European Commission

IST programme

Integrated Programme Portfolio Analysis (IPPA)

Report on the analysis done following the second IST call

May 2000

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Contents

1. Executive Summary

Objectives: Portfolio analysis and linking to the programme's vision

Following the evaluation of the 2nd call of the IST programme, an interdisciplinary team of 18 independent experts analysed the portfolio of projects resulting from the first two calls. The objectives were to provide a programme level overview on the response to the calls, an analysis of the development of the portfolio against the programme's vision and priorities, and suggestions for cross programme clustering.

Balanced portfolio coverage but requires additional focus on medium/long-term convergence.

The programme was found to have a broad range of activities - RTD and take-up actions - that address technologies and applications from various angles. This allows the mix between developers and users to be fine-tuned to the needs of each area. Critical mass is starting to build up in areas where Europe has a demonstrated strength, such as mobile communications and smart cards.

The growing need for inter-disciplinary RTD, in particular to address the medium to long term convergence of technologies and applications, is only partially met at present. Many projects address specific building blocks (KA4 and FET) or specific markets related to their areas (KA1, KA2 and KA3). More new partnerships bringing together complementary skills would have been expected as the programme gets more integrated. This suggests that the concept of an integrated programme is not yet fully realised in the IST community.

Clear focus on market opportunities but to be balanced with high risk/high reward research

Around 75 % of the projects have a time to market of less than five years and 20% fall in the 5-10 year range. For IST markets, 5 years is the dividing point between business planning and longer term strategy. Nevertheless the programme needs to address the longer time perspectives and, at present, there is a gap in supporting RTD with a 5 to 10 year horizon.

The majority of the projects from the 1st and 2nd call have times to market which fall within their market opportunity windows. This suggests that there is good correspondence between the content of the programme and industry planning. For projects that deliver results outside the market opportunity window, the market risk comes from the uncertainty that characterises market projections. On the other hand, the results of these projects, if innovative enough, could be highly rewarding (high risk/high return) in terms of new high value products and services.

Opportunities for synergies through Cross Programme Clustering

There are opportunities for Cross Programme Clustering in the areas of healthcare, personal mobile information appliances, new business and organisational models, and standards in coding and compression.

Linking the Portfolio to the Programmes Vision: broad yet unfocussed coverage

The mapping to the vision is encouraging, given the fact that the two calls were based on the 1999 Workprogramme, which does not integrate the programme's vision. The IST programme has a

broad, if as yet unfocussed, coverage of the technologies needed to realise its vision. Of the RTD projects 45% were found to make a significant contribution to the vision.

Take-up actions: well focussed but diverse implementation across the programme

About 50% of the 2nd call proposals were take-up actions. These are well focussed on specific markets or applications, and attract a significant number of SMEs and users (including those which are not normally users of IST).

Take-up actions are understood and implemented in different ways in the programme. This suggests that take-up is focussed on the areas specific needs. Large-scale and clustered trials can evolve into test-beds, as described in the vision.

Socio economic aspects and projects: Strengthening user feed-back

User involvement in call 2 projects was specifically examined as part of the socio-economic analysis. Users are involved in the majority of projects, but there presence is not always fully exploited. Feed-back from user testing into the development process is not always optimised.

Next to this, the 2nd call specifically called for projects on socio-economic research in IST. An appropriate share of the budget (3,4%) went to these projects.

2. Introduction

This report contains the findings of the Integrated Programme Portfolio Analysis (IPPA) of the first and second IST calls for proposals. This study was conducted by 18 independent experts during the week of 3 to 9 April 2000. The names of the team members are given in Annex 1.

The structure and approach for the study were based on the results of and lessons learned from the Programme Integration and Management Study (PIM) undertaken in July 1999 following the 1st IST call.

2.1. Objectives

The IPPA study aims at:

- Providing a programme level:
  - Overview on the response to the 2nd call
  - Aggregated analysis of the programme portfolio of projects
- Analysing the development of the portfolio against
  - The programme's vision and priorities
  - Workprogramme content
- Identifying possible clustering topics
- Providing results to feed into workprogramme drafting (and proposers' guides etc.)

2.2. Approach

The baseline information provided to the team was the set of 249 proposals that had been proposed for funding following the 2nd call evaluation, together with the abstracts of the funded 1st call projects. This was supplemented by the evaluation and implementation reports for both calls and the Commission's database.

Each proposal was read by a member of the team and classified according to:

- Technologies used
- Markets addressed
- Time to market
- Relevance to Key Enabling Technologies (see box)

The experts also prepared a personal aide-memoire to support them in the discussions in plenary sessions and working groups.

The ***IST programme vision***

The IST programme Advisory Group (ISTAG) has provided orientations for the programme, which have been elaborated in a vision statement:

'Start creating the ambient intelligence landscape for seamless delivery of services and applications in Europe relying also upon test-beds and open source software, develop user friendliness and develop and converge the networking infrastructure in Europe to world class.'

An ISTAG working group has also identified 10 key technologies to enable the achievement of the vision. These "Key Enabling Technologies" (KETs) are presented in annex 3. These KETs, together with the experts' findings, were used in the IPPA study to analyse the degree of alignment of the portfolio with the vision.

Regular plenary discussions were held to build up a shared overview of the content of the 2nd call. This overview included hypotheses on:

- Strengths, weaknesses, opportunities and threats
- The impact of the take-up actions (around 50% of the 2nd call projects)

- The risk profile of the 2nd call portfolio of projects
- Opportunities for cross programme clustering
- How well the 2nd call is focussed on the IST programme vision
- How to estimate and track the socio-economic impact of the IST programme vision

The team then divided into small working groups to verify and refine these hypotheses by mining the database and by re-reading the proposals. A further working group revisited the abstracts of the 1st call projects to identify their contributions to KETs, estimate their time to market and revise the technology and market mappings of the PIM report to align them with the revised set developed by the IPPA team.

The working groups reported back at plenary sessions, where other members of the team could provide additional input to their discussions. These sessions were also used to develop an integrated picture of the 1st and 2nd calls and formulate the major conclusions of the study.

An overall structure for the report was agreed and team members assigned to draft individual sections and, where required, to consolidate the supporting data. Once the overall structure and content had been agreed by the team, a small rapporteur group was appointed to polish the text and format the final version of the report.

3. Programme Portfolio of projects

3.1. Introduction

This chapter presents an overview of the programme portfolio in terms of technologies and markets covered. It also considers the implications of the Take-Up Actions and socio-economic activities that were a significant feature of the 2nd call. Table 1 below shows how the two calls break down in this respect.

Call No.	Segmentation of Call	No. of Proposals
Call 1	Number of RTD Proposals	465
	Number of Take-Up Actions	23
	Others*	70
	Total Number of Selected Proposals	558
Call 2	Number of RTD Proposals	95
	Number of Take-Up Actions	122
	Others*	32
	Total Number of Proposals suggested for funding	249

- Others includes non Take-Up accompanying measures, Thematic Networks, Training Fellowships, Concerted Actions.

Table 1: Breakdown of 1st and 2nd calls by project type

The IST 1st call mainly consisted of RTD projects. In contrast, almost half of the 249 proposals recommended for funding following the 2nd call are Take-Up Actions (TUAs). 17 of the proposals are specifically concerned with socio-economic research.

Take-Up Actions aim to transfer leading-edge or established but under-exploited methodologies and technologies to industry and other organisations. They include:

- Trials (evaluating promising but not fully established technology and methods),
- Best Practice actions (promoting take-up of well established technologies and methods),
- Assessments (evaluation of innovative products).

3.2. Technologies and Markets

The team identified the principal technologies and markets addressed by the 249 proposals that had been proposed for funding following the evaluation of the 2nd call. Proposals were classified into Technology and Market categories. These are presented in Table 2[1] .

[1] Because of the different action lines open in the 2nd call, it was found that some of the PIM technology and market classifications were too broad (i.e. addressed by a large number of 2nd call proposals) or too narrow (attracting only one or two proposals). A revised set of technology and market categories was agreed and these are presented in Table 2. A mapping between the PIM and IPPA categories is presented in Annex 2.

	Technology		Market
1	Software engineering, tools and packages	1	Administration/Non-profit/Public Sector
2	Middleware and interoperability	2	Software Market
3	Knowledge engineering and information management	3	Finance and insurance
4	Security, identification techniques and smart cards	4	Manufacturing
5	Agent technologies	5	Retail
6	Groupware and workflow	6	Services
7	Simulation & CAD/CAM	7	Healthcare (incl. Disabled)
8	Human interfacing inc. virtual reality	8	Media (inc. Advertising)
9	UMTS, Software Radio	9	Education
10	GPS, GSM Terminals	10	Electronics Industry (incl. consumer electronics)
11	Wireless access OPN/wireless LAN	11	Network and service operators
12	Optical networks, physical access networks	12	Telecom equipment
13	Network Management	13	Aerospace
14	Multimedia Information Access Tools	14	Auto industry
15	Components design and manufacturing	15	Architecture, Engineering and Construction
16	Semiconductor processes-equipment-material	16	Transport
17	Microsystems	17	Energy/environment
18	Microwave devices and antennas	18	Agri-food sector
19	Displays	19	Textile
		20	Home markets
		21	Tourism

Table 1 IPPA Technology and Market Categories

The 1st call projects were then reallocated to the revised categories. However, about 25% of the 1st call abstracts did not contain enough information to make a confident reclassification. Fig. 1 presents the distribution of the 1st and 2nd call projects by technology category.

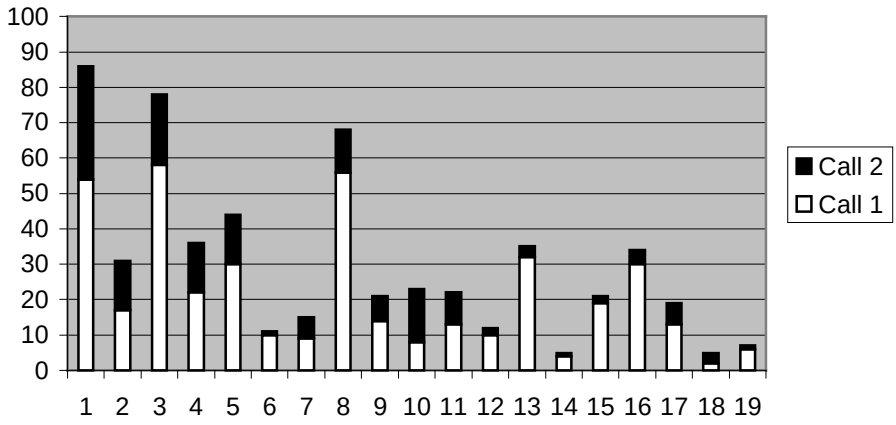


Fig 1: Distribution of 1st and 2nd call portfolio by technology

Overall the technologies most frequently addressed are:

- Software Engineering, tools and packages,
- Knowledge Engineering and information management
- Human Interfacing incl. Virtual Reality

Around 30% of the classified proposals fall in one of these 3 categories.

The distribution of the 1st call projects and 2nd call proposals by market categories is shown below.

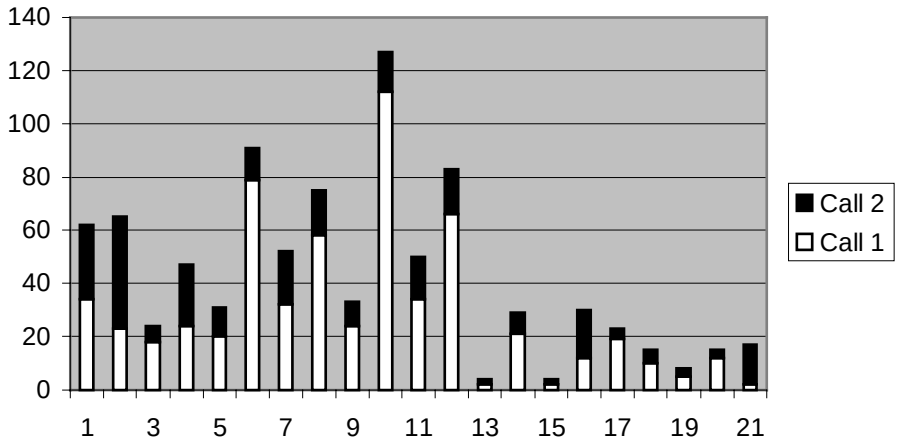


Fig 2: Distribution of 1st call and 2nd call portfolio by markets addressed

Here only12% of all proposals could not be classified into one of the IPPA market categories.
The market categories most frequently addressed are:

- Electronics Industry (incl. Consumer Electronics)
- Services Market
- Telecom Manufacturers

Around 36% of the proposals, which could be classified, fall in one of these 3 categories.

There are significant differences in the markets addressed in the 1st and 2nd calls. The most frequent markets in the 2nd call are:

- Software Market
- Administration
- Manufacturing.

The Electronics Industry is less strongly represented than in the 1st call.

3.3. Take-up actions

About 50 % of the 2nd call proposals are Take-Up actions, including 75 Trials, 37 Best Practice actions and 10 Assessment and Access actions. In order to analyse the role of these actions in the programme, the IPPA-team looked at SME participation and the user-supplier profiles of individual projects. The analysis addressed mainly Trials and Best Practice actions.

The analysis showed that there is a widespread involvement of SMEs in both Trials and Best Practice actions. The participation in take-up actions per type of organisation is shown in figure 3. Only 2 trials did not include SMEs.

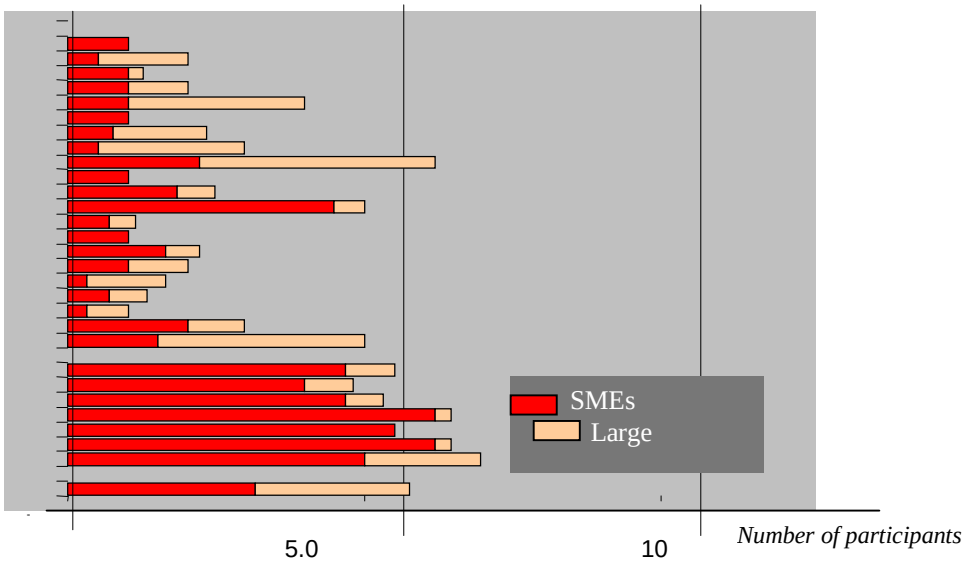


Fig 3: SME's participation in take-up actions (sorted by action line)

The user-supplier profiles were analysed separately for Trials and Best practice actions. Figure 4 presents the results, showing the number of users, industrial suppliers and research organisations involved in each proposal.

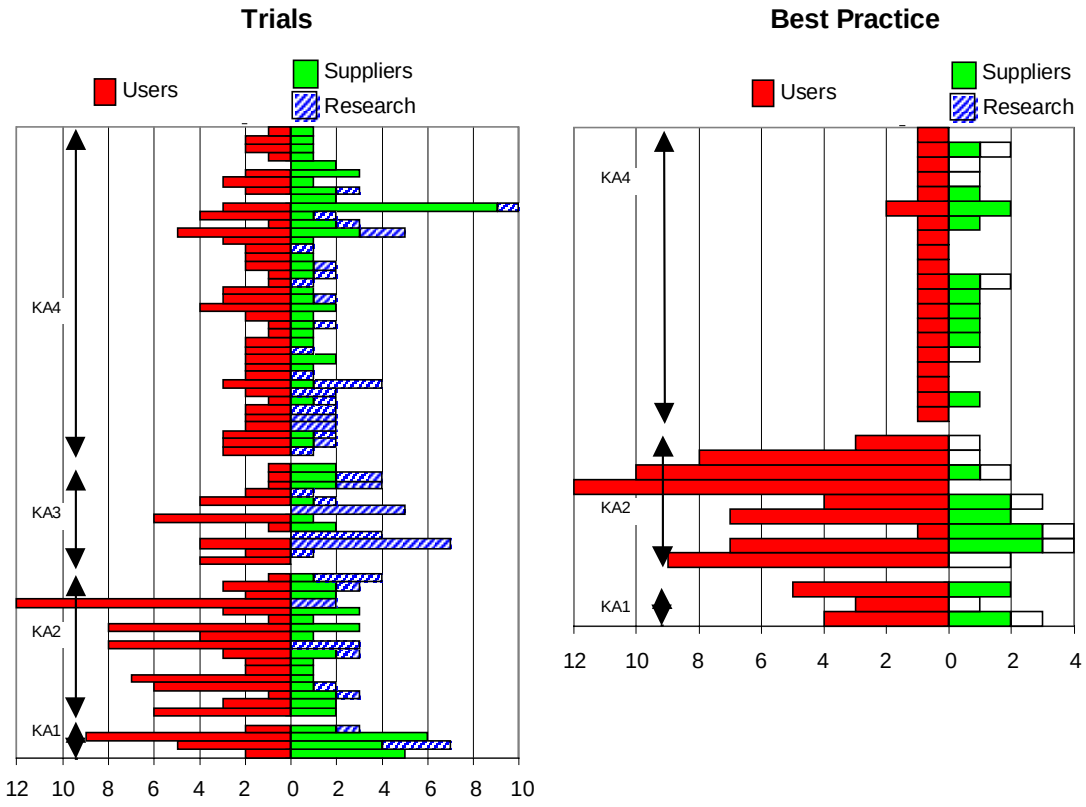


Fig 4: Participation profile of Trials and Best Practice Actions

Aggregating these figures at key action level, the following patterns emerge:

KA1	KA2	KA3	KA4
Equal involvement of users and suppliers. Substantial numbers of participants (users and suppliers). *Observations:* Resembles RTD participation structure.	More users than suppliers. Many SMEs. *Observations:* Close to market: - Requires large scale user participation, - Can lead to "market standard" setting.	Equal involvement of users and suppliers. Substantial numbers of participants (users and suppliers). *Observations:* Resembles RTD participation structure.	Small numbers of users and suppliers. Many actions. *Observations:* Small trials of advanced technology in application context.

The contrast between KAs relates to the differences between early tests of technology (KA 4) and a pilot for a new or emerging market where a critical mass is required in a trial (or best practice) to ensure subsequent engagement and development (KA 2).

3.4. Socio economic proposals

17 of the 2nd call proposals recommended for funding are RTD and Support measures addressing the Action Lines X.1.1 devoted to socio-economic aspects spanning the Key Actions. The proposed funding for these projects is 14 M Euro, which represents 3.4% of the budget for the 2nd call. This seems to be an appropriate share of budget for a technology oriented programme such as IST.

In addition user involvement was specifically examined as part of the socio-economic analysis. Chapter 7 and annex 6 examine in more detail the socio-economic aspects of the programme.

4. Portfolio analysis and findings

The analysis has been done from four inter-linked perspectives:

- Strength, Weaknesses, Opportunities and Threats analysis (paragraph 4.1).
- Time to Market (paragraph 4.2)
- Risk profile (paragraph 4.3)
- Evolution from call 1 to call 2 (paragraph 4.4)

4.1. Strengths, Weaknesses, Opportunities & Threats

Strengths and weaknesses have been assessed in terms of the current portfolio, combining the results of 1st and 2nd calls, and its contribution to the IST programme's vision. This should help identify ways of focussing the programme more precisely on the vision.

Strengths	***Weaknesses***
1. A broad range of activities, both RTD and take-up actions, that address technologies and applications from various angles. This allows the balance between developers and users to be fine tuned to the needs of each area. 2. Continuing development and deployment of advanced EU technologies, such as mobile communications and smart cards, is leading to a critical mass of activities in these areas across the programme. 3. A majority of projects have times to market which fall within their market opportunity windows. This suggests that there is good correspondence between the content of the programme and industry planning. (See §4.3) 4. Take-Up actions are well focussed on specific markets or applications, and appear to be good value for money projects, which should generate a positive and measurable Return On Investment. 5. Several large scale integration projects fit the vision of "testbeds". Several trials have a good balance between users, technology suppliers and integrators.	1. Not enough activities supporting the medium to long term convergence of technologies and applications. 2. The concept of an integrated 5th framework programme has not been widely enough appreciated. The opportunities of the wider IST community could have been exploited more effectively. 3. The proposal evaluation/negotiation process seems to be too slow for projects addressing areas where the market is changing rapidly e.g. e-business. Such projects could benefit from more frequent calls and a 'fast track' selection scheme to reduce project and EU risks 4. There is a strong focus on markets in the 3-5 year term. A full implementation of the IST vision requires a proper balance between short term market-driven activities and those with medium/long term focus (beyond 5 years). 5. Trials with too few participants may lead to de-facto standards that are only effectively accessible to a limited number of major players e.g. broadcasting, the music industry. In some areas, users are not involved strongly enough or not involved at all in Take-Up actions.

The above findings address the whole programme. Observations on strengths or weaknesses that are specific to a particular area are presented in Annex 4.

Opportunities	*Threats*
1. New effective partnerships could be formed, bringing together industry and research partners (traditionally from KA4) and essential applications (from other areas) to reap the benefit of an integrated programme. 2. Developing applications that exploit EU technological strengths (e.g., mobile systems and payment systems). 3. Promoting and supporting e-business in sectors that are not traditionally IT –aware, e.g. 2nd call projects addressing agriculture, food technology, jewellery, etc. 4. Achieving the 'critical mass' (e.g. in education, publishing), that is needed for the rapid diffusion of new technologies and the working processes they promote. 5. Initiating broad-based case studies on the socio-economic impact of IST projects. 6. Addressing sectors, such as entertainment and edutainment, which have both strong market drivers and high technological content. 7. Developing innovative applications for socially important sectors (Health, Transport, Environment).	1. Projects addressing rapidly changing areas (e.g. e-business, virtual enterprises, business re-engineering,) face a high risk of missing market opportunity. The level of innovation in these projects should be very high to avoid being overtaken by market evolution (see §4.3) and to prepare the next generation of products and services that would be compatible with their time to market. 2. The current unbalance towards research in the five year range might endanger Europe's capacity to innovate in the medium/long term and to compete on the global scale. 3. New players in areas, such as publishing, broadcasting and Telecom services are not significantly present in the programme. Opportunities for additional radical innovation that such new players can bring, may be lost. 4. Digital convergence, especially in the area of content development and delivery (e.g., with relation to interactivity) is not sufficiently addressed by the current projects.

4.2. Time to market

When reading the 2nd call proposals and 1st call abstracts, the IPPA team members estimated the time to market of the results of the RTD projects:

- Less than three years from the project start date
- Three to five from the start date.
- Five to ten years from the start date.
- More than ten years after their start date.

The aim was not to provide very precise figures but to identify the main trends. Take-Up actions were excluded because, by definition, these are close to the market. Figure 4 shows the results in terms of both numbers of projects and funding, for the 1st call and the combined 1st and 2nd calls.

The results are:

- 57 % of RTD proposals/projects are in the 3- 5 year range.
- About 20 % of RTD proposals/projects are in the 3 year range
- About 20 % RTD proposals/projects are in the 5-10 year range
- Few RTD proposals/projects (3%) are in the >10 year range

The average funding of around 2 M Euros per proposal seems to apply to all ranges of time to market.

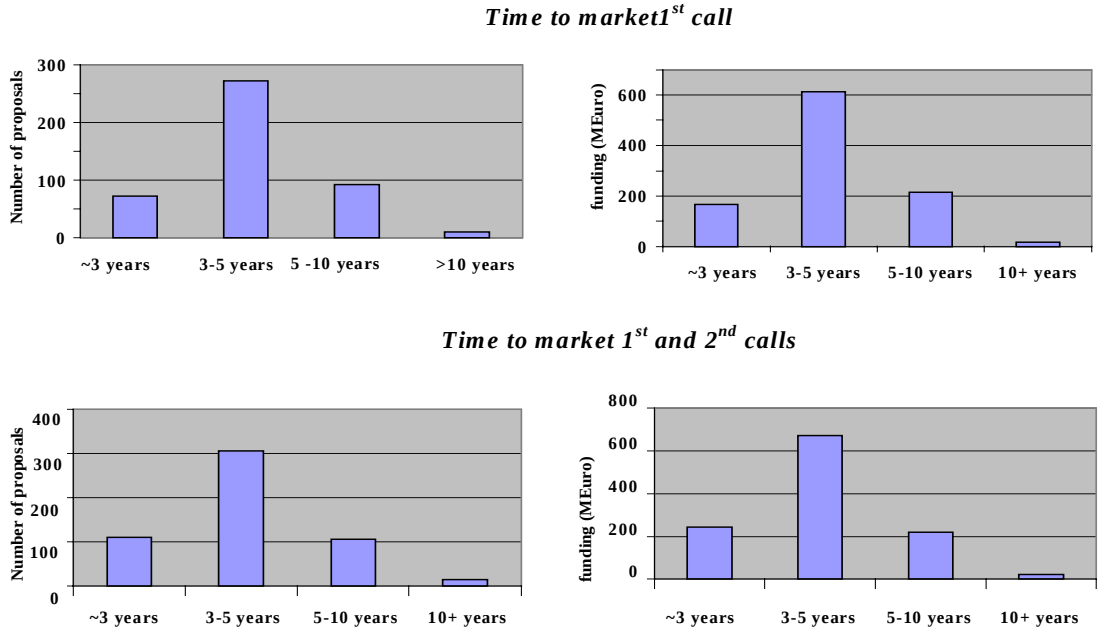


Fig 4: Time to market for RTD projects and proposals

4.3. Risk profile

The IPPA team focussed on *risks related to markets dynamics*, which might affect the impact of the programme. It identified the "market opportunity windows" for the areas that are addressed in the programme (i.e. the "time window" within which the relevant markets present visible opportunities). It then compared them with the times in which the projects were expected to deliver marketable products. Take-Up actions were not considered as these have short times to market that generally correspond to the market windows.

In estimating the market windows, the following factors were taken into account:

- Nature of the technology
- Maturity of the technology
- Market competition
- User acceptance
- Market characteristics and entry barriers

The rationale behind the analysis is:

- Projects that have times to market within the market opportunity window have relatively low market risk (i.e. Project results are delivered at a point when markets are ready to absorb them).
- Projects that have times to market outside the market opportunity window run the risk of not being exploited, unless they aim at the next generation of products and services. The degree of innovation is therefore critical to the success of such projects. Simple incremental developments in technologies or applications are generally not enough. If innovative enough, such projects could be highly rewarding (high risk/high return) in terms of new high-value products and services. The risk then comes from the uncertainty that characterises market projections.

The analysis was independent of the structure of the programme, e.g. projects addressing Public Services do not only come from KA1 and the same for projects in e-commerce (not only from KAII) or software (not only from KA4). The results of the analysis are presented in figure 5.

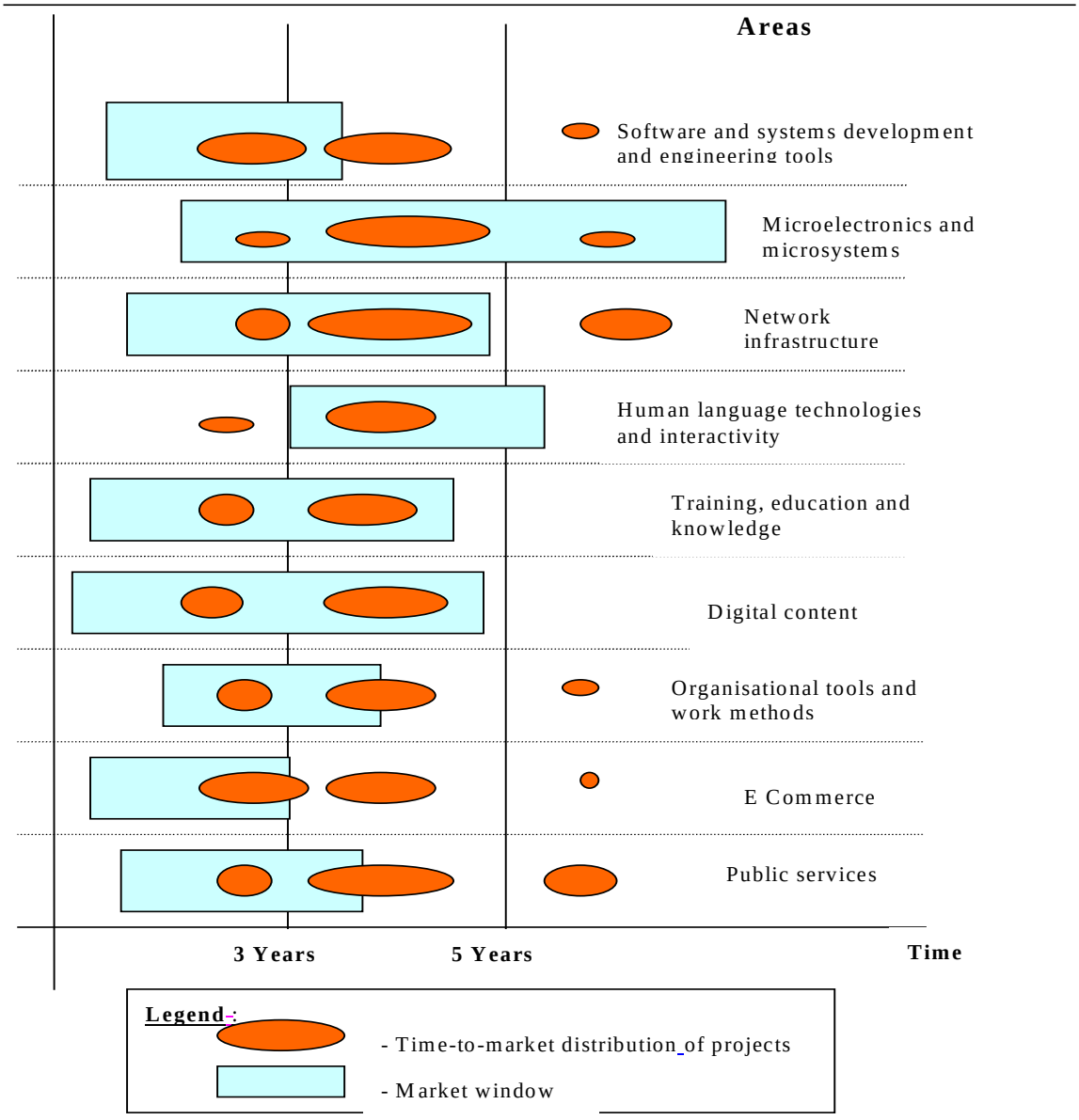


Figure 5: Market Windows and projects' time-to-market [2]

The following observations are offered on Figure 5:

- *Software and systems development and engineering tools*: Half of the RTD projects are expected to deliver commercial products outside of the market window. This suggests that these projects have high market risk and should be carefully monitored in order to ensure high levels of innovations or more rapid delivery of marketable products.

[2] *Example from microelectronics*: Market-window between 2 and 8 years and projects are in <3, 3 to 5 and 5 to10 timeframes.

- *Micro-electronics and micro-systems*: Most of the microelectronics projects have times to market that are consistent with the market windows. Microelectronics, unlike software, has high barriers to entry and developments tend to follow the expected roadmaps.
- *Network infrastructure*: The long-term nature of the investments implies a fairly wide market opportunity window. Two thirds of 1st and 2nd call portfolio are comfortably within this window. The projects outside it seem to be addressing next generation technologies.
- *Human Language Technologies and Interactivity:* Projects are in line with market opportunity window. Some of the applications (i.e. speech applications) could be enhanced by adding speech recognition to standard personal computing equipment and mobile phones/PDAs. A small number of projects would appear to be ahead of the market, probably because their integration into existing applications poses problems.
- *Training, education and knowledge:* Projects are in line with the market opportunity window and have low market risk.
- *Digital Content:* The majority of the projects are in line with the market opportunity window and have low market risk.
- *Organisational tools and work methods*: The majority of the projects are in line with the market opportunity window and have low market risk. However some fall outside and it is important that these address the next generation of methods and tools.
- *E-commerce* is a fast-moving but unpredictable area because technology and applications are evolving rapidly. Most IST projects will not deliver marketable products until after 2002~2003; which may be too late, unless they can offer very innovative approaches in terms of technology, applications or solutions that can be integrated within different paradigms (e.g., mobile solutions).
- *Public services*: The area is developing at a slower pace than e-Commerce. Almost half of the projects fall outside the market window. These should be innovative and should address new services and societal paradigm shifts. A number of 1st and 2nd call projects are clearly addressing innovative solutions (e.g. in transport or health).

4.4. Evolution from the 1st to the 2nd call.

- The 2nd call has added some large scale trials of the next generation of smart-cards and mobile communications, which will maintain and, hopefully, extend Europe's lead in these technologies.
- The 5-10 year gap identified by the PIM report is confirmed. Few 1st or 2nd call proposals address this time frame. A possible explanation is that, for IST markets, 5 years is the dividing line between business planning and longer term strategy. The programme is focussing on results that are of direct industrial relevance and, given the large numbers of SMEs involved, this short term focus is no surprise. Few SMEs can afford the luxury of long term planning although some put over 10% back into RTD to keep pace with the rapidly changing market.
- Mobile and wireless IP was not well covered in the 1st call. The 2nd call redresses the balance with around 15 projects in this area, addressing the development of new devices and on-line applications and services.
- Take-Up actions have increased the involvement of users and SMEs in the programme.
- The 2nd call contains the first specific proposals on socio-economic research in IST. However many individual projects include work on socio-economic issues.

5. Linking the Portfolio to the Programme Vision

5.1. Introduction

ISTAG was set up to provide the Commission with independent advice on the content and direction of the IST programme. As part of this work it developed a vision for the programme, namely that it should develop an environment where a citizen's everyday surroundings become the interface to IST resources. This idea has been elaborated into a vision statement

> *'Start creating the ambient intelligence landscape for seamless delivery of services and applications in Europe relying also upon test-beds and open source software, develop user friendliness and develop and converge the networking infrastructure in Europe to world class.'*

The vision has had a major influence on the development of Workprogramme 2000. An ISTAG working group has now gone a step further by identifying ten Key Enabling Technologies (KETs) needed to realise the vision:

1. Embedded intelligence
2. Middle-ware and distributed systems
3. IP mobile and wireless
4. Multi-domain network management
5. Converging core and access networks
6. Micro- and opto-electronics
7. Trust and confidence
8. Cross media content
9. Multi-modal and adaptive interfaces
10. Multilingual dialogue mode

A more detailed definition of each of these KETs is given in Annex 3.

5.2. Linking the programme portfolio to the KETs

The 1st and 2nd call projects were based on the 1999 Workprogramme, which predated the IST vision. To estimate the alignment of the current portfolio with the vision, the IPPA team examined the 1st and 2nd call RTD projects and asked:

- Is this project/proposal in an area of technology relevant to one of the KETs (relaxed criteria)?
- Does this project/proposal make a significant contribution to the ISTAG Vision (strict criteria)?

The results are presented in figure 6, in terms of the numbers of projects and the funding allocated to them. The contribution of Take-Up actions was analysed separately.

Of the 465 RTD projects in the 1st call, only 57 (~12%) could not be mapped to one or other of the KETs using the relaxed criteria and in the 2nd call, only 13 (~13%) of the 95 RTD projects could not be mapped.

When the stricter criteria were applied, rather fewer 1st call RTD projects (~40 %) were found to be making a significant contribution to the ISTAG vision. The largest number were concerned with micro- and opto-electronics (KET 6) and middleware and distributed systems (KET 2).
In contrast, the 2nd call RTD projects had more even coverage of the KETs and there was less contrast between the numbers. Although having far fewer RTD projects than Call 1, it featured a

more even spread in the number contributing generally and the number contributing significantly (60% of the RTD proposals were found to contribute significantly to one of the KETs).

Looking at the overall portfolio resulting from the 1st and 2nd calls, 45 % of projects were found to be making a significant contribution to the KETs. These projects represent about 50 % of the total funding. Micro- and opto-electronics (KET 6) has the largest number of projects closely followed by middleware and distributed systems (KET 2) and cross media Content (KET 8). Less well covered KETs include multi-domain network management (KET4) and multilingual dialogue mode (KET 10).

The more technologically oriented action lines such as KA4 and FET make the strongest contribution to KET 1, 2, 3, 4, 5, 6 and 10. KA1 projects in general contribute to KETS 1, 2, 3 and 10 and the e-commerce projects in KA2 make similar contributions to KET7. KA3 makes a significant contribution to KET 8, 9 and 10.

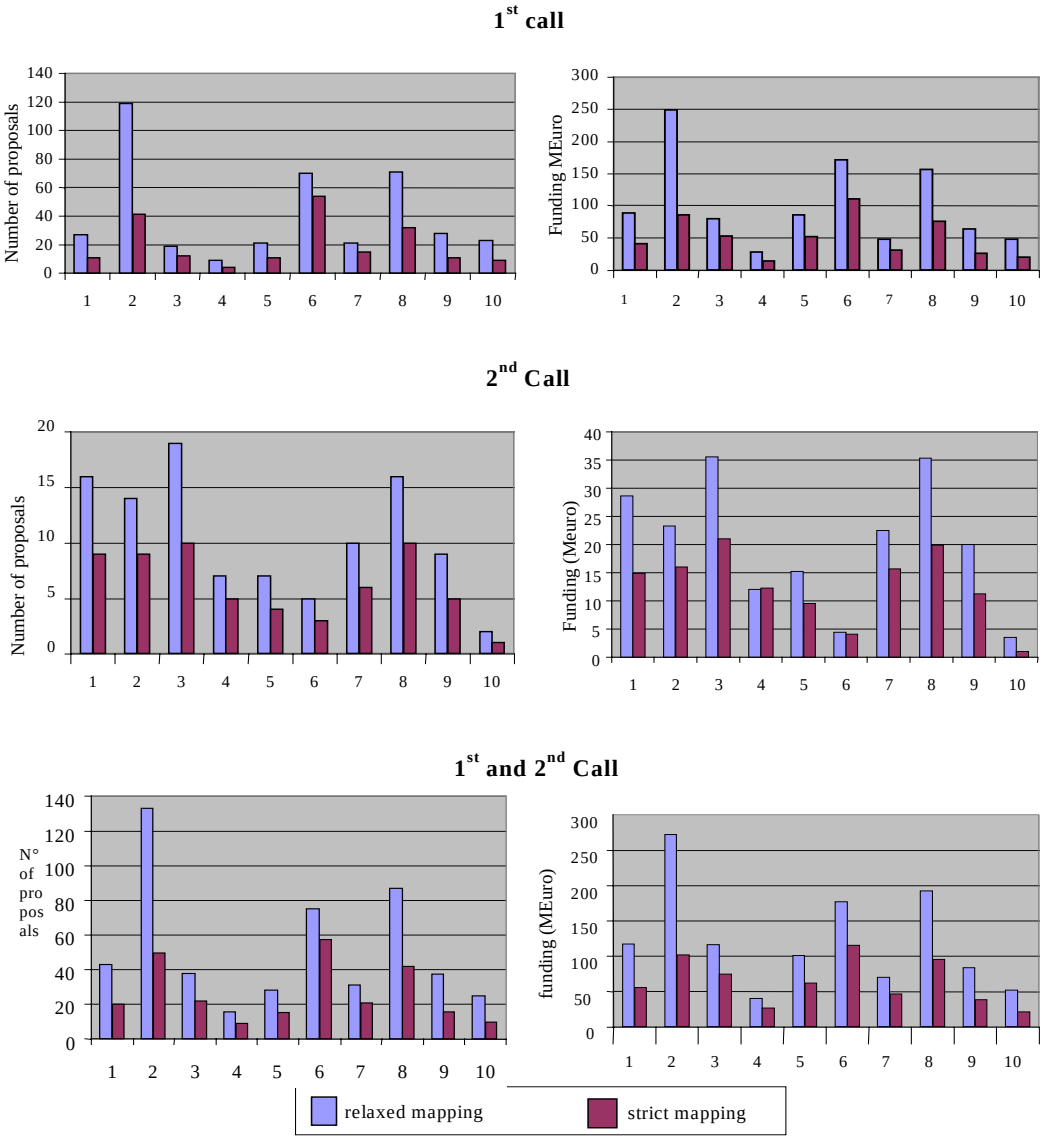


Figure 6: Mapping the IST Portfolio onto the KETs

Overall the above mapping is encouraging, because it suggests that, following the first two calls, the IST programme has a broad, if as yet unfocussed, coverage of the technologies needed to realise its vision. Proposals that could not map onto the KET using strict criteria covered several technology areas, with the most prominent being a block of about 15 projects on micro/opto-electronics processes and materials.

The 1999 work programme was prepared before the ISTAG vision was adopted as the programme's vision. It is therefore not surprising that many of the 1st and 2nd call projects are not strongly focussed on the KETs.

Contribution of Take-Up actions

Although Take-Up actions do not generally make direct contributions to the development of the KETs, they can make important contributions to the programme's vision. They do this by diffusing technology into the marketplace and obtaining feedback about its contribution to the social and economic drivers, such as:

- Education
- Employment
- Sustainable development
- Social inclusion

26% of the present Take-Up actions are aligned with the concept of "test-beds" outlined in the ISTAG report (largely integration of existing components). There may be an opportunity to cluster several trials in the same area into a larger test-bed. It may not be possible to do this retrospectively, but it could be an element of future calls.

24 Take-Up actions (i.e., approximately 20% of the total) were found to make a significant contribution to a KET. Half of the KETs have significant contributions from at least 3 take-up projects. Further details are provided in Annex 5.

General observations

The information presented in this chapter offers a way of assessing how well the evolving portfolio of IST projects is addressing the programme's vision and of highlighting areas of weakness to be addressed by future calls. In applying the mappings, it is important that the Commission, ISTAG and the IST Management Committee agree:

- what proportion of the programme should be strongly focussed on the vision,
- what proportion should be directed towards tactical solutions to shorter term problems
- the optimum distribution of RTD among the individual KETs.

It is important to note that the first two calls were based on the 1999 workprogramme, which predated the IST vision. WP2000 incorporates the vision and its action lines are more focussed on the KETs. It will be interesting to see how the mappings evolve in future calls.

6. Cross Programme Clustering

6.1. Approach

The IPPA clustering working group identified possible clusters:

- bottom-up by analysing the contents of the projects
- top-down by considering topics which were expected to be cross programme by nature. These topics were both application (e.g., healthcare, safety, tourism) and technology (Virtual Reality, personal information appliances, etc.) oriented.

The group focussed on Cross Programme Clusters, because clusters inside Key Actions have already been suggested by the evaluation panels. Clusters were retained when they had a meaningful size, covered three or more Key Actions and offered synergies leading to added value.

6.2. Possible Cross Programme Clusters

Four strong opportunities for Cross Programme Clusters have been identified:

Personal mobile information appliances

This cluster, which emerged at the intersection of applications and technologies, potentially contains 7 projects that all involve mobile or hand-held multimedia systems for information access in tourism, leisure or cultural heritage[3]. These projects span across KA1, KA2 and KA3. It was felt that these projects would benefit from comparing work in the field of e.g. Human-Computer Interaction and Content Creation. These proposals address from an application perspective, the gap identified in Call 1 on Wireless and mobile IP.

Healthcare

This cluster of 2nd call healthcare-related projects mainly focuses on healthcare applications[4]. It is of particular significance as RTD action lines for healthcare were not open in the 2nd call. The suggested cluster potentially contains 15 projects and covers 4 Key Actions. The projects address topics such as medical imaging, Virtual Reality, training in surgery, networks for clinical data access, software engineering for laboratory information systems, and could be related to projects from the first call in KA1.

The group then examined 1st call projects and again found some healthcare related projects outside KA 1. This increases the potential value of a cross-programme cluster on healthcare. The level of technological innovation varies significantly among the projects and dialogue between technology and application oriented projects could increase the programme's overall impact.

The set of projects cover various activities and areas combining technology advances and innovative applications across the program. The scope includes:

- Access to healthcare information,
- Exploiting satellite communications in healthcare;

[3] WH@M, PALIO, LISTEN, E-TOUR, 3D-MURALE, VDA, PAST.
[4] WIDENET, VIDEOCOM, GAUSS, IONIC, COBALIS, FM-ULTRANET, MINIMOB, DISMEDI, TRITEX, CREAM, ADAM, VRSUR, DEAF, ISAC, JPD.

- Co-operative work in the medical and healthcare sector;
- Imaging, patter recognition and classification
- Training (e.g. in the field of ultrasonic imagery, virtual reality training in surgery);
- Home Care (e.g. Take-up actions on development of micro-sensors for home-care platforms)
- Take-up actions in medical equipment using standards.

It was noted that the overwhelming majority of healthcare projects (from both calls) addressed the professional healthcare environment. While recognising the specificity of this sector, it was felt that the implementation of the IST vision is a more patient-centred approach; widening the scope to prevention and promotion of health good practices, it could even be a citizen centred approach. That issue is not covered in the proposals analysed, but the WP2000 corrects this aspect.

MPEG-4 and MPEG-7

This cluster addresses advanced standards in coding and compression. These are important to projects in a number of different Action Lines, addressing broadcasting, multimedia information retrieval, distributed multimedia services, etc. They are also strongly related to both content creation and research topics. Work on these standards started in telecommunication and broadcasting (fourth framework) but is now of broader interest (e.g. cross-media retrieval, content creation, natural interactivity and more generally on digital convergence). Because of these common interests, it is suggested that projects could exchange information at programme level rather than only through meetings related to MPEG-4 and MPEG-7 standards. This cluster potentially contains 10 projects[5]. from the two calls, spanning Key Actions 2, 3 and 4.[6].

New business and organisational models

This cluster addresses users that would not be generally considered as IT aware (in agriculture and food industry, jewellery, etc.). Although a majority of the potential projects are from KA2, some are from KA1, KA3 and KA4[7].

Other possibilities

There are some technical areas that are cross-programme by nature, such as Human Language Technologies (HLT) and Virtual Reality, but there does not yet seem to be enough cross-programme activity to justify clusters. However some HLT, such as speech technology, is reaching market maturity and is being applied in projects from various Key Actions. There may be an opportunity for these projects to learn from HLT take-up actions and trials on a case by case basis.

Transport, Tourism, Cultural Heritage and the Environment are obvious candidates for application oriented clusters. Number of projects have been identified across the programme in these areas. Links between these projects across KAs seem to be loose at this stage. The opportunities for clusters in these areas should be revisited after future calls. Of particular interest would be topics that are common to several such areas, e.g. safety critical applications or scheduling and optimisation tools.

[5] PISTE, MADISON, SAMBITS, VIRTUAL WINERY, CUIDADO, ASSAVID, VIRTUAL BLACKBOARD, FAETHON, OPENISE.
[6] More specifically, 2.3.2, 3.2.1, 3.3.1, 3.5.2, 4.3.4, 4.4.1, 4.4.2, 4.6.
[7] CUTTING EDGE, DIGISEC, EPOMAT, NETSTOCK, PROVE-SME, EXPLANTECH, JEWEL, CREATIV, E-CANNED, E-FLORA, HORTONET.

7. Socio-economic aspects

Socio-economic research is carried out as part of the IST programme in order to improve the fit between the programme's activities and the future needs and expectations of business and citizens. The 2nd call invited proposals addressing all the socio-economic action lines.

As part of the socio-economic analysis a framework was developed to model socio-economic drivers and transformations in socio-economic conditions, as there was no precedent to follow (see annex 6). It would be useful to develop a more precise set of outcomes, indicators and evaluation criteria which could be used in future similar exercises.

A user-centred approach is central to the programme's vision. The IPPA socio-economic working group therefore analysed the user participation and role. The objective was to identify how fast and early feedback from users can be obtained in order to effectively steer RTD and application development in a direction which will produce the desired market, economic and societal impact.

The socio-economic analysis is based on a sample of circa 70% of the 2nd call proposals. The major messages emerging were:

- 78 % of the projects include user-organisations and 60% end-users, and 65% carry out user tests. However these user tests often appear to have no specific methodology. Only 17% of proposals appear to devote sufficient time and resources to carry out effective user testing and feed the information back into the RTD process.

- The problem may be that proposers underestimate the importance of user testing or do not describe their plans clearly enough in the proposals. There may also need to be better communication from the programme to proposers about the purpose of user involvement in projects. With no confirmed methodology, the main benefit from user-participation in projects - systematic feedback from user reactions to RTD and application development may not be achieved. The field-trials may neither effectively influence the technology under development, nor help to increase user-acceptance at deployment at market level.

- An analysis of the users targeted shows that an estimated 30% of the projects are aimed at the general public, and an estimated 80% at professional users (some overlap). KA1 , KA2 and KA3 have more projects aimed at the general public, as could be expected.

There are 17 specific socio-economic proposals aimed at assessing and validating the implications of research for the Information Society. Examples are market studies of specific markets and their expected dynamics (e.g. BEE: biometric techniques for trustworthy transactions; MOBICOM: e-commerce using mobile communication, SENIORWATCH: IST applications for people with special needs (old and disabled), ACTIVE-AD: interactive advertising). These were submitted under the Action Lines spanning the Key Actions (x.1.1).

The proposed funding for these projects is 14 M Euro, which represents 3.4% of the budget for the 2nd call. This seems to be an appropriate share of budget for a technology oriented programme such as IST. A more detailed analysis would have to be conducted to indicate whether the alignment of programme vision and research devoted to socio-economic research offers scope for improvement.

A more detailed account of the work can be found in Annex 6.

8. Conclusions

Programme integration

The programme has a broad range of activities – both RTD and Take-Up actions- that address technologies and applications from various angles. This allows the mix between developers and users to be fine tuned to the needs of to each area.

In areas where mergers and new alliances are increasingly common (e.g. broadcasting and interactive services, home and mobile applications), more new partnerships bringing together complementary skills would have been expected as the programme gets more integrated. This suggests that the concept of an integrated programme is not yet fully realised in the IST community. These would not just include key European players but would attract new emerging players as well.

Strengths, Weakness, Opportunities and Threats

The programme's **strengths** include continuing development and deployment of advanced EU technology, such as mobile communications or smart cards, to create a critical mass of activities in these areas across the programme. Take-up actions are well focussed on specific markets. Large-scale and clustered trials can evolve into test-beds, as described in the vision.

A notable **weakness** of the programme is the relatively low level of activities supporting the medium to long term convergence of technologies and applications.

Opportunities derive from the vision and the potential for programme integration. New effective partnerships could be formed bringing together advanced technology research partners (e.g. from Key Area IV and FET) and essential applications (e.g. persons with special needs, healthcare, administration, education).

A **threat** is that projects addressing rapidly changing areas face a high risk of missing market opportunity. The level of innovation in these projects should be very high to avoid being overtaken by market evolution and to prepare the next generation of products and services that would be compatible with their time to market.

Time to Market and Risk Profile

Most 1st and 2nd call projects have times to market which fall within the market opportunity windows. This suggests that there is good correspondence between the content of the programme and industry planning. For IST markets, 5 years is the dividing point between business planning and longer term strategy. Few SMEs have the resources to plan beyond 5 years and some markets are so fast moving (reinvestment rates of over 10% back into R&D) that even large companies have difficulty in thinking beyond that point. Nevertheless the programme needs to address the longer term perspectives and, at present, there is a gap in supporting RTD with a 5 to 10 year horizon. Larger companies, highly innovative SMEs and public research labs should be encouraged to fill this gap.

Some projects are addressing times to market beyond the market opportunity window. Such projects need to be highly innovative if they are to minimise the commercial risk associated with being late entrants to the market.

Take-Up Actions

There is a widespread involvement of SMEs and users in Take-Up actions. However Take-Up actions are implemented differently in each part of the programme. KA1 and 3 Take-Up actions have similar mixes of users and suppliers to their RTD projects. KA2 Take-Up actions typically involve large numbers of users and one or two suppliers. KA4 Take-Up actions involve very small numbers of both users and suppliers. This suggests that Take-Up is flexibly focussed on the needs of the individual areas.

Supporting the programme's vision

Following the first two calls, the IST Programme has a broad but as yet unfocussed coverage of the technologies needed to realise the vision. The vision is now incorporated in the 2000 workprogramme and many action lines call for work on specific Key Enabling Technologies. The results of future calls should be better focussed on the vision.

Take-up actions can make an important contribution to the vision:

- Diffusing technologies into the market place.
- Obtaining feed-back about these technologies' contributions to social and economic drivers.

The IST programme managers need to agree:

- what proportion of the programme should be strongly focussed on the vision,
- what proportion should be directed towards tactical solutions to shorter term problems,
- the optimum distribution of RTD among the individual KETs.

Socio-economic aspects

Users are involved in the majority of projects, but their presence is not always fully exploited. Feed-back from user testing into the development process is not always clear.

9. Annexes

Annex 1: Members of IPPA Study Team

Name	**Function**	**Company**
Hill Stewart	Principal Consultant	Impington Technology Management
Tony Gore	Managing Director	Aspen Entreprises Limited
Ole Merk Lauridsen	Vice President, Development	Teledanmark
Roger Pelletret, Ph. D	Head of SDSC Division	CSTB
Alberto Bonetti	Head of Strategic Development	ASM BRESCIA SPA
André Rigaud	IT Consulting Director	Atos
Cinzia Giachetti	Director Technology Transfer Centre	Pisa Ricerche
Thomas Langer	Director for Ecological Technologies	Daimler-Benz Aerospace
Marc Van Rossum	Group Leader Nanoelectronics Div.	Imec
Jean-Pierre Chassetuillier	Direction de l'Audiovisuel	France Telecom
Ab Helderman	Manager	Pheidis Consultants
Mike Parr	Marketing Manager	SAQ Internet Ltd
Vasco Lagarto	Director of Coordination	Inovaçao
Tom Bösser	Director	Scientific Assets Publishing
Carmen Ceinos	Director	ECOMIT
Christos Nikolaou	Rector	University of Crete
Carmel Smith	Senior Usability Research Consultant	Usermatics Ltd
Marc Cavazza	Professor	University of Teeside

Annex 2: PIM and IPPA Market and Technology categories

One of the important goals of the IPPA study was the aggregation and comparison of the results of the analysis of the proposals retained in the 1st and 2nd calls.

Because of the different action lines open in call 2, it was found that some of the PIM technology and market classifications were two broad (i.e. addressed by a large number of 2nd call proposals) or too narrow (attracting only one or two proposals). In addition, several of the old categories were found to be ambiguous. The categories were therefore reviewed and refined, taking note of the re-reading of the 1st call abstracts.

The following tables give compare the old (PIM) and new (IPPA) classification schemes for technologies and markets.

Technology

PIM No	PIM-Name	IPPA No	IPPA Name	Remarks
1	Value/Support/Accompanying Measures			Deleted
2	Technology of Optimisation			Deleted
3	Software Engineering/Simuation	1	Software Engineering/Component based Development	Renamed ; Simulation excluded
4	Interoperability Technology	2	Middleware	Renamed; Combined with part of No 7
5	Knowledge Engineering and Management	3	Knowledge Engineering and Management	
6	Security	4	Security & ID	Renamed
7	Agent /Middelware	5	Agent Technology	Partly combined with No 4
8	Technology for Generic Applications			Deleted
9	Service Platforms and Facilities Technology			Deleted
10	Human Interfacing/Virtual Reality	8	Human Interfacing/Virtual Reality	
18	UMTS, Software Radio	9	UMTS, Software Radio	
19	GPS GSM Terminals	10	GPS GSM Terminals	
20	Wireless access OPN/Wireless LAN	11	Wireless access OPN/Wireless LAN	
21	Optical Networks, Physical Access Networks	12	Optical Networks, Physical Access Networks	
22	IP Plus Management node	13	Network Management	Renamed
23	WSI Cluster Projects			Deleted

PIM No	PIM-Name	IPPA No	IPPA Name	Remarks
24	Advanced Opto-electronic-design-coordination action			Deleted
25	Advanced Micro-electronic-design-coordination action			Deleted
26	Semiconductor process-equipment-material	16	Semiconductor process-equipment-material	
27	Microsystems	17	Microsystems	
28	Microwave Devices and Antennas	19	Microwave Devices and Antennas	
29	Quantum Research			Deleted
30	Basic Research			Deleted
31	Display and Components	18	Displays	Moved to Components Design
		6	Groupware and Workflow	New
		7	Simulation & CAD/CAM	New
		14	Multimedia Information Access Tools	New
		15	Components Design and Manufacturing	New; part of No 28 included

Markets

PIM No.	PIM-Name	IPPA No	IPPA Name	Remarks
1	Administration/Non-Profit/Public Sector	1	Administration/Non-Profit/Public Sector	
2	Software Market	2	Software Market	
3	Financial Banking	3	Finance, Banking & Ensurance	Renamed
4	Manufacturing Processes (incl. Construction)	4	Manufacturing	Construction dropped
5	Retail/Consumer Processes (incl. Tourism)	5	Retail	Renamed; Tourism dropped
6	Services Market	6	Services Market	
7	Healthcare (incl. Disabled and Elderly)	7	Healthcare (incl. Disabled and Elderly)	
8	Media (incl. Advertising)	8	Media (incl. Advertising)	
9	Education and Awareness	9	Education and Awareness	
10	Electronic Industry	10	Electronic Industry (incl. Consumer Electronics)	
11	Network and Service Operators	11	Network and Service Operators	
12	Telecom Manufacturers	12	Telecom Manufacturers	
13	Emergency Services			Deleted

PIM No.	PIM-Name	IPPA No	IPPA Name	Remarks
14	Autoindustry, manufacture and users	14	Autoindustry, manufacture and users	
15	Non-telephone Service Providers			Deleted
16	Transport Service Providers	16	Transport Service Providers	
		13	Aerospace	New
		15	Architecture, Engineering and Construction	Was in No 4
		17	Energy / Environment	New
		18	Agri-Food Sector	New
		19	Textile	New
		20	Home Markets	New
		21	Tourism	Was in No 5

Annex 3: Key Enabling Technologies

KET 1: Embedded intelligence: Development and deployment of networked embedded systems (and software) in common-place appliances (fixed and mobile) to improve comfort, safety, and functionality of applications at home, at work, on the move, in leisure etc.

KET 2: Middle-ware and distributed systems: Multi-layered architectures to enable interoperability, inter-working, openness and integration of applications and services across platforms. This includes Java and Corba like architectures and component based software development. Are also included the technologies and methodologies that enable businesses to deploy agile and integrated processes that cut across companies and organisations in support of the development of new value chains.

KET 3: IP mobile and wireless: IP technologies that underpin the development of the ambient intelligence landscape including mobile and wireless internet technologies, the evolution of IPv6 and future generation of nomadic IP solutions in areas such as mobile e-commerce, e-work etc.

KET 4: Multi-domain network management: Dynamic optimisation of network resources and network integration to assure service transparency and quality of service in a multi-domain context. This includes as well active networks management and self-reconfiguring networks and distributed network management approaches in the context of increasing numbers of interconnected appliances that are wireless, fixed or mobile.

KET 5: Converging core and access networks: Integration, inter-working and interoperability of networking infrastructure including both access and core networks (fixed, mobile and wireless) as well as technologies for integrated broadband networks.

KET 6: Micro- and opto-electonics: Microelectronics and opto-electronics for high speed communications and for better connectivity and mobility including Chipless/fabless Intellectual Property based developments and the development of Systems-on-a-chip (SOC) for information and communication terminals, and communication systems and networks.

KET 7: Trust and confidence: Technologies and applications to support privacy, security, and users and suppliers rights, as well as tools and methodologies to improve technology and infrastructure dependability, adaptability and survivability.

KET 8: Cross media content: Production and delivery including the integration of online and broadcasting services and technologies as well integrated authoring tools and applications in areas such as entertainment, advertising, publishing and education and training. “Context” based retrieval of, and access to content is a key feature of the ambient intelligence landscape.

KET 9: Multi-modal and adaptive interfaces: Technologies to improve the interaction between people, information appliances and information services through the integration and use of multiple modalities, including language, gestures, haptic contacts, emotions, augmented, synthetic and virtual reality. Personalisation and intuitiveness of interfaces and their application in challenging areas are included.

KET 10: Multilingual dialogue mode: Includes speech and language technologies to enable natural interaction with IST applications and services. Cross-lingual information retrieval and categorisation is included as well as contextual and deep semantic information analysis.

Annex 4: Strength and Weaknesses relevant to specific areas

1. There are a reasonable number of projects in the areas of security of traffic and health, combining technological innovation and user benefit in an exemplary way.
2. Projects address real user requirements combining existing tools and technologies especially to provide new services in Transport and Tourism.
3. A significant effort has been made to understand markets, socio-economic factors, user needs in KA2.
4. Good coverage of KET6 (Microelectronics) – process / materials / tools / methodologies / equipment / chips / circuits.
5. Some Trials/First User/Best Practice actions are actively addressing fundamental technologies needed to support KET lines, especially KET3 – IP mobile and wireless.
6. Many Take-Up actions offer significant social and economic benefits e.g. in medical applications and business processes. There is a substantial move towards building critical mass through best practice and trials, especially in KA2.
7. In the spanning line 3.1.1 (Social and Business models for Multimedia Contents) only 3 projects are funded. Only one of them has a broad objective; the other two are focussing of specific market segments. The conclusion is that the number of projects in this action line is not in balance with the total number of projects in KA3. More projects qualifying and quantifying socio-economic and organisational impact and behavioural change would be required.
8. Call 2 did not result in projects in the area of multi-modal and adaptive interfaces outside the screen and sound areas. There is no coverage in the touch, taste and smell modes (KA3).
9. In the Information Retrieval area, call 2, the focus seems to be mostly on integrating existing technologies although there is also some focus on retrieval of audio and video information (KA3).
10. There were no proposals selected in IV.1.1 – Scenarios and Analysis.

Annex 5 – Detailed Analysis of Take-up actions

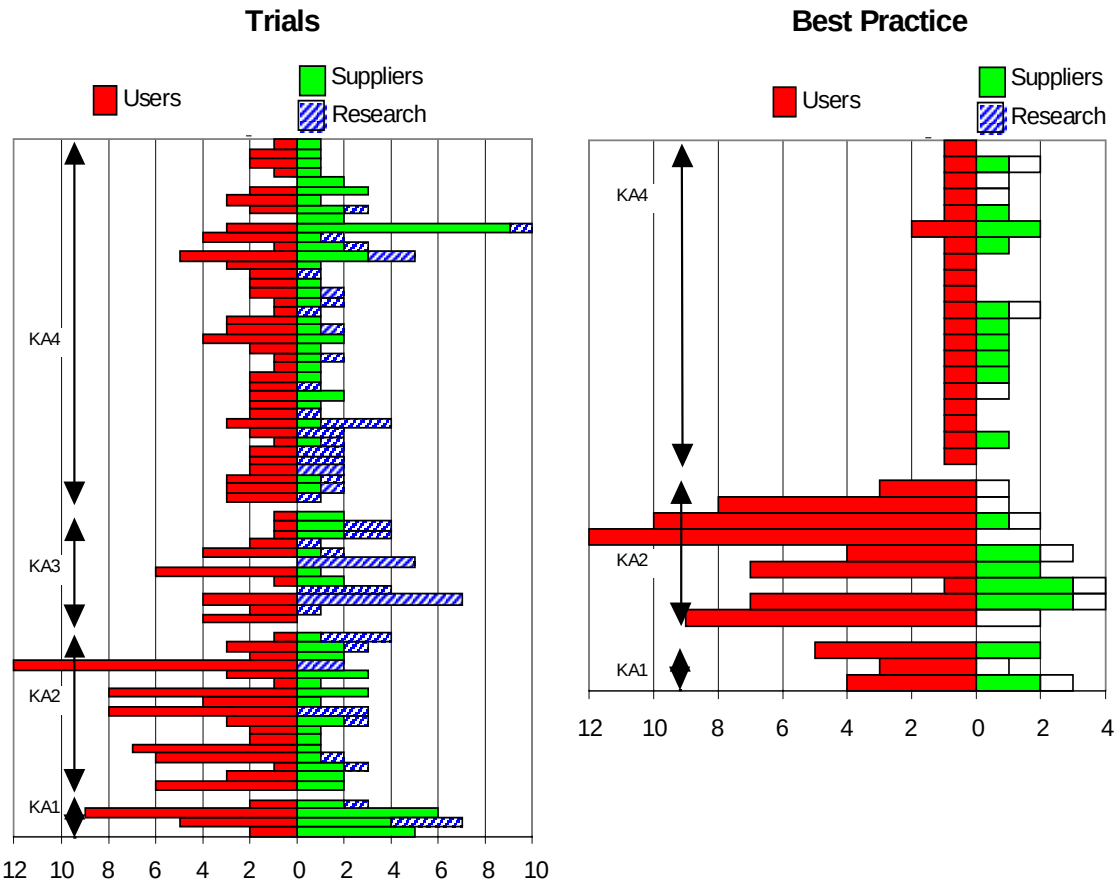
Objectives

The key objectives of this section are:
- to provide an overall picture of take-up measures in the 2nd call,
- to analyse their contribution to the programme's vision, which post-dates the 1999 workprogramme (the basis for both the 1st and 2nd calls).

Overall Picture

The first analysis looked at the spread of participation e.g. large companies, SMEs, researchers etc. (see end of this annex for details). There is a widespread involvement of SMEs, with only 2 trials out of over 70 not including SMEs.
To get an overview of both the projects retained and the trends, we did an analysis of supplier and user involvement. Trials and Best practice actions were analysed separately.

The interesting aspects are:
1. ratio of suppliers to users
2. overall number of participants



Looking at the individual Action Lines:

KA1	KA2	KA3	KA4
Equal participation of users and suppliers. Substantial numbers of participants (users and suppliers). Resembles RTD participation structure.	More users than suppliers. More close to market: * Requires large scale participation, * Can lead to "market standard" setting.	Equal participation of users and suppliers. Substantial numbers of participants (users and suppliers). Resembles RTD participation structure.	Small numbers of users and suppliers. Many actions. Small trials of technology in application context. In some cases process oriented.

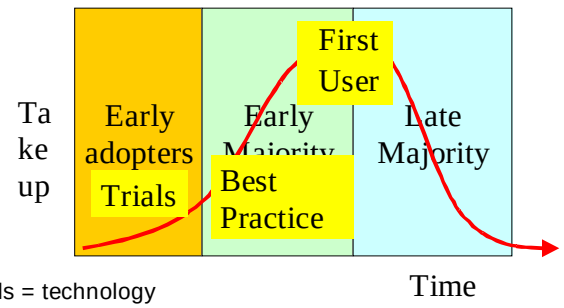
The contrast between KA2 and KA4 is in alignment with the differences between early tests of technology (KA4) and a pilot for a new or emerging market where a critical mass is required in a trial to ensure subsequent engagement and development (KA2).
There were hardly any take-up measures in Call 1, so no comparisons could be made nor trends identified.

Measurement against the programme's vision

The first question is what are the key points from the vision that are applicable to take-up measures?

Take up measures are mostly short term activities, apart from those introducing very innovative technology. The section of the ISTAG report "Orientations for WP2000 and beyond" dealing with "Harnessing the IST Workprogramme to the Vision" includes the following statement.
"Seed the workprogramme with problem oriented testbeds which will deliver a convincing demonstration of aspects of the vision in a specific domain. Such catalytic testbeds can both act as an applications focus and a showcase. Rather than fully ''green field' testbeds, these should be largely based on the integration of existing components".

By looking at where the different types of take-up action fit into the deployment cycle, we can identify what current activities best fit this part of the vision.
The diagram (right) shows the key points in the deployment cycle for innovation and new products, methods and technologies.



Trials = technology
Assessments = equipment and materials
Access = access to technology, tools, methods

The 2nd call has trials are the nearest thing that we can identify to 'testbeds'. Best practice and first user actions are too far downstream to fit this concept.

We classified all the 2nd call trials into three types:

- Type 1 = ***Integrating*** existing components

- Type 2 = ***Adapting*** and transferring technology
- Type 3 = ***Improving***, developing or assessing existing components (no transfer)

Only Type 1, ***integration***, is fully in agreement with the ISTAG view "… largely based on integration of existing components". Note, however, that this type may well be low on innovation. These could be classified as ***"market testbeds".***

Type 2, ***adaption***, take existing results and modify them for a new area. These could be classified as "***transfer***".

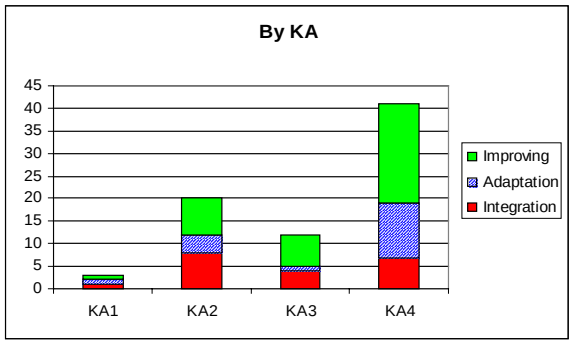
Type 3, ***improving***, do further development before integration and the actual trial. These could be classified as ***"RTD testbeds".***

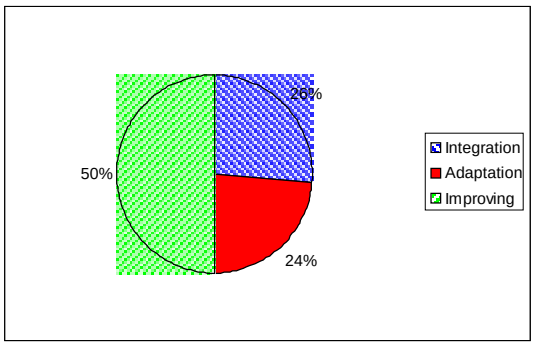
This classification not only shows the distance from market, it also shows the overall level of risk. The market testbeds have mainly a market risk; the others have higher market risks (through being further from market) as well as higher technical risks, as there is development before integration.

Results

Approximately 50% of the retained proposals are take-up measures. In part, this reflects the nature of the call. Taking just the trials and mapping them according to the classification described above gives the following results:

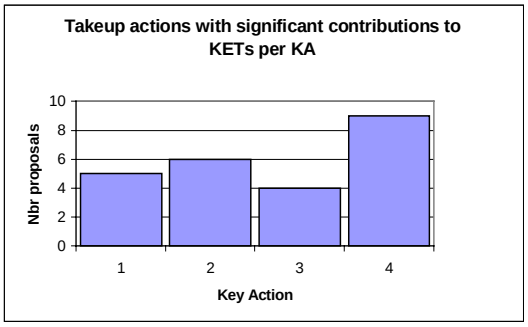
Action	Integration	Adaptation	Improving	Total
KA1	1	1	1	3
KA2	8	4	8	20
KA3	4	1	7	12
KA4	7	12	22	41
	20	18	38	76

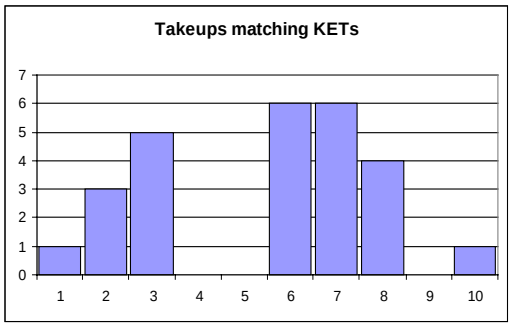




Only 26% are doing pure integration without any further development – more trials are doing some adaptation, transferring or improvement of technology.

An analysis was then made of which take-up actions – both trials and best practice – made a significant contribution to a KET.





It was found that of the 122 take-up actions:

- 24 take-up actions (20% of the total) make a significant contribution to a KET.
- 5 of the 10 KETS (KETs 2,3,6,7,8) have significant contributions from at least 3 projects.
- KETs 4 and 5 could have been expected to be addressed in a significant way by 2nd call take up actions.
- KET1 is addressed by only one take-up action.
- The action lines contributing to KET9 were not open for take-up in call 2.
- KET10 has one take-up project. This is the area of "multilingual dialogue mode" where there is a mismatch between current capability of the technology (translation, speech etc.) and user/market requirements – i.e. there is a large demand that is currently not met.
- KA1 is distributed across KETS 1,2,3 and 10
- KA2 addresses KET 7
- KA3 addresses KET 8
- KA4 addresses KETS 2 and 3

A further breakdown by project size was done to separate out the smaller trials from the large scale testbeds (see diagrams at the end of this annex for detail).This shows that there are three large scale trials (>2MEURO – one in 2.2.3 and one in two in 4.5.2, as well as 8 further trials in the range 1-2MEURO).This suggests that there are a number of testbeds in line with the ISTAG vision.

Conclusions

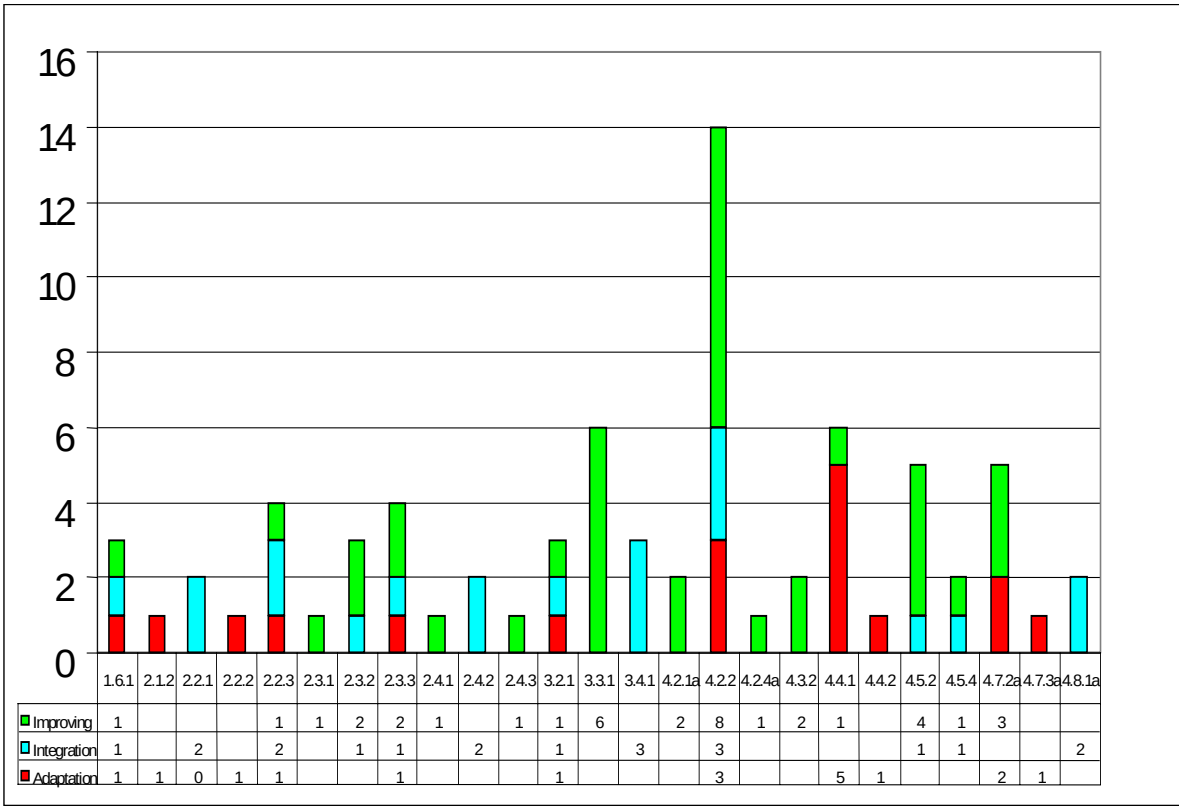
1. Take-up actions are understood and implemented in different ways in the programme. This suggests that take-up is focussed on different needs in different areas.
2. 26% of present take-up actions are aligned with the concept of testbeds outlined in the ISTAG vision (largely integration of existing components). There may be an opportunity through clustering to group several smaller trials in a common area into a larger testbed. It may not be possible to do this retrospectively, but could be an element in future calls.
3. 20% of take-up actions make a significant contribution to the KETs.
4. 50% of KETs have a significant contribution from at least 3 projects.
5. First user actions are typically single supplier, single user, and by their nature do not contribute to the KETs or the larger vision of testbeds.

Additional Observations

It is not clear who the end users are in some of the take-up projects, especially in the trials.
Many of the trials have a substantial development component which is in line with the experts' impression that a number of them look more like RTD projects. Possibilities for reducing this confusion are:

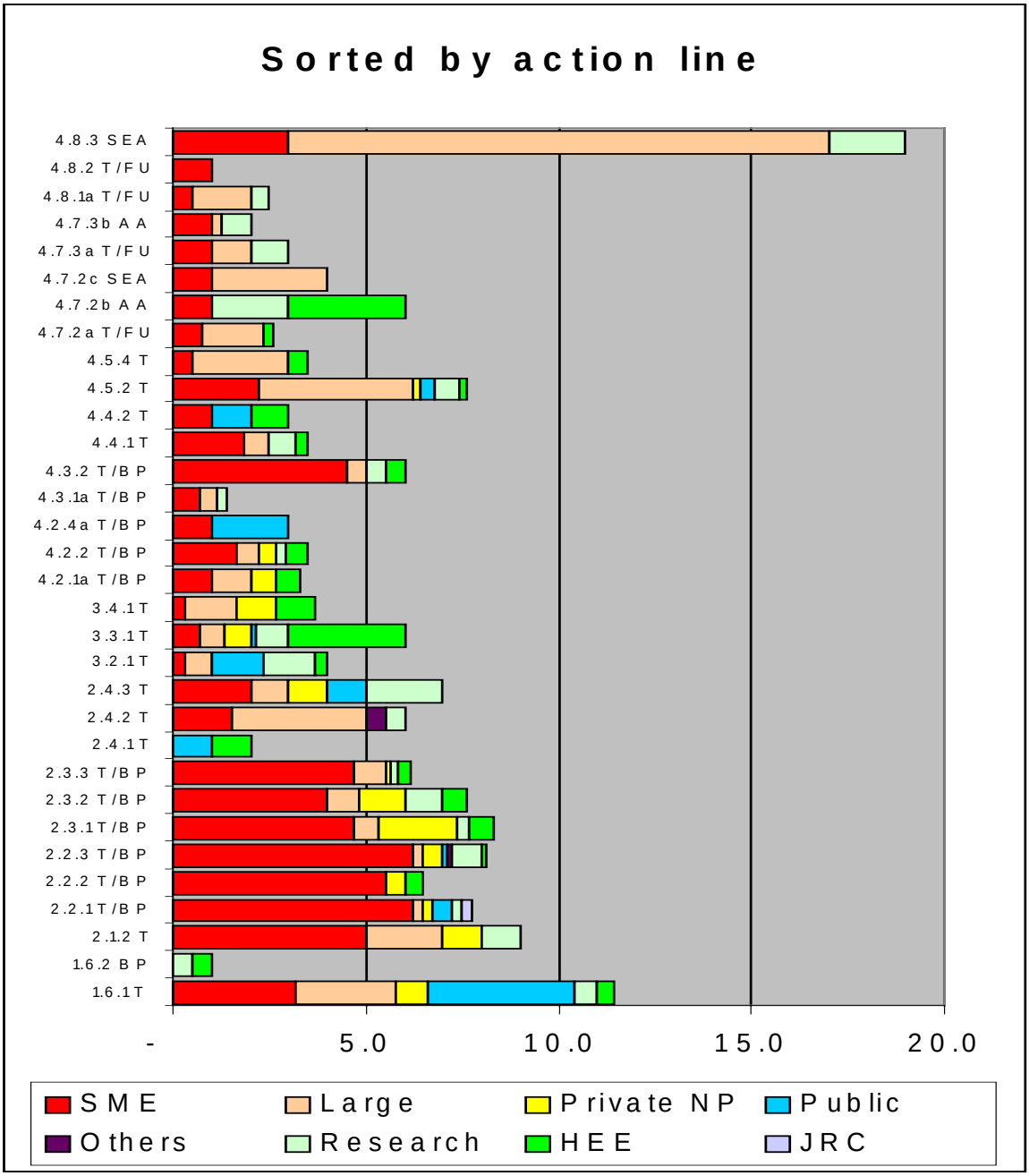
1. Enforce stricter criteria for trials and redirect those with any development component to more appropriate actions.
2. Separate out strictly the development and trial components to ensure that when development overruns (usually in time and budget) the trial is not compromised as a consequence.
3. Ensure for most action lines that whenever take-up actions are called, RTD proposals are also accepted, but with a small e.g. 200kEuro limit. This would allow SMEs to propose what they really want to do instead of having to wait until the action line is really open for RTD, and thus possibly missing the market/opportunity.

Better information for proposers may also address some of these points.

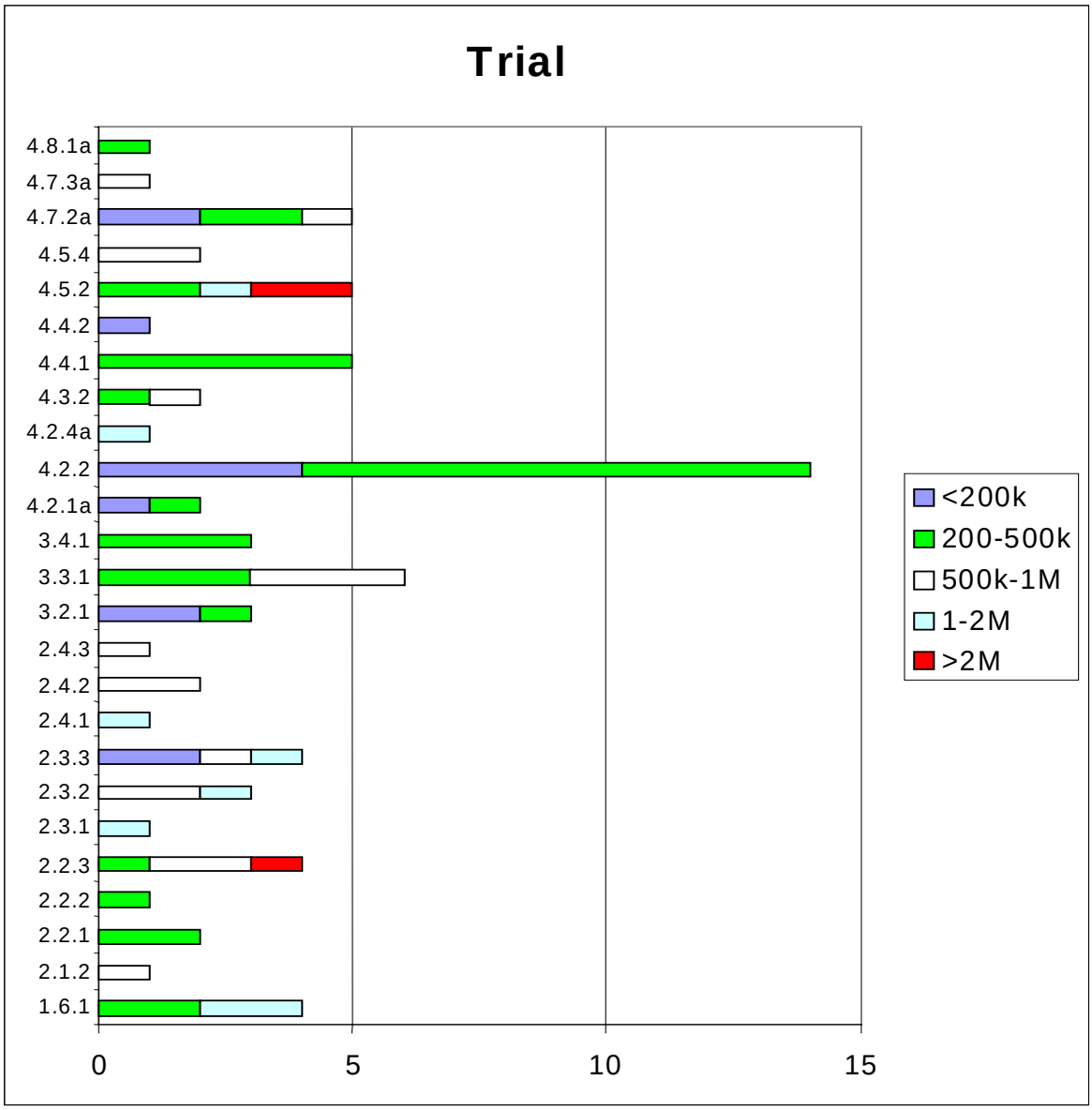


	1.6.1	2.1.2	2.2.1	2.2.2	2.2.3	2.3.1	2.3.2	2.3.3	2.4.1	2.4.2	2.4.3	3.2.1	3.3.1	3.4.1	4.2.1a	4.2.2	4.2.4a	4.3.2	4.4.1	4.4.2	4.5.2	4.5.4	4.7.2a	4.7.3a	4.8.1a
Improving	1				1	1	2	2	1		1	1	6		2	8	1	2	1		4	1	3		
Integration	1		2		2		1	1		2		1		3		3					1	1			2
Adaptation	1	1	0	1	1			1				1				3			5	1			2	1	

Breakdown of type of trial against individual sub-actions



Breakdown of trials showing the type of participation e.g. SME, large companies etc.



Breakdown of trials by project size

Annex 6: The Socio-economic aspects

The programme vision provides a blue print for an Information Society characterised by "Ambient intelligence and ubiquitous computing" which promises to transform socio-economic conditions and offers improved efficiency and quality of life for all citizens. The vision was not yet incorporated in the Workprogramme 1999.

From the socio-economic point of view the programme includes two types of projects: socio-economic research projects, which provide information on socio-economic conditions and drivers of socio-economic change and technical research projects which directly impact socio-economic drivers through the development and deployment of new technologies. Embedded within technical projects are activities designed to address the socio-economic impact of the project. This analysis addresses a specific, albeit restricted question*: Do call 2 proposals effectively contribute to leveraging socio-economic drivers and to providing feedback to the programme on transformations in socio-economic conditions?*

Framework of analysis and model of socio-economic transformation

To address this question, a framework of analysis was developed to model socio-economic drivers and transformations in socio-economic conditions. Socio-economic drivers and enablers, implicit in the programme vision and the IST Workprogramme, were identified in the first stage of the analysis. These include e.g. access, employment, equality, competitiveness. These drivers were then classified as influencing one of three levels of socio-economic transformation: the global societal and economic level, the market level and the user level. For example, at the global societal and economic level, transformation is influenced by drivers, such as quality of life, employment, equality and social cohesion. At the market level, socio-economic transformation is driven by e.g. growth and competitiveness. At the user level, socio-economic transformation is driven by e.g. access, affordability, acceptance, value, confidence. This model is the framework adopted for the socio-economic analysis and interpretation of results (see Fig 1).

Call 2 proposal screening and categorisation

The socio-economic analysis is based on a significant sample of circa 70% of the projects of call 2. These projects were loosely classified using the model of socio-economic transformation, in terms of whether they:

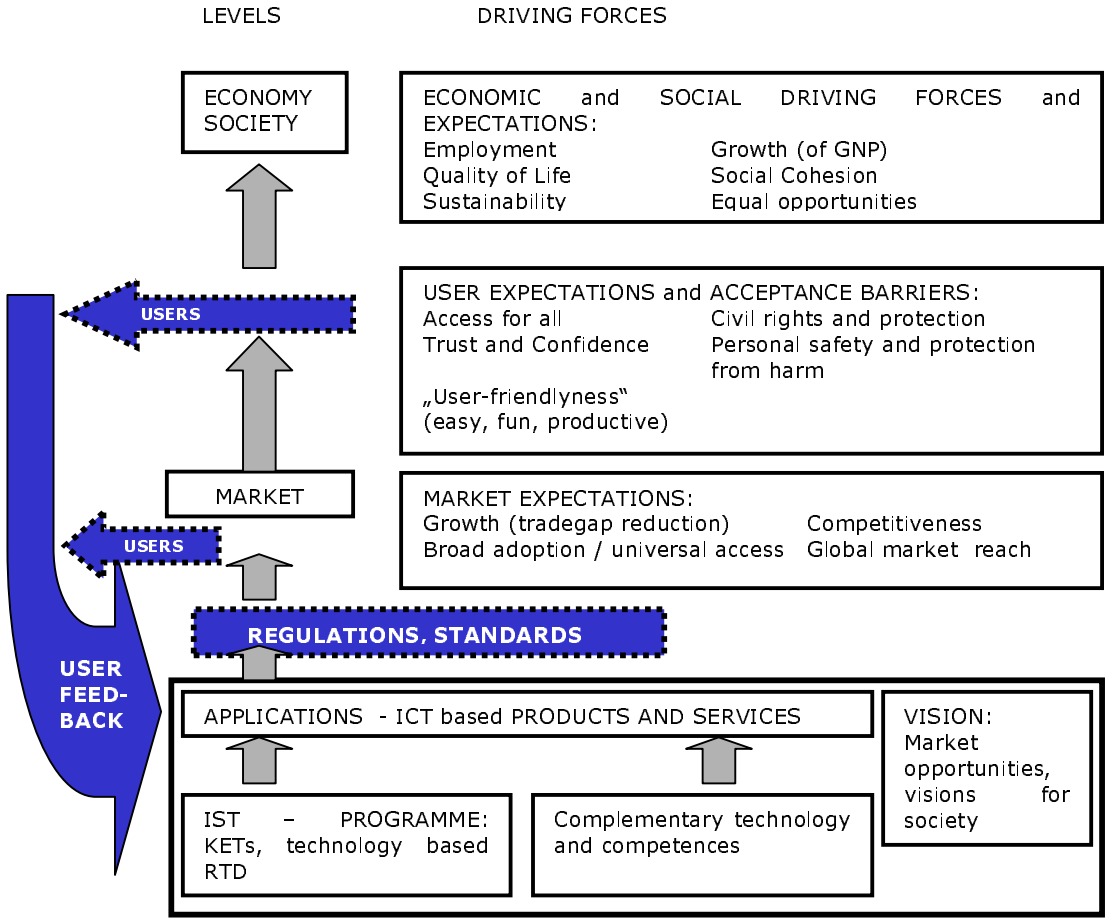
a) inform the IST programme on current variance in and transformations of socio-economic conditions at one or more of the three levels:

- **a1)** global societal and economic level
- **a2)** market level
- **a3)** user level

b) leverage socio-economic drivers, through strategic technology deployment, at one or more of the three levels:

- **b1)** global societal and economic level
- **b2)** market level
- **b3)** user level.

In this model individual projects can address two or more levels of socio-economic drivers within category **(a)** or **(b)**. Projects in category **(a)** are typically studies and projects which focus on measuring, modeling and evaluating socio-economic conditions. Projects in category **(b)** are typically RTD projects, which include technology development and Take-up and Trial projects. These projects include workpackages, which attend to socio-economic conditions, e.g. user and market requirements analysis, user validation, trials, dissemination and exploitation.



Socio-economic impact of research and application development

Analysis Issues and Results

This is a first attempt to conduct a socio-economic analysis as part of the IPPA and a large proportion of the analysis effort was allocated to defining a clear framework of analysis, as there was no precedent to follow. This definition of a framework is in itself an important outcome of the exercise.

The results are tentative for a number of reasons. The analysis had to proceed with a rapidly defined set of indicators, measures and criteria for assessing socio-economic outcomes at each level. It was for instance not possible to use a quantitative analysis method to identify reliable evidence of a project's likely impact on socio-economic drivers particularly for projects in category (b). Also the indicators of socio-economic impact are embedded in the depth of the proposal details and require judgements about how convincing e,g, common 'global' statements about 'contribution to EC policy' are.

A quantitative analysis was only possible to evaluate socio-economic impact at the user level (b3). The IPPA team were able to rapidly 'scan-read 'available proposals and code indicators of socio-economic impact on 'user acceptance'. Indicators of impact at this level are more readily available because the programme requires proposers to explicitly address user involvement in specific sections of the proposal. The results of the analysis for each category are described below.

Category a: Studies/projects which focus on measuring, modeling and evaluating socio-economic conditions

a1) Projects which provide feed-back on 'global' socio-economic conditions
The analysis identified a significant number of studies and projects, which provide information to the programme on global level socio-economic conditions and drivers, such as quality of life, environment, employment and equality. Examples include:

- opportunities to substitute environmental resource consumption using ICT (ASSIST)
- business, social and economic models of impact of ICT (TEDIP, HORTONET2)
- policy support requirements and provision for G8 experts (DEEDS)
- requirements for and generation of creative skills in interactive and multimedia publishing (RADICAL)

The results of these projects should be disseminated as widely possible as these have a ripple effect to the market and user level.

a2) Projects which provide feed-back on 'market' level socio-economic conditions
Socio-economic conditions and drivers at the market level are addressed by some projects as part of broader studies of global socio-economic conditions. Also the analysis identified some dissemination and awareness actions in call 2 which focus specifically on market level drivers at a regional level:

- peripheral regions (USHER, BIT-HOUSE-NET)
- specific sectors, e.g. health (PROEHTEL).

Most of the **a1** and **a2** category projects were submitted under the Action Lines spanning the Key Actions (X1.1).The proposed funding for these projects is 14 M Euro, which represents 3.4% of the budget for the 2nd call. This seems to be an appropriate share of budget for a technology oriented programme such as IST. A more detailed analysis would have to be conducted in the future to indicate whether the coverage and focus of such proposals effectively inform the programme on key socio-economic drivers.

a3) Projects which provide feed-back on 'user' level socio-economic conditions
The analysis highlighted two projects – USABILITYNET and PRUE - addressing specifically socio-econonic drivers at the user level: user acceptance and "user-friendliness": These projects perform a dual function: They provide information to the programme on user-level drivers (a3) and directly impact socio-economic change at the user level (b3).

Category b: Research projects which leverage socio-economic drivers

b1) Projects which leverage 'global' socio-economic drivers
The duration and scale of individual projects make an impact at a global level unrealistic. Only an aggregated longitudinal analysis of the cumulative effect of individual projects would be meaningful.

b2) Projects which leverage 'market' level socio-economic drivers
It was not possible to analyse with precision the impact of projects on key market drivers in this first IPPA socio-economic analysis. Below are some examples of projects which could provide significant leverage to key market drivers, such as growth and competitiveness, through strategic deployment of technology:

- BEE-biometric techniques for trustworthy transactions
- MOBICOM-e-commerce using mobile communication
- SENIORWATCH-IST applications for people with special needs (old and disabled)
- ACTIVE-AD- new interactive advertising formats and marketing models.

It would be interesting to develop a fuller set of indicators on market level socio-economic impact which could be used for future similar exercises.

b3) Projects which leverage 'user' level socio-economic drivers
It was possible to identify specific indicators of socio-economic drivers at the user level in call 2 projects, in particular user access and user acceptance drivers.

Access drivers: If the vision is being realised, one would expect to see a shift from technology targeted at the professional user in the business and work environment towards the non-professional user in the social and personal environment. An estimated 30% of the call 2 projects are aimed at the general public and an estimated 80% at professional users (some overlap). This gives a first indication. One has to keep in mind that this analysis is based on 70% of the projects of call 2, which had a relatively small number of action lines open in the application oriented KA's which are generally more end-user oriented

Acceptance drivers: The socio-economic model of transformation shows that "user-acceptance" of technologies and applications is the essential gateway for transforming technology into value for the citizen (cf. Fig 1). Feedback from users during the design, development and deployment of services and products ensures that technology converges on user needs, improves user-friendliness, ensures safety and protection, engenders trust and confidence and ultimately increases user acceptance.

The analysis shows that an estimated 80% of the examined proposals include user-organisations, 60% include end-users, and 65 % intend to carry out user tests. However, only an estimated 17% of these proposals, seem to devote sufficient time and resources to carry out effective user validation and feed the information back into the RTD process. This deficiency could be due to proposers underestimating the importance of user testing, failing to describe their user validation plans clearly in the proposals and/or not enough communication from the Commission about the critical requirement for and purpose of user involvement and validation in the programme. If the acceptance gateway is not passed there could be a serious restriction on the programme achieving the more global and long-term socio-economic impact required to achieve the vision. However there are two large projects in call 2, which specifically address the usability issue and which aim to assist individual projects to pass this threshold (c.f. **a3**).

Observations

- The share of budget devoted to socio-economic research appears to be appropriate for a technology oriented RTD programme. A more detailed analysis would be needed in future to determine how the socio-economic research aligns with the programme vision.

- User involvement in projects could be better exploited to strengthen the systematic feedback from user testing into the development process. Two call 2 projects address this issue.

- There may need to be better communication from the programme to proposers about the importance of user validation at a state-of-the-art level.

- The IPPA team developed a first tried-and-tested model for socio-economic evaluation. It would be interesting to develop a more precise set of outcomes, indicators and evaluation criteria which could be used in future similar exercises.

- It is often impossible for projects developing a generic technology or building blocks to identify direct socio-economic benefits with precision. Asking such projects to demonstrate direct and precise socio-economic impact in their proposals is a waste of both proposers' and evaluators' time and is leading to a marginalisation of this dimension. It might be better to ask projects, which have a direct socio-economic relevance (e.g. application areas such as health, elderly, e-work.) to describe *where* they might have a direct impact, *when* they expect such impact and *how* they intend to achieve it, rather than keeping this aspect as a general requirement for all proposers. This should be further explored.

- Society may transform dramatically if the new « Net Economy » materialises and this implies that business models and value-chains will be changed dramatically. The programme should promote open discussions on new methods of working, living and sharing in the forthcoming Information Society.

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