

Annual Impact Review of EUREKA 2005-6

Report of an Independent Expert Panel

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Executive summary

This report presents the findings of an independent review of the socio-economic impact of EUREKA projects. It has been prepared by a panel of experts mandated to provide an Annual Impact Report based upon EUREKA's Continuous and Systematic Evaluation.

The **overall conclusion** is that EUREKA continues to work well and it achieves its goals of developing technology-based innovative products through R&D projects. By these means it raises the productivity and competitiveness of those parts of European industry that take part as well as creating broader benefits

Evidence comes from 15 case studies of Innovative Projects and nine of projects within the EUREKA Clusters plus an analysis of Final Reports from the Continuous and Systematic Evaluation (CSE) database covering 678 participants in 328 projects that finished between 1 January 2001 and 31 December 2005. This gives a coverage of just over half of all projects in this timeframe. The case studies were based on a methodology designed to examine the full range of effects. Extended summaries of each of them are presented in this report to give a full picture of effects.

Key effects are:

- **EUREKA projects have clear market impact.** Almost two-thirds (63%) of participants expect to exploit their results in the market and 29% had already done so when they submitted their Final Report. 45% report good or excellent commercial impact. SMEs are particularly successful at bringing their products rapidly to the market.
- **Innovative projects have achieved high levels of sales** – 196 participants achieved €635 million additional turnover with €1,823 million expected within 3 years by 678 participants. Compared with total project costs for all participants this gives a conservative ratio of R&D costs/additional turnover of 57% upon completion and 219% within 3 years. If allowance is made for non-response this figure could be up to four times higher. Assuming 30% public funding this would indicate that for every Euro of subsidy between 13 and 53 Euros of additional turnover effects are generated.
- **Cluster projects have a longer time-to-market** but in the case-studies the technologies developed are expected typically to account for significant shares (around 20%) of the firms' revenues in very large markets.
- **Turnover benefits are unevenly distributed.** 12% of the projects accounted for 65% of effects on additional annual turnover at the point of the final report, while 60% of projects accounted for 4%. These results are typical of most R&D portfolios.

- **Projects are normally aligned with firm strategies but also create pathways to transform them.** Changes included movement from R&D services/consultancy to manufacture and assisting privatised state enterprises to become commercially viable. Improvements in organisation and methods induced by the project, including working at a higher technological level, were frequently internalised by the firms.
- **Reduced process costs were substantial for some projects and generally a core goal for Sub-Cluster projects.** The clearest example was the ITEA CAFÉ project where managed reuse and variability on software production led to product cost reduction of 60-70% and productivity a factor of between two and six times higher. Product lead time for major offerings such as Nokia's smartphones and Philips Medical Systems has been halved.
- **Use of technologies developed in other parts of the business represents a neglected aspect of benefits.** As well as opening new technological options through follow-on projects, several firms have applied the technologies developed to exploit new opportunities, potentially with turnover effects equal to or greater than in the originally intended application.
- **New contacts and networks have been generated by both types of projects.** Among Sub-Cluster projects the mobilising effect on large sectors is important, for example the AUTOSAR network in the automotive industry which emerged from ITEA EAST EEA. Prestige effects of the EUREKA label are helpful to give smaller firms a foothold in the market and visibility to investors.
- **The CSE database indicates 895 new jobs created in firms participating in Innovative projects and 1748 expected in non-participants.** As with additional turnover these figures could be multiplied for non-response. Case studies show qualitative benefits in upgrading employment by increasing the ratio of qualified scientists and engineers subsequently employed.
- **User and social benefits are substantial,** both to the direct customers of the innovating firms, where short payback periods indicate the value being generated for them by the EUREKA innovations. and beyond to end users who in several cases benefit from improved environments, safety or simply from better value for money and functionality in everyday objects.

The benefits above can be clearly attributed to EUREKA through two mechanisms:

- **Public funding** - for both categories of projects the additionality of public funding in enabling, extending or accelerating the work was stressed –there were no success cases without public funding and some remarked that they had not returned to EUREKA because the type of funding that had underpinned their success was no longer available. Advice from funding agencies was helpful to smaller or less experienced firms and large firms spoke very positively of the role of cluster offices.

- **Collaboration** between partners was an important aspect, allowing complementary skills to be brought together, often in a vertical structure, linking users and suppliers. In the clusters “pre-competitive” configurations were also visible, establishing de facto standards or sharing the cost of developing technologies that would be applied in different sectors. It was often the initiative of EUREKA that brought together these networks.

Success factors observed in the projects included having a clear target market in mind from the outset, the flexibility to pursue opportunities when they emerged, a clear vision and commitment from the main partner and a good alignment between EUREKA and company strategy.

Finally, we comment on the impact assessment itself. This has been limited by the resources available (100 person-days of effort) and could have benefited from extending the depth of the case studies and the analysis of the database. Questions beyond our remit such as the functioning of EUREKA structures and of projects could not be addressed. The CSE data collection method requires revision in several respects to improve quality control and to harmonise with the wider “audit trail” of projects. This in turn would enable a better method for case-study selection.

However, we believe that this assessment has demonstrated that EUREKA has contributed to extensive socio-economic benefits particularly for those who take part but also for a wider range of beneficiaries. The methodology has allowed less visible benefits to be highlighted and to demonstrate that the EUREKA policy instrument offers excellent value for money.

Part 1

Introduction

1 Introduction

EUREKA is an intergovernmental initiative which exists to raise the productivity and competitiveness of European industry. Since 1985 it has done this by supporting collaborative European projects to develop technology-based innovative products, processes and services.

This report is intended to give information on the broad range of socio-economic impacts (direct and indirect) of the projects EUREKA supports. It is intended for all of the stakeholders in the Initiative, including the political authorities who represent the taxpayers supporting it, policy managers and operators who are accountable for its successful management, those who work with it in national agencies and the European Commission, and of course the past and potential participants from industry and other organisations. All of these have an interest in understanding the extent and nature of these benefits.

As noted at EUREKA's Industry Day in 2005, the landscape for industrial R&D has become ever more competitive. For larger firms competition is clearly global and the pressure is for R&D also to become globalised. Proximity to major markets in the USA and China combines with the high quality of the science base in the former and the low cost of the latter to put at risk the location of new R&D investment in Europe. This creates a strong incentive for European governments to act together to create a more favourable environment for research and innovation. The dynamism of the SME sector is recognised as a key element of a successful knowledge economy. Large and small firms are brought together in a new ecology of industry in which corporate venturing, outsourcing of R&D to SMEs, specialised labs and universities has grown threefold. At the same time innovation increasingly requires close links with customers and suppliers, and with regulators who shape the market. In this open innovation system the kind of cooperation supported by EUREKA is even more important.

Against this background of change how confident can policymakers be that support for collaborative industrial R&D delivers the benefits that they desire? As ways forward are sought with the revised Lisbon Agenda and the need to "create an innovative Europe"¹ this report seeks to provide at least a partial answer to that question. This is not a presentation of "success stories" but rather an assessment of already realised socio-economic effects.

For those unfamiliar with its mechanisms, the decentralized EUREKA Network brings together partners from different European countries and lends its label to projects. National administrations frequently provide funding to participating companies and their partners in research centres and universities. This may or may not come from a dedicated budget. Projects are of three types. Standard Innovative Projects are stand-alone and particularly popular with SMEs. EUREKA Umbrellas are thematic networks which

¹ Creating an Innovative Europe – Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit, European Commission EUR22005, January 2006

generate projects in a specific technological area or business sector. EUREKA Clusters are larger scale industry-led pre-competitive initiatives, often concerned with standards or families of complementary products and processes. Sub-Cluster Projects are supported within the broader framework. All types of projects exhibit the flexible “bottom-up” character much favoured by industry.

1.1 Terms of reference

The terms of reference of this exercise were to prepare an Annual Impact Report for EUREKA based upon analysis of the detailed economic and other impacts of selected case studies of Innovative and Sub-Cluster Projects and upon analysis of the relevant Final Reports submitted by participants which constitute the Continuous and Systematic Evaluation database. The case studies were carried out by a panel of independent experts from different countries active in Eureka and analysed by the core team, who also prepared this report. Advice and support were provided by members of the Czech Chairmanship, the EUREKA Secretariat and the European Commission. The total resource available for the exercise was 100 working days.

1.2 Fifteen Years of Evaluation in EUREKA

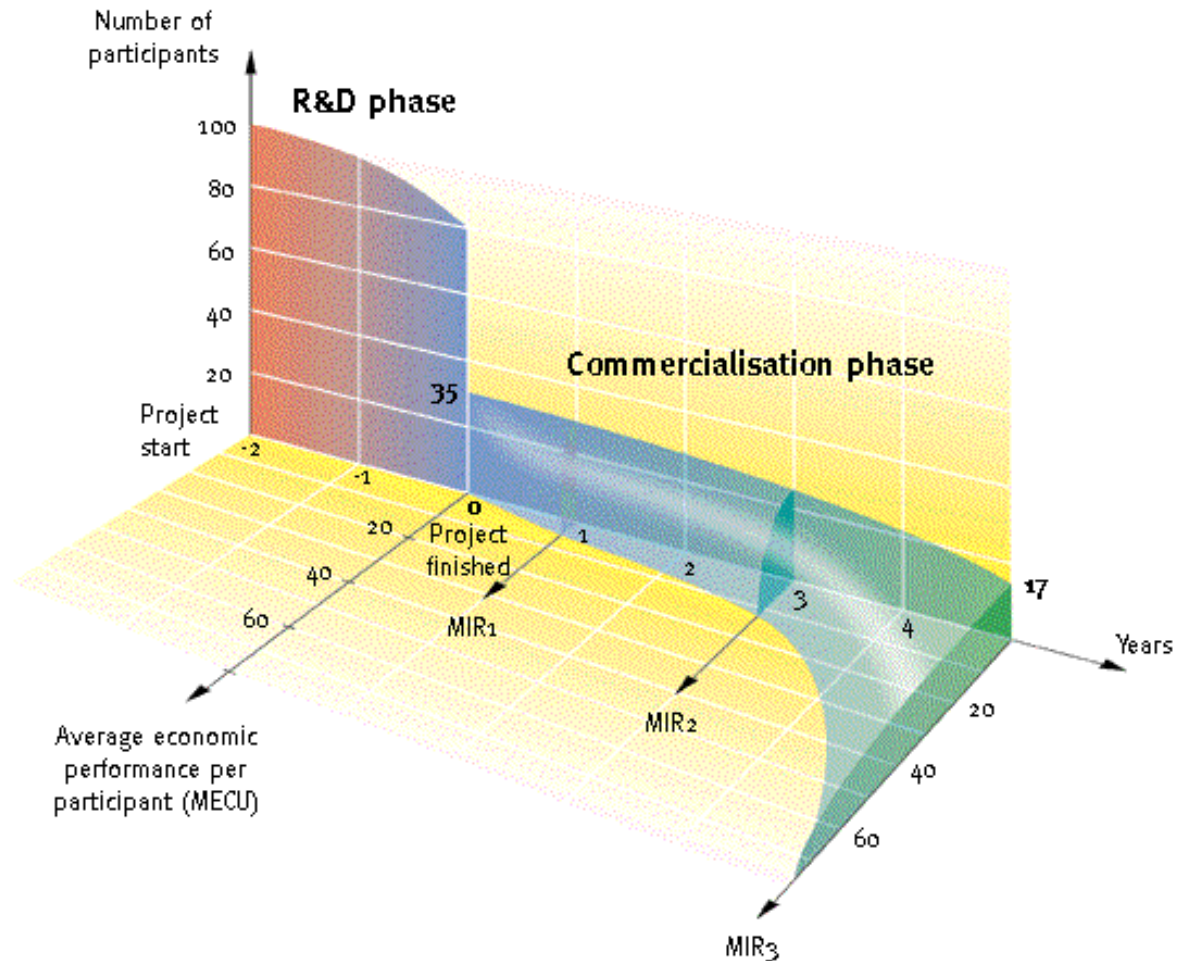
In this 20th anniversary year of EUREKA, it is worth noting also the contribution that EUREKA has made to the development of evaluation practice. Table 1 below shows some of the main evaluations made. In addition there have been evaluations of clusters and of their predecessor the JESSI initiative. The picture is completed by many national studies of participation in EUREKA.

Table 1 Focus of evaluations of EUREKA

| | | |
|------------|------------------|----------------------------------|
| 1991 | Dekker: | Mechanisms and procedures |
| 1993 | Ormala: | Impact and achievements |
| 1995 | Airaghi: | Tendencies in portfolio |
| 1996 | Davignon: | Co-ordination of European RTD |
| 1997 | Ernst and Young: | Structures and processes |
| 1999 | Georghiou: | Strategic Review of positioning |
| Since 1996 | CSE/AIR | Project impacts after completion |

In the early years each evaluation needed to establish its own data collection mechanisms with consequent costs and delays. In 1996 the decision was taken to establish the “Continuous and Systematic Evaluation” system (CSE). Technical final reports were replaced by a 4-page questionnaire focused on outputs and impacts, also called the Final Report. For those showing or expecting impacts further short questionnaires were despatched after one, three and five year intervals (see Figure 2). An independent panel used these questionnaires and a limited range of case studies to produce an Annual Impact Report (AIR). For several years this met the basic requirements for evaluation of accountability and some scope for learning and was well-received at events such as the Ministerial Conference.

Figure 1 Continuous and Systematic Evaluation



EUREKA evaluations have been well-cited in the literature, influenced practice elsewhere, and an account of the system received a prize from the US Technology Transfer Society.

The 1999 Strategic Review noted that the evaluations though different in their terms of reference had nonetheless concurred in their conclusions. Key findings common to most, if not all were:

- EUREKA works - projects have been market led and successful in achieving commercial aims;
- The variable levels and predictability of public funding available in different countries have constantly weakened the effectiveness of EUREKA;
- Barriers to commercialisation have generally occurred after project completion, particularly for SMEs;

- Finding the right synergy with the Framework Programme has been a long term issue.

While the consistency of findings lends confidence to the evaluation processes and to the success of projects, it also demonstrates the inability to date of EUREKA to correct or resolve its underlying problems.

1.3 New methodology

This year's Annual Impact Report has adopted a new approach in two respects:

1.3.1 Case study approach

The guiding principles behind the case-studies are to:

- a) Select cases with known and realised high impacts (not expectations); and
- b) Apply a methodology designed to estimate effects which are often neglected.

Case selection followed the observation that a relatively small number of projects account for a large proportion of effects (it is noted later in this report that 12% of projects accounted for 65% of additional turnover). Hence, if case studies are identified at the upper end of the spectrum, high coverage of the portfolio may be achieved with relatively limited resources. In future this selection should arise from the Final Reports but this year the data were not of sufficient quality and hence NPCs were consulted to identify the cases. Final selection by the Panel also took account of international distribution of participation.

The methodology adopted was developed by PREST, University of Manchester based upon the Beta methodology² but extended to include impacts upon non-participants. This approach is now described as the "Iceberg Model" to reflect the fact that it concentrates upon the hidden effects of R&D (see Figure 2).

² Bach L, Ledoux M-J and Matt M, Evaluation of the Brite/Euram Programme in Shapira and Kuhlmann (eds) Learning from Science and Technology Policy Evaluation: Experiences from the United States and Europe, Edward Elgar 2003



Sales of innovative product
 Reduced process costs
 Licence income

 Firm strategy, organisation and method
 learning
 Use of technology in other parts of the
 business
 New contacts/networks & prestige
 Employment, competence & training

Spillovers to non-participants
 User and social benefits

Figure 2 Iceberg Model of Effects

The method goes beyond the normal effects of sales and cost reductions to explore other benefits to the firm and beyond. Where possible interviewees are asked to estimate the economic value to the firm of the effect and the contribution made to the effect by EUREKA. A mixture of qualitative and quantitative information is presented which gives a much more complete view of the impact. Other questions concern jobs created or safeguarded, additionality of public support and observations on the innovation process.

The full methodology was presented in a protocol for use by the panel. Case studies were initially written up as responses to the questions. Two page summaries are presented in Part 3 of this report.

1.3.2 Analysis of the Database

In the past, Annual Impact Reports have used data dominated by older and often larger projects. A major effort has been undertaken to separate out these projects and hence to concentrate on the recent history of EUREKA. The statistics concern EUREKA projects that:

- finished between 1 January 2001 and 31 December 2005,
- and started after 1 January 1996

The statistics have been extracted from two databases:

- the EUREKA project database

- the CSE database of Final Reports containing impact data.

So, we have two sets of figures:

- a full set of projects that finished in the above-mentioned period, and
- a selection from this batch containing all projects with a Final Report (FR)

Umbrellas (*not umbrella sub-projects*) and clusters are not included in the statistics. The impact data in this report cover more than 50% (52,5%) of all projects finished in 2001-2005 and about 25% (23,7%) of all involved participants in these projects. In terms of total costs/investments, 62% is covered: 1,1 of €1,8 billion.

The sample of Final Reports corresponds very well with the full set of projects that finished in the period 2001-2005. Company representation in the FR-sample is 10% higher than in the full Finished-projects set (80% vs 69%). In view of the fact that we are assessing impact in terms of industrial exploitation and commercial achievements, this is an important point. In terms of time frame (start dates/finish dates) there is good correspondence between the two samples. In this Report, the impacts of 387 projects are compiled, describing the achievements of 678 individual companies/organisations, derived from the 678 Individual Final Reports.

1.3.3 Structure of this Report

In Part 2 of the Report, main findings are presented by category of effect for Innovative Projects and for Sub-Cluster Projects. The Chapter concludes with a synthesis and outlook. Part 3 presents the individual case-studies as two-page vignettes. Conclusions are presented. The annexes to this report include more detailed statistics on the database.

PART 2

Main Findings

2 Innovative Projects

In this section the benefits of EUREKA's Innovative Projects are summarised by category of effect. The section is mainly based on the case-studies but where relevant also draws upon the CSE database. Table 2 gives an overview and rating of the extent of each effect described. Detailed accounts of each case-study are presented in Part 3.

Table 2: Overview of E! Project Effects

| No | Category of E! Effect | Sub-category | Extent |
|----|--|--|--------------------|
| 1 | Firm Strategy | Direct Effect | <i>E! E!</i> |
| | | Indirect Effect | <i>E! E!</i> |
| | | Re-orienting Effect | <i>E! E! E!</i> |
| | | New Business approaches | <i>E! E!</i> |
| | | Shift to high tech business | <i>E! E!</i> |
| | | Regeneration of traditional business | <i>E! E!</i> |
| 2 | Sales of innovative products | Good/excellent commercial impact | <i>E! E! E!</i> |
| | | Additional annual turnover | <i>E! E! E!</i> |
| | | Highly innovative products | <i>E!</i> |
| 3 | Reduced process costs | Reduced costs for participant | <i>E! E!</i> |
| | | Cost savings through more efficient methods | <i>E! E!</i> |
| 4 | Use of technology in other parts of business | Applications in other areas | <i>E! E! E! E!</i> |
| | | Technology transfer through new competencies | <i>E! E! E!</i> |
| | | Follow-on projects | <i>E! E! E!</i> |
| 5 | New contacts/networks & prestige | Effective use of E! Label | <i>E! E! E!</i> |
| | | New commercial links | <i>E! E! E!E!</i> |
| 6 | Organisation and method learning | Quality control | <i>E!E!</i> |
| | | Transformation in methods and applications | <i>E!E!</i> |
| 7 | Employment, competence and training | Status of workforce | <i>E! E! E! E!</i> |
| | | New jobs in non-participants | <i>E! E!</i> |
| | | New S&E jobs generated | <i>E! E! E!</i> |
| 8 | Spill-over to non-participants | Competitor spill-over | <i>E!</i> |
| | | Network spill-over | <i>E! E!</i> |
| 9 | User and social benefits | Customer benefits | <i>E! E! E! E!</i> |
| | | Social and environmental benefits | <i>E! E!</i> |
| | | Economic, safety & product quality | <i>E! E! E!</i> |
| | | Combined benefits (health) | <i>E! !</i> |

Category 1: Firm Strategy

The latest approaches to evaluation debated at the OECD and elsewhere have tended to emphasise the importance of persistent effects of R&D support. This “behavioural additionality” approach recognises that public funding of R&D interacts with firm strategies and needs to be understood in this context. SMEs in particular may be heavily influenced by their experiences in a programme. In the following sections we explore various dimensions of effects, many of which are manifested in lasting changes in firm behaviour caused by acquisition of new capabilities. Effects on strategy detailed below include transformation from contract research to manufacture, from military work to civil, from traditional to technology-based and more generally finding new ways to do business.

E! Project case studies indicate reinforcement of firm strategy, and creation of pathways to change.

Examples of Direct Effects on firm strategy

The majority of projects were fully aligned with existing firm strategies to allow growth and extension of markets.

- The **SOLIMAP** project, for example, represented a 100% fit with Keygene’s company strategy: application and further development of the genetic technology on the one hand; and the development of new products and services based on this technology on the other.
- **Visualix 2000** has been a core project in Gendex Dental System’s existing strategy, constituting a major step forward in the product segment of dental intra-oral digital imaging.

Examples of Indirect Effects on firm strategy

- The **IVM-VTV** project’s impact on strategy was indirect, a positive feedback where the project’s success allowed the company to adhere to its strategy, namely expansion in related areas of manufacturing industry.
- Feedback could also be negative as in the **CONMOD** project, where VUHZ learnt that in its sector custom R&D for external industrial partners was a declining market.

Examples of E! projects re-orienting firm strategy

A number of projects had substantial effects in terms of re-orienting firm strategy. In some economies, projects were an instrument of transition.

- Transformation of privatised research institutes into commercially viable SMEs is one example: in the IVM-VTV project, the VUTS company was, until privatisation in 1981, the Research Institute of Textile Machines in the Czech Republic. Through the project it has moved to diverse custom R&D and founded

a joint venture to design and manufacture CAM systems. Transformation was also enabled from military to civil application, e.g. in the case of the P3D project which developed a passive surveillance system for air traffic control.

- Another kind of transformation was that of R&D service companies into production oriented firms, e.g. in the EUROAGRI GAT project, GAT Formulation Chemistry GmbH began as an R&D service company for the food industry but through the project transformed much of its business to industrial scale production, thus escaping the effects of a decline in its original market.
- Similarly the **HULLMOS** project allowed R Rovari OY to move from consultancy in ship-building to development of a whole family of hardware and software systems for monitoring stress in ship structures.

Examples of E! projects encouraging new business approaches

New ways of doing business, new product ranges and new markets were all features.

- For example, from the **FOLDHEX** project which developed a new cardboard packaging material, the Katholieke Universiteit Leuven launched a new spin-off company, EconCore to market the results.
- The impact of the **POETRY** project on Verosol's strategy has been enormous, accounting for its very survival, by allowing its products to gradually migrate from wall window decorations towards climate control functionality.

E! projects leading to a shift to high tech business

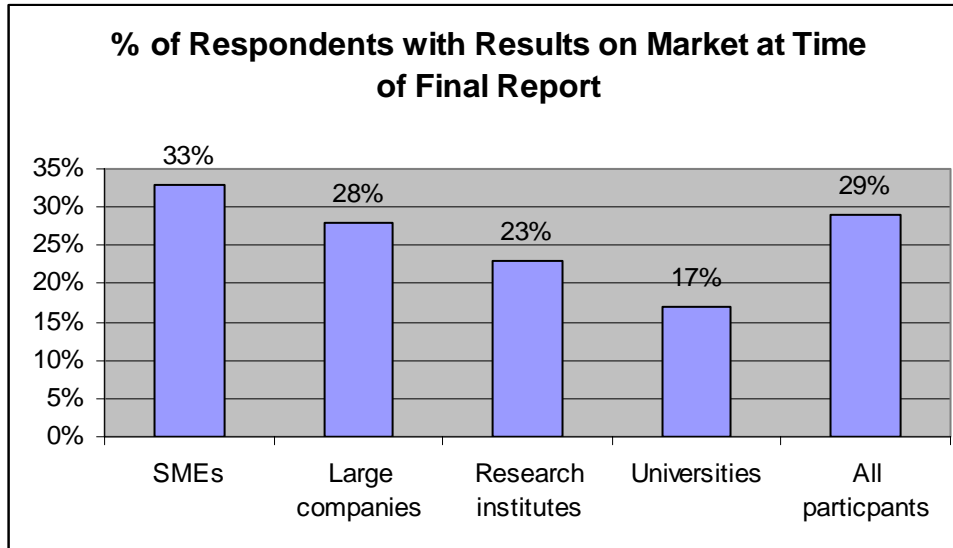
The shift could also be from traditional to high tech business.

- The **CLEANLAMB** project enabled the company to upgrade from crude low value-added meat production to high tech packaging and quality assurance.
- **EUROFEED** in the same sector enabled INKOA Systems sl to enter new markets in animal feed with a stronger technological base.

Category 2: Sales of Innovative Products

A core business of EUREKA is helping firms to bring innovative products to the market. Almost two thirds of participants (433 respondents accounting for 63%) expect to exploit their results in the market and 29% have already successfully exploited them. SMEs are particularly successful at bringing their results to the market at or before the point of project completion. However, other categories of participant including research institutes and universities have also brought results to the market (see Figure 3).

Figure 3



Good or excellent commercial impact is reported by 45% of participants. Here SMEs (49%) and large firms (47%) report similar success rates. Remarkably 40% of universities also report success here.

A more quantitative measure is the **additional annual turnover** generated. 196 participants (29%) have reported that a total of €35.1M has already been achieved with a further €827.0M expected within three years reported by 42% of participants. These figures represent 387 projects with a total investment cost of €123.9M reported by 678 participants.

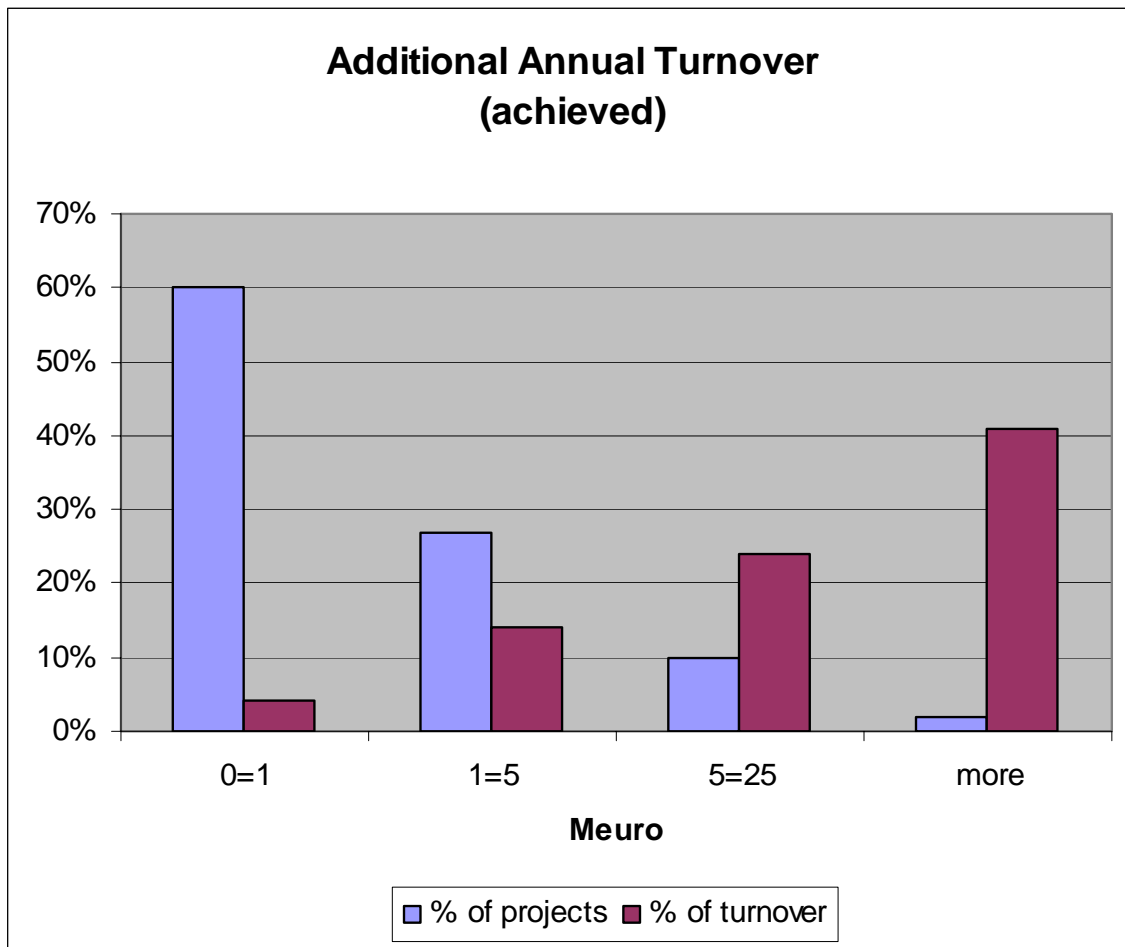
A conservative estimate gives a ratio of additional turnover to total R&D project cost through direct sales of 57% on completion and 219% within 3 years. This is almost certainly a substantial underestimate as the project costs apply to twice as many participants as responded and the Final Reports cover only 50% of the projects completing in that period. It is most unlikely that none of these groups achieved good returns – in fact not all of the case-study firms had returned final reports and all of these had positive turnover effects. An assumption of 30% public funding would mean that for every Euro of subsidy invested in EUREKA, between 7 and 29 Euros of turnover effects are generated. These numbers should not be confused with the rate of return as they

neither include investment costs to realise the benefits nor all of the other benefits measured in this report.

Benefits are not evenly distributed

As with most R&D portfolios the distribution of benefits is highly skewed. For example Figure 4 shows that 12% of the projects accounted for 65% of effects on additional annual turnover at the point of the final report, while 60% of projects accounted for 4%. These figures would shift over time and they should be taken in conjunction with the statistics on the high proportion getting to market as noted above, as well as on firms satisfied with their participation for other reasons.

Figure 4 Additional Annual Turnover (Achieved)



E! Project case studies indicate strong effects on turnover from sales of innovative products

The case-studies illustrate how such benefits are achieved, with 13 out of 17 achieving such effects, generating annual turnover of €24M from projects costing €30M in total (as subsequent sections will show these were by no means the sole economic effects of those projects).

- A good example is the **Visualix** project (E!2275) where Gendex Dental Systems in Italy developed a powerful digital system for high resolution dental radiography and has so far sold nearly 9000 units, generating annual sales of some €/m with excellent prospects for further growth.

Category 3: Reduced process costs

In most cases the projects resulted in significant cost savings for the customers of participating firms in terms of reduced process costs.

E! Project case studies indicate both reduced process costs for participants and clients and cost savings through improvement of business process methods.

However, there were also examples where the participant aimed directly to reduce its own costs, whilst achieving new levels of sophistication in process.

Examples of reduced process costs for participants

- Hence in the **CONMOD** project the Vitkovice Steel a.s. company was able to predict the quality of cast slabs leading to major savings in quality control procedures and heat energy, since the slabs did not need to be cooled for quality control routines and subsequently reheated. The savings were estimated to be €2.39M per annum (approximately 1% of annual sales in this area).
- In the **IVM VTV** project, VUTS a.s. company developed calculation and design methods for CAMs which resulted in higher level of sophistication and reduced costs of manufacture by 7-11%.

Examples of cost savings through more efficient methods

- In the **SOLIMAP** project, Keygene a life science company doing genetic research for vegetable breeders, changed its way of doing R&D, shifting it to a production environment. Together with a culture change, this resulted in more efficient working methods and considerable cost reductions.
- New technologies aimed at product improvement nonetheless also attacked production costs. In the **POETRY** project, Verosol developed a new window treatment concept which led to energy saving in production.

Category 4: Use of Technology in Other Parts of the Business

It is the normal case that the technology developed in the EUREKA project is subsequently applied to other areas of the business. This important category of effects is not generally picked up by reporting systems and hence results in under-valuation of R&D programmes.

E! project case studies indicate that key effects are generated through the broader application of technology and related know-how acquired through the project in other areas of business..

- Among the many examples in the case studies, the **EUROFEED** project's electronic technologies developed for process automation have been used for traceability and food safety in other areas of the company leading to a sales increase of 12%.
- Indirect use of technology was also important for Contronics in the **SANIFOGGER** project. Last year the company found a new customer in Belgium through a contact made by the EUREKA secretariat. This firm produced a spray for sanitising air-conditioning systems in cars. They needed to vaporise the spray in much smaller droplets. Contronics applied the hydration technology and developed a unit which has led to an order for 10,000 units, generating €1.5M per annum.
- As noted in the strategy section, the **HULLMOS** project has led to a family of related products including **ICEMON**, (a system to monitor the outside ice load on the ship hull) and **SLOSHING** (a warning system for potentially destructive waves).

Examples of technology transfer through new competences acquired

Transfer of the technology is often through competences acquired, a topic revisited below.

- The optimised technologies and products developed in **SOLIMAP** are broadly used in other research activities and services of the firm, not surprisingly as one-fifth of the workforce was involved in the project. Expertise has been used to create BAC libraries and transcript databases for species other than tomatoes.
- **VUTS** has exploited the technical and competitive edge of its system for producing cams, thus maintaining economic growth in a period of a sluggish market.
- **GAT** considers that its entire production division is a spin-off from EUREKA with a whole range of products emerging.

Examples of follow-on projects

The vehicle for transferring technology is often a follow on R&D project, sometimes also within EUREKA.

- The technology developed in **FOLDHEX** has been transferred to follow-on projects, such as TorHex and **THERMHEX**, a newer EUREKA project.
- In **CONMOD**, a number of in-house projects further developed the technology with the net result that VSAS is the first and only metallurgy plant in Europe to have its continuous casting train permanently computer monitored and controlled.

- **INKOA** has applied its EUROFEED knowledge to five projects on traceability and food safety which now generate 25% of the company turnover, that is 1.3 Meuro.

Category 5: New contacts/networks & prestige

New contacts and prestige can arise either from the EUREKA label itself or from the results of the project.

E! project case studies highlight the effective use of the E! label to garner prestige and market prominence as well as new links and contacts.

Examples of E! projects using the E! label

- In the first category, **RODAU** has used the EUREKA symbol on its olive oil bottle to demonstrate quality derived from R&D.
- For **HULLMOS**, the EUREKA label was vital in the beginning, giving large positive marketing effects and prestige until the firm could acquire customer references.
- The EUREKA label was considered by **VUHS** essential for raising funds for participation in international exhibitions and fairs, a key source of new business opportunities.

Examples of linkages with both commercial and technological partners arising from projects.

- For example, **INKOA** signed several commercial agreements in Portugal and formed contacts leading to a successful application to the Sixth Framework Programme.
- Prestige and linkage can be closely related, for example ERA has been active in its standards group EUROCAE, where it now chairs a working group. This is seen to be a highly effective promotion strategy for its products and services and also allows it to monitor regulatory trends.
- Keygene considers that the most important strategic benefit of **SOLIMAP** was in attracting its partner as a shareholder and in preparing the way for a Japanese shareholder, meaning that the five shareholders of Keygene control one-third of the world vegetables market.

- The technology itself can increase visibility and prestige, for example **VSAS** is now a supplier of slabs to many leading shipbuilders. **FICEP** has increased its image of technological advancement from its new direct drive for screw presses.

Category 6: Organisation and method learning

Some organisational changes induced in firms were noted under the strategy heading. In addition, we may note several examples of new management structures arising as a consequence of **EUREKA** projects.

E! Project case studies indicate significant effects in terms of improvement in quality control as well as supporting major transformations in working methods and market applications.

Examples of introduction of quality control.

- Through **CLEANLAMB**, Carnes Oviaragon has had its organisation radically transformed by the project with quality control becoming the core principle.
- **POETRY** has resulted in a more structured approach to quality assurance and has also led to a more project-oriented and focused approach to R&D.

Examples of transformation in methods and applications

- As already noted, **SOLIMAP** has changed Keygene's routines and working methods from a typical R&D environment to a production environment, leading to cost reductions through efficiency gains.
- Likewise, through **P3D**, ERA sped up conversion from military to civil market applications, now accounting for 50% of R&D activity.

Category 7 : Employment, competence & training

Participation affected both the quantity and quality of employment. The Final Report survey showed 213 participants (31%) reporting an increase in employment, 40% of these being SMEs, 24% large companies and 45% research organisations. Another 95 participants reported safeguarding employment and 11 a decrease. In terms of Full Time employment (FTE) 895 jobs have already been achieved, with a further 1187 expected in 3 years and 1748 expected outside the participating company (reported by 178 participants). As with additional annual turnover, these results could be multiplied to allow for non response within and between projects. The ratio of jobs created was around 2:1 between small and large firms.

The CSE database indicates 895 new jobs created in participant firms and 1748 expected in non-participants. Case studies show qualitative benefits in upgrading employment.

- Exemplifying this from the case studies, the **FORSYS** project had a considerable effect on the human capital of the firm with four skilled workers that were retiring being substituted by four engineers. The replacements would not have taken place without the new family of presses. The workforce's competencies were also improved through the Finite Elements Method for calculation and modelling.

Examples of the status of the workforce being affected.

- In **CLEANLAMB**, around 60 new jobs were created, with the added benefit of keeping an active rural population in place.
- Through **POETRY**, about ten jobs have been created and five safeguarded, whilst the success of the project has considerably increased the motivation of the labour force.
- Through **IVM-VTV**, VUTS recognised that its new technology required a high level permanent training procedure for employees, while in P3D, there has been an absolute increase in the company's workforce of about one-third and an increase of R&D staff of 10%.
- A start-up created through **PROSURF**, Mabotic Robotics and Automation employs four qualified engineers.

Examples of jobs generated in non-participants

Jobs are induced not only in the participants but in their supply and distribution chains.

- Contronics developed ten jobs through **SANIFOGGER** with a further ten in sub-contractors plus more in dealerships.
- **HULLMOS** safeguarded five jobs within the company but also generated 10-20 in its contractor partners.

As noted above, an important employment effect is on the number of qualified scientists and engineers.

Examples of employment of additional scientists and engineers

- **RODAU** in **EXTRAVIRGIN** has increased its knowledge base through interaction with its Italian partner and has hired two new employees for production and a graduate to work on project development.
- The **EUROFEED** project is considered to have trained the two additional researchers hired to work on it.
- Through **EUROAGRI**, GAT has increased its number of scientists and created a patent portfolio. About 24 additional jobs were created as a result of the project with a further fifteen or so safeguarded. **VISUALIX 2000** has reinforced its

human capital and the project resulted in three new professional jobs and an improved workplace environment.

Category 8: Spillovers to non-participants

Knowledge spillovers occur when firms other than the partners are able to benefit by acquiring the technology, through imitation or demonstration effects. In general the case study firms have not faced this kind of very direct competition. A few have secured intellectual property rights but most rely on occupying a specialised niche with appropriate competitive advantages. Nonetheless there is some evidence of impact on other firms.

E! Project case studies indicate some limited positive spillover effects on non-participants, in particular competitors as well as the broader network players.

Examples of spillover effects on competitors

- Use of RODAU's new extraction line in **EXTRAVIRGIN** has been rented out to competitors to optimise utilisation and others have visited it to become familiar with the new process.
- **HULLMOS'** competitors responded to the project by initiating their own Fifth Framework Programme project. Carnes Oviaragon's feeding system for sheep has been copied by 5-6 companies, despite patent protection.
- **GAT's** micro-encapsulation procedure has been ranked fourth on an international list of requested patents, demonstrating the demand for the procedure developed.

In some cases the advantage secured by one partner is at the expense of another.

- The CCD sensor developed by the British partner in **VISUALIX 2000** was covered by an exclusivity agreement which has now expired and hence is now available for general commercialisation.

Network spillovers occur when one innovation increases the likelihood of use or development of another. In the case studies those identified have generally been internalised by the participants.

Examples of network spillovers

- In **EXTRAVIRGIN**, network spillovers are integral to the project because of the relationship between the olive collection equipment and the new extraction mill developed by respective partners.
- **Through IVM-VTV** VUTS has further exploited its innovation by offering complete packages of custom service.

Category 9: User and social benefits

A neglected dimension of project benefits concerns those accruing to customers (normally other firms) and to end-users (normally the general public). These are rarely fully captured by the price paid and as market spillovers constitute part of the social benefits of the project.

E! Project case studies indicate a broad range of hidden benefits for users and society as a whole

Examples of customer benefits

- With **SANIFOGGER**, in terms of customer benefits, supermarkets have reduced their wastage in terms of food and vegetables thrown away by at least 50%. As the produce looks better, it generates a further rise in turnover. In total an increase in turnover of 2-3% is generated. The payback for a customer is 6 months for fruit and vegetables and 4 weeks for meat. A rough calculation based upon sales figures and payback times indicates that customer benefit could be around €12 million per year.
- Similarly, APS customers expect a short payback period for automated repair cells. **PROSURF** has delivered an 18-month payback, saving one customer 400,000 euro a year.
- **VEROSOL** Fabrics transfers its semi-finished products to two other **VEROSOL** products, where they are assembled to complete systems for the final customer, generating an additional 13 Meuro per year. Users of **VEROSOL** Fabrics new window system benefit from the excellent insulation and reflection properties, thus gaining increased comfort and cost-savings.
- Through **IVM-VTV**, users benefit through higher accuracy of operation and productivity of textile machines and reduced noise levels, wear and tear and energy consumption.

Examples of social, environmental and safety benefits

Important social benefits include improved safety and reduced environmental impact.

- R Rovari's clients particularly in the energy sector benefit by demonstrating improved risk management, in the same way the general public benefits because of a lower risk of an environment endangering accidents. **GAT**'s micro-encapsulation procedure is environment-friendly, increasing safety for factory workers and end-users. It also uses less hazardous substances.
- Through **P3D**, customers for ERA's passive surveillance systems gain more safety at half the price of existing systems. Moreover, they can use the technology in more difficult circumstances unfavourable to radar coverage. Airline operators and passengers benefit from improved safety and capacity for air traffic. Users of

FICEP forging press gain energy savings of 40-60 % worth about 20,000 euros per annum, materials saving of 14%, saving 720,000 per year and reduced maintenance costs of 60%.

Examples of combined economic, safety and product quality benefits

In the food sector, economic, safety and product quality benefits can co-occur.

- **INKOA**'s customers typically save 34,000 per annum through reduction of manpower costs in feeding animals and through increased quality and yield. This represents an investment payback of 2-3 years. End-users have the benefit of improved food safety and of knowing the origin of the products they buy.
- **RODAU**'s users benefit by receiving a different and high quality olive oil which has received prizes for its sweet and almond flavour.
- With **SOLIMAP**, developed products and technologies support the breeding of new varieties yielding cost-savings through accelerated and more efficient development and additional sales. Qualitative benefits include higher quality of seed products giving the end-user healthier vegetables with a better look and taste and a longer shelf life.

Examples of combined health, economic and social benefits

Health represents another area where economic and social benefits coincide. Customers benefit by eliminating expensive film-processing techniques and save time and effort, allowing the dentist to spend more time with the patient. Payback for purchase of the system is 2-4 years. Patients benefit from receiving faster and better decisions about their treatment.

Category 10: Eureka Benefits

E! Project case studies indicate benefits of additionality, input from agencies and collaborative partnership.

The socio-economic benefits cited above paint a positive picture but the question should be asked of what contribution EUREKA made to their achievement. In general, the achievements of the Innovative Projects have been ascribed to EUREKA inputs of one kind or another.

Example of additionality

In no case would the project have been unaltered without public funding. Projects fell into two groups, the first being those for whom public funding was critical to go ahead, and the second where the project was so important that it would have happened anyway but where public funding changed the nature of the project so that it proceeded faster, with greater technical scope, with a broader range of partners. All of these were seen as positive factors, with speed in particular being necessary to meet the market window.

Even where funding was disconnected from EUREKA, the label was seen as a positive factor in obtaining it.

- **POETRY** “The project would still have gone ahead with Eureka support because modernization and innovation was a prerequisite for the continuation of the company. However, at a much slower pace, if time would have allowed.”
- **FACTORY FORSYS** “The project could not have gone ahead without the public funding. The Eureka label facilitated the funding request to the Italian authorities giving to the project a guarantee of validity and originality.”

Example of beneficial interaction with agencies

EUREKA as manifested by the national funding agencies and NPCs that the firms dealt with was cited as proving positive input to project design and management:

- **SOLIMAP** “EUREKA provided support with proposal preparation and funding.”
- **FOLDHEX** “The label helped a lot, and still does (visibility, quality and marketing). [we received] assistance in finding partners, assistance with the preparation of the proposal and providing funding. Furthermore, assistance with exploitation after completion of the project.”

Example of collaborative partnership

- **VISUALIX** “The partnership facilitated a number of inputs, including the technological opportunities offered by CCD sensors and market trends in dental applications; the identification of competitive advantages; the assessment of risks and planning; the establishment of the team and access to financial resources.”

Summary for Innovative Projects

E! Project case studies indicate:

1. *reinforcement of firm strategy and creation of pathways to change*
2. *strong effects on turnover from sales of innovative products*
3. *reduced process costs for participants and clients and cost savings through improvement of business process methods.*
4. *that key effects are generated through the broader application of technology and related know-how acquired through the project in other areas of business..*
5. *effective use of the E! label to garner prestige and market prominence as well as new links and contacts.*
6. *significant effects in terms of improvement in quality control as well as supporting major transformations in working methods and market applications.*
7. *a range of effects in terms of employment, and from the database evidence of new jobs created both in participants and non-participants*
8. *some limited positive spillover effects on non-participants, in particular competitors as well as the broader network players.*
9. *a broad range of hidden benefits for users and society as a whole*

10. benefits of additionality, input from agencies and collaborative partnership.

3 Cluster projects

EUREKA ‘Clusters’ are long-term, strategically significant industrial initiatives. They typically have a large number of participants, and aim to develop generic technologies of key importance for European competitiveness, primarily in ICT and, more recently, in energy and biotechnology. Usually led by large companies, who cooperate with each other as well as with SMEs, research institutes and universities, typical cluster projects are further from the market than the Innovative Projects, even if, at least in scale, they have greater potential to transform European competitiveness. In their totality, and often in individual sub-projects they have a strategic role in securing the European position in their particular domain. Many see them as the precursors of Joint Technology Initiatives.

In the past clusters have been subject to separate evaluations, though not performed consistently or systematically across the different groups. This year’s Annual Impact Report has experimented with applying the same methodology to “Sub-Cluster Projects” with a view to identifying economic effects. Findings here are based on nine case-studies summarised in Part 3 of this report. All are in the area of Information and Communications Technology: the **ITEA/ITEA2** cluster seeks European leadership in software intensive systems; **MEDEA+** works on Microelectronics development for European applications system innovation on silicon for the e-economy; **PIDEA+** is developing New electronic packaging and interconnection technologies for miniaturisation; and **EURIMUS** supports the development of products and systems exploiting micro- and nano-technologies, including enabling technologies, manufacturing and equipment. Three case studies are selected from the first two clusters above and one each from the other two.

While the same methodology has been applied as for the Innovative Projects, the scale of Sub-Cluster Projects has meant that only a partial picture could be built of the effects, normally focussing upon the main partner interviewed. Furthermore, the projects involve complex technical systems which take some time to have an impact on the market so even older projects are at an early stage of maturity in terms of economic effects. The methodology and resources mean that no appraisal is made of the strategic significance of any of the clusters – we seek only to demonstrate the measured effects of the relevant parts of the projects covered and hence to learn more about the process by which value is gained in this type of project.

A key observation here, also justifying the cluster approach, is that the greatest effects often are the result of a series of related projects, or of combinations of projects extending within the cluster but also to the Framework Programme and wholly self-funded activities.

Having said that, significant effects can be identified:

| No | Category of E! Effect | Sub-category | Extent |
|----|--|--|--------------------|
| 1 | Firm Strategy | Direct Effect | <i>E! E!</i> |
| | | Re-orienting Effect | <i>E!</i> |
| | | Industrial ecosystem | <i>E!</i> |
| 2 | Sales of innovative products | Good/excellent commercial impact | <i>E! E! E!</i> |
| | | Multilevel sales impacts | <i>E! E! E!</i> |
| | | Highly innovative products | <i>E! E! E!</i> |
| 3 | Reduced process costs | Reduced costs for participant | <i>E! E! E! E!</i> |
| | | Software family engineering | <i>E! E! E! E!</i> |
| 4 | Use of technology in other parts of business | Applications in other areas | <i>E! E! E!</i> |
| | | Technology transfer through new competencies | <i>E! E! E!</i> |
| 5 | New contacts/networks & prestige | Clusters mobilising large sectors | <i>E!</i> |
| | | Prestige of E! Label | <i>E! E!</i> |
| 6 | Organisation and method learning | Broader process impacts | <i>E!E!</i> |
| 7 | Employment, competence and training | Competence gained through focus on enabling technologies | <i>E! E!</i> |
| | | New S&E jobs generated | <i>E! E! E!</i> |
| 8 | New or De Facto Standards | Setting new standards | <i>E!</i> |
| | | De Facto standards | <i>E! E!</i> |
| 9 | User and social benefits | Improved functionality and reduced costs | <i>E! E! E! E!</i> |
| | | More long-term benefits | <i>E! E!</i> |
| 10 | Eureka Benefits | Additionality | <i>E! E!</i> |
| | | Mitigation of risks | <i>E! E!</i> |
| | | Collaborative partnership | <i>E! E!</i> |
| | | Access to funding | <i>E! E!</i> |

Category 1: Firm Strategy

As might be expected with longer term strategic initiatives that are often following road-maps, the projects are always in line with firm strategy at the outset. Nonetheless they provide a mechanism to confirm and reinforce the strategy through project success.

E! Cluster project case studies initial close alignment with firm strategy, but with results in some cases transforming strategy.

Example of significant effects

A greater impact is evident where project results are able to influence and change strategy:

- as in the case of **ITEA CAFÉ** where the technology developed in the project affected the marketing strategy of Philips Medical Systems, such that products developed through the project's software production approach are both generated and sold as part of a family. The company's development strategy has also been changed by the project, with much more software support being used.

The "industrial ecosystem" may also be seen at work.

- For example in **MEDEA+ T201**, firms such as Air Liquide and Leica were able to use the R&D link as a base from which enter the equipment supply market in the semiconductor sector.

Category 2: Sales of innovative products

The typical situation is that products incorporating the technologies developed in the cluster are not yet on the market but promise to account for significant shares of the firms' revenues (around 20%) of the very large markets in which the firms are engaged.

E! Cluster project case studies indicate a high potential impact in terms of sales and market shares in the long-term.

- For example **MEDEA+ T201** CMOS logic 0.1µm has defined a basic CMOS process. It is estimated that returns from products using the technology will account for 20% of ST Microelectronics' revenues in 2-4 years.

Markets are often complex and large and effects on sales less easy to determine in advance and to quantify in their entirety.

- For example, **MEDEA+ INCA** which developed system-on-chip and integrated circuit technologies for xDSL applications, sales are at three levels: chipsets sold by component manufacturers, equipment sold by telecom integrators and sales of services enabled by the new equipment.
- A clear cut case of sales benefit came in **ITEA+ ATHOS** where Italtel became a major manufacturer of softswitch in telecom development in a market worth \$250 million in the second quarter of 2005.
- In the **ITEA BEYOND** project, one partner, apc interactive solutions AG applied the human centred user interface concept of the project to next generation multimedia payphones and to date about 1000 have been rolled out in Austria. The potential market to compete for could be 20% of the world's 3,000,000 payphones.

Category 3: Reduced process costs

This is the area of greatest effect as it is often the primary target for these projects.

E! Cluster project case studies indicate that reduced process costs are a key targeted and realised impact.

Spectacular success in the costs of software production has come from the concept of software family engineering.

- This is represented in the case studies by **ITEA CAFÉ**. Through such concepts as managed reuse and variability, the participants cite product cost reduction of 60-70%, with productivity a factor of between two and six times higher. Product lead time has been substantially reduced and maintenance cost is reduced by 50%. The approach forms the basis for Nokia's smartphone Series 60 platform with more than 25 million unit sales expected this year. As a result, Philips Medical Systems is able to get its products to market twice as quickly as before.

Category 4: Use of technology in other parts of the business

As enabling technologies it is not surprising that the knowledge developed in the projects has been applied more widely by the participants.

E! Cluster project case studies indicate that key effects are generated through the broader application of enabling technologies acquired through the project in other parts of business.

Examples of technology and knowledge transfer

- For example in the **MEDEA+ INCA** project the technology has been transferred from the xDSL domain to research areas such as wifi.
- For EADS an important outcome of the **PIDEA+ UMANISTA** project is a simulation platform which can also be used for other R&D processes. The use of simulation in product R&D helps shorten the time required for technical feasibility studies before prototypes are produced. Costly manufacturing procedures can be avoided. Simulation allows in depth discussion of the requirements with the suppliers. The total time frame for technical feasibility studies can be reduced with the use of simulation from three to four years (without simulation) to one to two years (with use of simulation).
- The 32 bit technology developed in **ESP@SS-IS** is now used in various ST Microelectronics products.

Category 5: New contacts/networks & prestige

E! Cluster project case studies indicate the important role of clusters in mobilising large sectors and in building new networks.

Example of clusters mobilising large sectors

- **ITEA EAST EEA**, already the largest collaborative R&D project ever launched by the automotive industry, bringing together 26 manufacturers, suppliers and tools and software providers. A key result of the project has been the establishment of AUTOSAR (the AUTomotive Open System ARchitecture). Its core partners are BMW, Bosch, Continental, DaimlerChrysler, Ford, General Motors (Opel), PSA, Siemens VDO, Toyota, Volkswagen. The AUTOSAR consortium aims at facilitating the reuse of software components between different vehicle platforms, OEMs and suppliers, and is not funded by public authorities. The basic idea behind the project is to benefit from a large scaling effect due to standardisation, thus shortening development times and reducing costs between 10% and 15 %.

Prestige effects from the EUREKA label were more important for smaller firms within the clusters.

- For example the Kontron Group within **EURIMUS DIAGNOSIS** regularly used the EUREKA label at presentations and reported that its audience recognised it.

Category 6: Organisation and method learning

Most firms did not perceive effects here except when seen as part of the broader process innovations already described.

E! Cluster project case studies indicate limited effects in organisation and method learning but a significant impact in the broader company setup.

- The **ITEA+ CAFÉ** project caused Philips Medical Systems to create a larger dedicated domain engineering group to replace previously independent groups. This has resulted in a 50% cost saving as the domain engineering group is doing the work previously done separately for each project.

Category 7: Employment, competence and training

E! Cluster project case studies indicate consolidation of existing employment through competencies generated.

Again, the focus on enabling technologies makes this a central part of the projects' objectives.

- Examples include **MEDEA+ T201** where researchers at the Crolles 2 microelectronics research centre have achieved a high level of competency enabling them to develop new technologies more quickly and to make better use of results coming from scientific collaborators. More broadly this project helped to establish Crolles 2 where a recent study concluded that 2000 indirect jobs were created as a result through inward investment, growth and the creation of new companies.

Category 8: Standards

In the ICT sectors in particular, standards are often the ground on which market success is built.

E! Cluster project case studies indicate important market impacts in terms of new and de facto standards established.

Several of the projects had a standards dimension

- Most explicitly, **MEDEA+ INCA** had a major effect in standards development with 14 contributions to international standardisation committees. The project successfully resolved a conflict between rival modulation standards in favour of its selected option DMT. VDSL2, the latest standard is purely DMT and was adopted by ITU and ANSI in 2005.
- De facto standards are also significant and have been part of the aim for **ITEA+ EAST EEA** and **ITEA BEYOND**.
- Other projects contributing to establishment of standards were **MEDEA+ ESP@SS-ISS** and **ITEA+ CAFÉ**

Category 9: User and social benefits

E! Cluster project case studies indicate a range of benefits to users both immediate and direct and in the long-term.

Benefits to users come from **improved** functionality and reduced costs.

- For example **MEDEA+ ESP@SS-ISS** enables more sophisticated services to be offered using Smart Card technology, ultimately making end-users lives easier.
- **PIDEA+ UMANISTA**'s hardware components for mobile handsets lead to more and better services and increased functionality of the handset for the customer.
- Telecom operators using the softswitch resulting from **ITEA+ ATHOS** benefit from a strong decrease in the network operating costs and the capacity to provide new services using the same architecture and equipment.

- Users of the **EURIMUS DIAGNOSIS** field bus in oilfields experience a much higher degree of security with faster reactions to risky situations.

Benefits for end users may take some years to materialise.

- For **ITEA+ EAST EEA** benefits to final customers are expected to appear around 2012. They may include higher quality of the product, more reliability, and faster introduction of innovations. The improvements will be market and regulation driven, and may include new driver assistance systems (“accident free driving”) as well as sophisticated entertainment systems.

Category 10: Eureka Benefits

E! Cluster project case studies indicate benefits of additionality, risk mitigation and collaborative partnership together with easier access to large-scale funding.

Example of additionality

- Only **EURIMUS DIAGNOSIS** stated unequivocally that the project would not have gone ahead without public funding because it was too risky for the main partner to support.

Example of mitigation of risk benefits

- Mitigation of technical and financial risk was also mentioned for **PIDEA+ UMANISTA**. EADS was able to share and reduce the risks through cooperation with EUREKA partners and public funding was very valuable for the firm. Setting up a network with suppliers would have been considerably more difficult outside EUREKA structures. All partners gain from the cooperation as they develop a common view on the requirements / technical problems and share a common goal. All of the other projects reported partial additionality in that the project would have gone ahead without EUREKA but on a reduced or otherwise altered basis.

Example of collaborative partnership benefits

- For the **MEDEA+ ESP@SS-IS**, the main advantage of the EUREKA framework was the opportunity to collaborate with partners along the whole supply and value chain (e.g. with service content and application providers) and to co-operate with competitors (which probably would not happen to this extent outside the EUREKA framework). The EUREKA setup made it easier to jointly develop standards on the interoperability of innovative platform solutions. Other important advantages of the EUREKA cooperation were the ability to create and maintain a long term vision through the combined strength of the partners, share the risks in an ambitious R&D project, reduce global timescales and exploit the power of the consortium to adopt the projects’ outcomes on an international scale.
- Partnership was also a key area of added value for **MEDEA+ T201**. Without Eureka support, industry would have still developed the technology as it is an absolute

necessity to stay competitive. Each company would have probably followed an internal roadmap. The project has allowed for a very important synergy with the other partners, allowing a significant part of the research to be shared, and therefore decreasing delays and costs. It has also led to a significant increase in the number of partners, which has proven to be very beneficial.

EUREKA status as a key to obtaining public funding was mentioned several times.

- In **ITEA+ CAFÉ** the EUREKA label opened the door for funding but also lent recognition and support within the firms. For **ITEA+ EAST EEA** the ITEA label was needed in order to have at minimum a European project, and not a German project (which was a possibility). Without funding and European cooperation, there would have been small projects on specific topics, but nothing of the magnitude of the project. The benefits expected now would have been much smaller.
- **MEDEA+ INCA** stated that public funding is key to extending partnership, and accelerating the timescale and increasing scale. EUREKA allowed peer-to-peer working rather than sub-contracting, which also led to unexpected useful results emerging from the academic partners.

Summary of Cluster Projects

E! Cluster project case studies indicate:

1. *initial close alignment with firm strategy, but with results in some cases transforming strategy.*
2. *a high potential impact in terms of sales and market shares in the long-term.*
3. *that reduced process costs are a key targeted and realised impact.*
4. *that key effects are generated through the broader application of enabling technologies acquired through the project in other parts of business.*
5. *the important role of clusters in mobilising large sectors and in building new networks.*
6. *limited effects in organisation and method learning but a significant impact in the broader company setup.*
7. *consolidation of existing employment through competencies generated.*
8. *important market impacts in terms of new and de facto standards established.*
9. *a range of benefits to users both immediate and direct and in the long-term.*
10. *benefits of additionality, risk mitigation and collaborative partnership together with easier access to large-scale funding.*

PART 3

Case Studies³

Innovative Projects

1. $\Sigma!$ 2429 CLEANLAMB
2. $\Sigma!$ 1867 CONMOD
3. $\Sigma!$ 1972 EUROAGRI MEMP
4. $\Sigma!$ 2857 EUROFEED
5. $\Sigma!$ 2451 EXTRAVIRGIN
6. $\Sigma!$ 1929 FOLDHEX
7. $\Sigma!$ 1957 FACTORY FORSYS
8. $\Sigma!$ 1765 HULLMOS
9. $\Sigma!$ 1762 IVM-VTV
10. $\Sigma!$ 1872 P3D
11. $\Sigma!$ 1837 POETRY
12. $\Sigma!$ 2317 FACTORY PROSURF
13. $\Sigma!$ 1692 SANIFOGGER
14. $\Sigma!$ 2110 SOLIMAP
15. $\Sigma!$ 2276 VISUALIX 2000

Sub-Cluster Projects

1. ITEA+ ATHOS
2. ITEA+ BEYOND
3. ITEA+ CAFÉ
4. ITEA+ EAST EEA
5. MEDEA+ ESP@SS-IS
6. MEDEA+ INCA
7. MEDEA+ T201 CMOS LOGIC
8. EURIMUS DIAGNOSIS
9. PIDEA+ UMANISTA

³ A further four cases-studies were carried out. For three Innovative Projects it was found that the effects had yet to reach the market and hence they did not meet the criterion of realised benefits. For the fourth, a sub-cluster project, effects were substantial but the case-study arrived too late to secure company approval for publication.

4 Innovative project case studies

Project E!2429 CLEANLAMB

| | | | |
|------------------|-------------|---------------------|-------------|
| Start Date | 11-Jun-2000 | End date | 11-Aug-2003 |
| Duration(months) | 38 | Actual cost (MEuro) | 2.05 |

The Project

The Cleanlamb project was aimed at adapting the productive and commercial situation of the sheep sector to meet current market demands. The project's objectives spanned animal production, processing meat, quality control and marketing. A sequence of Eureka projects began with (Euroagris Pecus 1994) aimed at improving the reproduction technologies and the quality of the lamb meat, whilst the second project, Sheep Feed (1998) was dedicated to fabrication and use of complete mixtures to improve the sheep feeding. Cleanlamb focused on opening up a complete and innovative production line.

Participants

Carnes Oviaragon is a cooperative group (1500 Members) located mainly in Aragon, which as a result of two mergers in 1999 and 2001, has emerged as a leader in Spain in the lamb meat sector, in terms of sales volume and capacity to undertake a complete program of production and commercialisation. In 2003, new facilities for cutting lamb into pieces, packaging under vacuum and elaborating pre-cooked foods coincided with the Cleanlamb project, offering the technical basis for development of a new agro-industrial phase. The project involved collaboration between Spain and Portugal. Project partners included a large company (Technidata) and SME in Portugal (Acomor) together with four research institutes and three Universities.

Market Application

The technological developments related to

- animal production: ewe and lamb nutrition using natural antibiotic-free products, management standardisation;
- processing of meat products: define the cold chain from slaughter to sale, use of vacuum and inert gas in meat packing, prepare pre-cooked meals;
- guarantee and control systems: detection of pharmacological and microbiological residues, determination of the biochemical profile of the meat;
- marketing systems: development of a direct sales channel via the Internet.

Direct and Indirect Effects on Participating Firms

- The concept developed created added value in production of €2.43M (2005). In 2005, 27% of production (1.6M Kg), equivalent to €12M was channelled through the new line,
- 30 new posts have been created in the chain dedicated to piece cutting and packaging and 28-32 new jobs in the logistics section.
- Complementary developments include a machine for cutting animals to pieces; a machine to automatically make filets; a packaging tray system.
- The project produced a radical transformation in the organisation of the firm introducing a completely different management concept based on quality.

- There has been an increase of the knowledge base due to the interaction with the research institutes and the universities.
- Reduction in the number of animal losses after the introduction of antibiotic-free food: the improvement of the environment where sheep live plus the antibiotic-free food have reduced the loss from 4% to 0.7%.

Broader Effects

- Meat processing using the cold chain and vacuum packaging has changed the operation and management system of meat sales, with a reduction of losses through product deterioration and the management of meat sales facilitated through Internet: in 14-16 hours the client has the meat requested at sales point.
- The benefits for the user are longer conservation of the product and the traceability and standardisation of product quality.
- The project helps to preserve an active rural population, as the new technologies allow peasants to remain in the countryside and continue animal production.
- The increase in productivity has resulted in a decrease in the number of animal factories in the Aragon region from 12.000 in 1986 to 6.000. The conversion to use of new processing technologies is mandatory to keep the sector alive.
- The related introduction of quality control and guarantee has improved safety in the workplace. The working and social climate in the enterprise has improved.

Eureka Benefits

The Eureka project facilitated travel to more advanced countries to learn from their experiences (New Zealand, Israel, Ireland, U.K., Belgium, Netherlands, Sweden).

The project had a strong impact on firm strategy and lead to the development of the new facility. The position currently occupied by Carnes Oviaragon in national meat production and sales is the result of the Eureka projects.

PROJECT EU 1867 CONMOD.

| | | | |
|-------------------------|-------------|----------------------------|-------------|
| Start Date | 01-Feb-1998 | End date | 01-Feb-2001 |
| Duration(months) | 36 | Actual cost (MEuro) | 1 |

The Project

The goal of the project was the "Optimisation of the quality of continuously cast billets required for subsequent processing". The project aimed to define better the interrelationship between conditions and parameters involved in the continuous casting process and the final product quality. The project involved the development of two simulation models and an expert system for future industrial applications - a dynamic 3-D model of heat transfer in cast products. This knowledge is a very important tool for predicting the future properties of the final products, mainly their inclination to developing cracks & fissures during manufacture. The validation of results and their commercial use was to be implemented in the steel-making industry, mainly by the project partner Vítkovice Steel a.s.

Participants

VUHZ a.s was formed when the state-owned Research Institute of Iron Metallurgy was privatised in 1992. It is a joint stock innovative manufacturing SME aiming to exploit its inherited knowledge-base. Its main commercial activity is the production of metallurgical specialities (manufactured by centrifugal casting, hot rolling), machinery products (specialised machines and machine trains and sound insulation systems) and regulation, measurement and automation devices for industrial applications. These production activities are supported by various services, including R&D on new materials & technologies. This integrated approach enables VUHZ to generate customised solutions, tailored to the needs of its customers. CONMOD and its follow up COOP were in fact the last VUHZ attempts to develop more complex projects in the area of custom R&D for external clients. Today its R&D focuses on product and business support for the firm.

The commercialising partner Vítkovice Steel a.s.(VSAS) is a big European player in the business of steel rolled products. It was established in March of 2001 as a part of the restructuring of the Czech steel-making industry. It comprises steel works (which apply the results of this project), rolling mills and plants for flame-cut steel products. Its most important markets are the shipbuilding industry and pipelines.

Market Application

CONMOD project's main benefits were for the commercialising partner and planned user, VSAS. The Project's most important result was the creating the ability to predict slab quality, which results on one hand in a reduced extent of traditional (rather costly) quality control procedures, on the other hand in savings of heat energy. The slabs intended for hot rolling need not be cooled any more for the needs of Quality Control (QC) control routines and subsequently heated up for processing by hot rolling. Slabs have increased in quality and consistency, which makes VSAS the preferred supplier for shipbuilding and other similar quality-exacting industries. VUHZ on the other hand made

a loss on the project as ownership changes in VSAS indirectly led to VUHZ's exclusion from the commercialisation process and a share in the benefits.

Direct and Indirect Effects on Participating Firms

- The Project provided negative feedback from the market, signalling to VUHZ a continuing decline in the market demand for custom R&D performed for external industrial partners. It dovetailed into a series of imperatives to change the VUHZ business strategy - to reduce the R&D sweep and focus it mainly on the backup of individual commercial projects and specific areas of the company development.
- As VUHZ was unable to participate in commercialisation of project results, the project resulted in a net loss for VUHZ of €0.15M, while the benefits for the user, VSAS, reached the expected level of cost savings - see below..
- The VSAS estimate of the CONMOD project impact is ca. 1% of annual sales and 2/3 of cost savings. A cost reduction related to improved quality of production, i.e. lower cost for QC and reprocessing of defective production in VSAS – compared with the 2001 benchmark, has meant on average savings of €2.39M per annum (1% of the turnover in this area is ascribed to the EUREKA project).
- Spectacular heat energy savings have been ascribed to the system capability of predicting the cast products quality, which enabled for VSAS a direct processing of cast products (slabs & billets) by hot rolling. They were estimated as €405k per year from 2003.
- In VSAS it prompted reduction of QC routine activities, which resulted in employment cost savings of €208k.
- Improvements in VSAS customers' confidence and preference for VSAS slabs, both for shipbuilding industry and pipelines for product transport. VSAS has won prestige as a renowned supplier for such companies like American Bureau of Shipping, Norwegian Det Norske Veritas, German Germanischer Lloyd, Russian Morskoy Sudovoj Registr or British Lloyd's Register of Shipping. This recognition puts VSAS among top-notch suppliers for the shipbuilding industry.

Broader Effects

- Users (VSAS business partners and others) have benefited from products of high consistent quality at competitive prices. The new products provide higher consumer comfort (reliability and quality) at competitive prices.
- The participation of academic partners has led to the publication of part of the results; in total 111 contributions were published, of which 66 were published abroad in 19 countries.

Constraints

- The Cooperation Agreement between the Project partners failed to work when the issue of sharing commercial benefits came up. This resulted in a net loss for the lead partner.
- The partners experienced difficulties in accessing funds at the beginning of the project.

Eureka Benefits

The Eureka label facilitated access to public funding, and initiated a sequence of events that brought the commercial success of the Project results to the user (VSAS). Probably the project could not have started and run without the public funding.

EUROAGRI MEMP (E!1972)

| | | | |
|-------------------------|-------------|----------------------------|-------------|
| Start Date | 01-Sep-1998 | End date | 01-Sep-2001 |
| Duration(months) | 36 | Actual cost (MEuro) | 1.51 |

Formulation Process Using Novel Microencapsulation + Dry Flow Technology; R&D Unit Able To Adjust The Technology To Various Active Ingredients; Use Of Environmental Sound Ingredients; Pilot Plant For Toll Manufacturing.

The Project

The aim of the project was to develop a micro-encapsulation technology that would allow the mixing of functional ingredients into food which would otherwise not be possible. The microcapsules work in a similar way to capsules or drugs and dissolve in the stomach, thereby releasing its content. Contrary to drug capsules, food capsules are only visible under microscope and thus give the impression that two otherwise immiscible substances can be combined together. Other advantages are also present. The firm which developed the technology, GAT, needed production facilities and through EUREKA teamed up with INDALVA S.L, a Spanish company able to provide these.

Participants

GAT Formulation Chemistry GMBH was founded in 1997. It is active in agrochemicals and increasingly in the development of innovative formulation technologies for the food industry and produces/develops functional food additives. GAT started out as an R&D service company conducting research on behalf of players in the food and chemical industries. As this market declined, and with impetus from this EUREKA project, GAT has established production facilities and 75 % of its costs can be attributed to the production department. This high share is mainly due to the high intrinsic value of the raw materials and products that are used in the production processes and not so much to the number of people working in production. R&D at GAT remains important and is mainly about product and process development.

Direct and Indirect Effects on Participating Firms

- The increase in sales from 2001 to 2005 is almost entirely due to the EUREKA project and the resulting strategy change. Turnover increased from €880,000,- to € 4.5 mio. in that timeframe with total sales due to the EUREKA project amounting to around € 3.6 mio in 2005. Sales of the “core” EUREKA product (the one all subsequent developments are based on) amounted to €620.000. This figure corresponds to the sales increase between 2001 and 2003. Production output in 2005 was 350 tonnes. The percentage contribution to sales is 80.4 %.
- A whole range of products has emerged out of the EUREKA project. Basically, the whole production division can be considered a “spin off” from the EUREKA project.
- The strategy change led to the setting up of a production division.
- A knowledge base was built and has been expanded ever since.
- The number of scientists employed at GAT has also increased.
- Employment figures increased from 3 in 1997 to 35 in 2005. About three quarters of the additional jobs resulted from the EUREKA project (about 24). 3 jobs were

safeguarded in GAT, and an additional 10-15 jobs in the partner company INDALVA S.A. as a result of using GAT.

Broader Effects

- Adaptation and creation of standards/regulations taking into account the new GAT technology are under way and will be issued by various organisations including FAO (Food and Agricultural Organisation).
- Customer benefits include higher sales margins of at least 30%.
- Some products can be only made using the procedure developed by GAT.
- The procedure developed by GAT is environment-friendly. It increases safety for those who are working in the factories and also for end users/customers. Substances used in the process are less hazardous (e.g., by using water is as a solvent). Advantages of the production procedures arise also in transport and packaging (substances are subject to less stringent transport and packaging regulations) and with respect to approval procedures.

Constraints

Regulation and approval procedures are an important factor and can cause substantial delays for getting a new product/technology out onto the market.

Eureka Benefits

It would not have been possible to carry out the project in a meaningful way without the EUREKA label. In fact, it was necessary to use a wide range of support programmes and services and there the EUREKA label was very helpful. EUREKA contributed greatly to GAT's decision to establish production facilities and thus transform the company from a pure R&D service provider to a more production-oriented (on an industrial scale!) company. The EUREKA project helped GAT to build a reputation. By moving to new premises after the EUREKA project (the EUREKA project has greatly affected that decision, too), it was possible for GAT to visibly demonstrate its industrial know-how.

Project E!2857 EUROFEED

| | | |
|-----------------------------|-------------------------------------|---------------------|
| Start date: 01 January 2002 | Finished : 01 September 2004 | Duration: 32 months |
| Actual Cost (MEuro):1.95 | Member contribution: Spain: 80.94 % | Portugal 19.06 % |

Development of an automatic feeding system for sheep to guarantee the quality, traceability and security of the raw materials for animal food.

The Project

The project was aimed at addressing two main issues for the food sector:

- **Safety and traceability** in response to loss of confidence and competitiveness following epidemics in recent years; and
- **Automation technologies** to improve product quality and working conditions.

Other aspects addressed include animal well-being, and control and traceability of GMOs. The development of the project has involved a change in the traditional system of animal food production by incorporating the control and automated management of all processes involved in animal feeding. It caters for times when grass is scarce or conditions are unfavourable, thereby improving animal welfare.

The system ensures the best distribution and permanence of food particles in animal due to the particles' size, which causes the animal to feel full and hence decreases consumption. This has reduced feeding costs and has improved ingestion by the animal. The system contains a device that treats the raw material and food and distributes it to the animals without the intervention of manpower. Inside the management system, all the data derived from the use of raw materials and foods are recorded, such as matter type, origin, dates, destinations, etc. It contains also a list of the different formulation types in order to be able to select the one that is more suitable according to the sheep conditions .

Participants

INKOA Sistemas is an engineering and consultancy company specialised in supplying integral solutions for the sustainable development of the agri-food sector, through high technology. Since it was set up more than ten years ago, INKOA has followed a strategy of expansion, diversification and technological innovation leading to the development of a group of companies, internationally active in the agri-food and environmental sectors. The solutions developed by INKOA include all stages of development, from the initial studies, through design and construction, to operating and training and depend on a high degree of expertise, integrated into an organisational structure focused on improving products and services..

Market Application

The main impact of the project in the sheep sector has consisted of its ability to guarantee the records of the food consumed by the animals, analyse the value of the final product and develop an innovative solution to the current sanitary problems in the sector of animal feeding.

Direct and Indirect Effects on Participating Firms

- INKOA entered a new sector where it had no previous experience, the cattle and feeding sector, by investing in technologies capable of solving problems of food safety management and providing consumers with all the necessary information to guarantee the quality of food products;
- New products in new markets allowing the company to go to other countries;
- Strengthening of the R&D department;
- Launching new lines of technological development.
- The concept developed through the project has had an impact on the turnover of the firm of approximately **15%** and its value is estimated at **0.80 M€** (year 2005)
- INKOA has incorporated the technology developed through the project in five projects that have a total value of approximately **2 M€**.
- The electronic technologies developed for process automation have been used in other areas of the company, mainly in systems for traceability and food safety. These have produced a **sales increase of 12% attributed 100% to the project**.
- In the framework of the development projects, INKOA is negotiating a contract of technology transfer with the Ministry of Agricultural of Brazil.
- 7 new jobs and improved expertise in electronics and food safety.
- Thanks to the diffusion activities carried out in the frame of the Eurofeed project and the know-how acquired, a new initiative was approved under EU FP6 for the application of technology to the pigmeat value chain.
- Two commercial agreements were signed with Portugal and a **300 K€ contract**.
- INKOA has launched a new technological line on traceability and food safety, with 5 on-going projects at national and international level. The new endeavours imply an additional investment of 250 K€to complete the product development.

Broader Effects

- The economic benefits gained by the costumers using the new technologies are:
 - Reduction of the manpower costs, used for the elaboration and distribution of the food (the time dedicated to animal feeding is approximately 80% of the total working time); For a small enterprise the savings amount to **34 K€ per year**.
 - Increase of product quality;
 - Animal well-being and increased yield.
- The project contributes to compliance with Regulation 178/2002 of the European Commission related to food traceability and safety.

Eureka Benefits

- The Eureka label facilitated the project going ahead by attracting public funding. The latter allowed the development of more projects simultaneously.

Project E!2451 EUROAGRI EXTRA VIRGIN

| | | | |
|------------------|-------------|---------------------|-------------|
| Start Date | 01-Jan-1999 | End date | 01-May-2003 |
| Duration(months) | 52 | Actual cost (MEuro) | 1.38 |

The Project

The Eureka project emerged from the idea of creating a cultivated area dedicated to obtaining an olive product of higher quality than the one currently on the market. Olive oil accumulated in the olive vacuole cell changes its properties and organoleptic characteristics during the ripening process. Difficulties in olive oil harvesting and extraction are more pronounced the less ripe the olive. The project focused on optimisation of all steps of the olive oil processing process: identifying the ideal ripeness level, improving harvesting techniques and extraction on same day as harvesting, using advanced technology, and conserving the olive oil in an inert atmosphere until bottling. The novelty of the approach is that olive oil is not considered as a vegetable fat, but as fresh fruit juice. The project focused on:

- The development of a precise olive-growing technique adapted to each olive variety, climate and soil in order to obtain maximum quality fruit;
- Follow-up research on the olive ripeness process in order to define the optimum harvesting moment
- The application of the olive tree piping system to the harvester, adaptation of the olive harvesting machine to tree growth and the best piping system;

Participants

Rodau S.L. is a small enterprise set up in 1986, focused on agricultural activities, mainly olive oil production. Rodau has close links with Bodegas Roda, using its distribution chain to commercialise extra virgin olive oil. RODAU S.L. has two estates, in Majorca and Catalonia, with different Mediterranean landscapes for producing two different olives. In 2004, the company employed 12 persons. The other partners were ETS Gregoire S.A., a French SME which developed the machine for automatic collection, and Alfa Laval S.p.A., a large Italian company which developed a new mill which avoids spoiling flavour through high temperatures.

Market Application

In addition to the benefits for the olive oil producer detailed below, the project led to the development of a new, continuous harvesting machine for automatic collection, much in demand worldwide, and a new mixed hammer and blade oil mill for oil extraction adapted to RODAU varieties.

Direct and Indirect Effects on Participating Firms

- As a user/producer Rodau has not generated any direct income from the equipment developments. However the project has led to cost reduction related to automation of the collection process in which labour normally accounts for 60% of costs. This is an important benefit as this type of seasonal manpower is difficult to obtain and very expensive. Rodau has also hired the machine to its competitors, to optimise its use.
- Rodau has benefited from a reduction in production costs due to the fact that the olives are no longer processed by a third party but in-house using technology developed within the frame of the project.
- The growth of Rodau has been associated with the development of the project. Two jobs were created in the production section and one in the R&D section.
- There has been an increase in the knowledge base as a result of collaboration with Italian firms active in olive oil production.
- The project has helped Rodau to gain prestige among its consumers, as they are aware of their R&D activities to improve product quality of the product. and the Eureka symbol has been used as a form of quality branding on the olive oil bottles. Rodau's product is placed in the high-end price brackets and its main export markets are EU, USA and Japan.
- Both the Italian and French partners are reaping benefits from exploiting the results of the project, in terms of entry into new markets for the oil machine and the patented adapted harvester respectively.

Broader Effects

- The project has resulted in a number of benefits for the users: a very high quality olive oil with a broader range of aromatic flavours, a higher content of anti-oxidants and improved freshness. The Dauro olive has received the prize "The best extra-virgen olive oil of Spain" given by the Ministry of Agriculture for its sweet, almond flavour.
- There have been positive spill-over effects with regard to the extraction line as other Spanish mills have visited Rodau to familiarise themselves with the new process and this has lead to follow-up business for Alfa Laval.
- Scientific collaboration with CIFA, Centro for Information and Agricultural Training (Jaén) and the Agro-food Laboratory (Madrid) has lead to a better understanding of the analytical aspects of olive oil extraction and private sector needs.
- The cardiologic health benefits of high quality extra-virgin olive oil are important for society as a whole.

Eureka Benefits

The Eureka project was a central factor in the development of Rodau. The Eureka label and the public funding it generated, have helped Rodau to achieve its goals within the set timeframe.

CASE STUDY - E! 1929 FOLDHEX

| | | | |
|-------------------------|-------------|----------------------------|-------------|
| Start Date | 01-Jan-1998 | End date | 01-Jun-2004 |
| Duration(months) | 77 | Actual cost (MEuro) | 4 |

The Project

FOLDHEX's main objective was to develop a new honeycomb sandwich core material and related products through a fast, one-step continuous production process. The Katholieke Universiteit Leuven started the project at the instigation of Jochen Pflug, a German student and inventor of the concept behind the new process technology. The concept outlined the development of an innovative and cost-effective process for producing a honeycomb core material for sandwich structures from a single continuous sheet of corrugated cardboard. The transformation of corrugated cardboard into a new much stronger honeycomb core is effected through successive in-line slitting, rotation and gluing.

The other active partners in the project were AssiDomaen (taken over by Kappa Packaging (NL) before the project start-up), Hexcel (BE) a cardboard producer, and Vonderheiden (DE), a machine builder. The original budget estimate was 4 million euros for a period of 77 months. The actual total costs were €2M, of which €1.2M was covered through public funds. It is estimated that another €1M and 2.5 years are needed for the project results to reach fully the market. The proprietary technology is well protected by patents. All the project objectives were achieved: a new process, demonstrators/prototypes and new products. Three patents have been awarded and two licensing agreements successfully negotiated.

The Participants

The Department of Metallurgy and Materials Engineering (MTM) at the Katholieke Universiteit Leuven is the largest research centre in material sciences in Belgium and is a regular research partner of industry and universities overseas. Also the Department of Mechanical Engineering was partner in the project. Based on the initial invention of Jochen Pflug, the FOLDHEX project was started in 1998, and Jochen Pflug joined the project as a PhD-student at Leuven University. Since April 2005 he has become the managing director of EconCore, a spin-off company of the university, located at the Leuven Innovation and Incubation Center. EconCore (www.econcore.com) provides core technologies and materials for economic honeycomb sandwich panels and parts, and further develops and commercialises the Foldhex, Torhex and Thermhex patents. The spin-off is a direct result of the FOLDHEX and THERMHEX projects. The shareholders of EconCore are Jochen Pflug, the University and two venture capitalists and the spin-off has 5 employees.

Market Applications

Two products and the related production processes are on the market:

- TorHex honeycomb cores can be produced in a very cost-effective process at a rate of 100 metres per minute from low-cost corrugated boards in 1,2 metres wide panels. The TorHex core is also especially suitable for thin panels and parts with glass fibre or natural fibre reinforced thermoplastic or thermosetting skins for automotive

interior and furniture applications. The second application of Torhex is the replacement of double flute corrugated cardboard; for this, kraft paper skins are glued to the Torhex core. The market potential is large: double flute corrugated cardboard has a market value of €4,5M per year in Europe alone and €15M expected in next 3 years.

- ThermHex is produced in a different, but also continuous way from thermoplastic foils or sheets for automotive, other transportation and building markets.

Direct Effects

- Income so far is generated by contract research (generated through links made during the project) and licensing agreements
- The Project led to the setting up of a University spin-off company, strengthening relations with industry for further contract research and alliances. The University has teamed up with EconCore on a number of follow-up projects (exclusively licensing the patents to the spin-off company), contributing to the transfer of basic knowledge to commercial applications, an important driver in materials research. The project has contributed to the university's knowledge base and in strengthening its spin-off policy.
- The technology developed in FOLDHEX has been transferred to follow-up projects and products such as Torhex and Thermhex. The actual and expected sales arising from this technology transfer are difficult to quantify, but the benefits can be attributed 100% to the original project.
- Licensing agreements with five potential industrial partners from several European countries are under negotiation and another five are interested. Companies in the US and Japan have also shown an interest in the products but the main potential customers are the former project partners.
- 4 new jobs were created as a result of the project and another 4 new jobs are envisaged within 3 years. 2 jobs have been safeguarded and another 6 jobs are expected to be safeguarded. An additional 3 jobs have resulted from the innovation. There have also been improvements in the quality of employment in terms of business orientation, strategic research collaborations and marketing.
- FOLDHEX has allowed complementary products and services to be brought to the market.

Broader Effects

The products are good competitive alternatives for existing products because they are produced in a cost effective way using very cheap raw materials. The new products have excellent weight-saving potential and insulation/energy-saving properties. End-users of the new products, e.g. the packaging industry, automotive industry, building industry and possibly other industrial sectors could benefit from the innovation due to a high added-value/quality in combination with cost-, weight- and energy-savings.

Eureka Benefits

Eureka provided assistance with proposal preparation and in finding partners and funding. The FOLDHEX case is rather unique in that the funding covered the whole trajectory from idea to company. Eureka also provided assistance with exploitation of

results on completion of the project. The Eureka label was instrumental in providing visibility, quality and marketing. The Eureka collaboration provided improved access to internal and external resources, access to complementary technical expertise and sharing of risks and costs. The links with users provided better market/business orientation, new follow-on contract research and new market channels and outlets.

Project E!1957 FACTORY FORSYS

| | | |
|----------------------------|------------------------------|--------------------------------|
| Duration: 36 months | Start date: 01 December 1998 | Finished : 07 April 2003 |
| Actual Cost (MEuro) : 4.90 | | |
| Member contribution: | Italy 65% | France 24% Switzerland 11% |
| FICEP S.p.A. | Main | Italy Large Company |
| Institute CIMSI | Partner | Switzerland Research Institute |
| Transvalor S.A. | Partner | France SME |
| Ergotronic S.A. | Partner | Switzerland SME |

A New Type of Press for Hot and Cold Forging Processes

The Project

The Project aimed to develop a new ranges of presses with direct drives for hot and cold forging processes, characterised by energy saving, reduction of maintenance, increased productivity by the forging of high quality pieces with traditional dies at high working speed, increased sensibility and high precision, and forging of other materials such as titanium and aluminium. The project consisted of the development of a range of presses with new features suitable for integration into a forging system capable of producing finished parts in an automatic cycle. Working with the scientific partners enabled the firm to introduce the finite element method for modelling and calculation. Strong cooperation with the users was essential for the project. The system is suitable for all the forging industries manufacturing solid pieces. These new presses, not only guarantee the forging of high quality pieces with traditional dies at high working speed but they also have made it feasible to accede to forging in a closed die and therefore to produce pieces which have approximately the shape of the finished part. Two prototypes have been manufactured with EUREKA support.

Participants

FICEP is a typical large family-owned Italian enterprise with over 500 employees, founded 75 years ago, in the Lombardy Region. FICEP is a leading manufacturer which designs, manufactures and sells worldwide CNC controlled machines & systems for the steel construction and forging industries. The role of R&D in the firm is to develop new products, with a dual objective: to support and improve the range of products and to develop new products to substitute the old ones so as to offer the clients a significant cost reduction in energy use, material conservation.

Market Application

There are about 500 forging plants in the European Union. Of those, 100-140 plants are interested in the new machine. There are 900 forging plants in North and South America and Asia. About 160-240 may be interested in the new development.

Direct and Indirect Effects on Participating Firms

- Twelve screw press machines excluding the prototype have been sold and installed up to now with an increase in sales from 2 M€year to 5 M€year. The turnover will increase further, when the full range of machines with higher capabilities are produced. At present FICEP is producing the screw press DD 400 at a cost of 2 M€

- The new screw presses direct drive has increased the firm's visibility, reinforcing the image of technological advancement at national level, mainly through UNISA1, the National Italian Union of Steel Forgers. At present, there is no machine tool in the market with the same capabilities and performance as the one produced by FICEP. There has been a request for a licence from Japan which is under negotiation.
- The principle developed in the new machine is being transferred to other machines. .
- The knowledge base was increased and professional skills were reinforced. Four skilled workers that retired were substituted by four engineers. Three new jobs were created and the new presses have allowed the firm to safeguard existing jobs.
- The benefits of R&D cooperation with scientific partners has allowed the firm to introduce the Finite Element method for modelling and calculation, an introduction that constitutes a new asset for the enterprise.

Broader Effects

- A significant improvement in safety at work is reported since the handling of cold and hot pieces is fully automated.

The innovation offers end-users and the general public an improved environmental product and customers compare the price they pay for the new machine mainly with the increased productivity and the energy saving (Data refers to a Direct Drive 85 size press (Maximum Force 14900 kN)):

- an increase of 7% in maximum impact speed;
- energy saving between 40- 60% with a saving of 20K€y;
- material saving of 14 % with a saving of 720 K€y
- an increase of 50% in hourly productivity;
- reduction of maintenance service of approximately 60-80% ;
- more forging precision, circa 10% higher;
- the possibility of increasing the stroke/travel;
- reduction in scrap, slag and pollution;
- FICEP is investigating new applications of forging machines, e.g. camion wheels in forged aluminium which are more resistant, weigh less, and use less fuel.

Eureka Benefits

The project could not have gone ahead without the public funding which the Eureka label made possible, giving the project a guarantee of validity and originality. The EUREKA task force at the Ministry of Education, University and Research provided administrative support. As a result of the EUREKA project, more resources were devoted to complementary products, such as robotic manipulation of pieces; auxiliary machines for pre-forming and trimming.

E!1765 HULLMOS

| | | | |
|---|-----------------|----------------------------|-------------|
| Start Date | 01-Jun-1997 | End date | 01-May-2000 |
| Duration(months) | 35 | Actual cost (MEuro) | 2.11 |
| Company | Country | Type | Role |
| R. Rouvari Oy | Finland | SME | Main |
| Sirehna S.A. | France | SME | Partner |
| Imtech Marine & Industry R & H Systems B.V. | The Netherlands | Large company | Partner |
| Rz Products B.V. | The Netherlands | SME | Partner |
| Vtt/Marine And Mechanical Engineering Technical Research Centre Of Finland | Finland | Research Institute | Partner |

Ship Hull Monitoring System

The Project

The HULLMOS project addressed the problem of fast and/or uneven loading which can cause imbalances within a freighter and lead to cracks in the hull of the vessel. The project aimed to develop a system that could monitor hull stress during the loading process of a freighter, thus increasing operational safety and lowering, for example, insurance costs. The project focused on developing a hardware platform with sensor and fibre optic cabling and software to operate the system. A number of Dutch partners were responsible for the software, while the leading partner R. Rouvari Oy developed the strain sensors. The company SMARTFIBRES provided fibre optic technology for the system. SIREHNA from France acts now as resellers, in return R. Rouvari Oy supports other SIREHNA business activities in the Far East.

Participants

R. Rouvari Oy produces devices, programmes and services for the marine sector. It started off as a consultancy company and subcontractor for Finnish shipbuilders in the 1980s. R. Rouvari Oy could draw for its business on the experience of its founder and owner Risto Rouvari who worked for the Finnish Navy as an engineer until 1985. After the initial success, the collapse of the Soviet Union (and thus of the main market for Finnish vessels) brought down the Finnish shipbuilding industry. R. Rouvari had to reorient itself and to develop new products in order to survive. R&D at R. Rouvari is oriented towards developing new products and, to a lesser extent, to improving product support. Its turnover in 2005 was approximately €1.4 m.

Market Application

The HULLMOS project proved to be a highly successful, and HULLMOS itself became a marketable product in 2000. HULLMOS II is the extension of the initial HULLMOS project, an adaptation/enhancement for fast ships built with lightweight material. Based on the HULLMOS R&D project, products have been developed for a) the monitoring of

hull stress, b) collision avoidance and accurate navigation and c) engine monitoring. Production of the devices has been off shored to an Estonian company, where, depending on the workload, one to 10 persons are working on HULLMOS and related devices.

Direct and Indirect Effects on Participating Firms

- Sales due to HULLMOS amounted to €1.4 mio. in 2005. 21 ships have been or are in the process of being equipped with the HULLMOS system. Due to HULLMOS, yearly sales have increased sevenfold since 2000 and doubled if compared to 2004. For the future, yearly sales increases of about 30 % p.a. are anticipated. The percentage contribution to sales is almost 100 %. HULLMOS (and HULLMOS derived products) account for most of the turnover of the company.
- HULLMOS' results have provided an important input for ICEMON (a system to monitor the outside ice load/pressure on the ship hull) and SLOSHING (a warning system for potentially destructive waves) projects.
- The project resulted in cost reduction effects (60-80%) with regard to the development costs of SLOSHING and ICEMON. It would have taken much more time and it would have cost a lot more to develop these systems without the availability of the hardware platform of HULLMOS.
- HULLMOS is the backbone of the company. All other projects that were started afterwards were based on HULLMOS. As HULLMOS, being a technological product, is a clear departure from the consulting activities done before, it has affected the firm's core strategy and still is the main pillar the company strategy spins around
- The project resulted in learning effects with respect to the management of R&D projects and networking/cooperation with other companies.
- 5-6 jobs were safeguarded in the partner companies and no jobs were lost.

Broader Effects

- The HULLMOS system is part of a risk management and safety system, a monitoring tool that allows to check timely whether design limits are exceeded or not. Vessel operators may need to demonstrate that they have installed the HULLMOS system in order to secure contracts.
- The general public benefits because of a lower risk of environment-endangering accidents.

Eureka Benefits

The Eureka label was vital at the start, as it greatly facilitated the partner search and proved to be a viable tool for marketing purposes. It had enormous positive marketing effects and boosted prestige in the absence of references. Now that the company has references, the label as such has become less important. One success factor in the links with Eureka was the One-Stop-Shop facility of TEKES, the Finnish innovation agency.

PROJECT EU 1762 IVM-VTV.

| | | | |
|------------------|-------------|---------------------|-------------|
| Start Date | 01-May-1997 | End date | 01-May-2000 |
| Duration(months) | 36 | Actual cost (MEuro) | 0.73 |

The Project

The goal of the project was to develop an innovative system of cams / cam systems design and manufacture, by using state-of-the-art methods of design, while applying advanced principles of mechatronics and modern methods of component machining and finishing. The resulting machine components were intended for a new generation of machinery featuring significantly higher quality (higher accuracy of operation, higher productivity, lower noise level, reduced wear, i.e. higher life expectancy of components & whole units, substantial reduction of required power input, i.e. energy savings). The main areas of project implementation were textile machines, but benefits stemming also from use in other areas of manufacturing industry were expected. The success of the project opened the way to a new generation of textile and enabled significant progress in related areas of manufacturing industry. The project results were used by VUTS in another EUREKA project E! 2067 VN VSA for development of a new multi-spindle turning lathe.

Participants

VUTS a.s. is a joint stock SME focused on research and development in machines and equipment design for the manufacturing industry. It was established originally in 1951 as Research Institute of Textile Machines (RITM), and then privatised in 1991 into VUTS a.s., an R&D driven company, capitalising on past outstanding knowledge portfolio of RITM, mainly in R&D, design, construction and marketing of highly innovative machines, equipment and technologies, mainly intended for world-wide use in the textile industry. Its main business remains R&D and design of highly sophisticated textile machines but it has also diversified of its activities across the whole of manufacturing industry, including R&D for packaging equipment and technology, machine tools, polygraph machines and machines & technology for foodstuff and glass processing industries. R&D activities play a key role in VUTS business programme, accounting for almost half of annual turnover. They cater for both in-house needs and the demand of external partners

Market Application

The technology is on the market both through new and improved machinery offered by the company and through a new business – the direct sale of cams. Economic growth has been maintained even in the recent period of sluggish market for machinery products and services (2002-2004). Similar effects have been achieved in related application areas – VUTS cooperation projects, new development projects and custom-based projects for customers in the global market. Substantial income has been earned through direct sales of cams and cam systems.

Direct and Indirect Effects on Participating Firms

- The aggregated effects of the product and its follow-ups contributed to VUTS sales growth, accounting for 10-15% of company sales, the current level being €706k.

- The benefits of these changes form an integral part of the driving force promoting the company's development. More specifically, they can be included among the benefits stemming from R&D, which has been quantified at 60-70% of company turnover.
- Costs of manufacture have been reduced by 7-11%, depending on the type of cam.
- Currently VUTS can be characterised as the global leader in air-jet weaving and cross-winding machines & technologies, offering a "one stop shop" service in a complex customised R&D service, including manufacture and verification of prototypes.
- The technical and competitive edge of the new system of producing cams / cam systems has been reflected in a higher level of technical, environmental and economical excellence of VUTS' new products.
- The project impact on the VUTS strategy was indirect, a kind of a positive feedback.
- The access to funding facilitated by the Eureka Label allowed VUTS to maintain the current level of R&D staff even in years of recession in the relevant market segment. The company's stable situation mean there was no need to increase headcount of R&D staff.
- The project helped to safeguard two jobs for R&D staff and two for blue-collar workers.

Broader Effects

- The innovative textile machines afford higher consumer comfort: improved reliability, reduced maintenance costs, reduced noise level, reduced energy consumption, and higher productivity. Other benefits relate to quality, OSHA issues, environment and economic factors with the result that customers pay competitive prices for leading edge solutions.
- By applying the mechatronic approach in the design of individual components, the time loss due to non-productive steps during machine operation, is reduced by almost one third.
- In addition to the user-friendliness of VUTS innovative solutions, based on the customised service, benefits include:
 - higher accuracy of operation of textile machines subsystems/textile machine unit
 - higher productivity
 - reduced noise level
 - reduced wear, i.e. higher life expectancy of components & whole units
 - substantial reduction of required power input, i.e. energy savings.

Eureka Benefits

The Eureka label facilitated access to public funding, which eased implementation of an important part of the VUTS innovation strategy. Without these public funds, the progress & commercialisation process would have been much slower and the scale of the project most probably narrower. Acquiring the Eureka label also eased the procedure of raising financial funds to support VUTS participation in international fairs and exhibitions, providing the invaluable opportunity to find new business opportunities.

PROJECT EU 1872 P3D.

| | | | |
|------------------|-------------|---------------------|-------------|
| Start Date | 07-Nov-1997 | End date | 07-Nov-2000 |
| Duration(months) | 36 | Actual cost (MEuro) | 0.89 |

Middle Range Multilateration System

The Project

The goal of the project was to develop systems of passive surveillance (PSS) of mid-range sweep, to verify and certify them and bring them to the stage of small-series production. The PSS is intended for finding, identifying and tracking aircraft in the air space above airports and within a 200 km radius. Another targeted area of the application was to provide a tool for precise runway monitoring. The PSS commercial potential is in a niche market. The competitive advantages inherent in the system are:

- very high accuracy of 3D surveillance
- significantly reduced purchasing and operation costs in comparison with existing secondary surveillance radar (SSR) systems
- it may be installed either as a parallel cost effective duplication of existing SSR systems (but based on another physical principle, thus intrinsically increasing reliability & safety of air traffic) or as an independent system in areas where the terrain configuration or existing radar coverage render the conventional SSR option useless.

The overall project costs were €0.83M, with Eureka-initiated financial support of €0.31M.

Participants

ERA a.s is a joint stock SME focused on electronic systems intended for application in the area of both passive and active radar surveillance. It was established in 1994 as a result of privatisation of the state-owned concern Tesla. On privatisation ERA undertook a major shift in business military to civil market applications. R&D activities played a key role in this re-structuring process and the support provided by Eureka for this start-up company played a significant role. ERA has emerged as a global leader in passive surveillance systems designed both for air traffic control (ATC) and air defence applications.

Market Application

The first commercial embodiment of the Eureka project was the Multilateration Surveillance Radar P3D, the system featuring complete SSR function (Secondary Surveillance Radar), but newly enhanced by multilateration 3D information. This provided a basis for a number of spin-off products which are also on the market.

Direct and Indirect Effects on Participating Firms

- The technology developed during the project P3D was a springboard for a number of subsequent projects that put together, provided the foundation of current ERA's leading position in the area of passive surveillance systems.

- The overall impact of ERA and its spin-offs is assessed as forming 30-50% of total ERA's sales in the period of 2002-2004, giving a total value of €5.4-9.0M over 3 years.
- Fourteen new jobs have been created in ERA and 20 in the partner firms who perform outsourced manufacture.
- ERA has obtained the approval certificate of the Czech Republic Civil Aviation Authority to produce, maintain, repair and modify ground ATS (Air Traffic Services) equipment and to make its design changes - a powerful door opener for EU and related global markets
- ERA was elected as chair this year by the 70-member EUROCAE Working Group on Wide Area Multilateration setting global standards in this area
- P3D led to ERA's initial re-engineering, necessary to implement the management's new vision. Eureka-initiated financial support from the state budget facilitated the shift to a realistic market niche area, through appointment of 7-9 researchers. The Eureka project provided the initial impetus for the subsequent "chain reaction" which brought ERA to its current advanced position.
- The technical and competitive edge of PPS technology over conventional solutions inspired further development ("development chain reactions"), translated into new ERA products.

Broader Effects

- The cost of ERA systems is significantly lower than that of conventional radar systems. Thus the price of ERA PSS is roughly one half of that for a comparable SSR system (Secondary Surveillance Radar).
- Even more important than the economic benefits is the fundamental contribution to safety of air traffic, not only regarding air traffic management, but also the ground situation at the airports where there is high intensity movement of planes and vehicles in an area of complex configuration.
- The user-friendliness of ERA's innovative solutions has led to broader take-up.

Eureka Benefits

The Eureka label was very important at the beginning in facilitating access to public funding, and the start of a sequence of events that brought commercial success.

CASE STUDY - E! 1837 POETRY

| | | | |
|------------------|-------------|---------------------|-------------|
| Start Date | 28-Feb-1998 | End date | 31-May-2002 |
| Duration(months) | 51 | Actual cost (MEuro) | 3.44 |

Poetry With Light - A New Functional Window Treatment Concept For 2000

The Project

The main objective was to develop a complete new window treatment concept, including a new textile, a new production line and an improved high vacuum metallization process. For market reasons the new product had to be based on 2,5 metres wide textiles instead of the traditional 1.5 metres. The project objectives have been largely achieved. POETRY has resulted in a modern 2.5 metres wide production line and a new product range of window coverings combining high performance, insulation, light filtering, sun reflection and decorative properties.

Participants

Verosol Fabrics, forming part of Blydenstein-Willink NV (a group listed on the Amsterdam Stock Exchange since 1953), is responsible for developing aluminium-plated fabrics for window blinds. It manufactures pleated blinds, roller blinds, vertical blinds and curtains which are sold all over the world. Verosol Fabrics has a turnover of about 10 million euros and employs 60 people. 8 employees are assigned to R&D and R&D spending accounts for about 10% of total turnover. The other partners in the project were Trevira (DE), a division of Hoechst (now part of the Reliance Group), and GVE (General Vacuum Equipment), a machine builder from the UK.

Direct and Indirect Effects on Participating Firms

- On completion of the project (2002), Verosol had already achieved an additional annual turnover of 30%. To date, more than 90% (in square metres of aluminium-plated textile) is being produced on the new machines, resulting in an annual sales of about 9 million euros directly arising from the project.
- The impact of the project on Verosol's strategy has been highly significant, as the company may not have survived the adverse effects of market forces and reorganisations within the Blydenstein group had it not been for the project's success.
- Verosol Fabrics' semi-finished products are largely 'sold' to Verosol subsidiaries in Holland and Australia, where the products are assembled into complete systems for the final customer. The combined annual turnover of the two subsidiaries is an additional 13 million euros per year. This turnover can be directly attributed to the new semi-finished POETRY products.
- Two application patents have been filed for light/transparency regulation by means of complete window systems consisting of double blinds.
- As a result of the project, Verosol products have slowly migrated from a wall/window decoration to providing a climate control functionality.
- POETRY has provided the basis for ISO certification of the company and the new product line has resulted in a more structured approach to quality assurance.
- The project has contributed to a more project-oriented and focussed approach in terms of follow-up company R&D activities.

- Future sales are expected to grow gradually in line with new product developments. Potential markets are office buildings (due to labour condition regulations), the clothing industry and the construction sector.
- The project has led to better working methods, improved sense of quality and a higher level of R&D. In addition, the success of the POETRY project has considerably increased the motivation of the labour force.
- It is estimated that the project created 10 jobs and safeguarded another 50.

Broader Effects

- Due to the excellent insulation and reflection properties of the new products, there are considerable cost/energy savings both in terms of production and for users of the new window systems. Qualitative benefits to final users of the window systems are increased comfort and better labour conditions.

Eureka Benefits

The key tangible support from Eureka was in facilitating access to funding. The R&D cooperation encouraged through Eureka, helped to improve the speed of development and the sharing of costs and risks.

PROSURF

Start date : 01-Oct-2000 **End date :** 01-Jan-2006 **Duration :** 63 months
Total cost : 3.71 Meur

The Project

The aim of PROSURF was to overcome the challenges in applying advanced process and production automation technologies in metal surface processing and net-shaping for repair welding and recovery services. A European research network of industrial partners and research institutes from Germany, Romania, Portugal and Spain carried out the research required under the EUREKA FACTORY umbrella.

- The partners specifically addressed R&D on the repair and regeneration of press and forming dies and turbine blade repair.
- A second work package dealt with research on new technologies for mould design and tooling such as cladding, near-to-net shaping capabilities, structuring of 3D surfaces with diode laser technology, selective removal of material with diode laser technology and recovery with tapping technology and surface coating.
- A third strand focussed on finishing and surface structuring of parts for mass production by **milling**. Finally, process automation was a major R&D issue in PROSURF, especially in the areas of 3D topographic sensing, repair welding with robots, simulation-based process planning and adaptive control and automation in closed process chains.

Cooperation with pilot users / in pilot applications was essential for the success of the project.

Participants

APS GmbH - European Centre for Mechatronics, the project coordinator, is a not-for-profit engineering company established in 1981, in Aachen, focusing on research and development, industrial-driven engineering projects, training and education, technical services and technology transfer in the field of production automation. Currently APS employs 25 research staff. The total budget of the German part of the PROSURF project was about €2.7M of which about half was publicly funded. *Mabotic Robotics & Automation* is a start-up engineering company founded in 2004 with a view to exploiting the results of the PROSURF project.

Market Application

The partners tested the project results in pilot applications such as turbine blade repair, barrel extruders and forming dies, thin coating of high pressure vessels and recovery of machinery components. The total market potential for industrial applications of the PROSURF results is very high. Due to the modular structure of developed tools and systems modules, the PROSURF results can be used in application areas such as repair welding and recovery of complex-shaped forming and extruding tools / machinery products, small batch production of complex-shaped products with specific functional properties, tool manufacturing (e.g. forming and forging tools), rapid tooling applications, hard facing, and thin coating, finishing, processing of unknown-shaped products with

conventional processes, prototyping, functional prototypes, machine tool repair services, recovery of wear-affected products/machinery components, etc.

Direct and Indirect Effects on Participating Firms

- APS and Mabotic won a contract to develop a pilot facility for automatically repairing the base blades of the undercarriages of heavy surface mining machinery (total value: approximately €600k including robot component) and an engineering contract for an automated repair work cell at a German manufacturer of high quality electric dental hygiene products (€100k value of engineering work and IT excluding robot / digitally programmed machine tool).
- Mabotic anticipates at least one more industrial engineering contract for automated repair welding (also valued several k€). Income is likely to be generated from maintenance contracts for the supplied industrial solutions (annual value approximately 10% of the total engineering costs).
- The engineering solutions for the integration of software, sensors, scanner, 3D image processing, control systems and the hardware involved (robots, machine tools) developed in PROSURF are being used in other project activities.
- Recently APS and four other partners applied for German Federal R&D funds (total project costs approximately €3M) for a collaborative R&D project, aimed at the development of mobile production assistants. This project builds to some extent on the results of the PROSURF project in case of simulation technologies and simulation-based robot programming.
- Future collaborative activity has been enabled with manufacturer of robots and machine tools in engineering projects (costs for the robot may account for 2/3 of the total project costs).

Broader Effects

- Higher precision of the welding process and improved quality of the welded products benefit customers.
- Clients in manufacturing expect very short RoI for automated repair cells. One can expect that the clients' cost savings pay for the investment within 18 months, e.g. RWE Power saves approximately €400k a year from using the automated robot welding facility.

Eureka Benefits

- As a non-profit contract research company, APS depends on public R&D funds and the support from the Federal Ministry of Education and Research under the R&D programme "Research for manufacturing technologies of tomorrow" proved critical. The project benefited from the fact that the programme manager for the national R&D programme also serves as NPC for EUREKA Factory in Germany.

EUREKA 1692 SANIFOGGER

Title: Ultrasonic Humidification System With Degermification By Active Air/Ozone (O3), Sodium Chlorite (Clo4)

Participants: Contronics Engineering B.V., The Netherlands; Norman Pendred & Co. Ltd. United Kingdom

Start date: 1st January 1997 End date: 1st April 1999

Duration: 27 months

Budget: €0.26 M

The Project

The main partner, Contronics Engineering B.V. won the EUREKA Lynx Award for market success in producing humidifiers that keep salads, vegetables and meats fresh in supermarket storage and refrigerated cabinets. Without humidification the produce dries out, causing wilting and loss of weight. The SANIFOGGER project developed a stainless steel ultrasonic humidifier incorporating a special filter which produces pure water particles just a micron in size. The water quickly evaporates, blanketing and cooling the produce, which absorbs the moisture through leaves and roots and continues to grow. An application of ozone at night kills any bacteria that may have accumulated during the day.

Participants

Contronics was founded 25 years ago to manufacture electronics for cooling devices. It produced its first humidifier in 1985 but then the firm encountered complaints of bacteria build-up, a problem for which there was no solution at that time causing sales of dehumidifiers to fall to almost zero. The present managing director bought the company in 1998 with a partner in a management buy-out and began work on the current technology. The UK partner firm, Pendred, installs, maintains and services humidifiers and water systems, buying components from firms like Contronics. A second EUREKA project TRAVELFOGGER began in 1998 (budget €0.68M) with a French partner ARECO and developed a system for humidifying during transport. The component developed by this partner was an important part of the whole development.

Market Application

By October 2000, the new series of humidifiers was introduced in Germany. Contronics is currently still finding new markets for it. The biggest market for the new humidifier is in fresh produce where it prevents dry-out of fruit, vegetable and meat – humidifiers are mainly used in refrigerated displays of produce in supermarkets and in cold stores. This humidifier generates an extra 5 degrees in cool air and the benefit is that very little energy is needed to produce a fine mist. Pendred's market has diverged, now focusing on using the technology for large scale storage facilities. The demand for refrigerated cabinets has declined in the UK as supermarkets phase out fresh food counters.

Direct and Indirect Effects on Participating Firms

- In 1999 the firm's turnover was €0.7 million and declining. In 2004 it rose to

€ million and with a further new product last year it was €3.8 million. Almost all of this is generated through humidifiers and vaporisers. The development of the humidifier is entirely attributable to the EUREKA project.

- Pendred has developed a related product called the crop hydration system. This is essentially a large scale fogger used to recondition salads and vegetables post-harvest after they are imported. Sales are about €375k and growing fast with exports including New Zealand and Florida.
- Indirect use of the technology was also important for Contronics. Last year the company found a new customer in Belgium through a contact made by the EUREKA secretariat. This firm produced a spray for sanitizing air-conditioning systems in cars. They needed to vaporise the spray in much smaller droplets. Contronics applied the hydration technology and developed a unit which has led to an order for 10,000 units p.a.
- Both firms mentioned organizational learning benefits – for Contronics the developments allowed the installation of a quality manager while Pendred repositioned itself in the market. Staff retention was much improved through high morale and R&D staff increased from one to five in Contronics.
- Jobs created in Contronics are 10 in the company and 10 in subcontractors, plus more in dealerships while for Pendred 6 jobs have been created or safeguarded by transfer to this business.

Broader effects

- In terms of customer benefits, supermarkets have reduced their wastage in terms of food and vegetables thrown away by at least 50%.
- As the produce looks better, it generates a further rise in turnover. In total an increase in turnover of 2-3% is generated.
- The payback for a customer is 6 months for fruit and vegetables and 4 weeks for meat. A rough calculation based upon sales figures and payback times indicates that customer benefit could be around €42 million per year.

EUREKA Benefits

- The EUREKA label and in particular the Lynx award provided substantial marketing and visibility benefits for Contronics. The Eureka Brussels office helped to provide contact with producers and clients. Contronics was encouraged to go for the Eureka Award through Senter, the Dutch Eureka Contact Point.

Project E!2275 VISUALIX 2000

Start date: 01 December 1999 Finished : 07 April 2003 Duration: 25 months

Actual Cost (MEuro): 0.86 Italy: 40 % United Kingdom: 60 %

| Partners | Role | Country | Type |
|---------------------------|---------|---------|---------------|
| Gendex Dental Systems srl | Main | Italy | Large Company |
| EEV Limited | Partner | U.K. | Large Company |

Powerful and Complex Digital Diagnostic System for High- Resolution Dental Radiography.

The Project

The project aimed to develop an innovative CCD (Charged Coupled Device) sensor along with a personal computer platform with dedicated peripherals for the dental market. This replaces conventional film in dental X-rays. It is a powerful and complex digital diagnostic system for high-resolution dental radiography, featuring advanced technology and innovative hardware and interactive software. The project innovations included an advanced x-ray image sensor performance featuring extra-image resolution higher than that for radiographic film, sophisticated intermediate electronics (IME) controlling the sensor's operational phases and providing real time image acquisition at the fastest rate, a Universal Serial Bus (USB) connection to the PC, allowing easy portability among stations, thereby improving flexibility and efficiency in the dental practice and a dedicated application software running on a PC platform providing 16 bit image acquisition, treatment, archiving and connectivity to the external world.

Participants

Gendex Dental Systems was founded in 1992 when PHILIPS Medical Systems' Dental Division was purchased by GENDEX Corporation, a US firm prominent in the field of medical and dental radiology. Today it is owned by the US firm Danaher. The main activities of Gendex Dental Systems firm are the development, manufacturing and worldwide distribution of digital x-ray diagnostic equipment and imaging software for easier and more accurate diagnosis. Gendex Dental Systems has two main operative facilities: one in Italy, the other in North America. Its turnover in 2004 was €36.6M. The UK partner EEV was responsible for the development of the CCD. Gendex had exclusive use of this until 2004 but EEV is now free to exploit it in other applications.

Market Application

The dental market comprises about 700,000 dentists and 500,000 dental practices in the world. The dental digital radiography market is considered a young market, still in its initial phase of evolution. Current penetration of digital radiography systems is limited to about 5% of dental practices, while in the next few years, thanks to innovative technologies and performances, market penetrations is expected to increase by about 2% per year. The main market for Visualix has been Europe one, but the product has also been sold in North America, Japan, Asia, Australia, South Africa, Brazil and Russia.

Direct and Indirect Effects on Participating Firms

- The sales, since 2002, have been worth €28.6M to produce 8,635 units. The contribution to total 2005 sales for the firm was 20 %.
- Visualix 2000 has been a core project for the company, constituting a major step forward in the product segment of dental intra-oral digital imaging.
- A patent application granted protection for the intellectual property of the innovative method developed.
- There was an extended product certification and validation program before the commercialisation of the new product, through the Italian Institute of Quality Brands.
- Several distributors have requested tailored versions of the product to sell them using different brands. Sales of these were done through Original Equipment Manufacturing (OEM).
- The project generated three new jobs: two engineers in the R&D department and one engineer in production. There was an improvement in the workplace, as the firm moved to a new establishment with a dedicated production area.
- The firm has extended its knowledge base, acquiring expertise on specific technologies and applications, and a patent on a new automatic self-trigger method. The benefits of these changes for the firm are reflected in the reinforcement of human capital, available for development of future projects.

Broader Effects

- There are economic benefits for the customer in using the new product, as they can do away with more expensive film-processing techniques. The elimination of the need of film development and liquid disposal saves a lot of time and effort and allows the dentist to spend more time with the patient. The benefits gained compared with the price paid are estimated to yield a 2 to 4 year investment payback period.
- Other qualitative benefits relate to the higher quality of the images and versatility in use.
- The end-user, the patient, when treated by a dentist using Visualix 2000, enjoys the benefits of an immediately available image and the possibility of better decisions and treatment in cases where time is critical.

Eureka Benefits

The support from EUREKA, through a private consulting firm advising Gendex on different funding programmes, was both financial and promotional. The initial contacts were through the Italian Agency for Innovation and the Ministry for Education, Universities and Research. This provided the company with access to public funding which has allowed it to build an enlarged and more dedicated R&D team and permitted an aggressive market introduction plan.

5 Cluster case-studies

ATHOS project (ITEA 99001), “Advanced platforms and technologies for communication services”

The Project

ATHOS has built an environment in which appropriate communication services can be implemented across Europe by developing an advanced architecture based on middleware. This has been done by creating new application programming interfaces (APIs) to ease the development of services and application, and to design, develop, integrate and evaluate systems that will use the new reference architecture. It was probably the first development of a middleware platform dedicated to the convergence of IP and telecom. The main context for the project was the move of telecom networks to a totally new network: the NGN or Next Generation Network, based largely on Internet Protocol, and relying on software development, contributing strongly to the convergence between telecom and IT industries.

Participants

ATHOS project was led by Italtel, a telecom equipment manufacturer, and included France Telecom R&D, Evidian, a subsidiary of Groupe Bull established in July 2000, Bull/Dyade, ILOG and INPG. Italtel’s core business is the design, development and installation of new-generation integrated multi-service networks (voice/data/video), enhanced by a full range of support services. NGN (Next Generation Network) technologies are key to the company. The Eureka project was part of the strategy developed by Italtel, to become a major NGN equipment and solutions provider.

Market Application

Telecom Italia was a pioneer for NGN and VoIP migration of its legacy network, starting from the national backbone. Telecom Italia selected Cisco Systems and Italtel to provide the first converged network “VoIP/MPLS”, with immediate application. Since October 2002, all of Telecom Italia’s national Rome-Milan calls run over a converged “VoIP/MPLS” network. The ATHOS project cannot take credit for the network’s full development, but it allowed a bridging of the selected architecture with the Advanced Call Server developed by Italtel. The firm used the middleware developed within ATHOS to gain flexibility in software development and to offer customers systems that accelerate time-to-market when introducing new services. This contributes to the generation of softswitch products, which are a key product for Italtel.

Direct and Indirect Effects on Participating Firms

- A new product area related to ATHOS is the softswitch market. Softswitch is based on IP use on telecom networks and relies largely on a separation between network hardware and network software. Italtel has become a major manufacturer of softswitch. The worldwide softswitch market for the second quarter 2005 is estimated by Infonetics around 250 million USD. The project has contributed to Italtel’s advance in softswitch development, as compared to its worldwide competitors.
- NGN, through the decoupling of the application layer from the network level, is paving the way to NGS and to the convergence of Telecom with IT. Thus the

- development of NGN, a major service enabler, opened the door to new services, for which a strong growth is expected.
- SIP application servers represent a \$466 million market in 2005 and will grow at a CAGR of 79% to reach approximately \$4.8 billion by 2009.
 - A major impact of the move to NGN is a strong decrease in Operating expenses (OPEX), linked to the decoupling of software and hardware and to the prominent role given to software. The move to NGN allowed for a strong reduction of operating costs: a 20 % decrease in the first year (2003). Other press announcements mentioned a total OPEX reduction of 66 %.
 - NGN as a whole is paving the way to NGS (Next Generation Services), and to the convergence of telecom and IT. The development of new services is only starting for the multimedia sector, and will acknowledge a major growth in the future years.
 - The project ATHOS has led to the creation of a new company, set- up by Bull and INPG, named ScalAgent Distributed Technologies, which is positioning itself to develop and market advanced mediation solutions for large-scale Internet business infrastructure and applications.

Broader Effects

- The telecom operators, the main customers, benefit in two ways : a strong decrease in the network operating costs; and the capacity to provide new services using the same architecture and equipment.
- NGN as a whole is paving the way to NGS (Next Generation Services), and to the convergence of telecom and IT.
- The general public, as well as industry clients, will be able to use the new services to be developed.

ITEA Beyond

The project

ITEA Beyond aimed to improve the capability of European IT industry in user centred design methods, tools and techniques for the validation of design and development of advanced interactive products and services. The project goal was to develop software principles, methods and guidelines to support human centred approaches for user interfaces (UI) development in professional and consumer domains. APC Interactive solutions ag developed and tested UIs for application in their next generation public payphone. The results of the Beyond project was used to design multimedia payphones called *MultimediaStation*. A Multimedia Station is a telephone booth with broadband Internet access. Users can surf in the internet, send SMS's, emails, photo-mails, video-mails, digital greetings cards and photo greetings cards. There is a videophone connection available from one MultimediaStation to another. The payphone is also a device to provide specialised contents and services (such as e-government applications).

Participants

APC Interactive Solutions AG is an award-winning Austrian company which produces and operates in public multimedia terminals, founded in May 2000, as a joint venture between Philips (24,9%), LB data (10,6%), management and staff (11%) and a group of smaller financial and private investors (53,5%). Initially, the company dedicated almost all available resources to R&D activities. Today 10% of turnover goes to R&D as the company effects the transition to commercialisation and marketing activities.

Market application

There are around 1 million payphones in Europe and approximately 4 million worldwide. Apc interactive estimates that around 20% will be replaced by multimedia payphones. Beyond yielded far more advanced results in design of user interfaces (UI) for public payphones than the customers are currently happy to accept.

Direct and Indirect Effects on Participating Firms

- Since August 2003, APC Interactive Solutions AG and Telekom Austria have been rolling out about 1,000 coin- and card-operated public telephones all over Austria under the name *MultimediaStation*. Substantial investments also come from an advertising marketing partner which invested in the new telephone booths and sells the poster advertising space.
- Telekom Austria outsources the operation, servicing and maintenance of the new payphones to APC Interactive (which generates additional revenue for the company). APC Interactive also generates revenue from content management and advertisement on the UI (approx. 20% of the total operating turnover).
- New multimedia payphones are usually build in locations where public demand makes sure that the RoI is less than 3 years.
- APC Interactive is currently expanding business to other countries. The company has already agreed contracts with telecom operators in Germany, France, and Bulgaria where several hundred multimedia payphones will be installed soon.
- Based on the results of the ITEA Beyond project, apc interactive also pursues commercialisation activities beyond payphone development and operation.

- Another recent development is the installation of around 200 in-door multimedia corners in well known fast-food restaurant chain in cooperation with a telecom operator.
- APC Interactive managed to keep its key R&D personnel and improved the level of staff qualification.
- The company has gained high visibility at national and European levels.

Broader Effects

- The new generation payphones helps keep alive the provision of public payphones.
- The MultimediaStation provides specialised location based services and enables companies to communicate with their customers in new ways. Restaurants and shops that offer in-house multimedia terminals can generate additional revenues from higher turnover and new customers.
- The new pay phone provides open access to Internet anytime, anywhere, regardless of whether they have access to Internet at home or at work.
- The commercialisation of the UI R&D results lead to a de-facto user standard.

Eureka Benefits

- The Eureka label considerably facilitated the access to public R&D funds from the Austrian Industrial Research Promotion Funds (FFF) - around €2M. The company considers the support received from the Austrian NPC essential to get Eureka status for their project activities and to access innovation partners and business networks.

CASE STUDY CAFÉ (ITEA 00004)

The Project

CAFÉ has to be seen in the context of three successive ITEA projects (along with ESAPS and FAMILIES). The main goal of this sequence is to contribute to solve the software productivity gap by using the concept of software family engineering, using notably lessons from mechanical engineering technologies. The specific role of CAFÉ was domain engineering, based on the concept of “Family”, a set of projects managed as a single entity in a company. The idea was to develop application specific software tools for each family. A key goal is to produce very rapidly many different types of equipment. CAFÉ put more emphasis on building and testing applications, and on the business issues, costs and benefits. The methods included managed reuse, with separated development for platforms and products and managed variability (with application specific elements). The project resulted in fast generation of software and fast production of variants, with as associated results: reduction of development cost, reduction of product lead-time, reduction of maintenance cost, feature propagation, common look-and-feel and software quality.

Participants

In total 31 partners contributed, 13 partners were present for all 3 projects, mainly larger companies. The company interviewed, Royal Philips Electronics is one of the world's biggest electronics companies. Philips Medical Systems has over 30,000 employees – more than half of them in the US- and operates in four main business groups: cardiac and monitoring systems, digital imaging systems, medical IT and ultrasound.

Market Application

Partners worked in separate domains: for example Philips in medical equipment and consumer electronics, Bosch in car equipment, Thales in control systems and Nokia in mobile phones and network equipment.

Direct and Indirect Effects on Participating Firms

- Almost all sales (99%) by Nokia mobile and network products are coming from products using the Family system. For Philips Medical Systems, together with derived products more than 60 % of sales are involved.
- Philips developed ViewForum, a “Multi-modality Viewing & Processing Environment”, as a launch pad for a variety of clinical applications. They include Quantitative Contrast Analysis, Cardiac MR Analysis and X-Ray Vascular Processing.
- Nokia could on the same basis develop a whole set of different mobile phones, addressing different clients: from basic phones to very sophisticated ones. Nokia developed a platform for its smartphone, named Series 60 platform, with more than 25 million sales expected this year. Nine different Series 60 platform phones have been developed using the CAFE results together with the Series 80 platform developed for enterprise developers. Nokia is selling its Series 60 platform to other mobile manufacturers. 10 years ago the firm developed a new mobile phone

- per year. Currently the company develops 30 to 40 mobile phones per year, with approximately 10 times more employees.
- Market Maker, a small German company, was able to stay in the financial market due to the project and has seen a 15 times faster development time, allowing having good business figures in a very competitive market.
 - For Philips Medical Systems, the project changed both the marketing strategy with products now sold as part of the family, and the development strategy, with much more software support.
 - Philips Medical Systems gets a product to the market twice as fast and has a uniform user interface for all products, which is appreciated by the customer, and also make the products easier to maintain.
 - Cost reduction was a key objective of the project. The results have been used by very diverse industrial sectors and include product cost reduction of 60-70 %, productivity improved with a factor of 2-6 higher output, investment reduction an average of 50 %, up to 90 %, product lead-time reduction, ease of configuring an average of 50% faster, up to 95%, maintenance cost reduction with an average of 50% fewer components and training time reduction.
 - Nokia is selling its mobile platform to its competitors, creating a new range of revenues, and competing with software companies such as Microsoft.
 - The technology has been used inside Philips by Consumer Electronics (development of products) and Semiconductor divisions (development of chip processing machines for ASML).
 - There was a significant change in internal organisation. Previously independent groups developed each system. Now there is a bigger group dedicated to domain engineering, and the other groups have been reduced in size (or keep constant with more results). People are now meeting regularly (once or twice a year), in order to discuss their common problems and elaborate common solutions. 50% cost reduction
 - There was a significant effect on standardisation at OMG (Object Management Group). Inputs are accepted, some parts have been initiated by the project. The UML2.0 standard published last year has also been influenced by the project. .
 - It contributed to maintaining existing jobs: the same people were doing more, but there was no growth for 3 years, except for domain engineering (more than 50 extra people). The market shares were kept with more products.
 - There is now more specialisation per product, allowing the software people better defined jobs and allows for cooperative work: different people for different parts.

Broader Effects

- There was a significant dissemination effort made by the project, including three books on Education (published August 2005), Best Practices (to be published January 2006) and Research Topics (to be published January 2006). Material for training courses exists at academia, in companies and by consulting firms.

EUREKA Benefits

- The Eureka label helped to secure the funding, but being recognised and supported internally also helped. Project participants in all countries were funded.

CASE STUDY EAST-EAA

The Project

The project East-EAA (ITEA 00009): Embedded Electronic Architecture started in July 2001 and ended in June 2004. The main challenge was to integrate different electronic systems, subsystems, modules and components delivered by different suppliers into the complete network of a vehicle system. A basic objective was to develop a new business model, whereby automotive OEM would be able not only to buy black boxes from their suppliers, but also pieces of software that would fit into their hardware. A specific goal was to contribute towards improving and securing Europe's position in the international automotive competition in terms of leadership in technologies and standards. The project proved also a powerful learning tool on how to make things together, firstly by defining a common language. Both middleware and communication layer concepts have been implemented and validated in demonstrators from different automotive domains using the methods developed in the project. Beside the technical work, EAST-EEA also addresses issues of a more general nature including development and examination of scenarios for systems integration and for new business models to reflect the future conditions of business relations between manufacturers and suppliers. Such supporting activities played an integral role within EAST-EEA, leading to the introduction of a new embedded electronic architecture into future vehicles.

Participants

Led by PSA, EAST-EEA is the biggest collaborative R&D project ever launched in the automotive industry, bringing together 26 organisations, from at least three types of companies: the automotive industry Audi, BMW, Daimler-Chrysler, Renault; automotive suppliers Magnetti-Marelli, Bosch, Valeo, Siemens and tools and software providers.

Market Application

For automotive OEM, the issue is not to increase sales, but to decrease cost. By enabling re-use of hardware and software, the project offers opportunities for dramatic cost reductions and ensures the leading position of European car manufacturers and suppliers into the future.

Direct and Indirect Effects on Participating Firms

- A key result / spin-off of East-EAA is the setting up of AUTOSAR (the AUTomotive Open System Architecture). Its core partners are BMW, Bosch, Continental, DaimlerChrysler, Ford, General Motors (Opel), PSA, Siemens VDO, Toyota, Volkswagen. The AUTOSAR consortium aims at facilitating the reuse of software components between different vehicle platforms, OEMs and suppliers, and is not funded by public authorities. The basic idea behind the project is to benefit from a large scaling effect due to standardisation. The possibility to use building blocks much more often (for different car models and types) allows cost reduction (cost development is shared among more vehicles). Another advantage is that by using a building block policy, the development time is shortened. However the real effects of the project will only become effective by the

beginning of 2007 at the earliest. According to Autosar internal estimates, the cost reduction may be between 10% and 15 %.

- An indirect effect is a growing awareness of problems in the development departments. A major change in culture inside the former DaimlerBenz, and Chrysler resulted from the merger to DaimlerChrysler, leading to more “international thinking”. It is expected that Mercedes, a brand inside the DaimlerChrysler company, will take the lead, followed by others one or two years later.
- Products are mainly developed by automotive suppliers such as Bosch. OEM manufacturers may benefit in terms of more choice of suppliers, more competition between suppliers and a higher product quality.

Broader Effects

Benefits to final customers will appear around 2012. They may include higher quality of the product, greater reliability and faster introduction of innovation. The improvements will be market and regulation driven, and may include new driver assistance systems (“accident free driving”) as well as sophisticated entertainment systems.

EUREKA Benefits

The support from ITEA was very efficient in selecting, building and managing projects. The ITEA label was needed in order to have a European project. Without funding and European level cooperation, the result would have been small projects on specific topics, but nothing to compare with the actual magnitude of the East-EAA project. The benefits expected now would have been much more modest.

CASE STUDY ESP@SS-IS

The Project

The ESP@SS-IS project's primary goal was to provide open smart-card platforms (both hardware and software) to support the development of value added electronic and mobile commerce services. The secondary level goal is to develop a set of reusable innovative technological bricks from which future generations of high security smart-card products may be constructed. The strategic relevance of the project was its supporting role in the European effort toward achieving a leading position in secure Internet and wireless applications.

The project was a follow on activity of a real breakthrough project called MASSC (Multi Application Secure Smart card; 1999 - 2001) which was funded in the MEDEA programme. That project developed an open platform that included innovative design methodologies to support both fast development cycles and formal security certification. The innovative methodology used in MASSC for high-security computing was applied to the Smart Card environment. ESP@SS-IS sought to develop ways to securely connect a Smart Card to computer systems over the Internet using the same computer architecture but new standards (JAVA). The project aimed to test the technological feasibility with real applications.

Both the hardware and the software development was successfully finished in 2004. The core Smart Card architecture developed in ESP@SS-IS is now the basis of the ST 32-bit Smart Card platform which is of particular interest for telecom applications. The project yielded a smart card technology demonstrator, which combines a sophisticated 32-bit secure microcontroller with 1Mbyte of Flash memory technology. Storing application code in Flash rather than Read-Only Memory (ROM) greatly increases the flexibility of the card by allowing personalization of generic products, software upgrades and post-issuance downloads.

Participants

The project coordinator, ST Microelectronics is the only company that is a world leader in both smart card chips and Flash memory and this synthesis contributed to STM's technology leadership in the smart card business. EsP@ss-IS brought together semiconductor manufacturers, component providers, the computer industry, software developers and service providers to work on the feasibility of high-security computing on Smart Cards (Axalto, Telecom Italia Mobile, Thomson, Philips Consumer Electronics, Viaccess, Trusted Logic and the research institutes CEA-LETI and TIMA). The project brought together all actors in the value chain from semiconductor development to service providers. Operators (banks, TV content distributors) with an interest in using the technology were also actively involved in the project.

Market Application

The technology opened up a host of open platform opportunities. In the mobile market, the increased memory facilitates the creation of new applications such as video services and mobile imaging (MMS) and full feature 3G/4G operation. SmartJTM is placed to become the standard platform for Mobile Network Access and for Secure Personal Portable Objects. Other applications areas include high-end Internet access and Pay TV solutions.

Direct and Indirect Effects on Participating Firms

- STM's ST22FJ1M product was developed using the R&D work of the project. Services based on the ST 32-bit technology are not on the market yet and market introduction of the 32-bit technology is largely still pending since the value chain is very complex.
- The main advantage of the 32-bit platform is more functionality, although the main impeding factor for broader market penetration today is limited bandwidth for the networks.
- The share of 32-bit based Smart Cards at STM is currently about eight to ten percent. By 2010 approximately 20-30% of the Smart Cards sold by STM could be 32-bit based. STM strategically concentrates on the high-end, high-value market segment.
- The 32-bit technology is now used in various STM products.
- The project established links to a new partner coming from the content distribution industry (Viaccess).
- The technology has the potential to become openly accessible via coordinated action in the standardisation domain. Open platforms will stimulate the software industry creating new companies to exploit the new technology

Broader effects

- The citizen or end-user can benefit directly from the developments, which allow unprecedented secure access to new and wide-ranging services, ensuring more functionality and more sophisticated services.

EUREKA Benefits

The main advantage of the EUREKA framework is that it facilitated collaboration with partners along the whole supply and value chain (e.g. with service content and application providers) and also co-operation with competitors, which probably would not have happened to the same extent outside the EUREKA framework. The EUREKA setup made it easier to jointly develop standards on the interoperability of innovative platform solutions.

Other important advantages of the EUREKA cooperation were the ability to create and maintain a long term vision through the combined strength of the partners, the sharing of risks in an ambitious R&D project, reduction of global timescales and the opportunity to exploit the power of the consortium to adopt the project's outcomes on an international scale.

CASE STUDY INCA A106 MEDEA+

The Project

Integrated Network Copper access (INCA), project A106 from the MEDEA+ cluster, started in January 2001 and ended in December 2002. The project is dedicated to xDSL technologies, which allow high speed data handling using the existing local telephone loop. The total budget was around 165 person year for 2 years. The goal of the MEDEA+ INCA project was to develop SoC (system-on-chip) and IC (integrated circuit) technologies for xDSL applications to the level where European companies can compete successfully in the global market for high data rate local access services. The project aimed to contribute to the development of innovative integrated products for advanced telecommunications services by offering very high data rate processing capabilities combined with low cost to market. The project proceeded along two main axes: develop basic algorithms and find how to implement them. A complete prototype was developed and validated, from system and algorithms definition to silicon realizations, production of demonstrators and field tests.

Participants

INCA involved 12 partners, including Alcatel, Alcatel Microelectronics, ST Microelectronics, Telia, France Telecom and several research centres and universities. It involved participants from all parts of the value chain: telecom operators (FT, Telia), integrators (Alcatel, Thomson Multimedia), component manufacturers and IP developers (STM, Alcatel Microelectronics), a design house Centro Team and 5 Universities and Research Institutes. Alcatel and STM have been very active in translating into standards the basic concepts and contributed to the development of new, highly-integrated, low power xDSL devices. Thomson Multimedia focused on the development of a validation and demonstration platform for ADSL/VDSL technology, targeting applications for broadband multimedia equipment and services. France Telecom and Telia with their specific know-how as operators, ensured ADSL/VDS interoperability, validation of new algorithms for enhanced VDSL, through suitable tests on laboratory benches, and field trials. Universities and Research Institutes developed the system and algorithms. The companies were also working together within INCA to define a common system and architecture requirements to make future VDSL chipsets interoperable.

Market Application

One of the main xDSL technologies is ADSL (Asynchronous Digital Subscriber Line). The technology appeared early in 1992, with Alcatel being very rapidly involved. The first ADSL circuit was developed around 1996. A key technological issue was interoperability. Its impact which was highly significant thanks to the development of a very rich standard definition, was largely underestimated. A key guideline for INCA has been xDSL standardisation and interoperability. The new VDSL and ADSL2+ offers which are currently proliferating enable a triple play offer by Telco operators or other players. They allow provision of high definition TV distribution, video on demand, visiophony, very high speed Internet access, and Voice over IP on a standard fixed phone line. They are thus opening up huge market opportunities. Clearly, INCA is not the cause

of such a movement which is a worldwide trend, but it has contributed to European industry staying competitive and in some cases being ahead of its worldwide competitors.

Direct and Indirect Effects on Participating Firms

- As with many of the MEDEA projects, involving cooperation between chipset manufacturers, equipment manufacturers and services providers, sales are very difficult to measure. In this case, three levels of sales should be considered: sales of chipsets by component manufacturers, sales of equipment by telecom integrators, and sales of services enabled by the new equipment. Project participants have high or leading world market share in all three. The sales of Alcatel in Access Networks in 2004 are estimated by Morgan Stanley to amount to 1.8 billion euros.
- The advantage gained by STM in development cost is significant: the learning curve for DVB-H has been reduced by a factor of 5 to 10, as expected by starting from scratch. A DVB-H product has been developed in less than a year.
- The INCA project has developed the first platform for VDSL-DMT worldwide, and was used most notably by the FSAN organisation (organisation linking most of the largest telcos worldwide), for which the first demo was produced in October 2000. It has also contributed to convincing the Korean authorities to select DMT for VDSL (Korea was the first country to launch ADSL).
- The technology has also been transferred to other domains of research such as Wi-Fi, since the project allowed STM to obtain core competences, that it is able to reuse, becoming more reactive.
- The project has contributed to the consolidation of ties between Alcatel and STM. STM bought Alcatel Microelectronics, leading to a clearer basis for cooperation, with STM concentrating on chip sets and Alcatel on equipments. This has contributed to the consolidation of the research teams and led to employment increases through manufacturing and sales of new products.
- A major effect of the project was in standard development. It has been recognized that conflict between two modulations standards QAM and DMT for VDSL has delayed considerably the choice by standard committees. Fortunately, VDSL Olympics, which were organized in May 2003 with all the VDSL chipset providers present at the moment, confirmed the superiority of DMT modulation and later forced the choice in IEEE, ANSI and ITU-T. INCA project members such as Alcatel and STMicroelectronics have been deeply involved in the VDSL Olympics with the VDSL chipset built in the framework of INCA. This chipset proved to be superior to any other VDSL chipset QAM and DMT in competition at the moment. The INCA project made 14 contributions to the international standardization committee. The project consortium has been able to impose the use of DMT in the VDSL standard, by developing an efficient prototype.
- INCA has also contributed to the standardisation of ADSL2 and ADSL2+. It contributed to the creation of the VDSL Alliance, with more than 50 companies working on DMT (including Nokia, Texas Instruments, Samsung and many others), which was a main contributor to standard selection.

EUREKA Benefits

- The support from the MEDEA Office was very good: the organisation of MEDEA Forum, organisation of meetings between project leaders, support to the entrance of new countries and interface with the Public Authorities.
- Without EUREKA the project would have gone ahead, but not in this format: building a formal consortium allowed participants to have more interesting partners. Public funding is key for that. It has allowed them to accelerate development, to work on a greater scale, and to have the needed partners. Eureka has allowed them to work together peer to peer, not on the basis of subcontracting. Research work done by the Universities led to unforeseen results, which have proven useful.

CASE STUDY T201 CMOS logic0.1 MEDEA+

The Project

The MEDEA+ T201 CMOS logic 0.1µm project (January 2001 December 2002) brought together major European chipmakers, process equipment manufacturers, materials suppliers and research institutes. Although the original target was to develop the process for the large-scale fabrication of 100nm devices, the project quickly adapted to the smaller 90nm feature sizes identified as the next technology node by the revised International Technology Roadmap for Semiconductors (ITRS) in 2001. Design rules were issued last quarter 2002, and a demonstrator fabricated beginning 2003 (a chip with 54 million transistors). T201 allows the definition of a common basic CMOS process, based on which participating companies may define options and compete. This allows competitors to develop together the common, but difficult and expensive, basic technology.

The Alliance, STMicroelectronics, Philips and Freescale (formerly a Motorola company) has decided up to now to cooperate on 90nm, 65nm and 45 nm. In one year's time, it is planned that 70 % of circuits developed in Crolles 2, a large research 12 inches facility nearby Grenoble opened in 2003 uses the CMOS 90 nm technology. T201 was followed by T207 65nm CMOS process in 300 mm wafers, which started in January 2003 and ended December 2005. T207 is using T201 results and also the results of other technology MEDEA+ projects, as well as IST projects such as ARTEMIS or ULISSE. Experience gained in T201 has generated the success evident in T207, with notably much more efficiency in the prototyping process. A new MEDEA project is drawing on all of these predecessors to develop 45nm technology.

Participants

The project leader is the Franco-Italian firm ST Microelectronics, among the 10 largest semiconductor manufacturers worldwide with a turnover of around \$9billion and 53,000 employees. This project is part of the company's global strategy, and is considered as a priority, as STM is only working in projects that fit its strategy. The project does not change the company's strategy, but consolidate it. The 12 partners include another major chipmaker, Philips, and several equipment and materials suppliers.

Market Application

STMicroelectronics has also a R&D facility in Crolles1, with a technology using 200 mm wafers. T201 was first developed in Crolles 1 using 200 mm wafers. When T201 was launched, a new centre, Crolles 2 was already under construction, so that three months after the end of T201, Crolles 2 went into operation. Its key technology is 90nm , where results of T201 represents a major contribution to it and is now used with 300 mm wafers in Crolles 2 The transfer of the technology was effected mid 2003 and production began by the end of that year.

Direct and Indirect Effects on Participating Firms

- It is expected that the revenues from products using this technology will account for 20 % of the company's total revenues in 2-4 years. The technology is already

- in use for products such as baseband mobile telephony, Bluetooth, set-top boxes and telecom equipment. One should stress that the project did not include any circuit design or product development. It is basically an enabling technology.
- Decrease in circuit dimension contributes to the decrease of cost per function observed in microelectronics.
 - One may consider that the participation of Freescale in the Alliance is a direct consequence of the project.
 - The project allowed consolidation of relations with the academic network both French and European. For academics, the advantages are significant : funded by the Ministry of Industry, they are able to buy expensive equipment and establish a direct relationship with major manufacturers.
 - The relevant parts of the technology developed in Crolles have been transferred to STM's Italian plant in Agrate to be used in the production of non volatile memories
 - The project has allowed participants in the project to enter the market, for example Air Liquide and some other equipment suppliers.
 - The development has led to an increase in the number of researchers in Crolles 2, with a high level of competence, enabling them to develop faster new technologies. It has also led to a better use of the R&D results coming from other research centres such as CNRS.
 - A recent study has estimated that the indirect employment related to Crolles 2 is above 2000 people (other researchers, suppliers, ST Grenoble).

Broader Effects

- The partnership between STM, Philips and Freescale, which was facilitated by T201, contributed to the creation of a pole of competence with a worldwide dimension.
- ST M clients benefit from new and more powerful integrated circuits. The 90 nm technology has allowed the development of the so called SOC or "System On a Chip", which allows for the integration in the same circuit of multiple complex functional blocs (memories, CPUs, DSPs,...). This is a key factor of progress for systems, allowing complex systems to be the fastest, smallest and least power consuming.

EUREKA Benefits

All the partners were funded. The logistical support from MEDEA was good in terms of dissemination, logistics, Forum and publications, with positive and constructive critics. Without Eureka support, industry would have still developed the technology but each company would have probably followed an internal roadmap. The project has allowed for a very important synergy with the other partners, enabling the sharing of a significant part of the research, and therefore decreasing delays and costs. It has also led to a significant increase in the number of partners, which has proven to be very beneficial. Funding contributes to the creation of a synergy that would not exist otherwise. When the project is launched, the working team does not already exist: building the team and the project contributes to creating a dynamic move, which continues after the project ends.

EURIMUS DIAGNOSIS - Digital Gauge Network System

The Project

The initiative for the project came from Schlumberger, France. The overall aim of the project was to develop a high pressure sensor as effective as the conventional sapphire or quartz sensors but cheaper, using microelectronics. An oilfield drill can be controlled from the surface even if the drilling takes place 5 km under ground. By introducing a new generation of gauge based on microsystem technologies, EURIMUS Diagnosis was to come up with an electronic control instrument, offering a breakthrough in terms of permanent monitoring of oil wells, particularly multi-branch and multi-layered wells. Safety was the prime design consideration, in the harsh and dirty operating environment. Despite good work progress, Schlumberger decided towards the end of the project to stop all efforts, due to financial reasons related to lack of fit with the company's core business. The other EUREKA partners, the University of Karlsruhe and the company Kontron, both located in Germany, were still able to profit from the project to a certain extent.

The field bus system developed through the DIAGNOSIS project was the result of a development process that had started long before, but the specifications set by the project partners were the last building blocks to complete the project for commercialisation.

Participants

Schlumberger Limited is a major oilfield services company supplying technology, project management and information solutions. Schlumberger Information Solutions (SIS) is a subsidiary that offers the integration of information technology to produce more oil. Schlumberger operated as a system integrator and had several subprojects for this gauge that ran separately. The various teams had not been in touch with each other before. In this case, Schlumberger was looking for a company that was able to produce field buses tailored to the special needs of electronic boards in harsh environments. The Kontron Group which took over from the original partner, PEP, designs and manufactures embedded computer systems and is one of the world market leaders in this field. The Institut für Prozessrechentchnik (Institute for Process Control and Robotics) (IPR) at the University of Karlsruhe deals with distributed real-time systems, e.g. in drills. The DIAGNOSIS project fits 100% with the activities of the department. The final inspection of the field bus developed by Kontron was in the second quarter of 2005, at which point the relationship/collaboration came to an end. The rights for licensing and marketing remained with Schlumberger.

Direct and Indirect Effects on Participating Firms

- Kontron was able to profit from the know-how developed during the DIAGNOSIS project and integrate it into subsequent projects, e.g. a platform on the basis of SPS is being marketed today. Firm strategies were as a result not altered but strengthened.
- For Kontron the development improvement that was achieved through the DIAGNOSIS project will most likely lead to an increase of sales between 15-20%. It is envisaged that similar products will follow in which case, the building blocks will have to be adjusted to the new specifications

- Kontron is marketing the field buses of the follow-up projects mainly for clients in Germany but some clients are located in the USA. This kind of field bus can not only be used for drilling in oil fields or in any other harsh environment, but also for automation and in environments where it would have to withstand substantial levels of vibration, for example large scale industrial environments.
- With the new kind of field bus the workplace for people working in harsh and unpredictable environments can be made a lot safer, e.g. the embedded field bus is able to react to changes in the environment (such as vibrations or sudden change of material or change of state of aggregation) and to send this information to a central control system.

Broader Effects

- For customers a major benefit is the security provided by the field bus. The users of the field bus have a much higher degree of security as the control works more reliably than conventional systems and can react immediately to new and precarious situations.

EUREKA Benefits

- The project would not have been realised without public funding. For Schlumberger it would have been too risky to take on the financing of such a project on their own.
- The EUREKA label was regularly used by Kontron at presentations of the projects and was recognized by the audience as such. It provided Kontron a reference to access other publicly funded projects in Germany.

CASE STUDY UMANISTA

The Project

UMANISTA (Universal Module enhancement for Secured Telecom Applications) was a hardware component project for secure mobile telecommunications. The Professional Mobile Radio Systems (PMR) market has very long product cycles (around 10 years lifetime of handset parts), evident in today's PMR building blocks which reflect the state of mobile communications technology in the mid '90s. Normal components cannot be used due to the particular specification requirements for secure systems. Of these components it is the handset, consisting of approximately 1000 sub-components which drives corporate R&D. A major challenge is the thermal management within the handset (to dissipate the heat). In the old generation this was done via a metal bloc which radiated excess heat inside the handset.

UMANISTA was set up by EADS in cooperation with its partners as a technical feasibility study. The project ran from June 2001 to December 2004 and the development of the demonstrators took three and a half years. The technical aims of the project were to significantly reduce both the number of components in the mobile handset and the energy consumption. The prototypes should demonstrate better output power and bands (higher efficiency). For the user of the handset, this means more autonomy and smaller and lighter equipment. UMANISTA comprised R&D on five demonstrators: power amplifier, two antenna switches, SAW filters and VCO (Voltage Controlled Oscillator). R&D on the power amplifier, the antenna switches and SAW filters was successful. The project could not come up with a working functional VCO unit. The project also included an economic feasibility assessment of the prototypes and demonstrators developed. For all four technologically feasible components the economic assessment showed positive results.

Participants

The project coordinator, EADS is a global leader in aerospace, defence and related services. EADS Secure Networks employs around 1,500 people all over Europe and has sales offices all around the world. PMR provides integrated security solutions for public safety and civil defence agencies, including TETRAPOL standard secure communication. The partners of the consortium were: Thales Microelectronics (power amplifier unit), LTCC (on the market), UMS (gas galvanisation DII), TMEX (VSOs, filters; on the market), Alcatel ME, Elpasa (PCB) and IMEC.

Market Application

- Customers of PMR (professional mobile radio) products are mainly security forces, police and fire brigades, but also airports, railway operators, or large production facilities. The unit's products not only comprise mobile equipment but they offer their clients complete systems solutions (mobile networks, reconfigurable software, radio

terminals and terminal equipment and mobile equipment). The potential market volume is very small and mobile equipment is manufactured on the basis of orders by customers. EADS SS sells around 50,000 mobile units a year (compared to the 140,000,000 GSM units NOKIA, for example, sells annually).

Direct and Indirect Effects on Participating Firms

- The results of UMANISTA are not yet in EADS products on the market. EADS plans to further develop the handset over the next two years. The time horizon for marketing the product is three to five years from now, since the handset is only one part in a whole network of building blocs that constitute a secure mobile communication network. For the time being there are still technical problems with the network part to be solved, as agreement on a new standard / system definitions for RF functions in base stations to allow for higher data exchange rates is still pending. When the new system comes to the market, it will be the standard for EADS PMR for the next ten years.
- Thales has already marketed the new power amplifier for sailing alarm systems. LTCC has also marketed the developed components in other products.
- For EADS an important outcome of the project is the simulation platform which can also be used for other R&D processes. The use of simulation in product R&D helps shorten the time required for technical feasibility studies before prototypes are produced. Costly manufacturing procedures can be avoided and simulation allows in-depth discussion on requirements with the suppliers. The total timeframe for technical feasibility studies can be reduced with the use of simulation from three to four years (without simulation) to one to two years (with use of simulation). There has been a broader introduction of the simulation platform in R&D activities.
- Strategically, the project certainly was at the core of EADS PMR research activities, as the content addressed an indispensable hardware element in the development of new generation professional mobile radio communication. R&D was steered and carried out in close cooperation with the purchase department of EADS PMR.

Broader effects

- The main benefits of the UMANISTA hardware components for mobile handsets are more and better services and increased functionality of the handset for the customer. The new systems will allow more sophisticated applications when the product comes on the market. The price of the PMR will probably not come down. The main benefit is in significantly better functionality and more sophisticated applications.

EUREKA Benefits

The project involved a high level of technical and financial risk. Being able to share and reduce the risks through cooperation with EUREKA partners and public funding was very valuable for EADS. Setting up a network with suppliers would have been considerably more difficult outside EUREKA structures. All partners have gained from the cooperation as they developed a common view on the requirements / technical problems and they shared a common goal.

6 Conclusions

Overall, the annual impact assessment has found strong evidence of positive socio-economic benefits arising from the projects. The message both for the policymakers who support EUREKA and for the firms who take part is that EUREKA continues to work well and it achieves its goals of developing technology-based innovative products through R&D projects. By these means it raises the productivity and competitiveness of those parts of European industry that take part as well as creating broader benefits.

By using the case study methodology as the prime instrument for this year's review it has been possible to demonstrate that there is a risk of serious underestimation of the benefits of EUREKA (and more generally of industrial R&D). As we note below the normal measures of sales of innovative products themselves produce very encouraging results, though here the benefits tend, as in most R&D portfolios, to be focussed on a smaller group of "Big winners". However, it is the rest of the effects which are more usually either missed or simply recorded in a checklist without an attempt to pursue their value to the firm and more broadly. Under the broad heading of "behavioural additionality"⁴ we have seen evidence of effects of firms' strategies, on their organisation and method, and more broadly on their capabilities and competences. Raising the technological base of the companies through the project has been shown to give them the means to apply the knowledge across a broad range of products, processes and market opportunities. The value of networks, alliances and prestige is also demonstrated.

Beyond the enhanced benefit to the participating firms we have also catalogued social benefits, both to the direct customers of the innovating firms and beyond to end users who in several cases benefit from improved environments, safety or simply from better value for money and functionality in everyday objects. Another area of social benefit has been the employment created, safeguarded or enhanced.

The specific contribution of EUREKA to the achievements needs some discussion. It could be argued that strong economic benefits would have occurred anyway and that EUREKA's success is confined to the ability to label (and at a national level fund) potential winners. The evidence does not support this contention. For both categories of projects the role of public funding in enabling, extending or accelerating the work was stressed – indeed there were no success cases without public funding and some remarked that they had not returned to EUREKA because the type of funding that had underpinned their success was no longer available. Advice from funding agencies was helpful to smaller or less experienced firms (though large firms also spoke very positively of the role of cluster offices). Collaboration between partners was also an important aspect, allowing complementary skills to be brought together, often in a vertical structure, linking users and suppliers. In the clusters "pre-competitive" configurations were also visible, establishing de facto standards or sharing the cost of developing technologies that

⁴ See the new OECD publication on this: "Government R&D Funding and Company Behaviour – Measuring Behavioural Additionality" OECD, Paris, 2006 ISBN 92-64-02584-7

would be applied in different sectors. It was often the initiative of EUREKA that brought together these networks.

This has been the first impact assessment to cover both Innovative Projects and Sub-Cluster Projects. Hence we have the chance to comment on the differences between them. At the obvious level there is the issue of scale and scope. For the most part the Sub-Cluster Projects are led by large firms (though with SME and academic participation) and have a broader agenda to structure markets as well as to seek technological advantage within them through innovation. Mobilising an entire sector to secure the position of Europe's firms is the aim here. Timescales are also different. The process orientation of many Sub-Cluster Projects has meant that these principally address the productivity objective of EUREKA and realise their economic value through substantially reduced production costs. Even where they are product oriented the time to market is much longer than for the typical Innovative project. It is difficult to generalise but perhaps the typical Innovative project achieves its innovation through novel configurations of existing technologies, with the insight coming in the means of linking these to a niche application.

This exercise was defined by its remit and resources to be an impact review not a full evaluation equipped to study success factors in firms and projects, or to assess EUREKA's own structures and processes. Nevertheless we offer a few impressionistic comments on what could be learned. We do not reproduce the more common observations from the literature (need for project champion etc) but focus rather on some EUREKA specifics.

A typical successful project had:

- **A clear target market in mind from the outset.** Past evaluations have shown that the most common reason for failure is not technological but rather one of misjudging the markets' requirements or the difficulty of entering it without references. Successful projects identified needs and mobilised the competences necessary for the innovation.
- **Flexibility to pursue opportunities when they emerge.** Helped by the flexible nature of EUREKA projects were able to change direction easily if circumstances changed. Flexibility is also necessary to make wider use of the technology developed in different applications.
- **A clear vision and commitment from the Main Partner** – in only one case was the Main partner not also the principal beneficiary within the project. While those involved in project selection might also wish to examine potential benefits for other partners, a focus on the Main is a first approximation to project success.
- **Good alignment between EUREKA and company strategy.** Successful projects were never peripheral to the firm. For SMEs they were often synonymous with the firm's business strategy as well as its technology strategy. They also were vehicles for transformation of the business, usually from research consultancy to production. For

large firms again strategic alignment was strong and the projects were mainstream in the part of the business concerned with the project.

Finally we comment on the impact assessment itself. The exercise has clearly been limited by the resources available – more case studies and more depth on those carried out, particularly in the clusters to allow interviewing beyond the coordinator, would have been beneficial. If there is a desire to extend the remit to examine either EUREKA's processes or broader innovation and management issues in relation to the projects then again an extension of resource would be necessary.

Some use has been made of the Final Reports and the breadth of coverage they offer makes it necessary to keep them within the ambit of the Impact Assessment. Also the separation of "recent" projects substantially improved the relevance of the analysis by comparison with previous AIRs. Nonetheless, the procedure of routinised data collection creates severe limitations. There is no means at present to deal with obvious errors in completing the forms (for example in scale of currency). This process could be somewhat improved by devolving it to a market research agency with built in telephone follow up to improve response rates and to check for potential errors.

With these improvements the second methodological difficulty could then be addressed. To ensure that case studies are of high impact projects there should be prima facie evidence. This year the main means to identify these was by asking NPCs. This was not efficient for several reasons and resulted in delays. It would be far better to select cases from a fully functional database. We also recognise that data collection improvements are likely to need to be a part of the broader harmonisation of project information (the "audit trail"). This would also facilitate learning as results could eventually be compared with initial (PAM) assessments for example.

As a final word though, it may be said that despite the imperfections of approach, EUREKA has clear evidence to show its value to all of its stakeholders.

7 ANNEXES

Statistical overview

1. INTRODUCTION

The statistics concern EUREKA projects that:

- finished between 1 January 2001 and 31 December 2005,
- and started after 1 January 1996 (*it doesn't make no sense to look back at projects that started more than 10 years ago*).

The statistics have been extracted from two databases:

- the EUREKA project database
- the CSE database of Final Reports containing impact data.

So, we have two sets of figures:

- a full set of projects that finished in above mentioned period, and
- a selection from this batch containing all projects with a Final Report (FR)

Umbrellas (*not umbrella sub-projects*) and clusters are not included in the statistics.

2. STATISTICAL RELEVANCE

Impact data in this report are extracted from the FR-database and are at the level of individual participating organisations in a project. So, one project could be covered by more than one participant, meaning more than one Final Report per project.

The full EUREKA project database contains 737 projects that finished in the period 2001-2005. The number of participants in these projects is 2855 (i.e. on average 3,9 partners per project).

The Final Report database contains FRs from 678 different participants, covering 387 different projects.

So, the impact data in this report cover more than 50% (52,5%) of all projects finished in 2001-2005 and about 25% (23,7%) of all involved participants in these projects.

In terms of total costs/investments, 62% is covered: 1,1 of 1,8 billion euro.

In the table on the next page some specific data of both datasets are compared in order to see if the FR data provide a representative picture of the full dataset of finished projects.

| | All finished projects (2001-2005) | | Final Reports database | |
|---|--|-------|-------------------------------|-------|
| Number of projects | 737 | | 387 | |
| Number of participants | 2855 | | 678 | |
| Type of participant: | | | | |
| SME | 1247 | 44% | 344 | 51% |
| Large company | 713 | 25% | 199 | 29% |
| Research institute | 425 | 15% | 74 | 11% |
| University | 372 | 13% | 53 | 8% |
| Administration | 98 | 3% | 8 | 1% |
| Technological area: | | | | |
| BIO | 138 | 18,7% | 79 | 20,4% |
| INF | 136 | 18,5% | 60 | 15,5% |
| MAT | 114 | 15,5% | 62 | 16,0% |
| ENV | 108 | 14,7% | 59 | 15,3% |
| ROB | 94 | 12,8% | 60 | 15,5% |
| TRA | 58 | 7,9% | 20 | 5,2% |
| ENE | 44 | 6,0% | 28 | 7,2% |
| COM | 35 | 4,8% | 14 | 3,6% |
| LAS | 10 | 1,4% | 5 | 1,3% |
| Total investment/costs | 1819,4 Meuro | | 1123,9 Meuro | |
| Aver. costs per project | 2,5 Meuro | | 4,7 Meuro | |
| Project size (in # projects) | | | | |
| Meuro ≤ 1 | 279 | 38% | 131 | 34% |
| Meuro > 1 = 2 | 221 | 30% | 112 | 29% |
| Meuro > 2 = 5 | 173 | 23% | 104 | 27% |
| Meuro > 5 = 10 | 44 | 6% | 26 | 7% |
| Meuro > 10 | 20 | 3% | 14 | 4% |

Overall conclusions:

The sample of Final Reports corresponds very well with the full set of projects that finished in the period 2001-2005.

Company representation in the FR-sample is 10% higher than in the full Finished-projects set (80% vs 69%). In view of the fact that we are assessing impact in terms of industrial exploitation and commercial achievements, this is an important point.

Another positive point adding to the credibility of the impact assessment is that the total value of the FR-projects (in terms of costs or investments) covers 62 % of the total value of the full set of finished projects in the given period (cf. the number of FRs cover 52% of the total F-portfolio).

Also in terms of time frame (start dates/finish dates) there is good correspondence between the two samples:

| | All finished projects (2001-2005) | | Final Reports database | | Coverage of FRs |
|--------------------|--------------------------------------|--------|------------------------|-------|--------------------|
| Start date | | | | | |
| 1996 | 42 | 5,7% | 25 | 6,5% | 60% |
| 1997 | 76 | 10,3% | 53 | 13,7% | 70% |
| 1998 | 127 | 17,2% | 81 | 20,9% | 64% |
| 1999 | 130 | 17,6% | 65 | 16,8% | 50% |
| 2000 | 136 | 18,5% | 79 | 20,4% | 58% |
| 2001 | 121 | 16,4% | 53 | 13,7% | 44% |
| 2002 | 61 | 8,3% | 22 | 5,7% | 36% |
| 2003 | 41 | 5,6% | 8 | 2,1% | 20% |
| 2004 | 3 | 0,4% | 1 | 0,3% | 33% |
| total | 737 | | 387 | | 53% |
| Finish date | | | | | |
| 2001 | 109 | 14,8% | 83 | 21,4% | 76% |
| 2002 | 102 | 13,8% | 65 | 16,8% | 64% |
| 2003 | 90 | 12,2% | 50 | 12,9% | 56% |
| 2004 | 283 | 38,4% | 138 | 35,7% | 49% |
| 2005 | 153 | 20,8 % | 51 | 13,2% | 33% |
| total | 737 | | 387 | | 53% |

In the next chapters the impact of 387 projects are compiled, describing the achievements of 678 individual companies/organisations, derived from the 678 Individual Final Reports.

3. TECHNOLOGICAL ACHIEVEMENTS (FR question 4)

| Overall technological achievements | Number of participants (Final Report respondents) | Percentage (of total 678 participants) |
|------------------------------------|---|--|
| Excellent | 144 | 21% |
| Good | 419 | 62% |
| Weak | 52 | 8% |
| Bad | 10 | 1% |
| No answers | 53 | 8% |
| Total | 678 | |

83% of participants report 'good' to 'excellent' technological results. Distribution of technological achievements over the different organisation types shows the following picture:

| | Excellent | Good | Weak | Bad | (blank) | total | Percentage good/excellent |
|-------------------|------------|------------|-----------|-----------|-----------|------------|---------------------------|
| SME | 72 | 210 | 30 | 4 | 28 | 344 | 82% |
| Large co. | 30 | 128 | 21 | 6 | 14 | 199 | 79% |
| Institute | 23 | 45 | 1 | 0 | 5 | 74 | 92% |
| University | 18 | 30 | 0 | 0 | 5 | 53 | 91% |
| Admin. | 1 | 6 | 0 | 0 | 1 | 8 | 88% |
| total | 144 | 419 | 52 | 10 | 53 | 678 | 83% |

Many companies, small as well as large, report good to excellent technological achievements.

Technological achievements translated to concrete products, processes, services and other results:

| Technological achievements | Achieved | | Expected within 3 years | |
|----------------------------|------------------------|-----------------------------------|-------------------------|-----------------------------------|
| | Number of participants | Share of total participants (678) | Number of participants | Share of total participants (678) |
| New products | 244 | 36% | 160 | 24% |
| Improved products | 219 | 32% | 67 | 10% |
| New processes | 230 | 34% | 89 | 13% |

| | | | | |
|-------------------------|-----|-----|----|-----|
| Improved processes | 185 | 27% | 57 | 8% |
| Prototype/demonstrator | 293 | 43% | 36 | 5% |
| | | | | |
| New services | 72 | 11% | 69 | 10% |
| New strategic alliances | 132 | 19% | 69 | 10% |
| | | | | |
| New licences | 19 | 3% | 29 | 4% |
| New patents | 70 | 10% | 46 | 7% |
| | | | | |

The figures underline the short-term ‘close-to-the-market’ policy of EUREKA projects; concrete results have already been achieved at project completion rather than after 3 years.

New or improved products and processes are favourite deliverables of EUREKA projects compared to new services: only 11% of participants report the achievement of new services.

Licences: the total number of achieved licence agreements - reported by 19 participants - is 612, resulting from 10 projects. Two SME projects (E! 1892 and E! 2620) account for 600 of them.

Patents: 184 patents resulting from 35 projects are reported by 70 participants. One project (E! 1549 COMMEND; total costs 126,3 Meuro) is responsible for 70 of them.

4. INDUSTRIAL EXPLOITATION (FR question 5)

150 participants (22% of 678) expect no industrial exploitation as a result of their participation in a EUREKA project. Besides universities and research institutes, this is reported by 20% of the participating SME and by 25% of the large companies.

On the other hand 433 respondents (63%) expect industrial exploitation by their own company. 207 respondents (31%) expect exploitation by another company. [*These numbers include double counts*].

195 participants (29% of 678) have already successfully introduced their newly developed products/processes/services on the market. In particular SMEs seem to be quite successful: one third of them have already brought their project results onto the market at project completion. See table below:

| Project results already on the market | Number of participants (FR respondents) | Total number of that organisation type | Percentage of total |
|---------------------------------------|---|--|---------------------|
| | | | |

| | | | |
|---------------------|-----|-----|-----|
| SMEs | 113 | 344 | 33% |
| Large companies | 56 | 199 | 28% |
| Research institutes | 17 | 74 | 23% |
| Universities | 9 | 53 | 17% |
| | | | |
| Total | 195 | 678 | 29% |

Also universities and research institutes benefit from their participation in EUREKA projects, be it less than companies.

5. ACTUAL COMMERCIAL IMPACT (FR question 6)

| Actual commercial impact | Number of participants (FR respondents) | Percentage (of total 678 participants) |
|--------------------------|---|--|
| | | |
| Excellent | 42 | 6% |
| Good | 266 | 39% |
| Weak | 124 | 18% |
| Bad | 24 | 4% |
| Nil | 121 | 18% |
| | | |
| No answers | 101 | 15% |
| | | |
| Total | 678 | |

45% of participants report good or excellent commercial achievements as a result of their project participation. A breakdown per organisation type shows the following picture:

| | Excellent | Good | Weak | Bad | Nil | (blank) | total | Percentage good/excellent |
|-------------------|-----------|------|------|-----|-----|---------|-------|---------------------------|
| | | | | | | | | |
| SME | 23 | 145 | 78 | 14 | 44 | 40 | 344 | 49% |
| Large co. | 12 | 82 | 29 | 8 | 51 | 17 | 199 | 47% |
| Institute | 4 | 20 | 14 | 2 | 13 | 21 | 74 | 32% |
| University | 3 | 18 | 3 | 0 | 10 | 19 | 53 | 40% |
| Admin. | 0 | 1 | 0 | 0 | 3 | 4 | 8 | 13% |
| | | | | | | | | |
| total | 42 | 266 | 124 | 24 | 121 | 101 | 678 | |

Almost 50% of the industrial participants report good or excellent commercial achievements. Remarkably, the number of universities reporting good or excellent commercial results is relatively high (40%).

Additional annual turnover

A total additional annual turnover of **635,1 Meuro** already achieved, is reported by 196 participants (i.e. **29%**).

A total additional annual turnover of **1827,0 Meuro** expected within 3 years in addition to what is already achieved, is reported by 284 participants (i.e. **42%**).

These figures represent 387 projects with a total investment/costs of 1123,9 Meuro, reported by 678 participants. Not every participant in a project has delivered a Final Report. If we assume that on average a project consists of 3,5 participants - which gives a total of 1355 participants - the figures in the table above might be multiplied by a factor 2. This would mean that a return on investment is reached already at project completion. After 3 years a ROI of 4.4 is achieved. It should be noted that the Final Reports cover only 50% of the total number of projects that finished in the given period. So, theoretically one might end up with an ROI of approximately 9.

Distribution of the additional annual turnover (AAT) figures over the different organisation types gives the following picture:

| AAT Achieved (in Meuro) | On Domestic market | On European market | Outside Europe | Total in Meuro | Achieved by (numbers) | Total number org type | % with AAT |
|-------------------------|--------------------|--------------------|----------------|----------------|-----------------------|-----------------------|------------|
| | | | | | | | |
| SME | 68.4 | 80.7 | 37.0 | 186.1 | 128 | 344 | 37% |
| Large co. | 102.1 | 190.1 | 149.7 | 441.8 | 53 | 199 | 27% |
| Institute | 1.1 | 0.2 | 0.0 | 1.4 | 8 | 74 | 11% |
| University | 2.5 | 3.3 | 0.0 | 5.8 | 7 | 53 | 13% |
| Admin. | 0.0 | 0.0 | 0.0 | 0.0 | 0 | 8 | 0 |
| | | | | | | | |
| total | 174.1 | 274.3 | 186.7 | 635.1 | 196 | 678 | 29% |

Some observations:

- 37% of participating SMEs report an AAT achieved on domestic market as well as in and outside Europe. So, a considerable share of SMEs participating in EUREKA is active on international markets.
- Compared to SMEs, the share of large companies that achieved AAT is relatively low (27%).
- Self-evidently, research institutes and universities achieved a low AAT and are less internationally oriented than companies. Remarkably, universities are doing better than research institutes.

The table below concerns the AAT expected within 3 years in addition to what is already achieved:

| AAT Expected (in Meuro) | On Domestic market | On European market | Outside Europe | Total in Meuro | Expected by (numbers) | Total number org type | % with AAT |
|-------------------------|--------------------|--------------------|----------------|----------------|-----------------------|-----------------------|------------|
| | | | | | | | |
| SME | 386.9 | 310.1 | 226.4 | 923.4 | 189 | 344 | 55% |
| Large co. | 197.5 | 324.1 | 288.6 | 810.2 | 72 | 199 | 36% |
| Institute | 62.3 | 2.2 | 0.6 | 65.1 | 14 | 74 | 19% |
| University | 9.1 | 11.5 | 5.2 | 25.8 | 7 | 53 | 13% |
| Admin. | 0.0 | 2.5 | 0.0 | 2.5 | 2 | 8 | 25% |
| | | | | | | | |
| total | 655.8 | 650.4 | 520.8 | 1827.0 | 284 | 678 | 42% |

Additional annual turnover expected after 3 years approaches to 2 billion euro and is expected by 42% of the participants. A high share of SMEs (55%) is accountable for a high share of this expectation (54%). In contrast to achieved AAT, research institutes do better than universities when it concerns expectations.

Access to new markets

In addition to additional annual turnover also access to new markets is reported as a result of project participation:

- 128 participants already achieved access to new markets at domestic level,
- 106 at European level, and
- 64 outside Europe

Again SMEs account for a big share:

- at domestic level: 65% of all participants
- at European level: 63% of all participants
- outside Europe: 56% of all participants

The expectation figures are about twice as high.

6. EMPLOYMENT IMPACT (FR question 7)

213 participants (i.e. 31%) report an increase of employment, divided over the different organisation types as follows:

SMEs

137

(40% of total SMEs)

Large companies:

47

(24% of total Large)

| | | |
|----------------------|-----------------------------|-------------------------------|
| Research institutes: | 15 | (20% of total Institutes) |
| Universities: | | 13 |
| | (25% of total Universities) | |
| Administration: | 1 | (13% of total Administration) |
| | === | |
| Total | 213 | (31% of total participants) |

Another 95 participants report a safeguard of employment and 11 a decrease.

| | |
|--|--|
| In terms of Full Time Equivalent (FTE): | |
| Already achieved: | 895 FTE |
| Expected in 3 years: | 1187 FTE (in addition to already achieved) |
| Outside own company: | 1748 FTE (reported by 178 participants) |
| which brings the total employment impact up to 3830 FTE. | |

As described in chapter 5 under ‘additional annual turnover’, also here a multiplying factor of 5-10 might be applied.

In the next table an overview by organisation type is given.

| Employment Impact (in FTE) | Achieved | | Expected within 3 years | | Total FTEs |
|----------------------------|----------------|---------------------------------|-------------------------|---------------------------------|-------------|
| | Number of FTEs | Achieved by number of org. type | Number of FTEs | Expected by number of org. type | |
| SME | 525 | 112 | 722 | 111 | 1247 |
| Large company | 270 | 40 | 387 | 38 | 657 |
| Research institute | 76 | 12 | 50 | 13 | 126 |
| University | 24 | 11 | 26 | 8 | 50 |
| Administration | 0 | 0 | 2 | 1 | 2 |
| Total | 895 | 175 | 1187 | 171 | 2082 |

Although 213 participants reported an employment increase, only 175 mentioned concrete numbers.

Again SMEs account for a relative big share.