Recommendations of the IST Advisory Group for Workprogramme 2001 and beyond

"implementing the vision"

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Executive Summary

The role of the IST Advisory Group (ISTAG) is to provide the Commission with independent advice concerning the content and direction of research work to be carried out under the IST Programme. In their recommendations "Orientations for Workprogramme 2000 and beyond" issued in September 1999 (http://www.cordis.lu/ist/istag.htm), ISTAG developed a vision statement which was incorporated into the workprogramme revision for 2000. The vision was to :

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

Two new working groups were set up by ISTAG; one focused on preparing recommendations for workprogramme 2001, and the other addressing longer-term information society issues. The first working group has worked closely with the Commission services and particularly with the IPPA report (integrated programme portfolio analysis) which was compiled in April 2000 by a group of experts, and provides an analysis of the portfolio of projects selected from the first two IST calls for proposals held in 1999. The experts proposed a set of recommendations which were discussed and transformed into a final report at the ISTAG meeting on June 29, 2000.

As a result, ISTAG has identified a set of ten Key Enabling Technologies which support the realisation of the vision and has issued the following recommendations for WP2001:

- The balance of the programme should be adjusted to encourage and accommodate longer-term research, the results of which should affect the market in the 5-10 year range.

- Greater consideration should be given to matching of the nature and size of projects to the specific requirements of the topic, in calls for proposals and selection of proposals.

- In order both to stimulate innovation and maintain relevance of the IST Programme, there should be further encouragement of participation from new constituencies, of fresh participation from existing constituencies, and of new collaborations between constituencies.

- Mechanisms should be devised which will enable the community to respond more rapidly to technology and market developments.

ISTAG recognise that the eEurope Initiative and the IST programme have common goals, but work on different timescales. The IST programme is already contributing to eEurope objective particularly in the Action Lines and modalities (e.g. take-up measures) having output with relatively short lead times. ISTAG recommends that the contribution from IST to eEurope could be strengthened by measures such as increased clustering and accelerated dissemination of results within the current framework and the ISTAG vision.

Background

ISTAG has identified 10 'Key Enabling Technologies[1]' (KETs) for the achievement of the vision. While development of these KETs will be also stimulated by development of leading-edge applications, the expectations for these technologies enables a longer-term view to be taken of research and development requirements. The description of the KETs is contained in Annex 1 of the present document (annex 3 of the IPPA Report).

The IST programme has put in place a process called IPPA (Integrated Programme Portfolio Analysis (IPPA) which is conducted by a group of independent experts and aims at providing a programme level overview on the programme projects following each call for proposals. The experts responsible for the IPPA exercise were asked to analyse activity in the IST Programme so far by KET. The results of that analysis are contained in Chapter 4 of the IPPA Report (Annex 2 to the present document).

Associated with the analysis of Strengths, Weaknesses, Opportunities and Threats contained in Chapter 3 of the IPPA report, is an analysis of the timeliness of projects with respect to their 'market window'. The technical topics used in that analysis do not map readily to the KETs and it was decided to generate an analysis of the time to market of projects by KET. The results of this analysis for the first two calls of FP5 (1999) are provided at Annex 4 to the present document. In addition, an estimate of the likely out-turn from the 2000 calls is provided at Annex 5. (It is emphasised that this is a very early and uncertain estimate.)

ISTAG has also taken cognisance of the Action Plan 'eEurope 2002' and in this regard has set up a working group to analyse and advise on the synergies to be developed between the programme and *e*Europe. The report of this Working group is due in September 2000

ISTAG now makes five recommendations to the programme. ISTAG accepted, in general, the analysis of Strengths, Weaknesses, Opportunities and Threats contained in the IPPA report. However, many of the specific issues identified are interlinked.

ISTAG makes three recommendations informed by the full set of Strengths, Weaknesses, Opportunities and Threats identified. ISTAG makes two further recommendations, one on the general subject of maintenance of this monitoring process; and another addressing the need to be more responsive to technological and market developments.

[1] These are technologies with the potential to make significant contribution to realisation of the ISTAG vision of 'ambient intelligence'. They will enable the development of a wide range of applications in a variety of user domains. (Note that 'technology' is used here in its broad sense of *"The totality of the means and knowledge used to provide objects necessary for human sustenance and comfort"* – Longman Dictionary.) The 10 KETs are described in Annex.1

Recommendation 1: Rebalancing with respect to longer-term research.

The balance of the programme should be adjusted to encourage and accommodate longer-term research, the results of which should affect the market in the 5 - 10 year range.

ISTAG identified five of the Key Enabling Technologies which are particularly appropriate for rebalancing. These are:

- ***KET 1: embedded intelligence***
- ***KET 3: IP mobile and Wireless***
- ***KET 6: Micro- and opto-electronics***
- ***KET 7: trust and confidence***
- ***KET 9: multi-modal and adaptive interfaces***

At present there is a preponderance of projects in the 3 - 5 year time-to-market frame. This is natural, given the business horizons of most industrial participants. ISTAG is concerned that, with the present very small proportion of projects having 'market windows' beyond 5 years, there will be a shortage of 'seed' technologies in future.

Moreover, while it is encouraging to see the growth in high-tech start-ups in Europe, and growing entrepreneurialism in young technologists, there is now a growing risk of a shortage of research skills. There is a need to build knowledge and research skills. This reinforces the need to rebalance the time horizons of the actions in the programme so as better to address the medium and longer-term research requirements.

Having identified the KETs upon which to focus, it will be necessary to:

- identify, among the outputs of the recent Programme Consultation Meetings, relevant themes which contribute to development of the KETs
- identify appropriate areas of the programme in which such themes might be supported
- identify appropriate types of action (modalities, etc)
- negotiate with those responsible for the relevant areas to incorporate appropriate requests for action in the Work Programme.

In addition , it is also necessary to encourage and select innovative, high-risk, high-impact projects. Note that the risk should come from the innovative nature of the technological development and its viability, according to the appropriate technological roadmap, (*see Recommendation 4*) rather than from a likelihood that its development would take too long to hit the market at the right time.

Given that the emphasis on 3 – 5 year market windows is believed to be, at least in part, a consequence of the business horizons of participating companies, there is some concern that industry may not participate as fully or as enthusiastically in longer-term projects. This must be monitored and may require adjustment to the balance and/or nature of participation in projects, particularly with regard to commitment to exploitation.

Recommendation 2: One size does not fit all; one style does not suit all.

ISTAG recommends that greater consideration be given to matching of the nature and size of projects to the specific requirements of the topic, in calls for proposals and selection of proposals.

The first two strengths identified in the IPPA Report - the breadth of the range of activities in the IST Programme and the establishment of critical mass in certain areas - are accepted. However, different KET's and different developments within those themes are amenable to different types and sizes of project.

For some topics, RTD projects may be too long and even Take-Up actions, which might be used to provide an applications focus or showcase, could take too long. Mechanisms external to the Framework Programme could be more appropriate (start-up funding, for instance) though the CEC might have a role in stimulating such alternative mechanisms.

For other areas where critical mass is required for an individual project or a cross-programme cluster, such as in mobile communications, smartcards or electronics, constrained expectations of a particular size or style for projects must not jeopardise project viability through causing inappropriate budget reduction or even non-selection. This message must be conveyed to evaluators as well as to project officers and proposers.

Recommendation 3: New Blood

ISTAG recommends that in view of the emergence of new markets and the convergence of existing markets, in order both to stimulate innovation and to maintain relevance of the IST Programme, there should be encouragement of:

- ***participation from new communities***
- ***fresh participation from existing communities, and***
- ***new collaborations between existing communities (in the context of convergence)***

ISTAG believes that KET 8 – 'Cross media content' and KET 10 – 'Multilingual dialogue mode' particularly favour such new consortia.

It is recognised that encouragement of participation from new communities is not easy. It may require a long-term approach. Mechanisms which should be considered, include:

- Marketing of the IST Programme to new communities
- Targeted involvement of specific representatives of new communities
- Encouragement of the formation of industrial 'clubs' and networks so as to familiarise participants with the Programme and the ethos of the programme, and to establish relationships as the basis of future collaborations
- Explicit guidance to evaluators on the merits of participation by new players and of new, and particularly unusual, innovatory, collaborations

Recommendation 4: Future monitoring

ISTAG recommends that:

- ***the dimensions of analysis used in the IPPA Report and future reports of this kind should be rationalised***
- ***a technological road-map be defined for the KETs***
- ***the analysis by 'market window' and technological 'window of opportunity' should be updated once per year***
- ***the IPPA report and its successors should include an analysis of <u>all</u> proposals with respect to their timeliness for the relevant window***
- ***socio-economic studies should be performed to assess user acceptability, future user needs, and constraints on and arising from user needs***

While ISTAG welcomes and is impressed by the IPPA report, the variety of dimensions of analysis - KET's, technologies, market areas - is problematic. It is recognised that analysis by different dimensions is necessary and desirable, but at present the dimensions chosen are not sufficiently 'orthogonal'.

The essence of the key enabling technologies is that they may be applied in a range of applications in different markets. So it is inappropriate to talk of a 'market window' for a KET. However, ISTAG recommends that technology roadmaps, such as those produced by the JRC Institute for Prospective Technological Studies, be used.

It is recommended that the roadmaps should be used both for assessment of the timeliness of proposed technological developments, and identification of areas where European technological development is at risk by failing to address particularly longer-term research requirements.

At present, we have in the current IPPA report an assessment of the timeliness of recommended proposals. ISTAG recommends that this analysis be extended to show the profile of all proposals – those which are *submitted*, those which are *filtered* (with regard to innovation), those which are *recommended* and those which are *accepted* – so that these different classes can be compared. This will facilitate better understanding of the state of preparedness of the community and effectiveness of the selection.

The IPPA Report indicates the importance of user acceptability. We recommend that this be studied not only for the information itself, but so that through the better understanding we gain, we might enhance our ability to develop and implement, in the market, new products and services.

Recommendation 5: Flexibility

ISTAG recommends that mechanisms be devised which will enable the community to respond more rapidly to technology and market developments. This should include:

- ***means to support new and emerging research topics***
- ***means to change the nature of a project, for instance from R&D to take-up action***

A specific example arises from the recognition that, while Europe is strong in mobile and wireless technologies, the US is becoming extremely strong and worryingly dominant in broadband fixed (optical) technologies which are essential for future multimedia networks and personalized video services. It is not clear what the European response should be, and it may well not be an RTD issue, but the Commission must be aware of developments of this kind and have available the mechanisms (Fast-Track procedures, Open Schemes, …) to respond appropriately and rapidly.

Accommodate new and emerging research requirements

For ad hoc, longer-term, more speculative research, an appropriately flexible mechanism already exists in the 'Open Domain' of the Future and Emerging Technologies activity (FET). FET is able to respond quickly, offering routes for rapid proposal evaluation. (At present, there is then a delay while contracts are arranged, but it is understood that efforts are being made to reduce this delay.) ISTAG recommends that consideration be given to the adoption of similar rapid-response procedures for nearer-term research in other areas of the IST Programme where there is both high risk and high potential in a highly dynamic market. However, in contrast to the FET Open Domain, the technical scope of any call for proposals would need to be more precisely circumscribed.

Where specific themes of longer-term research can be identified, FET also supports specific 'Proactive Initiatives', such as 'Quantum Computing', and additional proactive initiatives can be incorporated.

In these ways FET, and new FET-like mechanisms, could perhaps provide all the desired flexibility for both long-term and medium-term research.

Accelerate exploitation of research

Flexibility of a different kind is required so as to accelerate progress from research to commercial exploitation. During the course of a research project it may be realised that progress of the research, in conjunction with other technology and market developments, presents an opportunity to move more quickly to the market. It may then be preferable to switch effort to take-up actions, for instance, rather than continue to execute the programme plan of the original research project.

However, under the present rules, it is not possible simply to redeploy the remaining project budget for another purpose: a fresh bid for funding must be made. The consequence is that, at present, the only option for such redirection of effort is to terminate the existing project and to reapply for support of more appropriate kinds. This means delay, considerable administrative overhead, a loss of impetus, and highly uncertain outcomes - all of which militate against the original intention.

ISTAG recommends that mechanisms to be devised so as to facilitate conversion of activity between modalities - particularly between research and other modalities.

We understand that options under consideration at present include:

- 'Fast tracking' for proposals for small projects which have been ranked highly in an evaluation
- 'Continuous submission' - whereby the present mechanisms for submission of certain classes of projects outside the fixed calls might be extended to other classes of project
- 'Multi-phase projects' - in which, in effect, multiple types of project activities (research, take-up, etc) might be supported within the same overall project. This would allow a change of emphasis between 'phases' of what is, on paper, the same project. Such a mechanism requires funding from multiple budgetary sources for the different types of activity. It also requires a new form of contract.

While the first two of these options might facilitate and accelerate the existing processes, and should be progressed, only the third addresses directly the need for seamless transformation between modalities. We recommend that this - and other options - be developed so as to achieve that goal.

Timely research and timely exploitation of research must not be hindered by artificial administrative barriers.

Annex 1: (IPPA Report Annex 3): Key Enabling Technologies

Annex 1: 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, multicasting aspects 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 enabling tools: 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 2: (IPPA Report Chapter 4): Linking the Portfolio to the Programme Vision

4.1 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. ISTAG 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.

4.2 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.

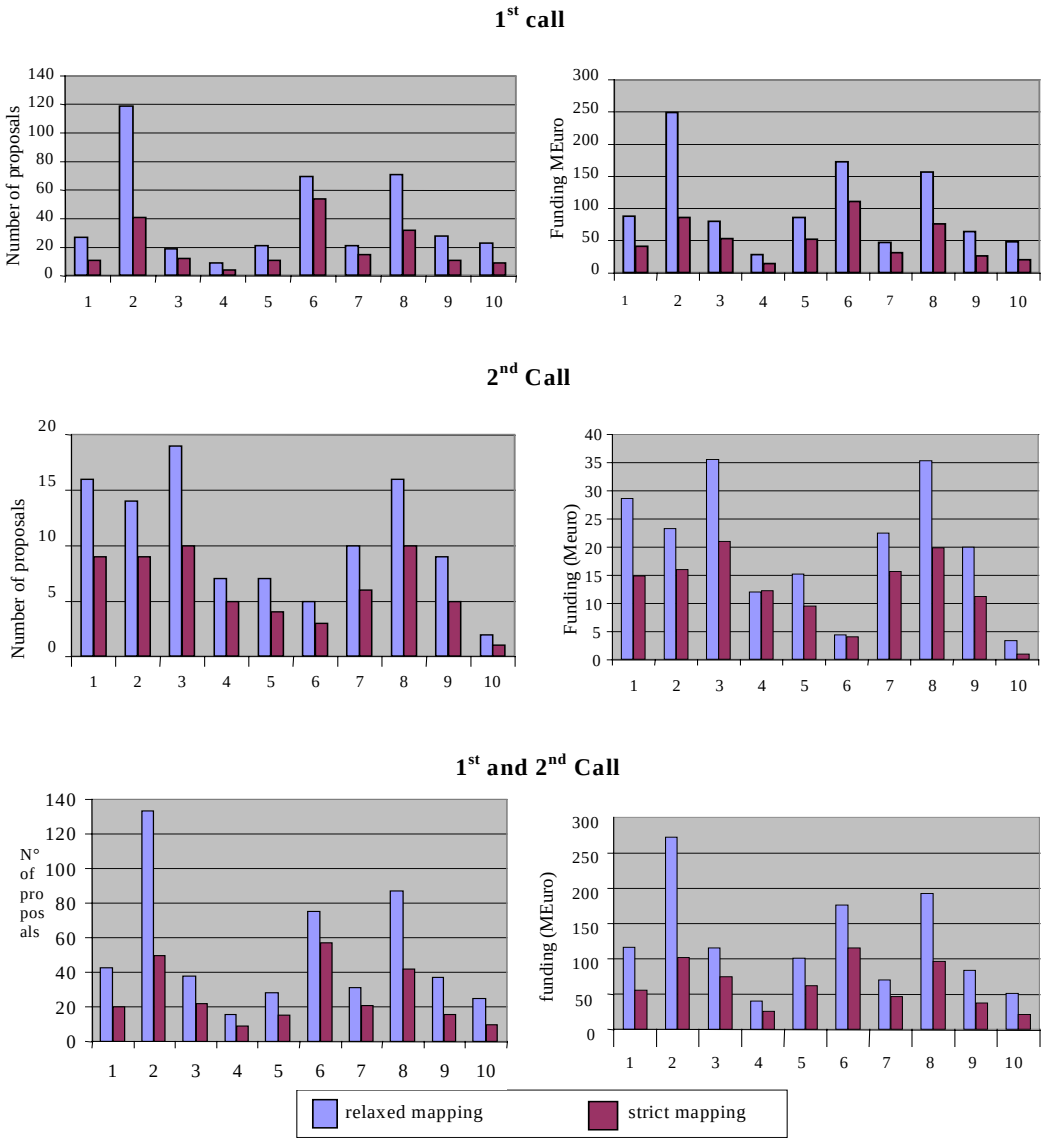


Figure 6: Mapping the IST Portfolio onto the KETs

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 material.

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 clustering 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) 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.

Annex3: (IPPA Report Annex 5) – Detailed Analysis of Take-up actions

Objectives

The key objectives of this section are:

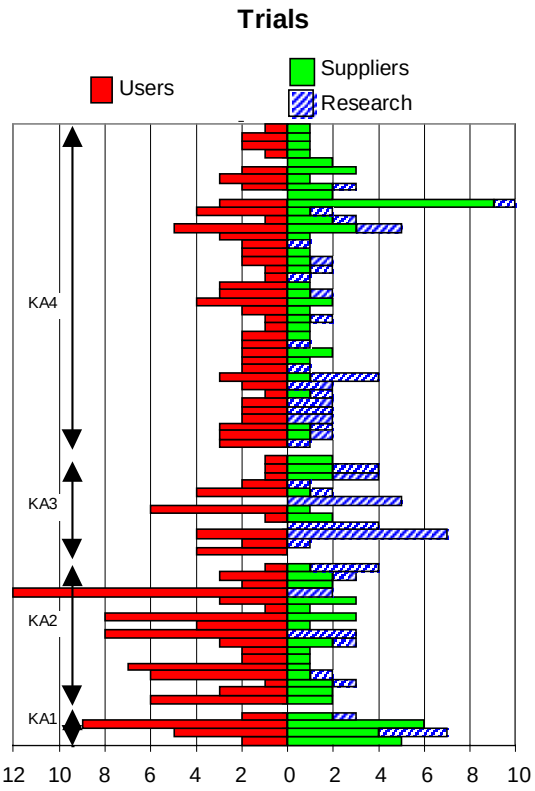
- to provide an overall picture of take-up measures in the second call,
- to analyse their contribution to the programme's vision, which post-dates the 1999 workprogramme (the basis for both the first and second calls).

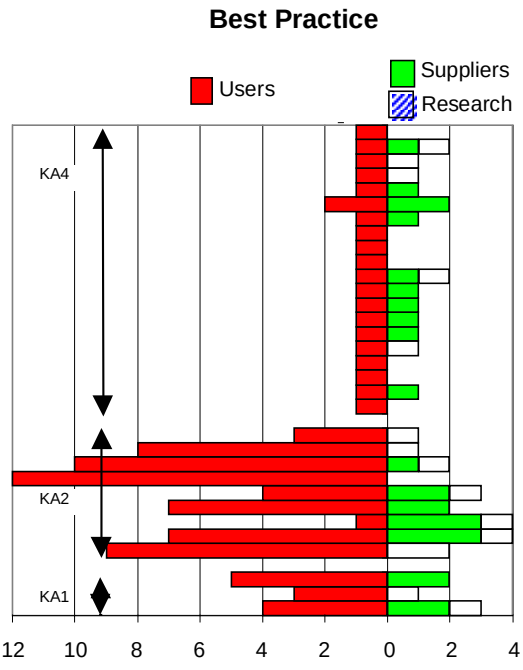
Overall Picture

The first analysis was to look 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 both an overview of the projects retained and the trends, we did an analysis of the supplier and user involvement in the projects. 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 no take-up measures in Call 1, so no comparisons could be made nor trends identified.

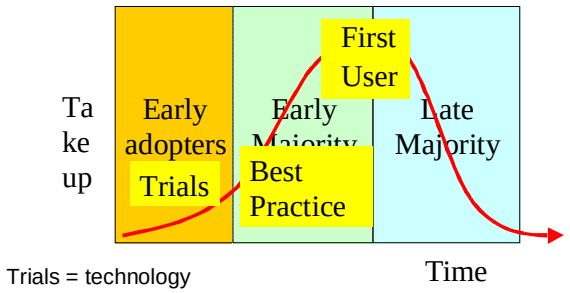
Measurement against the programme's vision

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

Take up measures mostly fall into short term activities, apart from those introducing very innovative technology. Quoting from ISTAG's report on "Orientations for WP2000 and beyond" the section on "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 current different take-up action types fit in the deployment cycle, we can identify what current activities best fit this part of the vision.

The diagram (below right) shows the key points in the deployment cycle for innovation and new products, methods and technologies, and is the basis for the group's work.



The existing call has trials, which are the nearest thing that we can identify to this. Best practice and first user actions are too far downstream to match this.

We classified all the trials in Call 2 into one of 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***".

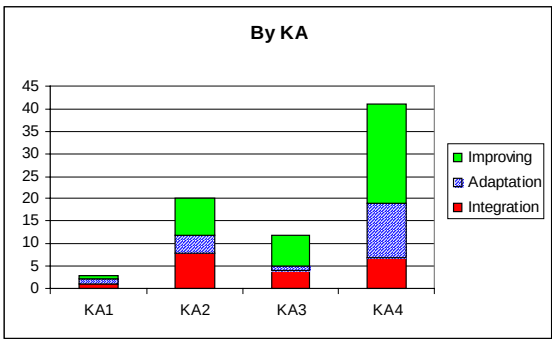
Type 3, ***improving***, do further development before integration and the actual trial. These could be classified as ***"RTD testbeds".***

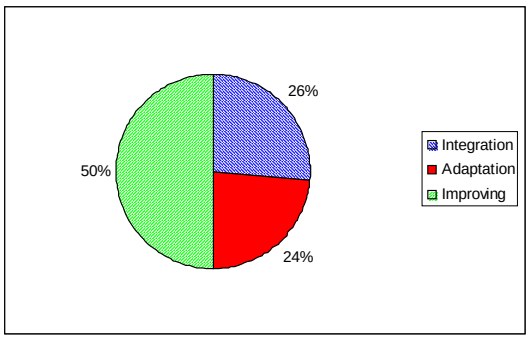
Not only does this classification show the distance from market, but it also shows the overall level of risk. The market testbeds have mainly a market risk; the others have higher market risks (through being further from market) as well as higher technical risks, as there is development before integration.

Results

Approximately 50% of the proposals retained 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:

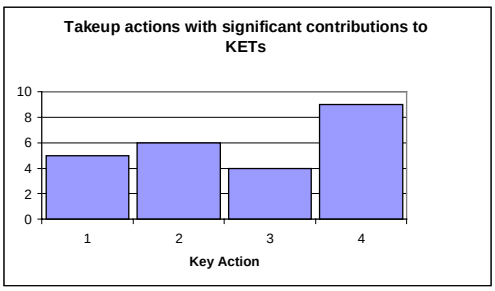
Action	Integration	Adaptation	Improving	Total
KA1	1	1	1	3
KA2	8	4	8	20
KA3	4	1	7	12
KA4	7	12	22	41
	20	18	38	76

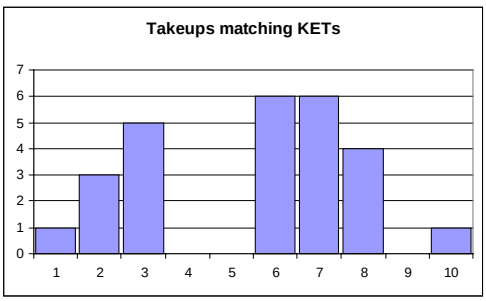




Thus, only 26% are doing pure integration without any further development – more of the trials are doing some adaptation, transferring or improvement of technology.

Next, an analysis of all take-up actions – trials and best practice etc. was made against the criteria of a significant contribution to a KET.





The results for 122 take-up actions are:

- 24 have a significant contribution to a KET. This is 20% of the total.
- Half (5 out of 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 a couple of take up actions in call 2.
- KET1 is addressed by only one take-up action.
- The action lines contributing to KET9 were not open for take-up in call 2.

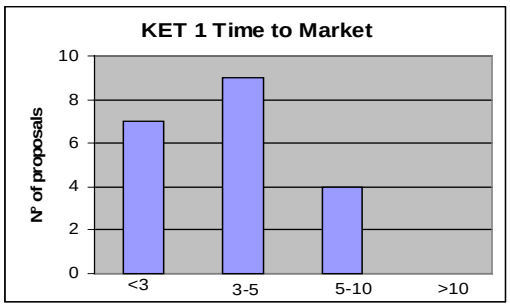
- KET10 has one take-up project. This is the area of "multilingual dialogue mode" where there is a mismatch between current capability of the technology (translation, speech etc.) and user/market requirements – i.e. there is a large demand that is currently not met.
- KA1 is distributed across KETS 1,2,3 and 10
- KA2 addresses KET 7
- KA3 addresses KET 8
- KA4 addresses KETS 2 and 3

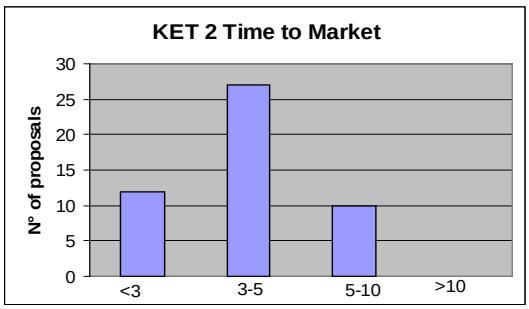
A further breakdown was done by size of project to separate out the smaller trials from the large scale testbeds (see diagrams at the end of this annex for detail).
This shows that there are three large scale trials (>2M – one in 2.2.3 and one in two in 4.5.2, as well as 8 further trials in the range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

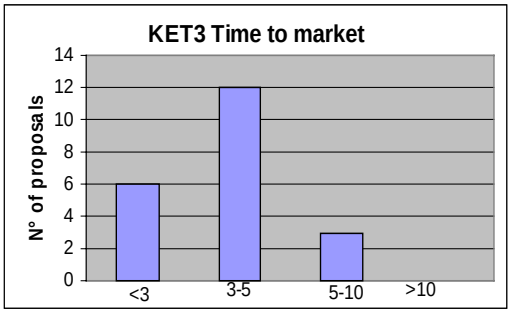
Conclusions

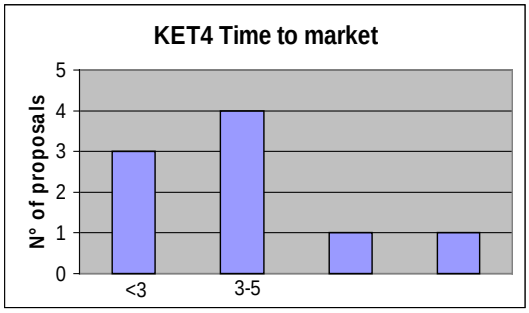
1. Take-up actions are understood and implemented in different ways in the programme. This suggests that take-up is focussed on the different needs in different areas.
2. 26% of present take-up actions are aligned with the concept of testbeds outlined in the ISTAG vision (.. largely integration of existing 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.

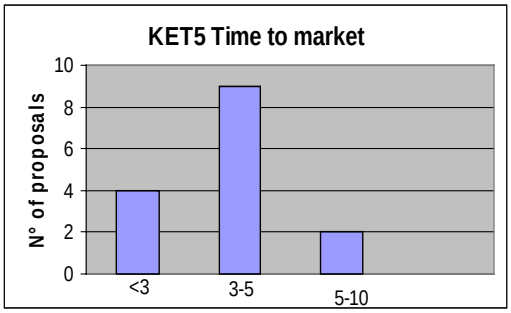
Annex 4: Time-to-market analysis for each KET in 1999 results

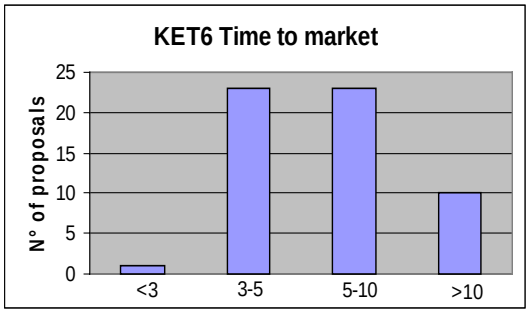


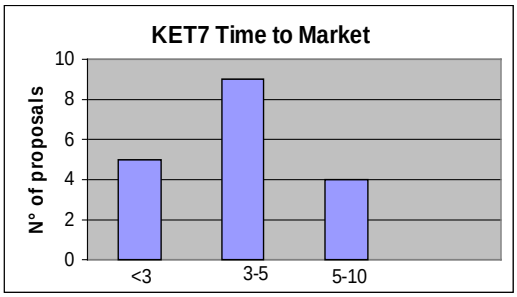


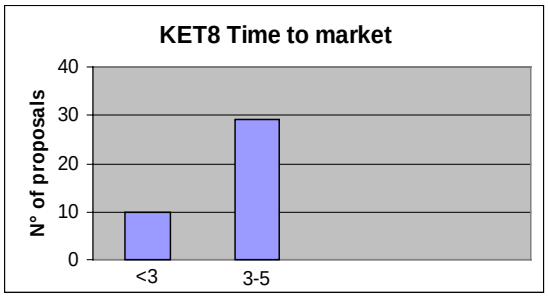


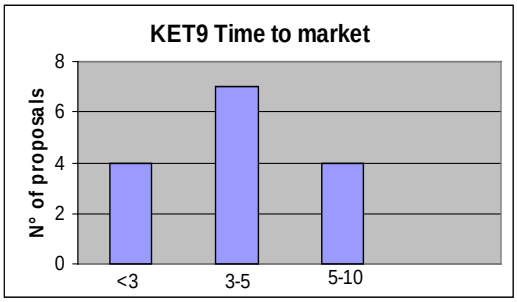


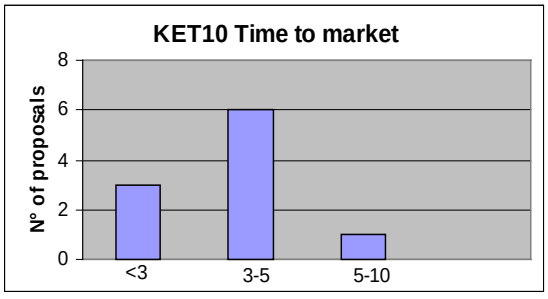












Annex 5: Mapping to the KETs: Expectations for Y2000

Background

This analysis is based on the work done in the IPPA report to map the portfolio of projects to the Key Enabling Technologies as defined with ISTAG's WG4. It intends to anticipate the mapping to the KETs of projects resulting from IST calls 3, 4 and 5 as a response to IST WP2000. The outcome of the analysis should be read cautiously as it is speculative by nature and depends on the reaction of proposers to the Workprogramme which is difficult to predict. The following basic considerations have been taken into account:

- In comparison with 1999, there is a strong focus in WP2000 on all KET related areas and on their contribution to the vision, and particularly KET 1, Embedded Intelligence and KET 7, Trust and Confidence. Some of the KETs do not directly belong to the 1999 priorities (e.g. networked embedded technologies) or were not highlighted enough in the various action-lines description (e.g. infrastructure convergence, integration of on-line and broadcasting technologies, or the holistic approach to interactivity). For these areas, it is expected to have a substantial increase in the number of projects after the Y2000 calls.

- There is a stronger emphasis in WP2000 on highly innovative research and medium to long term perspectives in particular for KA1, and KA2 and for KA4 that specifies what are the medium and the long term outlooks for technology development. This is expected to draw more projects that fall in the 5-10 year time-window for all related KETs.

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Expectations per KET for Y2000

KET 1 Embedded Intelligence: "Ubiquity" of IST applications and services is a major priority in WP2000 and is addressed in all areas throughout the programme. In KA1, "ubiquitous access and presence of systems and services" is introduced and highlighted in most Action Lines. In KA2, in addition to the presence of KET 1 across the KA, a new action line has been added on "Mobile and ubiquitous e-commerce and e-work". The same applies to KA 3 with a new Action line on "mobile and domestic information and content processing". In KA4, networked embedded technologies have been introduced at the devices (design and manufacturing) level, at the systems architecture level and in software development. FET is launching the Disappearing Computer that focuses on embedded intelligence and finally several CPAs'(e.g. Home environments) address this aspect. A substantial increase of activity is therefore expected for KET 1 with a re-balancing towards the 5-10 year term.

KET 2 Middle-ware and distributed systems: This has been suitably covered in WP99 and the same level of activity is expected in WP000 with more emphasis on the medium to long term activities that contribute to the vision and less work on the three year perspective.

KET 3 IP mobile and wireless: There has been an increase of activities in this area between the first and second call. The trend is expected to continue and to develop as several action lines across the programme highlight this aspect from the application and technology development perspective including activities that target the medium term.

KET 4 Multi-domain network management: This is addressed in particular in three action lines in KA 4 and in the RN action lines. It is expected to draw several projects (between 15 and 20 probably or the equivalent in funding) addressing the area totally or partially including testing and validation.

KET 5 Converging core and access networks: This is covered in 5 action lines in KA4 and in RN and it is expected to draw between 30 and 40 projects in these areas including a part that is specially focussing on long term (e.g. Terabit networks and fourth generation mobile).

KET 6 Micro- and opto-electonics: As in 1999, the area will draw projects that cover the whole range of time windows with a significant number of projects beyond the five year range.

KET 7 Trust and confidence: The increase of activities on Trust and Confidence in Y2000 will come first from the action line devoted to trust and security building blocks in KA2 (with emphasis on medium to long term), from the KA4 action lines that include dependability aspects, from the CPAs on "survivability of large scale infrastructures" and on "smart cards", and from several application action lines that require trustful and safe technology.

KET 8 Cross media content: The area is covered mainly in KA3 and in some action lines in KA4. The focus in WP2000 is on the 3-5 year time frame for content creation and retrieval but projects addressing the integration of on-line and broadcasting technologies in the medium term can be expected as well. The overall coverage is expected to be similar to 1999 but with higher focus on the vision.

KET 9 on Multi-modal and adaptive interfaces and KET 10 on Multilingual dialogue mode: Multimodal, multilinugual and adaptive interaction modes belong to the WP2000 key priorities and are addressed in all KA's and areas in terms of paradigms, concepts, technology building blocks, systems and applications all geared towards the realisation of the ambient intelligence landscape. The programme is expected to draw a significant number of proposals in this area. For KET 9 (mulimodality), there might be a re-balance towards the 5-10 year time window and for KET10 (multilinguality), the same distribution as in 1999 is expected (i.e. 75% in the 5 year range).