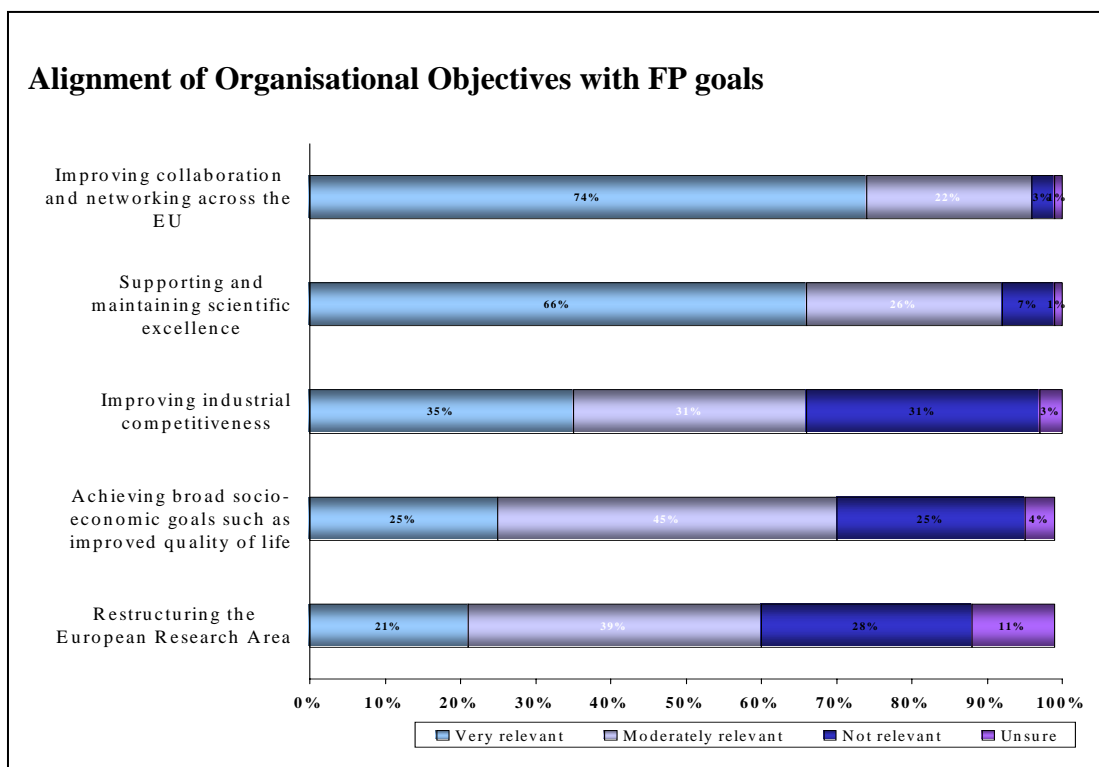
Do the Framework Programmes work?

From the perspective of a participant in FP5, the question of whether the Framework Programmes work or not can be assessed in terms of:

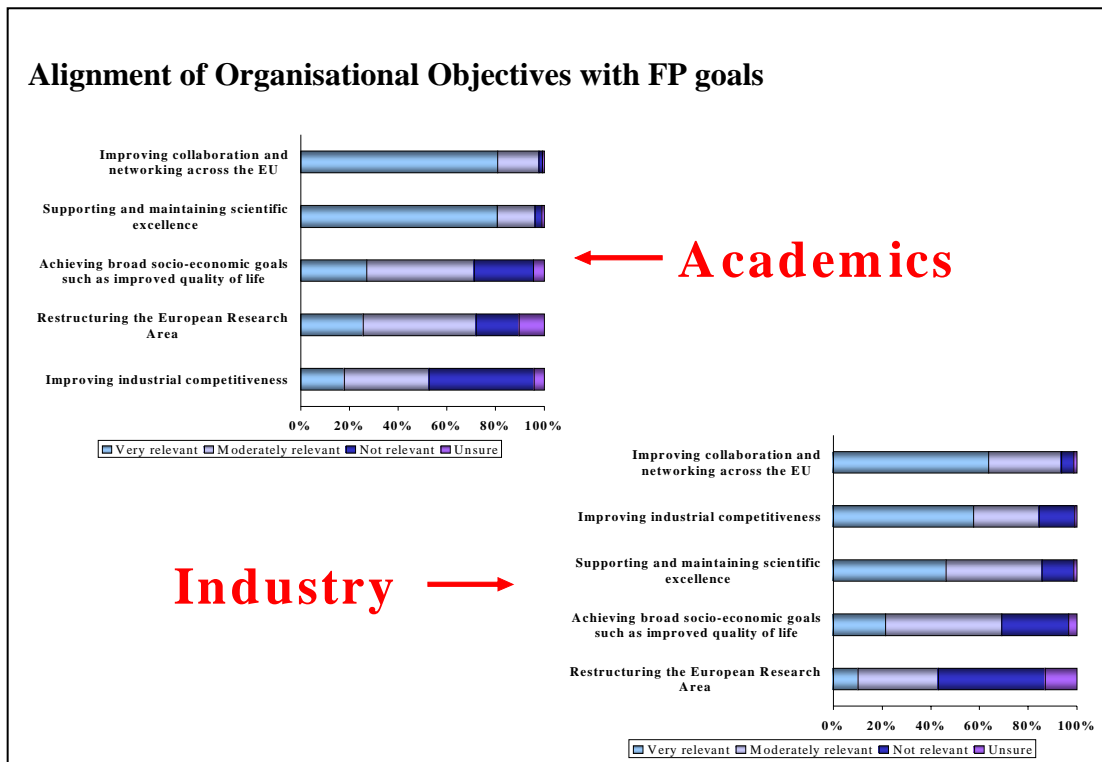
- The alignment of the strategic objectives of the Framework Programmes with their own strategic priorities
- The satisfaction of participants with the way the Framework Programmes have been implemented, especially comparisons between past and present satisfaction levels
- Whether or not the Framework Programmes have delivered the results they were anticipating.

In terms of the latter, all the evidence discussed so far points to the success of FP5 as a vehicle for the majority of participants to attain important goals and reap expected outputs, outcomes and benefits. As regards the other issues, however, a mixed picture emerges.

Alignment with Organisational Objectives



Questionnaire respondents were asked to indicate which of the strategic objectives of the Framework Programmes were most relevant to the goals of their own organisations. The results strongly indicated that one of the main objectives of the Framework Programmes, namely improved collaboration and networking across the EU, was very much in line with participants' own priorities. However, whereas the focus on collaboration was strongly aligned with the interests of both academic and industrial participants, partners in Higher Education Establishments and Research Institutes were – perhaps understandably – much more aligned with the pursuit of excellence in research – another major goal of the Framework Programmes – than their industrial partners, 52% of whom felt that such a goal was only moderately relevant or not relevant to their strategic priorities. Conversely, industrial partners were much more aligned with the goal of improving industrial competitiveness across the EU.



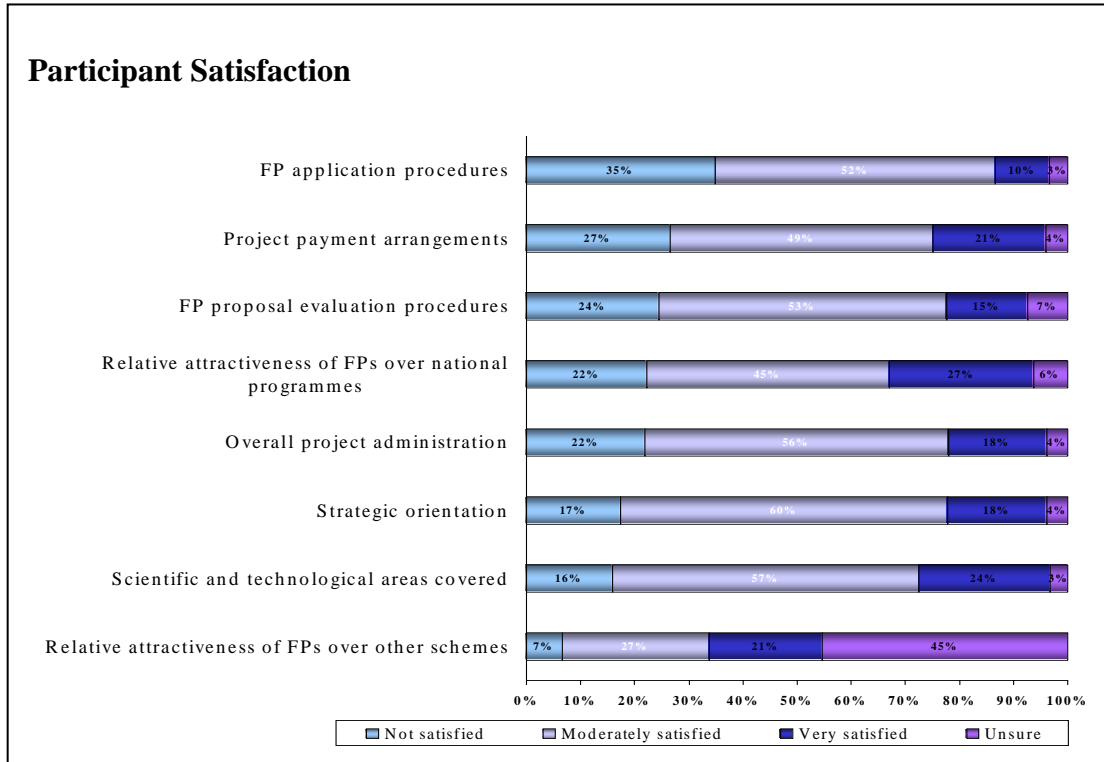
Academics and industrial perspectives converged in terms of the relevance to both groups of the Framework Programme’s emphasis on the attainment of broad socio-economic goals, such as improvements to the quality of life. Perhaps surprisingly, over two-thirds of both populations agreed that these goals were also moderately or very relevant to their own strategic priorities. There was greater divergence, however, over the relevance of the current focus on restructuring the European Research Area. Whereas two thirds of academics felt that this goal was in line with their own interests, only 43% of industrial participants concurred.

Participant Satisfaction Levels

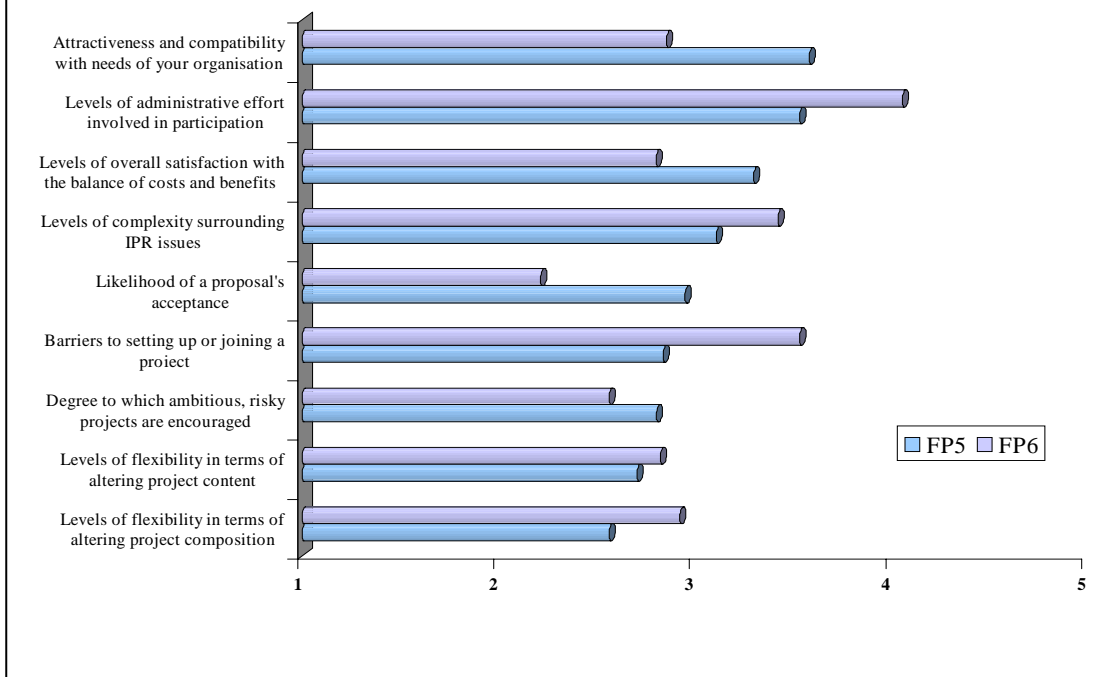
Participants were asked to assess their current and past satisfaction with a number of aspects of the implementation of the Framework Programmes. These included the strategic orientation of the FPs, the range of scientific and technological areas covered by them, a variety of aspects relating to the administration of the FPs and their relative attractiveness compared with other types of support scheme.

The majority of participants were moderately satisfied with most aspects of current programme implementation. Fewer were very satisfied. Participants were most satisfied with the range of scientific and technological areas covered (with 24% very satisfied and 57% moderately satisfied); with the strategic orientation of the FPs; with programme administration overall; and with the relative attractiveness of the FPs over national programmes of a similar nature. Conversely, participants were most dissatisfied with FP application procedures (35% dissatisfied); FP project payment procedures (26%); and FP proposal evaluation procedures (24%).

Satisfaction levels with the administrative aspects of past FPs, however, have decreased over time, though participants were generally more satisfied with the strategic orientation and scientific and technological coverage of the current Framework Programme than they were in the past. They were less sure about the relative attractiveness of FPs when compared with other types of scheme.



Comparison of FP5 with FP6



The growing dissatisfaction over time with the administration of the FPs was also highlighted when participants were asked to compare the instruments used in FP5 (e.g. Shared Cost Research Projects, Demonstration Projects and Mobility/Training Projects) with those used in FP6 (e.g. Integrated Projects and Networks of Excellence). On most counts, more participants were dissatisfied with the FP6 instruments than with the FP5 instruments. For example, the majority of participants felt that the levels of administrative effort associated with involvement in FP6 were high. The same was true for FP5, but the majority was smaller. Similarly, whereas many participants felt that FP5 was both attractive and compatible with the needs of their organisations, a smaller proportion felt this way about FP6. The only exceptions concerned the flexibility of the FP6 instruments. Participants generally felt that these allowed greater freedom in terms of altering both the content of projects and their composition.

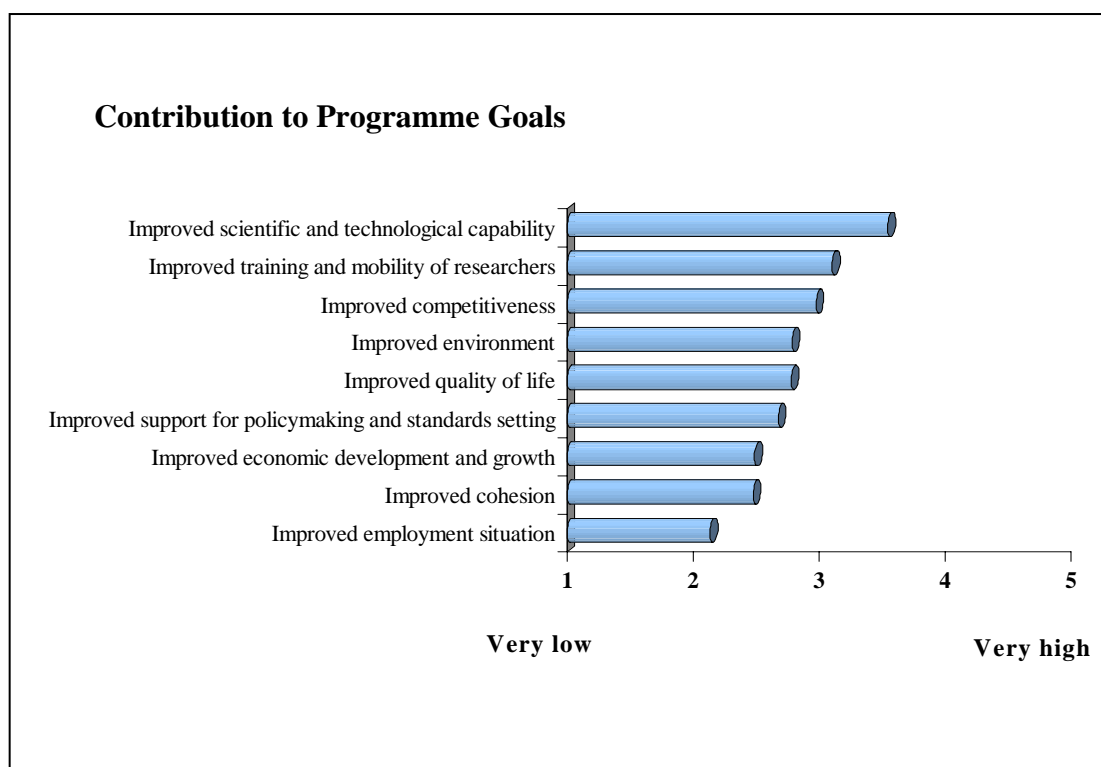
How does Europe benefit?

Assessing the overall impact of FP5 on the socioeconomic milieu in the EU is not something that can be tackled via a questionnaire to participants. Such an approach, however, can provide some clues as to how Europe benefits from the existence of the Framework Programmes.

The most obvious way in which the EU benefits from the Framework Programmes is if the participants achieve their own goals and resultant impacts on these organisations are high, which was generally the case in FP5. In addition, however, all these achievements have to:

- Contribute to the realisation of overall programme goals
- Have noticeable Third Circle impacts on overall indicators and levels of, for example, EU scientific and technological capabilities and industrial competitiveness
- Represent high additionality from the point of view of the EU as well as the participants themselves.

Contribution to Programme Goals



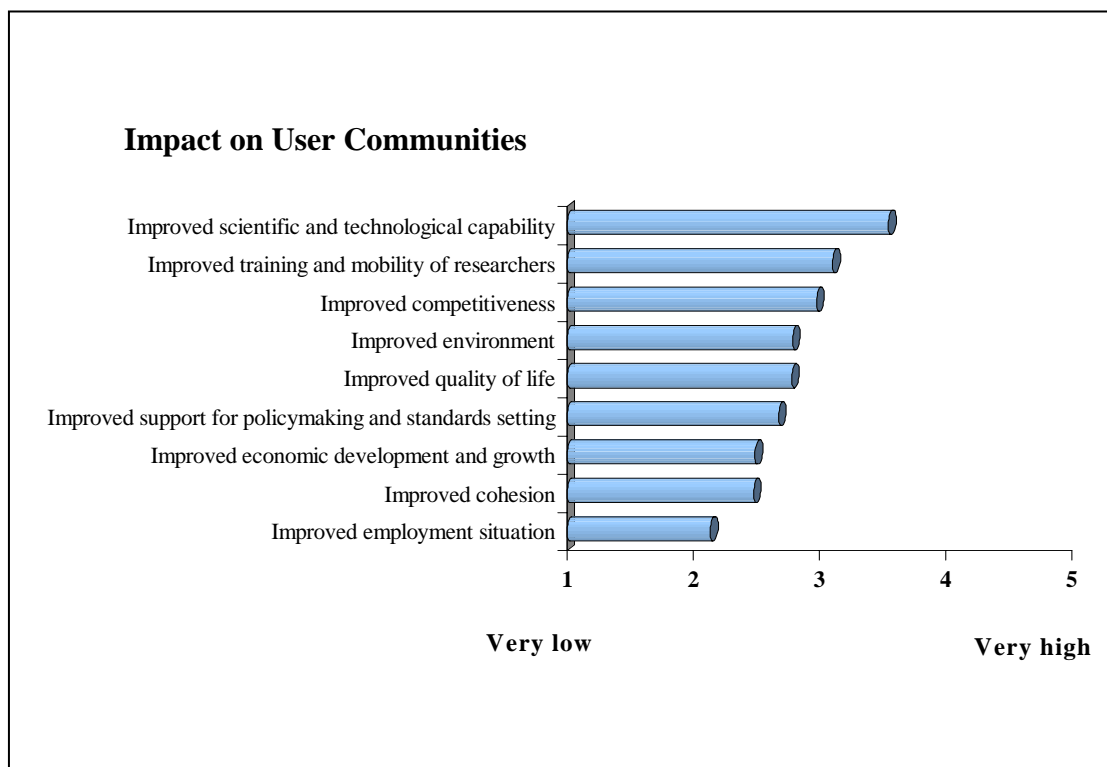
The overall goals of the Framework Programmes have evolved over time. Some, like the goals of improving the scientific and technological capability of the EU and improving competitiveness, have been constants over many years. Others, such as socioeconomic goals related to improved environmental conditions and quality of life, have been fairly recent additions. In the questionnaire, participants were asked to indicate the extent of the contribution

of their FP5 projects to individual programme goals along a scale of 1 (no or very low contribution) to 5 (very high contribution).

The results indicated that the majority of participants felt that their projects had made significant contributions to the goals of improved scientific and technological capability, improved training and mobility of researchers, and enhanced competitiveness. The contribution to training and mobility was particularly marked for academics, whereas the contribution to competitiveness was more marked for industry participants. The contributions to improved employment were much less apparent, which is not overly surprising given that such impacts are generally a downstream consequence of overall economic growth.

The achievements of participants, and hence of FP5, in the spheres of enhanced knowledge bases, skill sets and training and mobility are also in line with many of the goals set at Lisbon by the European Council. If the EU is to become an important knowledge-based society, the provision of more and better-trained researchers is a necessity. Such capability enhancement is also an important step on the path to the creation of a stronger European Research Area – a goal established after the onset of FP5, but to which the programme has undoubtedly contributed.

Impact on User Communities



Participants were asked to rate the impact of their projects on various communities using a scale of 1 (no or low impact) to 5 (very high impact). For benchmark purposes, these communities included their own research teams, their project partners and their own organisations, but they also included

communities as varied as the scientific community in general, policymakers and regulators, and different economic sectors.

As expected, the majority of participants considered impacts to be highest for their own research teams and for their project partners. Interestingly, though in keeping with the profile of a collaborative R&D programme prioritising 'first order' knowledge and networking goals over 'second order' exploitation goals, more participants also considered impacts on the research community at large to be greater than the impacts on their own organisations, and this was the case for both academic and industry participants.

Major impacts on other communities were less widespread. Typically a minority of projects had large impacts in these quarters, with the majority having more modest or even very limited impacts. FP5 was undoubtedly important for the organisations involved and for the broader research community, but impacts elsewhere were diffuse. This is entirely in line, however, with overall expectations for a collaborative R&D programme, since the funding for these constitutes only a very small proportion of the R&D likely to influence overall developments in the user communities considered.

Additionality from an EU Perspective

The responses to the questionnaire demonstrated that the activities facilitated by FP5 were additional (either in a 'pure' or 'behavioural' sense) to those that the participants would have undertaken in the absence of the programme. From the perspective of the Commission or the EU as a whole, however, this is not enough. Usually such activities have to be additional in the sense that, in the absence of the programme, they wouldn't have been carried out by anybody else either.

Demonstrating this via a questionnaire to participants is not feasible, but questionnaires can be used to throw light on the issue of whether the additionality perceived by participants is in line with interests of the public sector. This can be done via an examination of the strategic importance of the projects funded, since it is not in the interests of the Commission or the EU as a whole to support marginal projects of low strategic importance, however additional they might be.

Additionality and Strategic Importance

	Pure Additionality	Behavioural Additionality	No Additionality	Negative Additionality	TOTAL
High Strategic Importance	38.7%	30.6%	3.8%	0.9%	74.0%
Moderate Strategic Importance	13.6%	4.6%	1.1	0.1%	19.4%
Low Strategic Importance	4.9%	1.3%	0.3%	0.1%	6.6%
TOTAL	57.2%	36.5%	5.2%	1.1%	100.0%

In FP5, very few projects of low or even moderate strategic importance to participants were funded, and the large majority (two thirds) of projects were both additional and of high strategic importance to firms. In other words, additionality in FP5 was in line with both the interests of the firms involved and the interests of the Commission and the EU as whole.

Conclusions

The importance of the macroeconomic relationship between R&D, enhanced competitiveness and economic growth has been widely recognised for many years. Establishing a relationship, however, between economic growth at an EU level and specific R&D projects or sets of projects, e.g. those carried out under the auspices of the Framework Programmes, is not feasible, primarily because such projects constitute only a very small proportion of the projects carried out by the R&D actors in the Member States. Neither is a questionnaire addressed only to participants the most effective way of collecting information on the impacts of participation on anybody other than the participants themselves.

Nevertheless, such questionnaires have their uses. In particular, they can reveal a great deal about goal attainment and the impacts of participation on the project partners, which in turn provides a perspective on overall programme effectiveness. Collaborative R&D programmes such as FP5 are generally expected to contribute to economic growth by stimulating interactions between individual R&D actors within innovation systems – interactions that are then expected to strengthen both their knowledge and exploitation competences. In a very real sense, therefore, judgements of programme effectiveness are dependent on the aggregate achievements of participants in these spheres. Moreover, by collecting information on the satisfaction or otherwise of participants with various aspects of programme implementation, questionnaires can also provide an overview of programme efficiency.

In terms of programme effectiveness, there can be little doubt that FP5 was a success. Firstly, there were high levels of goal attainment and strong First Circle knowledge and networking impacts on research teams, all in line with the generic goals of collaborative R&D programmes. Secondly, there were major Second Circle achievements in terms of the internal use of project results and the enhanced reputations of participating organisations, with indications that competitive position had been strengthened for many and modest commercial returns achieved by significant numbers, especially by industrial partners ranking such goals as important. Finally, although Third Circle impacts on user communities and even further downstream were weaker, these results were in line with expectations for collaborative R&D programmes.

There were some indications, however, that overall levels of satisfaction with both the benefits associated with the Framework Programmes and with programme efficiency were in decline. Although most participants were broadly satisfied with many aspects of programme implementation, significant minorities were dissatisfied with application and proposal evaluation procedures and with project payment arrangements, and this dissatisfaction had increased over time. Moreover, the transition from FP5 to FP6 had not been smooth, with comparatively more organisations dissatisfied with the FP6 instruments than with the FP5 instruments. The fact that first time participants in FP5 were either less likely to apply for FP6 funding or more likely to fail in their applications than more experienced participants was also a concern.

If future Framework Programmes are to continue to attract academic and industry partners and enable them to attain strategically important goals, steps will need to be taken to improve the acceptability of programme procedures and modalities. Overall programme performance could also be improved by ensuring that proposal selection criteria adequately reflect many of the project attributes associated with successful outcomes, e.g.

- The presence in proposals of clearly specified and ambitious project goals
- Evidence of sound technical, managerial and exploitation capabilities within partnerships
- Indications that partners consider projects to be strategically important projects in core technology areas.

European Commission

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